Digital Panel Meters 47 Series

PULSE INPUT TOTALIZER

(6-digit, LED display type)

Model: 47LPQ

OPERATING MANUAL

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

CONTENTS

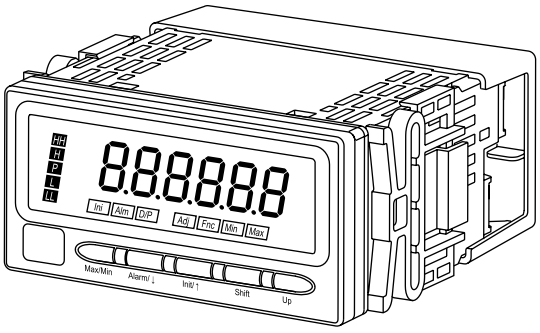
1. INTRODUCTION

1.1 BEFORE USE....

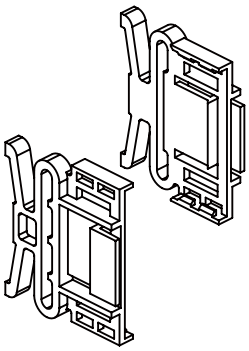
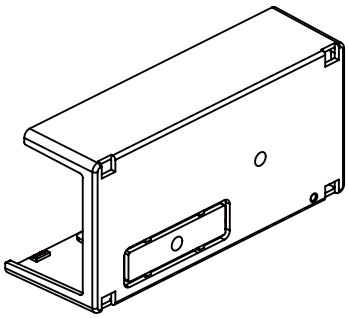
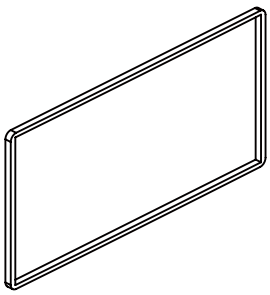
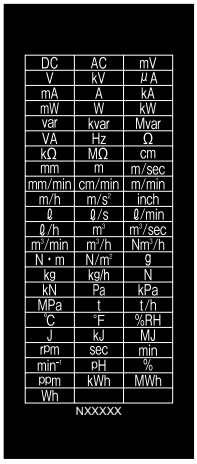
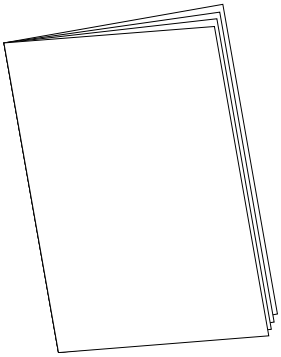
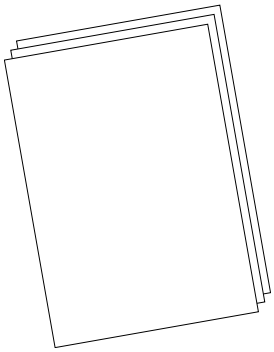
Thank you for choosing us. Before use, please check contents of the package you received as outlined below.

■ PACKAGE INCLUDES

Digital panel meter



Accessories

Mounting bracket (2) 	Terminal cover (1)  (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	kWh	MWh
Wh		

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.
- Wait at least for 1 minute before turning on the power supply after it has been turned off.

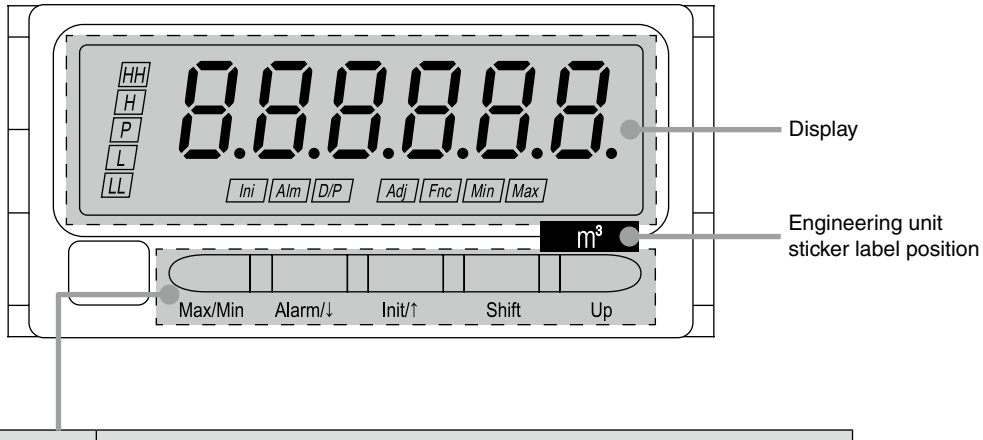
■ TO ENSURE DUSTPROOF AND WATERPROOF (degree of protection IP66)

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



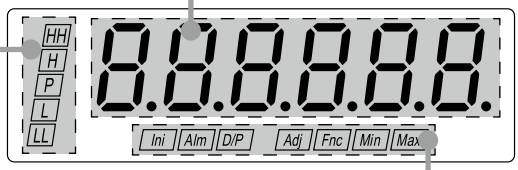
BUTTON	FUNCTION
Max/Min	Used to switch the main display to show the present value, MAX value or MIN value, and to reset the MAX and MIN values. Also used to cancel a set item.
Alarm/↓	Used to confirm the alarm setpoints, to move on to the alarm and other setting modes, or to shift through setting items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

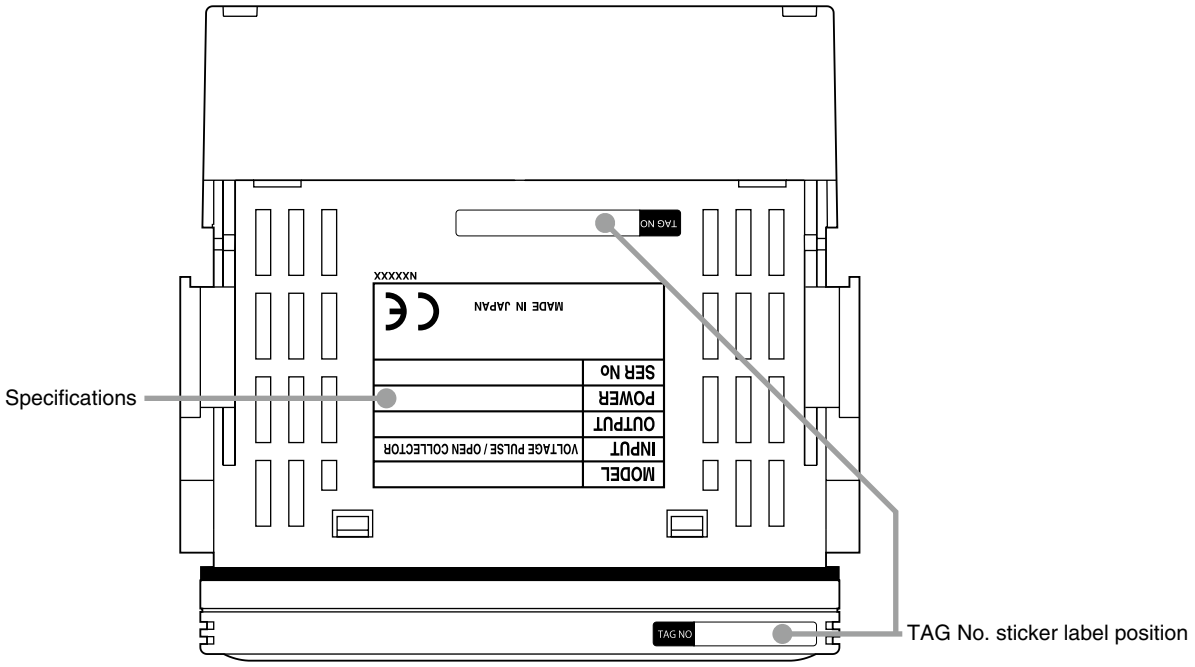
COMPONENT	FUNCTION
Main display	Indicates present, MAX and MIN values, parameters, setting values and error codes.



INDICATOR	MODE	FUNCTION
Alarm	Setting	Indicates parameters in Alarm Setting Mode. (Refer to 8. SETTING ALARM OUTPUT.)
	Confirming alarm setpoints	'HH', 'H', 'L' or 'LL' indicator blinks in confirming each alarm setpoint. (Refer to 19.1 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 detection of input signal. 'D/P' indicator turns on for 1 second. (Refer to 5. OPERATION.)
		Indicates count reset, held or inverted with control input ON. 'Adj' indicator turns on. (Refer to 11. SETTING CONTROL INPUT FUNCTION.)
		Indicates MAX or MIN value. 'Max' or 'Min' indicator turns on. (Refer to 19.2 RETAINING MAX AND MIN VALUES.)

■ **TOP VIEW**

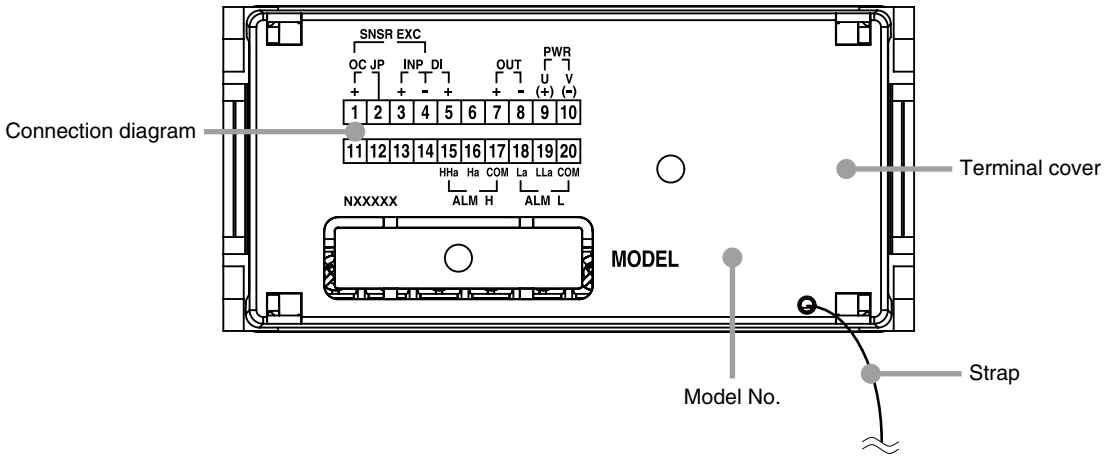


NOTE

- 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

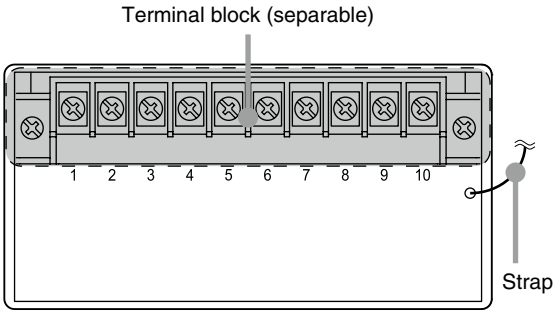


NOTE

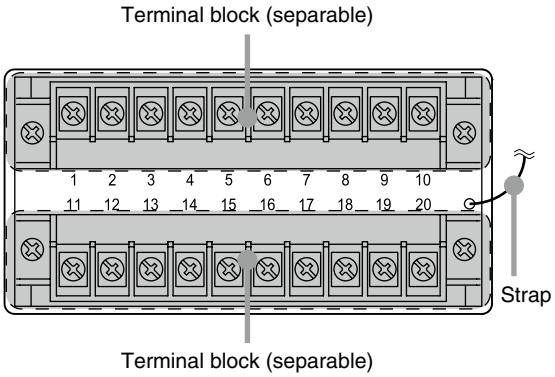
- The connection diagram depends on the specifications.
- The MODEL shows the same as that in the specification label on the top of the unit.

• Without Terminal Cover

No alarm output



Alarm output

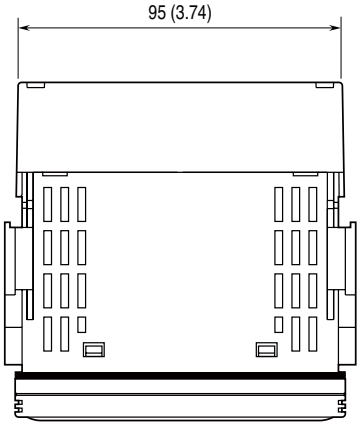


1.5 INSTALLATION

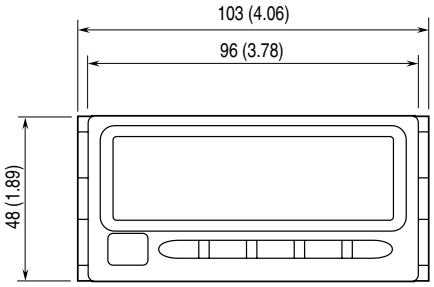
1.5.1 EXTERNAL DIMENSIONS

unit: mm (inch)

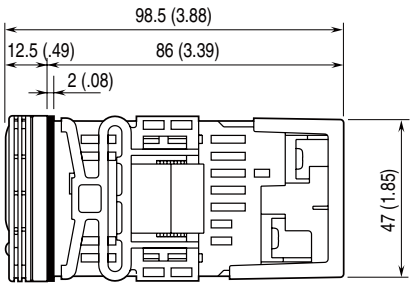
■ **TOP VIEW**



■ **FRONT VIEW**

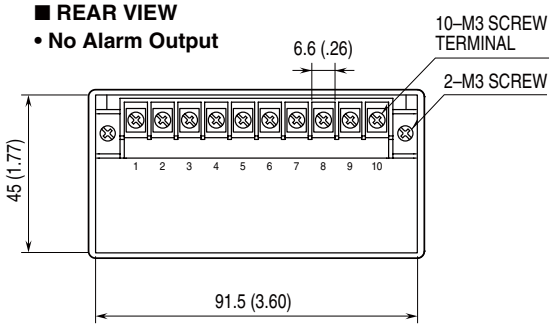


■ **SIDE VIEW**

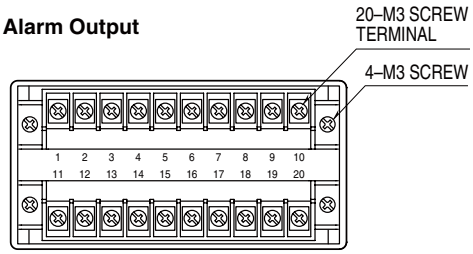


■ **REAR VIEW**

• No Alarm Output

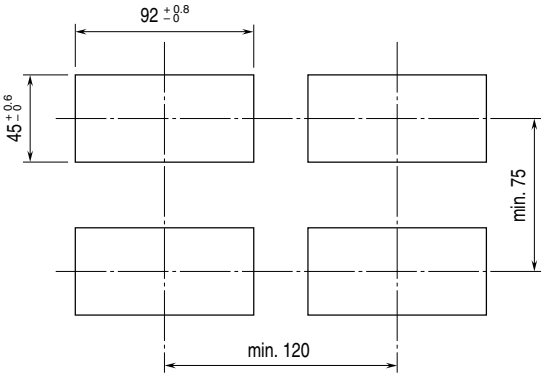


• Alarm Output



1.5.2 PANEL CUTOUT DIMENSIONS

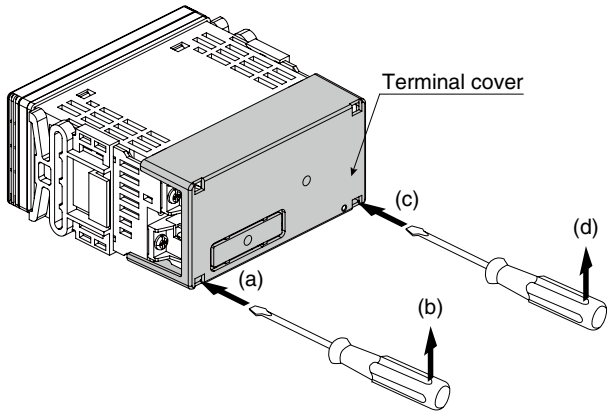
unit: mm



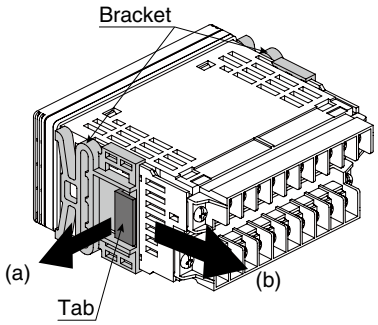
Panel thickness: 1.6 to 8.0 mm

1.5.3 INSTALLATION

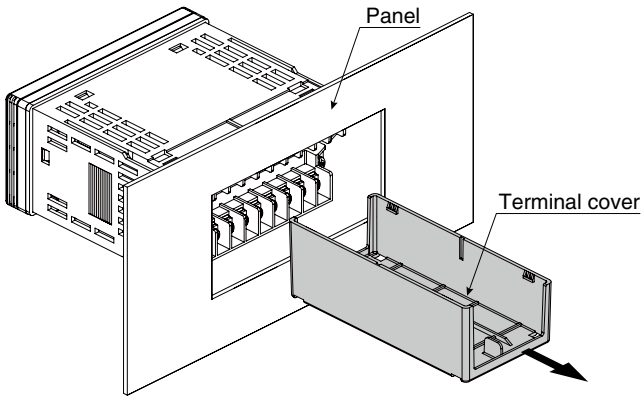
(1) Remove the terminal cover.
  (a) Insert the minus tip of a screwdriver into a hole at the lower left corner of the cover.
  (b) Pull the handle upward.
  (c) Then insert the screwdriver into a hole at the lower right corner.
  (d) Pull the handle upward to separate the terminal cover.



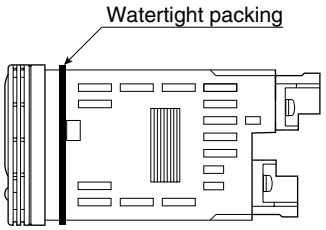
(2) Remove the mounting brackets.
  (a) Flip a tab of a bracket.
  (b) Then pull the bracket toward the terminal block to remove it.



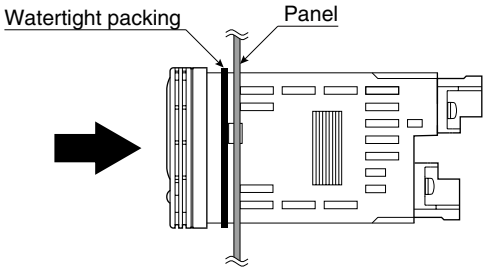
(3) Put the terminal cover through the panel cutout.



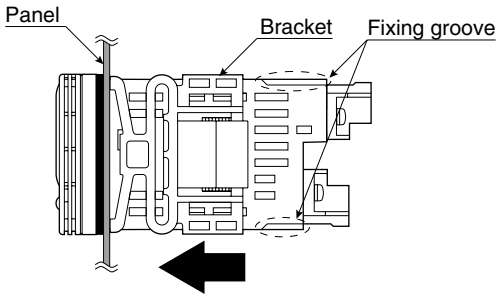
(4) Make sure that the watertight packing is placed behind the front cover regardless of necessity of water-tightness.



(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

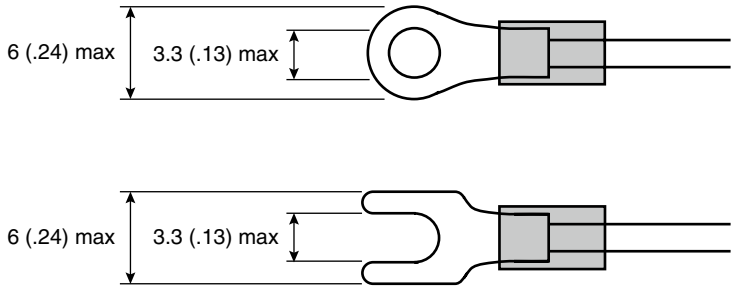
1.6.1 CAUTION IN WIRING

- 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)



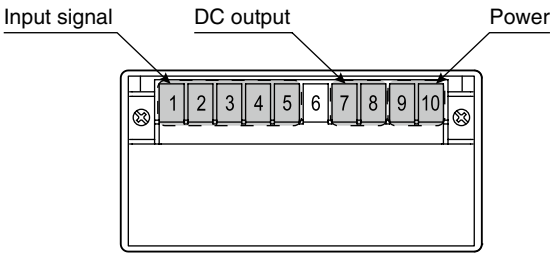
Applicable wire size: 0.25 to 1.65 mm^2
Torque: 0.6 N·m
Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd., Nichifu Co., Ltd.

IMPORTANT

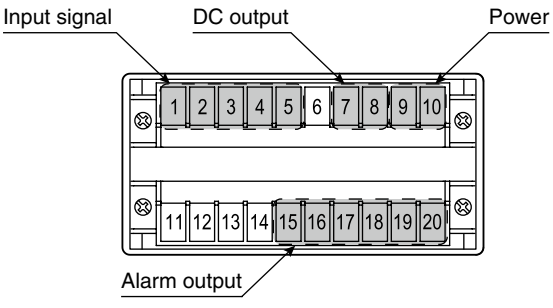
- Insulated solderless terminals are recommended.
- In using non-insulated solderless terminals, cover them with insulating caps or tubes.
- Ring tongue terminals are recommended rather than spade tongue terminals to prevent from falling off.

1.6.3 TERMINAL ASSIGNMENT

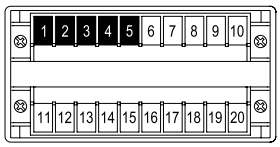
■ NO ALARM OUTPUT



■ ALARM OUTPUT



1.6.4 WIRING INPUT SIGNAL

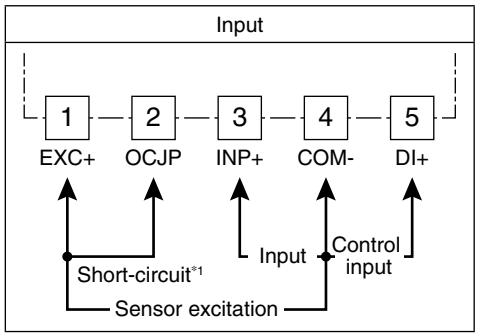


Connect input signal wires. Be careful that the input terminal assignment depends on the sensor to connect.

Sensor excitation	12 V DC ±10%
Sensor excitation current	30 mA
Current limit protection	Approx. 60 mA

IMPORTANT

- The connection depends on the sensor output specifications. Wrong connection may result in incorrect display.
- Make sure that the saturation voltage (residual voltage) and H/L levels of the sensor meet the detecting levels of the unit. Otherwise the unit may display incorrectly.
- Make sure that the power voltage of the sensor is 12 V DC with the current capacity 30 mA or less in using the sensor excitation. Over-capacity lowers the excitation voltage of the unit, which, as well as insufficient power voltage, may cause the sensor to be inoperative.
- With voltage pulse input, the waveform other than square may result in incorrect display.
- Be sure to confirm the input polarity in wiring.
- Chattering input signals cannot be measured accurately. Add a capacitor (10,000 pF) or similar devices to the input terminals to eliminate the input signals' instability. A capacitor with larger capacitance is effective to eliminate chattering signals, however allows passage of lower frequency signals only.
- Maximum frequency for the input type '1' is 120 Hz, and that for '100' is 12 kHz (For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set "input type" to "1 (no counting scaling)").
- 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.



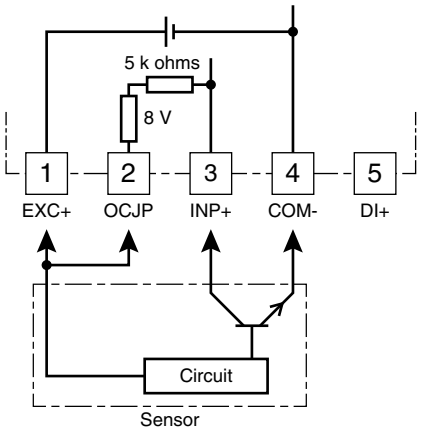
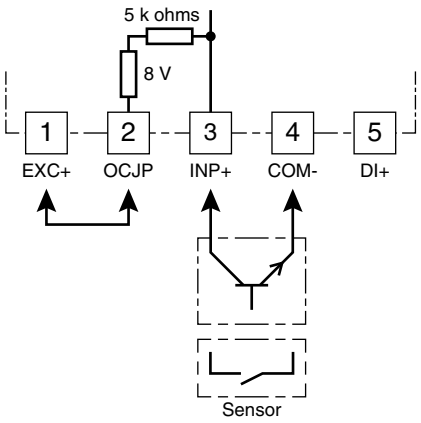
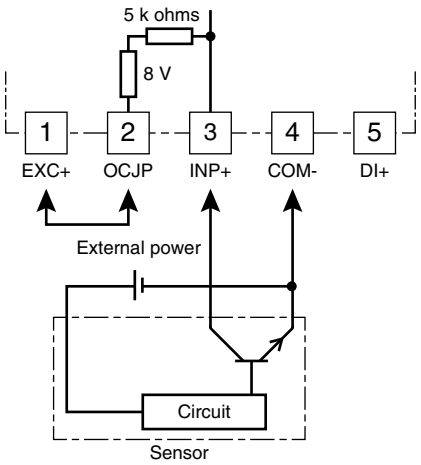
*1 Close across the terminals for open collector.

■ OPEN COLLECTOR, MECHANICAL CONTACT

An open collector output, other no-voltage switches (including a relay, a photo MOSFET relay, and an open drain), a totem pole output, or a complementary output circuit can be connected.
Connecting conditions are as shown in the following table.

Detecting voltage		Approx. 8 V DC
Detecting current		Approx. 1.6 mA
Detecting levels	ON	≤ 300 Ω / 0.6 V
	OFF	≥ 10 kΩ / 4.5 V
Minimum pulse width requirements	Open collector	5 µsec. for both ON and OFF
	Mechanical contact	500 msec. for both ON and OFF

INPUT CONNECTION EXAMPLES

With sensor excitation	Without sensor excitation	
	2-wire	3-wire
		

IMPORTANT

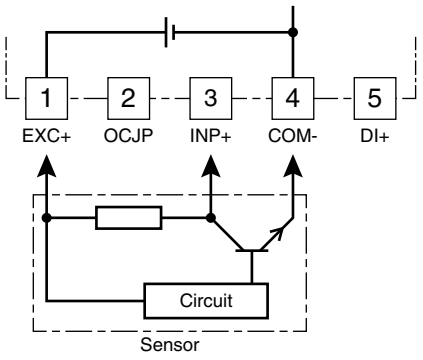
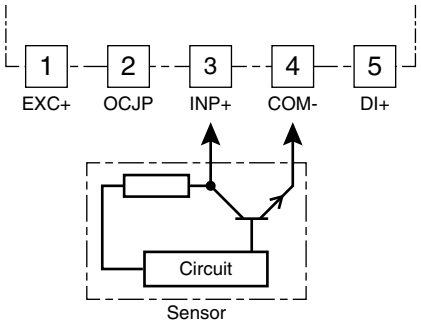
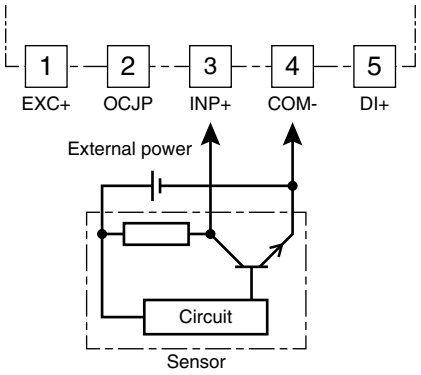
Close across the terminals 1 and 2.

■ VOLTAGE PULSE

A voltage output circuit, a totem pole output or a complementary output circuit can be connected.
Connecting conditions are as shown in the following table.

Voltage range		0 – 5 through 26.4 V ±5 to ±26.4 V (equal amplitude at both poles)
Waveform		Square (detecting sinking pulse edges)
Input impedance		≥ 10 kΩ
Detecting levels	Low level	-26.4 to +0.6 V DC
	High level	4.5 – 26.4 V DC
Minimum pulse width requirements		5 μsec. for both ON and OFF

INPUT CONNECTION EXAMPLES

With sensor excitation	Without sensor excitation	
	2-wire	3-wire
		

IMPORTANT

Plus or minus input must have equal amplitude at both poles.

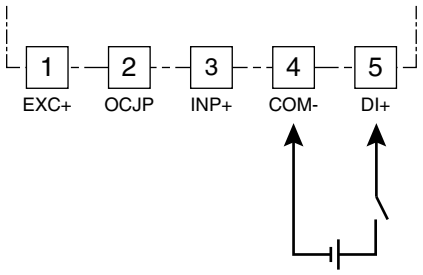
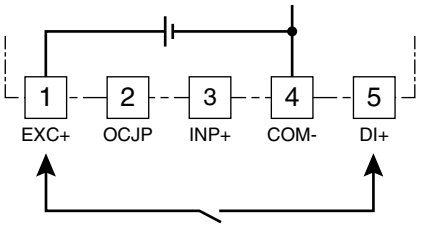
■ CONTROL INPUT

Voltage input can be connected. When it is difficult to prepare the power supply, short-circuit across the terminals. Connecting conditions are as shown in the following tables.

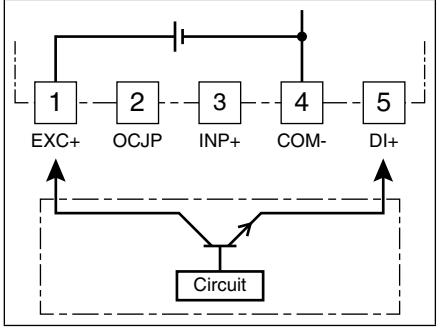
• Voltage input

Voltage range		0 – 5 through 26.4 V ±5 to ±26.4 V (equal amplitude at both poles)
Detecting levels	Low level	-26.4 to +0.6 V DC
	High level	4.5 – 26.4 V DC
Detecting time		≥ 200 msec.

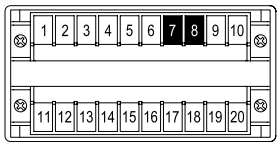
INPUT CONNECTION EXAMPLES

Voltage input	Short-circuit
	

* Open collector circuit can also be connected.

Open collector


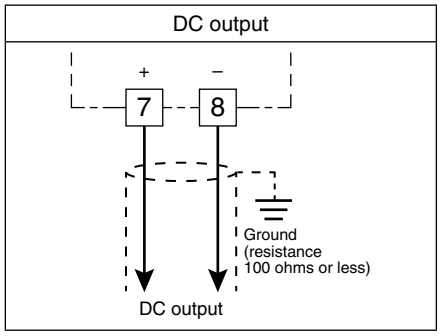
1.6.5 WIRING DC OUTPUT



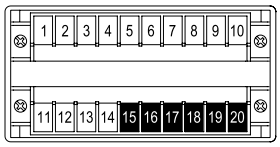
Voltage or current is output depending on the specified DC output code.

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.



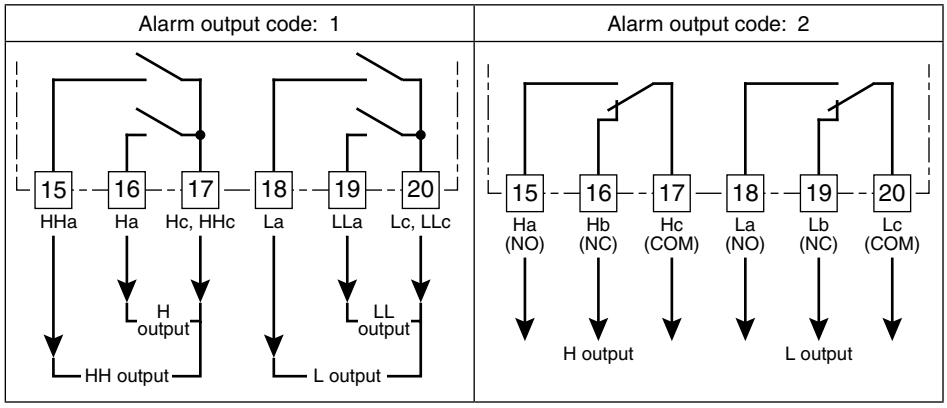
1.6.6 WIRING ALARM OUTPUT



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

IMPORTANT

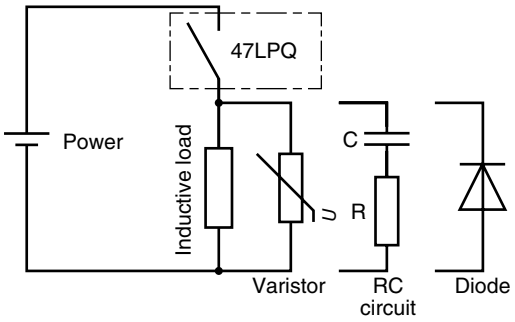
- Connect load within the specifications.
- The mechanical lifetime of the relays is 5,000,000 operations.
- With inductive load such like an external relay or a motor, insert a CR circuit (for AC or DC power), a diode (for DC power) or a varistor (for AC or DC power) in parallel to protect the contacts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



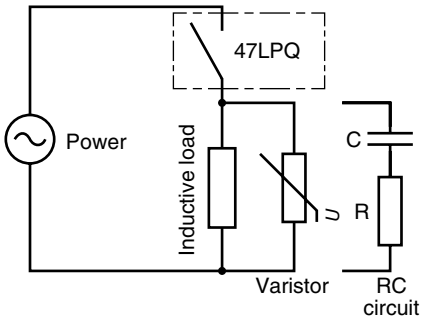
NOTE

Example of contact protection circuit with inductive load

■ **DC powered**

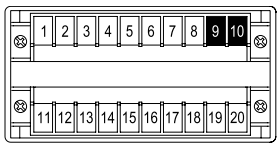


■ **AC powered**



* 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

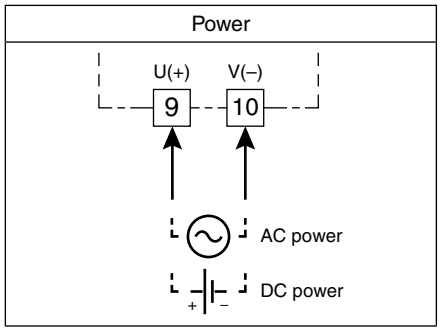


Connect power according to the power input code. The power specifications are shown in the following table.

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.



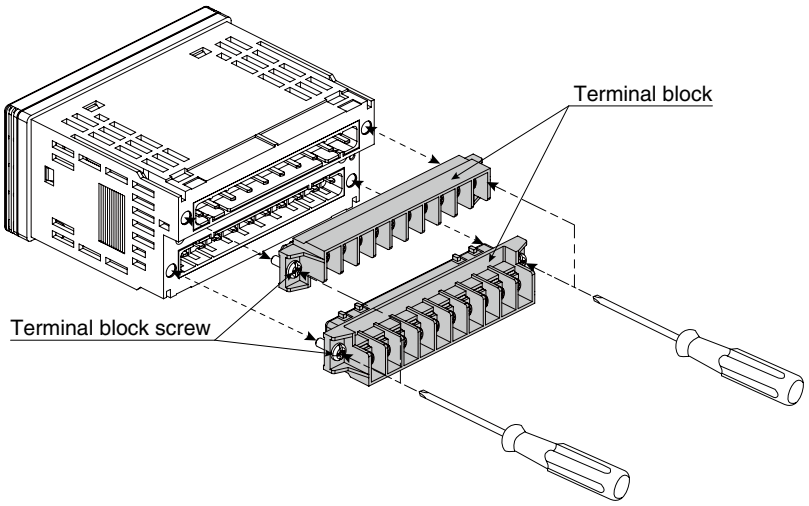
1.6.8 INSTALLING/SEPARATING TERMINAL BLOCK

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.

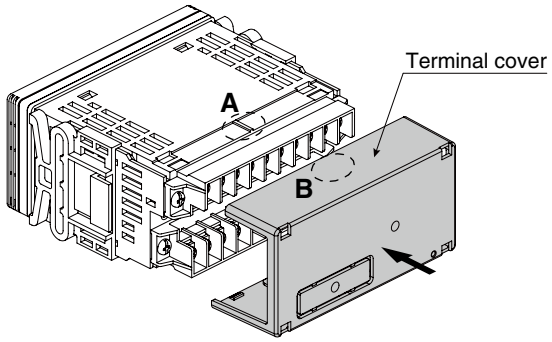


1.6.9 ATTACHING/REMOVING TERMINAL COVER

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

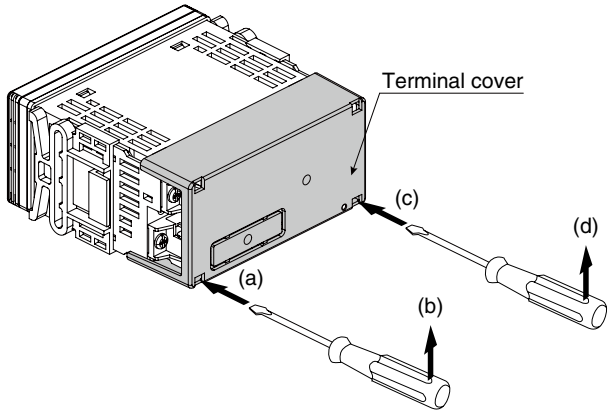
■ ATTACHING TERMINAL COVER

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.



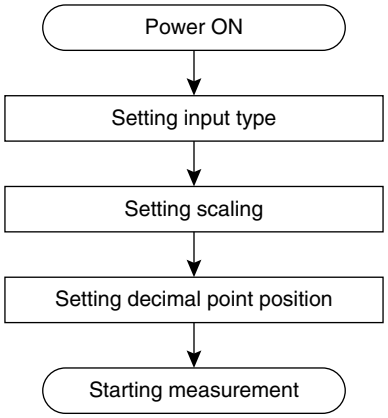
2. BASIC SETTING AND OPERATION

2.1 BASIC SETTING

This section describes flow and procedure of the basic setting.
The following shows the flow and procedure to set pulse count for an hour with the pulse unit 0.1 m^3/p and max. flow rate 150 m^3/min. as an example.

2.1.1 BASIC SETTING FLOW

The basic setting is as shown in the following flowchart.



2.1.2 HOW TO DETERMINE INPUT TYPE

To select an input type, it is necessary to calculate maximum frequency.
Refer to the following example (flow rate) to calculate.

e.g. Pulse unit 0.1 m^3/p, max. flow rate 150 m^3/min.
Frequency = max. flow rate ÷ pulse unit ÷ 60 sec.
150 m^3/min. ÷ 0.1 m^3/p ÷ 60 sec. = 25 Hz

* Formula with max. flow rate unit m^3/s: frequency = max. flow rate ÷ pulse unit
Formula with unit m^3/h: frequency = max. flow rate ÷ pulse unit ÷ 3600 sec.

The calculated max. frequency is ≤ 100 Hz. Both input types “no counting scaling” and “counting scaled to 1/100” are selectable.

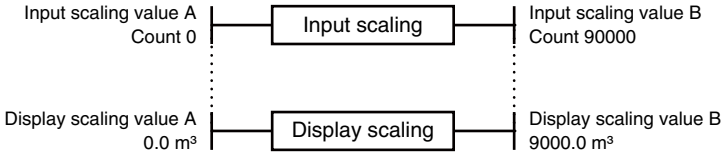
* With the input type set to “counting scaled to 1/100”, count 1 is equivalent to 100 pulses.

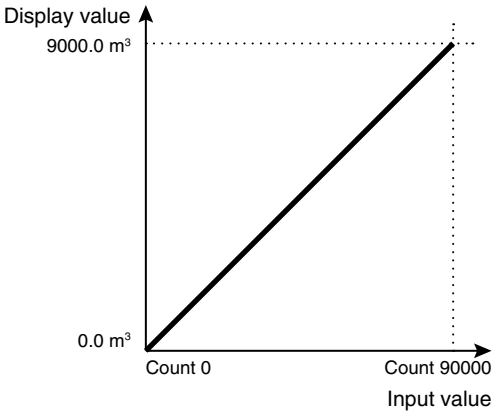
NOTE

- Calculation of max. frequency depends on devices. Refer to the manual of the device.
- For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set “input type” to “1 (no counting scaling)”.

2.1.3 RELATION BETWEEN INPUT SCALING AND DISPLAY SCALING

The relation between input scaling and display scaling is as shown in the following figure and chart.





Input scaling: Default count (input scaling value A) and max. count (input scaling value B)
Display scaling: 0% display value (display scaling value A) and 100% display value (display scaling value B)

Refer to the following example (flow rate) to calculate maximum count.

e.g. Pulse unit 0.1 m^3/p, max. flow rate 150 m^3/min., totalization for an hour
Max. count for an hour = max. flow rate ÷ pulse unit × 60 min.
150 m^3/min. ÷ 0.1 m^3/p × 60 min. = count 90000

* Formula with max. flow rate unit m^3/s: max. count for an hour = max. flow rate ÷ pulse unit × 3600 sec.
Formula with unit m^3/h: max. count for an hour = max. flow rate ÷ pulse unit

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NOTE

Calculation of max. count depends on devices. Refer to the manual of the device.

2.1.4 BASIC SETTING PROCEDURE

The following shows the procedure to set pulse count for an hour with the pulse unit 0.1 m^3/p and max. flow rate 150 m^3/min. as an example. Set values meeting signals to use. The input scaling value A is fixed to 000000. Refer to 3. SETTING INPUT TYPE for details of setting. It is convenient to use the scaling factor to indicate count 1 for 10-pulse input, for example. Refer to 9. SETTING SCALING FACTOR 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, Alm	No counting scaling
Input scaling value A	000000	Ini	0% input: count 0
Display scaling value A	000000*1	Ini, D/P	0% display: 0.0 m^3
Input scaling value B	090000	Alm	100% input: count 90000
Display scaling value B	090000*1	Alm, D/P	100% display: 9000.0 m^3
Decimal point position	09000.0	D/P	1 decimal place (10^{-1})

*1 The decimal point position depends on the decimal point position setting.

■ BASIC SETTING PROCEDURE

The basic setting procedure is as follows.

1 **Confirm the wiring, turn on the power and move on to Scaling 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 scaling values in the order of display scaling value A, input scaling value B and display scaling value B.**

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

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 three setting types, “numerical value setting”, “setting value selection” and “decimal point position selection”. Basic operation of each type is as shown below.

■ NUMERICAL VALUE SETTING

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

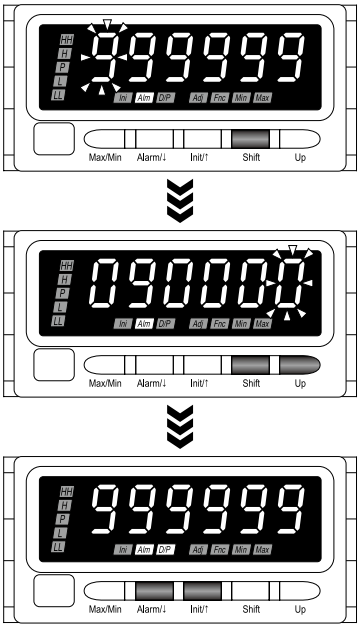
• The most significant digit starts blinking.

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

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

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

• The next or previous parameter setting is indicated.

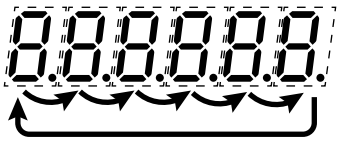


*1 Display depands on the specifications and settings.

NOTE

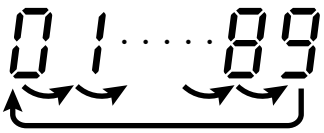
■ SHIFTING DIGITS

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. In setting the sixth digit for display scaling values A and B, or an alarm setpoint, the indication following ‘9’ will be ‘-’.
• The negative sign (-) must be set to the 6th digit. For example, set ‘-004.00’ instead of ‘-4.00’.



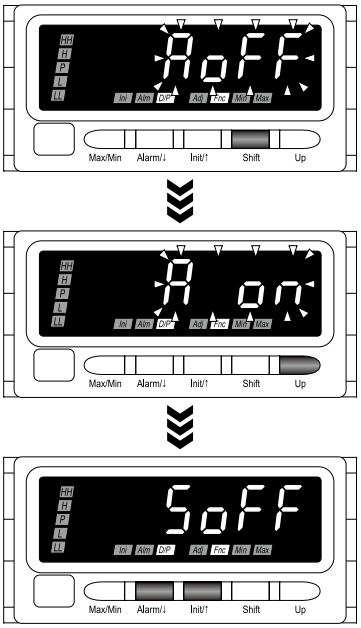
■ SETTING VALUE SELECTION

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.

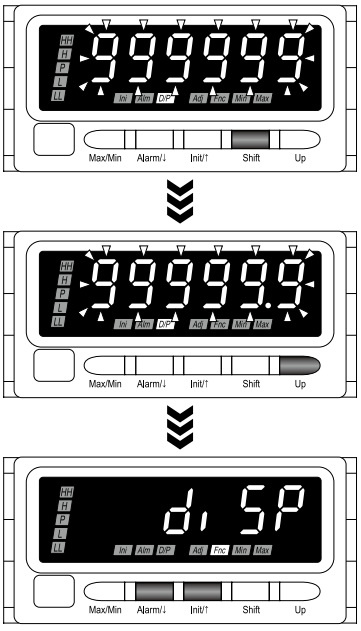
■ DECIMAL POINT POSITION SELECTION

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

2 **Press Up button to select a desired decimal point position.**

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

• The next or previous parameter setting is indicated.

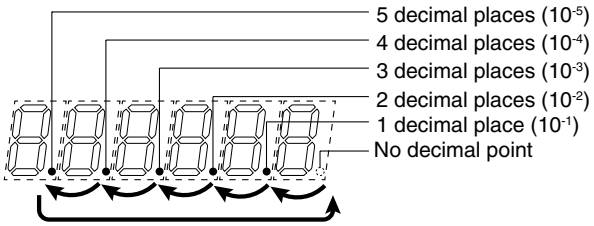


*1 Display depands on the specifications and settings.

NOTE

■ MOVING THE DECIMAL POINT

Pressing Up button moves the decimal point one place to the left.



■ DECIMAL POINT POSITION

"No decimal point" to "5 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION	SETTING VALUE	FUNCTION
888888	No decimal point	888888	3 decimal places (10^{-3})
888888	1 decimal place (10^{-1})	888888	4 decimal places (10^{-4})
888888	2 decimal places (10^{-2})	888888	5 decimal places (10^{-5})

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 'input scaling value A = input scaling value B'.
  - – 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 16. 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 22.2 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 6. PARAMETER CONFIGURATION for details.

■ DIFFERENCES IN FIRMWARE VERSIONS

- A certain default setting depends on the firmware versions. Refer to 23.6 DIFFERENCES IN FIRMWARE VERSIONS for details. Also refer to 22.3 CONFIRMING FIRMWARE VERSION to confirm the firmware version.

3. SETTING INPUT TYPE

Set input type according to the maximum frequency to input. With max. frequency ≤100 Hz, choose the input type '1' (no counting scaling). With 100 Hz < max. frequency ≤ 10 kHz, choose the type '100' (counting scaled to 1/100). With max. frequency ≤ 100 Hz, the input type '100' (counting scaled to 1/100) is also selectable (For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set "input type" to "1 (no counting scaling)").

To select an input type, it is necessary to calculate maximum frequency.
Refer to the following example (flow rate) to calculate.

e.g. Pulse unit 0.1 m^3/p, max. flow rate 150 m^3/min.
Frequency = max. flow rate ÷ pulse unit ÷ 60 sec.
150 m^3/min. ÷ 0.1 m^3/p ÷ 60 sec. = 25 Hz

* Formula with max. flow rate unit m^3/s: frequency = max. flow rate ÷ pulse unit
Formula with unit m^3/h: frequency = max. flow rate ÷ pulse unit ÷ 3600 sec.

The calculated max. frequency is ≤ 100 Hz. Both input types "no counting scaling" and "counting scaled to 1/100" are selectable.

* With the input type set to "counting scaled to 1/100", count 1 is equivalent to 100 pulses.

NOTE

Calculation of max. frequency depends on devices. Refer to the manual of the device.

IMPORTANT

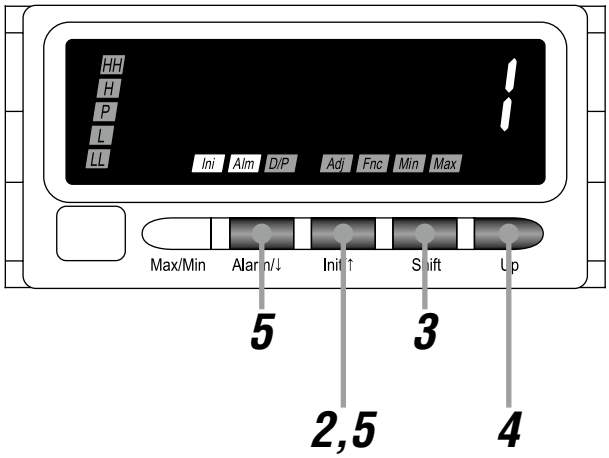
- The input and display scaling values are returned to the previously set values per input type (or default values when the input type is selected for the first time) when the input type has been changed. All alarm setpoints are disabled (reset to '------' status). Also other alarm parameters (except for alarm tone and main display blinking at alarm) are reset to the default values. It is recommended to record the current settings as necessary.
- Turn off the input signal while setting the input type.
- To indicate the scaled value, refer to 9. SETTING SCALING FACTOR.
- With the input type set to "counting scaled to 1/100", 1/100 scaled value × 100 can be indicated. Refer to 14. SETTING DISPLAY VALUE WITH 1/100 SCALING for the details.

3.1 INPUT TYPE LIST

DISPLAY	FUNCTION	OPERATIONAL FREQUENCY	DEFAULT VALUE
1	No counting scaling	≤ 100 Hz	1
100	Counting scaled to 1/100	≤ 10 kHz	

3.2 OPERATING PROCEDURE

Procedures to change '1' (no counting scaling) (default) to '100' (counting scaled to 1/100) are described here.



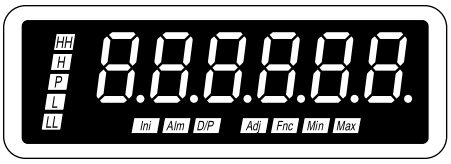
NOTE

- Procedures to change '1' to '100' are described here.
- To change '100' to '1', the procedures are same. Select '1' in Step 4.

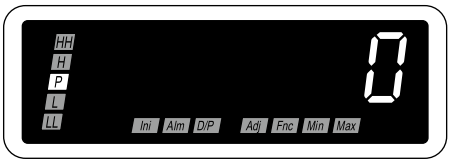
1 Confirm the wiring, and turn on the power.

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

■ Immediately after power on (all indicators on)



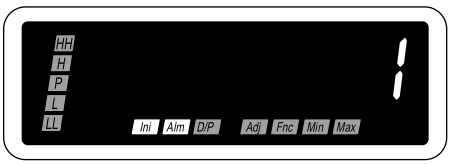
■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

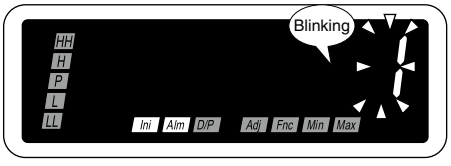


NOTE

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

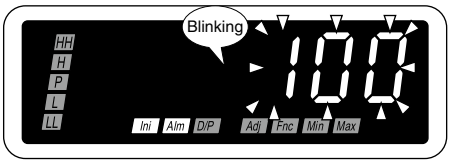
3 Press Shift button to shift the display into the setting standby mode.

- The indication '1' starts blinking, to which you can apply changes.



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

• Select '100' (counting scaled to 1/100).



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 scaling value A will be indicated.
• Press Init/↑ button, and the decimal point position will be indicated, or the analog output 100% adjustment 'ADJ' will be indicated with DC output.

---

6 **■ TO GO ON TO SET THE DISPLAY SCALING VALUE A,**
Skip to Step 3 in "4.1 STEP 1. DISPLAY SCALING VALUE A"

■ 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 16. 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 22.2 INITIALIZING SETTING VALUES.)

---

4. SETTING SCALING VALUES

■ INPUT SCALING

Input scaling means setting a count within the setting range.
The input scaling values include A and B.

- Input scaling value A is default count (0%).
- Input scaling value B is max. count (100%).

e.g. Count 0 – 90000

Input scaling value A	count 0
Input scaling value B	count 90000

IMPORTANT

- Do not set 'input scaling value A = input scaling value B'.
- The input scaling value A is fixed to 000000.

■ DISPLAY SCALING

Display scaling means setting a value to display actually.
The display scaling values include A and B. A decimal point can be set in any position.

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

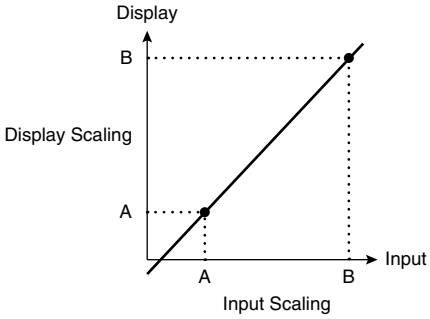
e.g. Display value 0.0 – 9000.0 m^3

Display scaling value A	0.0 m^3
Display scaling value B	9000.0 m^3
Decimal point position	00000.0 (1 decimal place)

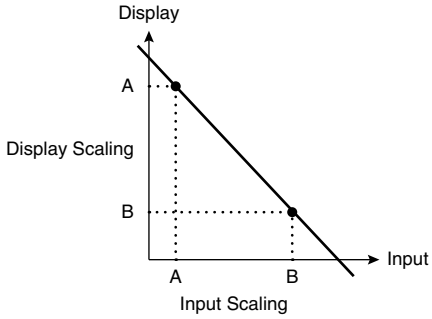
IMPORTANT

- It is convenient to use the scaling factor to indicate count 1 for 10-pulse input, for example. Refer to 9. SETTING SCALING FACTOR for details of setting. Set the display scaling with the scaled values after setting the scaling factor.
- With the input type set to "counting scaled to 1/100", set the display scaling with 1/100 scaled values.
- With the counted pulse edge set to "rise and sink", count 2 is equivalent to 1 pulse.
- With the input type set to "counting scaled to 1/100" and the display value with 1/100 scaling set to "1/100 scaled value × 100", set the display scaling with 1/100 scaled values × 100. Refer to 14. SETTING DISPLAY VALUE WITH 1/100 SCALING for details.
- Both normal scaling (display scaling value A < display scaling value B) and inverted scaling (display scaling value A > display scaling value B) can be set within the range of -99999 to 999999.

■ Normal Scaling
The display value increases
when the input signal increases.



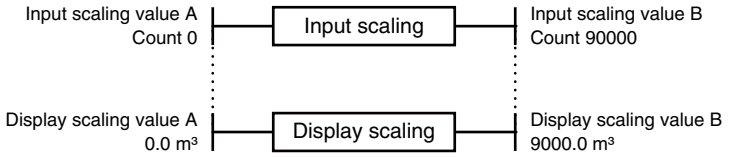
■ Inverted Scaling
The display value decreases
when the input signal increases.



■ RELATION BETWEEN INPUT SCALING AND DISPLAY SCALING

The relation between input scaling and display scaling is as shown in the following figure.

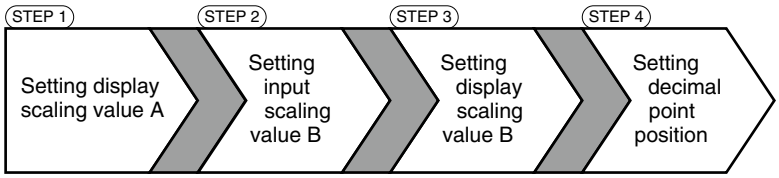
e.g. To display count 0 – 90000 as 0.0 – 9000.0 m^3



■ PROCEDURE TO SET SCALING VALUES

• Flow in setting scaling values

4-step settings are necessary to set scaling values.



• Operating procedure to set scaling values

Following pages describe operating procedures in each step to set the input scaling to count 0 – 90000, and the display scaling to 0.0 – 9000.0 m^3 for totalization for an hour with the pulse unit 0.1 m^3/p and max. flow rate 150 m^3/min. as an example.

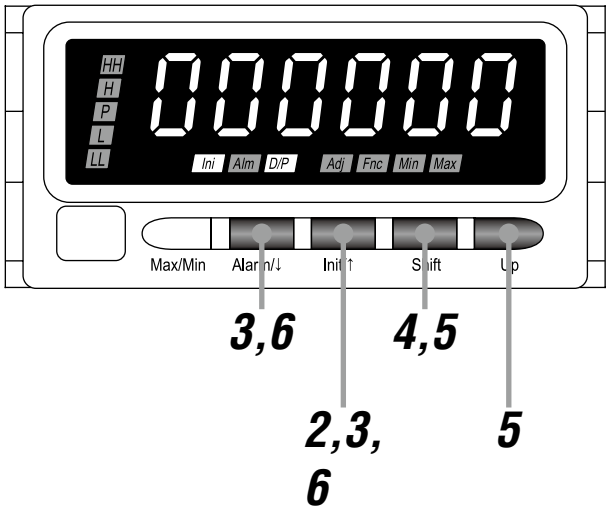
4.1 STEP 1. DISPLAY SCALING VALUE A

4.1.1 DISPLAY SCALING LIST

Display scaling default values and setting ranges are as shown in the following tables.
The display scaling values are reset to the default or the previously set values per input type when the input type has been changed.

INPUT TYPE	DEFAULT VALUE	SETTING RANGE
1	Display scaling value A: 000000 Display scaling value B: 999999	-99999 to 999999
100	Display scaling value A: 000000 Display scaling value B: 999999	

4.1.2 OPERATING PROCEDURE



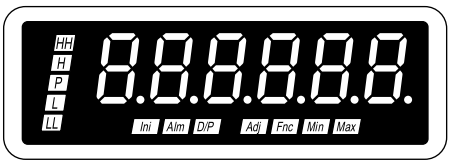
NOTE

The left figure shows a display example. The display depends on the settings.

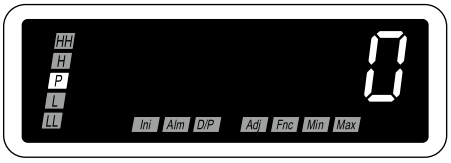
1 **Confirm the wiring, and turn on the power.**

- 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)



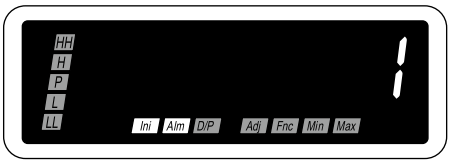
■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

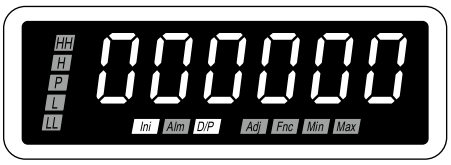


NOTE

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

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

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

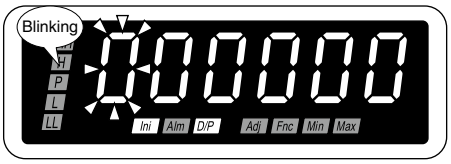


NOTE

Skip to Step 7 if the default value is acceptable.

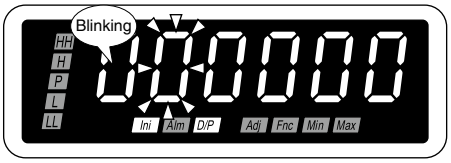
4 **Press Shift button to shift the display into the setting standby mode.**

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



5 **Press Shift and Up buttons to set to '000000'.**

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



NOTE

- '000000' is a display example. Set any value within the range of -99999 to 999999.
- The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
- The negative sign (-) must be set to the 6th digit. For example, set '-004.00' instead of '-4.00'.

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 scaling value B will be indicated.
- Press Init/↑ button, and the input scaling value A will be indicated.

7 ■ **TO GO ON TO SET THE INPUT SCALING VALUE B,**
Skip to Step 3 in "4.2 STEP 2. INPUT SCALING VALUE B".

■ **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…**

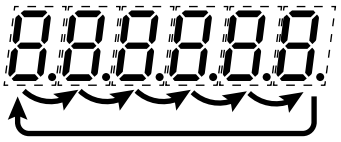
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 16. 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 22.2 INITIALIZING SETTING VALUES.)

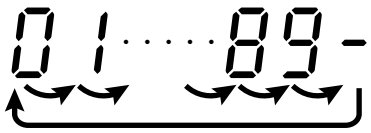
■ **SHIFTING DIGITS**

- Each time pressing Shift button, the blinking digit moves to the right.



■ **SETTING A NUMERICAL VALUE**

- Each time pressing Up button, the numeral is incremented by 1.
- The negative sign (-) is indicated in the sixth digit only.



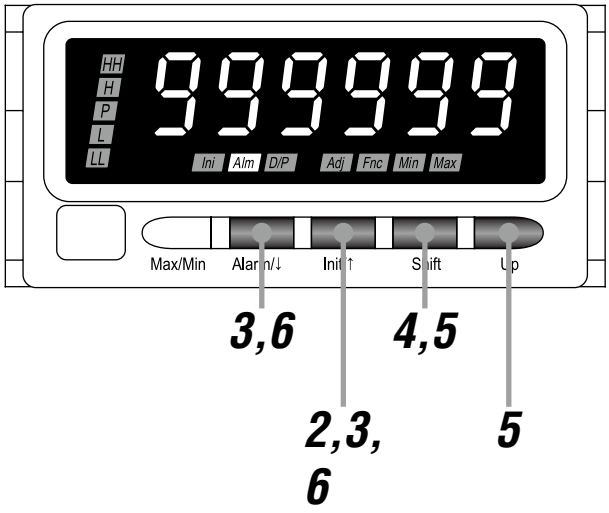
4.2 STEP 2. INPUT SCALING VALUE B

4.2.1 INPUT SCALING LIST

Input scaling default values and setting ranges are as shown in the following tables.
The input scaling values are reset to the default or the previously set values per input type when the input type has been changed.
The input scaling value A is fixed to 000000.

INPUT TYPE	DEFAULT VALUE	SETTING RANGE
1	Input scaling value A: 000000 Input scaling value B: 999999	0 – 999999
100	Input scaling value A: 000000 Input scaling value B: 999999	0 – 999999

4.2.2 OPERATING PROCEDURE



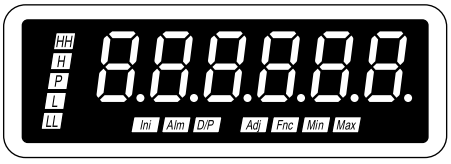
NOTE

The left figure shows a display example. The display depends on the settings.

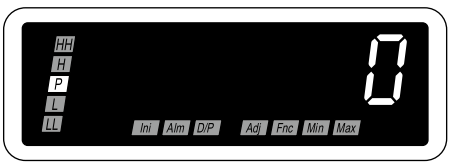
1 **Confirm the wiring, and turn on the power.**

- 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)



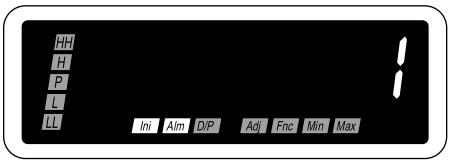
■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

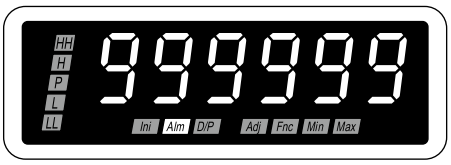


NOTE

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

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

- The input scaling value B is indicated.
- 'Alm' indicator turns on.

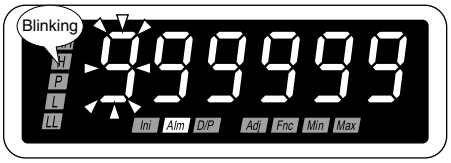


NOTE

Skip to Step 7 if the default value is acceptable.

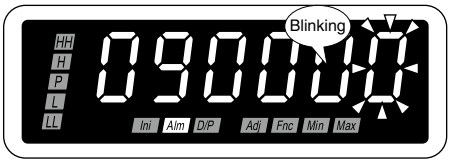
4 **Press Shift button to shift the display into the setting standby mode.**

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



5 **Press Shift and Up buttons to set to '090000'.**

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



NOTE

- '090000' is a display example. Set any value within the setting range.
- 'Min' and 'Max' indicators start blinking when the set value is same as the input scaling value A. Return the setting within the valid range.

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

• And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the display scaling value B will be indicated within the range of -99999 to 999999 depending on the setting.
- Press Init/↑ button, and the display scaling value A will be indicated within the range of -99999 to 999999 depending on the setting.

---

7 **■ TO GO ON TO SET THE DISPLAY SCALING VALUE B,**
Skip to Step 3 in "4.3 STEP 3. DISPLAY SCALING VALUE B".

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

NOTE

■ INPUT SCALING SETTING

- Do not set 'input scaling value A = input scaling value B'.

■ IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…

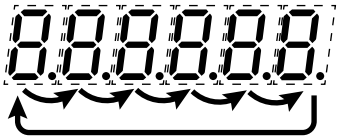
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 16. 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 22.2 INITIALIZING SETTING VALUES.)

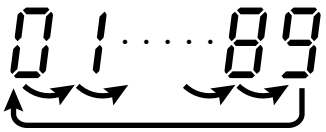
■ SHIFTING DIGITS

- Each time pressing Shift button, the blinking digit moves to the right.



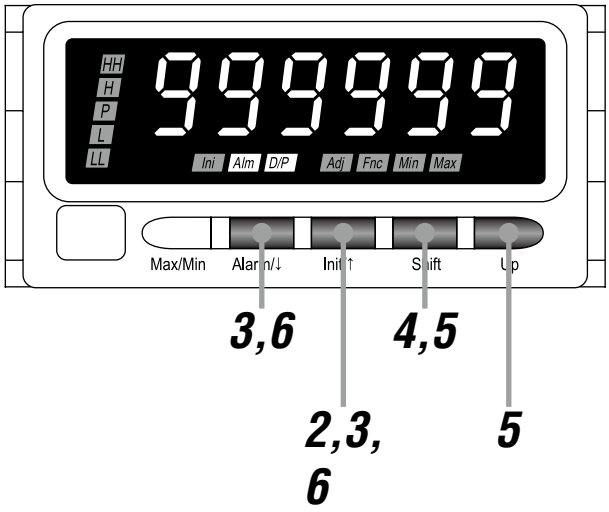
■ SETTING A NUMERICAL VALUE

- Each time pressing Up button, the numeral is incremented by 1.



4.3 STEP 3. DISPLAY SCALING VALUE B

4.3.1 OPERATING PROCEDURE



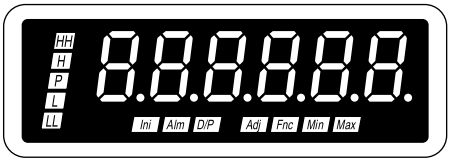
NOTE

The left figure shows a display example. The display depends on the settings.

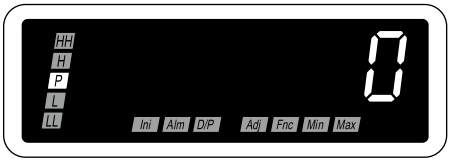
1 **Confirm the wiring, and turn on the power.**

- 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)



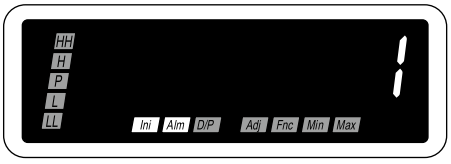
■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

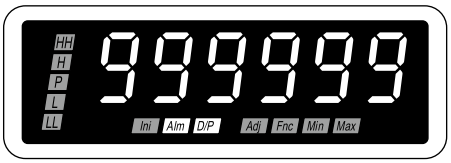


NOTE

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

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

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



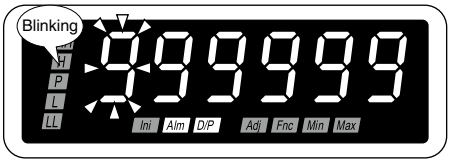
NOTE

Skip to Step 7 if the default value is acceptable.

---

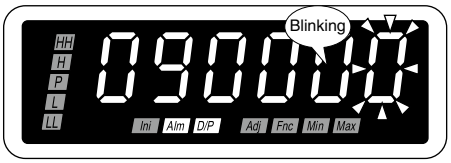
4 **Press Shift button to shift the display into the setting standby mode.**

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



5 **Press Shift and Up buttons to set to '090000'.**

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



NOTE

- '090000' is a display example. Set any value within the range of -99999 to 999999.
- The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
- The negative sign (-) must be set to the 6th digit. For example, set '-004.00' instead of '-4.00'.

---

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 will be indicated.
- Press Init/↑ button, and the input scaling value B will be indicated.

---

7 ■ **TO GO ON TO SET THE DECIMAL POINT POSITION,**
Skip to Step 3 in "4.4 STEP 4. 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…**

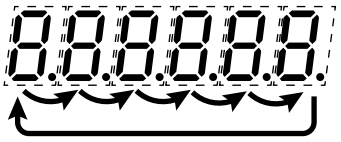
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 16. 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 22.2 INITIALIZING SETTING VALUES.)

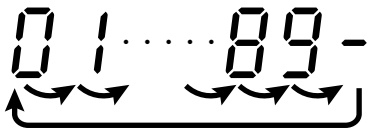
■ **SHIFTING DIGITS**

- Each time pressing Shift button, the blinking digit moves to the right.



■ **SETTING A NUMERICAL VALUE**

- Each time pressing Up button, the numeral is incremented by 1.
- The negative sign (-) is indicated in the sixth digit only.



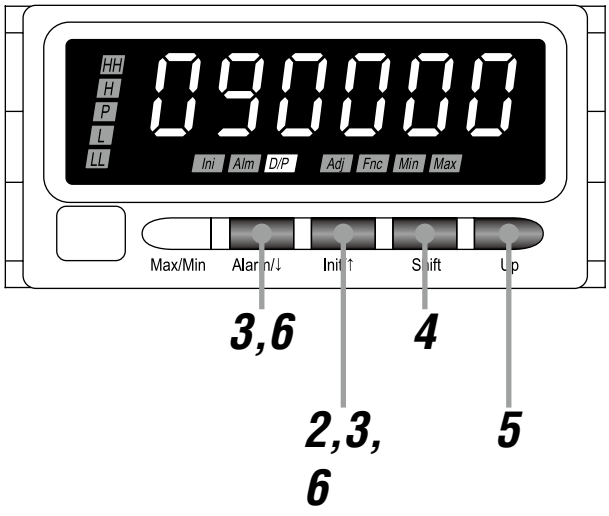
4.4 STEP 4. DECIMAL POINT POSITION

4.4.1 DECIMAL POINT POSITION LIST

Default values of decimal point position are as shown in the following tables.
The decimal point position is reset to the default or the previously set position per input type when the input type has been changed.

INPUT TYPE	DEFAULT VALUE
1	999999 no decimal point
100	999999 no decimal point

4.4.2 OPERATING PROCEDURE



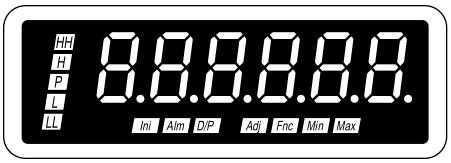
NOTE

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

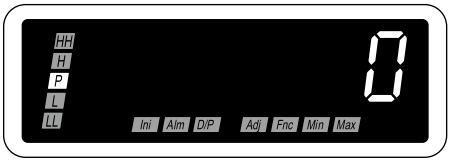
1 **Confirm the wiring, and turn on the power.**

- 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)



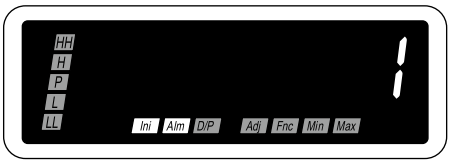
■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

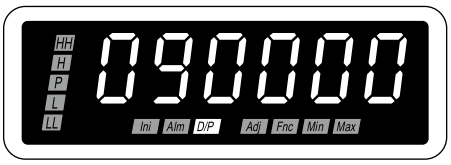


NOTE

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

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

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

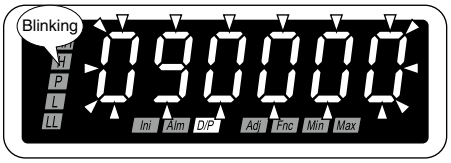


NOTE

Skip to Step 7 if the default value is acceptable.

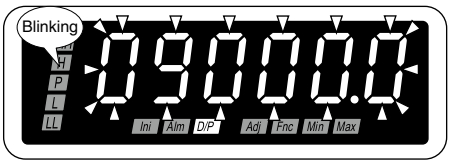
4 **Press Shift button to shift the display into the setting standby mode.**

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



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

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



NOTE

The right figure shows a display example. Select one among "no decimal point", and "1 decimal place" to "5 decimal places".

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 type '1' or '100' will be indicated depending on the setting. Or with DC output, the analog output function mode 'DISP' or 'SCLE' will be indicated depending on the setting.
- Press Init/↑ button, and the display scaling value B will be indicated within the range of -99999 to 999999 depending on the setting.

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

■ **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…**

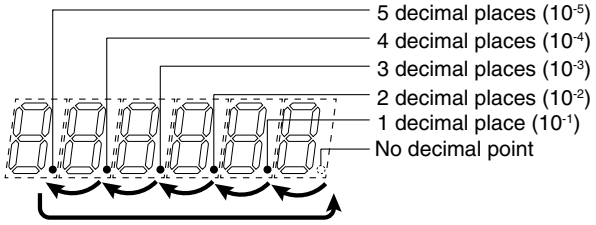
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 16. 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 22.2 INITIALIZING SETTING VALUES.)

■ **MOVING THE DECIMAL POINT**

- Pressing Up button moves the decimal point one place to the left.



■ **DECIMAL POINT POSITION**

- "No decimal point" to "5 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION
000000	No decimal point
000000	1 decimal place (10^{-1})
000000	2 decimal places (10^{-2})

SETTING VALUE	FUNCTION
000000	3 decimal places (10^{-3})
000000	4 decimal places (10^{-4})
000000	5 decimal places (10^{-5})

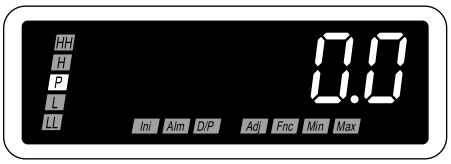
5. OPERATION

Make sure that 0.0 – 9000.0 m^3 is correctly indicated according to the count 0 – 90000 provided.

IMPORTANT

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

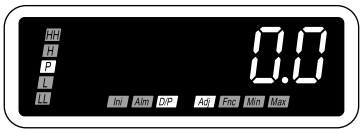
1 **Apply count 0 (0%) and make sure that 0.0 m^3 is indicated.**



*1 Display depends on the settings and input.

NOTE

■ WHEN THE FOLLOWING IS INDICATED…



- When 'ADJ' indicator turns on, the control input is turned ON. Cancel the control input. (Refer to 11. SETTING CONTROL INPUT FUNCTION.)

■ INPUT INDICATION

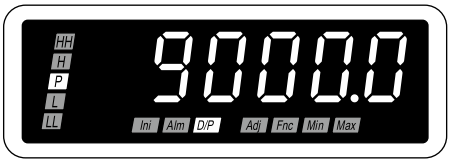
- After a valid pulse train has been detected, 'D/P' indicator turns on for 1 second and then turns off (applied to 1/100 scaled signal for the input type "counting scaled to 1/100"). The unit monitors input signal and 'D/P' turns on and off every time a valid pulse train has been detected. With the input frequency approx. 1.2 Hz or faster (approx. 120 Hz or faster with the input type "counting scaled to 1/100"), 'D/P' indicator looks like constantly turned on.

■ ALARM INDICATORS

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

2 **Apply count 45000 (50%) and make sure that 4500.0 m^3 is indicated.**

3 **Apply count 90000 (100%) and make sure that 9000.0 m^3 is indicated.**



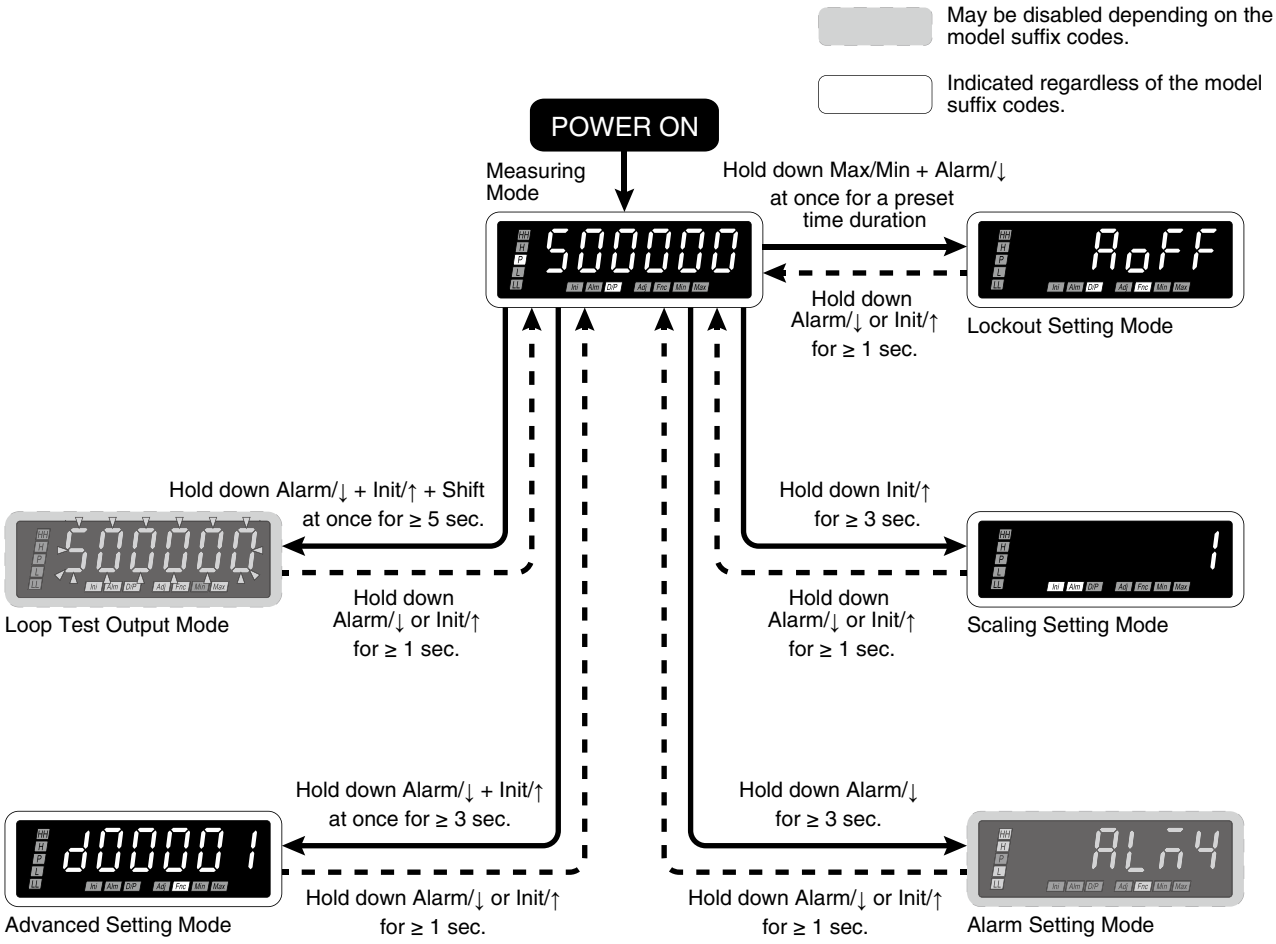
6. PARAMETER CONFIGURATION

■ MODE

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

MODE	FUNCTION	MEASUREMENT
Measuring	Normal measurement state where the unit takes in input and provides alarms. Present value, MAX and MIN values, alarm setpoints can be indicated in Measuring Mode. Also the count can be reset in this mode. When the power is supplied, the unit operates in Measuring Mode.	Measuring
Scaling Setting	Basic settings such like input type, input scaling and display scaling, and also analog output function and analog output adjustments can be performed.	Measuring stopped
Alarm Setting	Alarm setpoints, trip action, deadband and ON delay time can be set.	
Advanced Setting	Scaling factor, overflow count mode and control input function 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 Scaling 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.

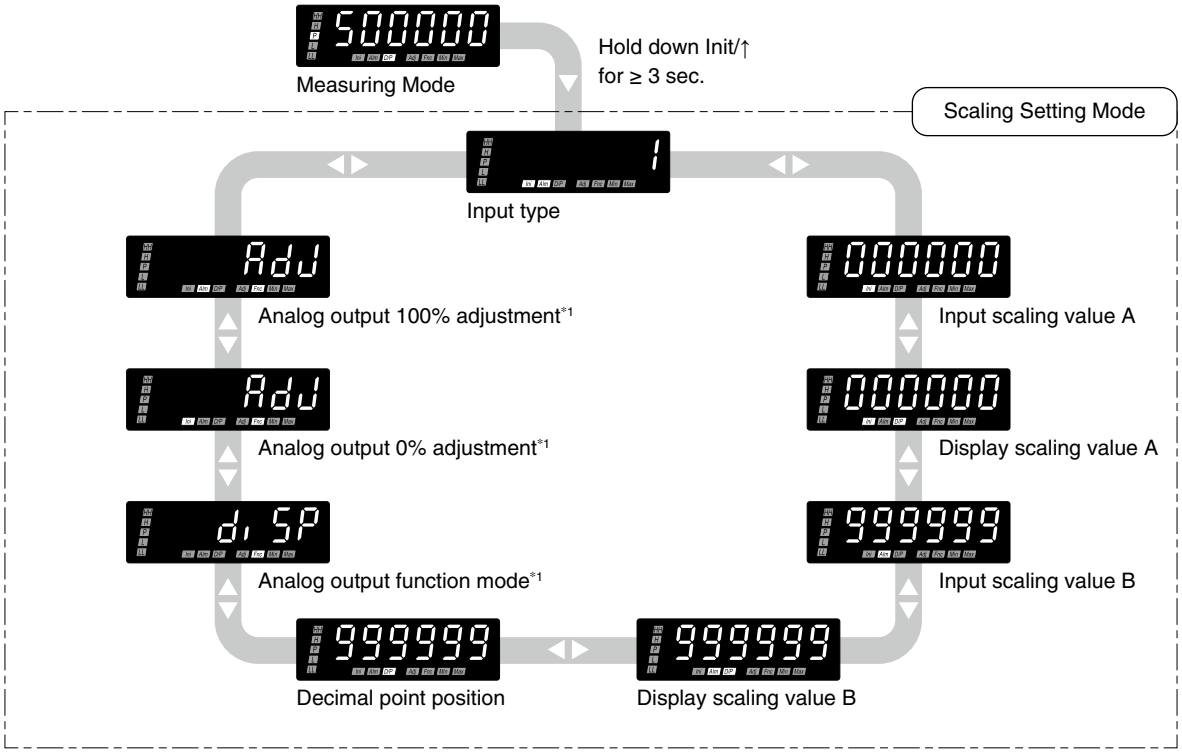
■ TRANSITION FROM EACH MODE TO MEASURING MODE

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

■ SHIFTING THROUGH SETTING PARAMETERS

(1) Parameter shifting in Scaling Setting Mode

In Scaling 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).



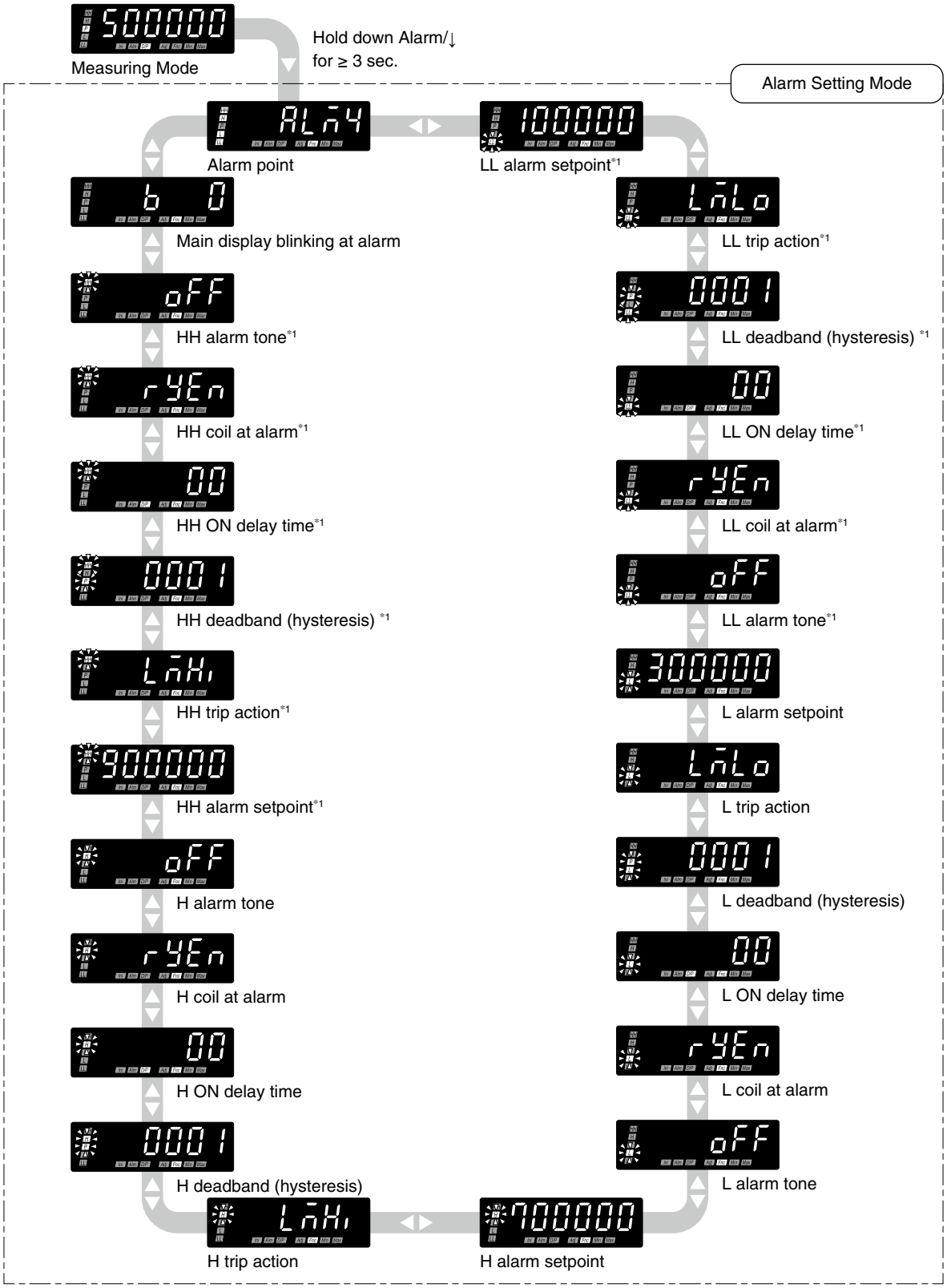
*1 Disabled with no-DC-output type.

NOTE

- The display depends on the input type and settings. The above displays show default values with the input type '1'.
- 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).



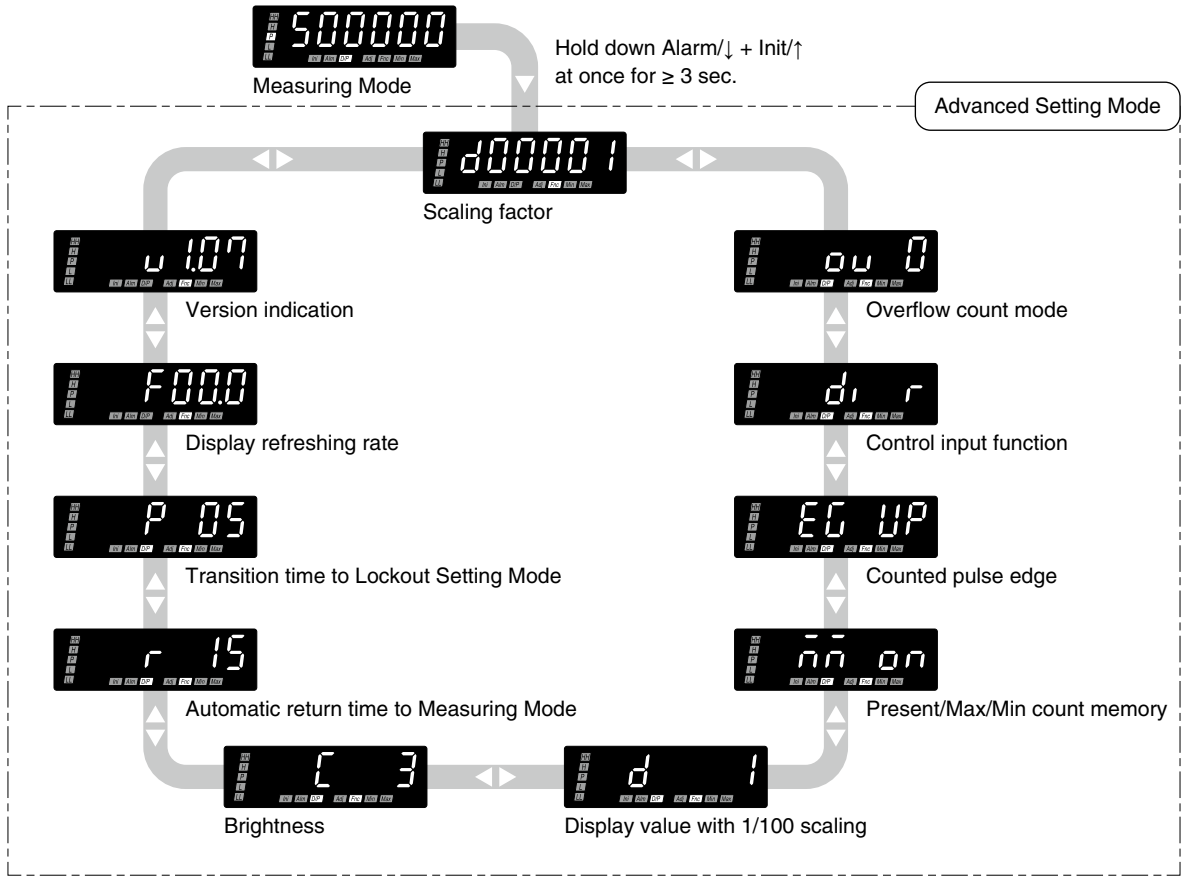
*1 Disabled with "Dual alarm" selected for the alarm point parameter.

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).

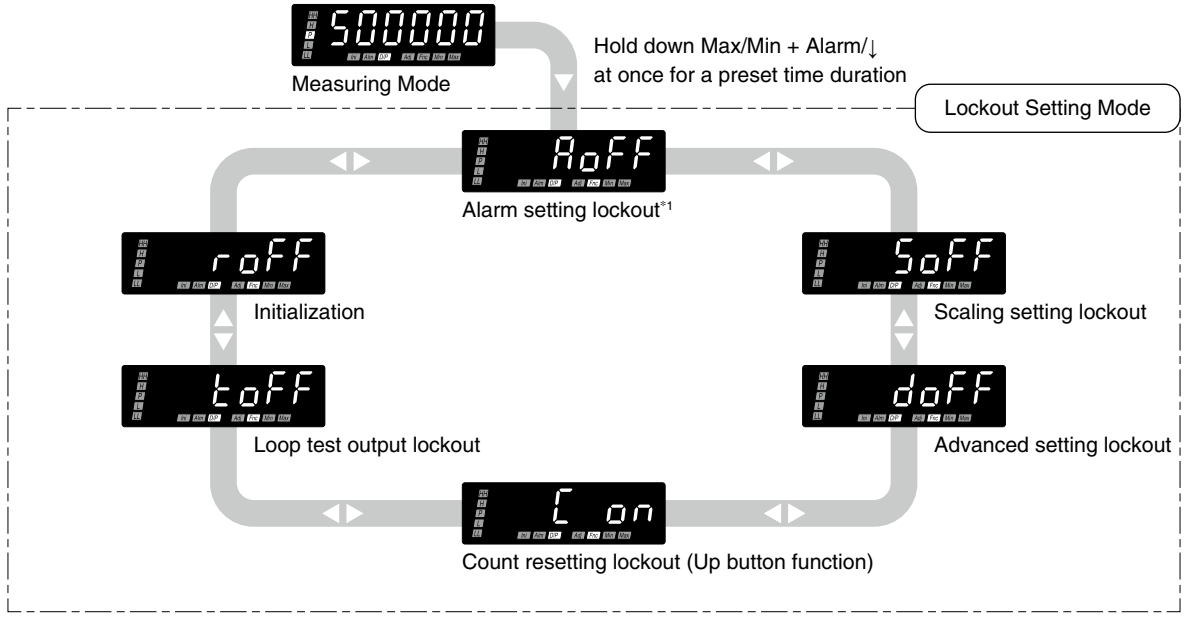


NOTE

- 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.

7. SETTING ANALOG OUTPUT FUNCTION

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

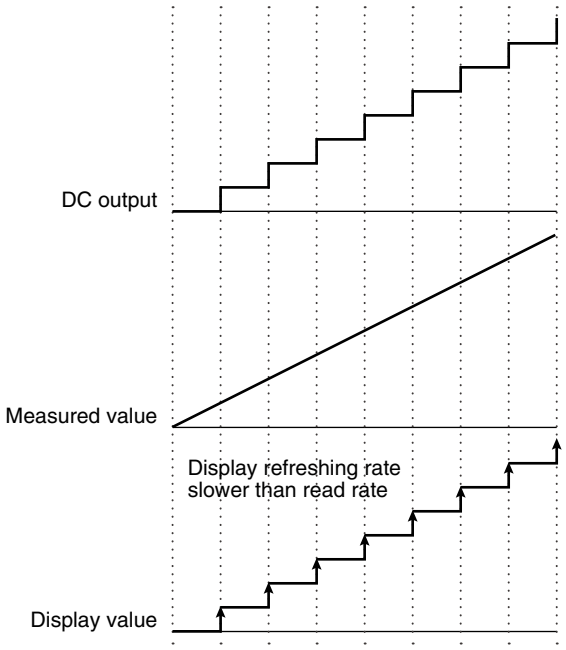
■ ANALOG OUTPUT FUNCTION

ANALOG OUTPUT	DISPLAY	FUNCTION	DEFAULT VALUE
Proportional to display value	dI SP	DC output proportional to the display value affected by display refreshing rate (Figure 1).	dI SP
Proportional to scaling value	SCLE	DC output proportional to the measured value (Figure 2).	

■ DIFFERENCE OF ANALOG OUTPUT FUNCTIONS

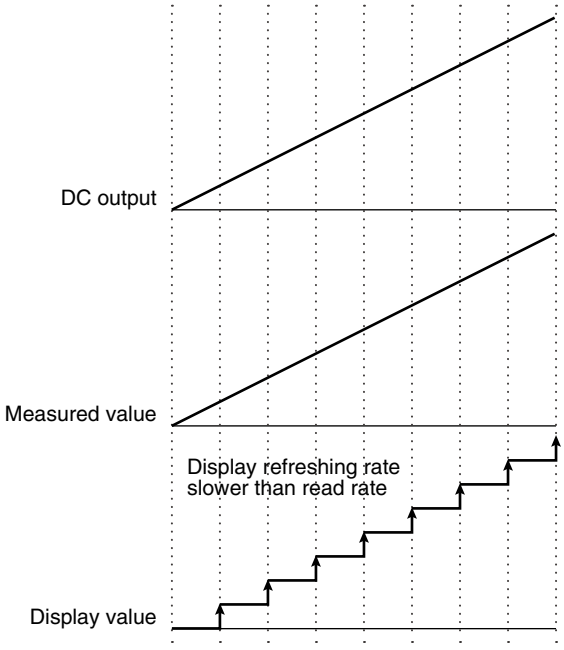
Figures 1 and 2 show the difference of DC output functions, when the display refreshing rate is set slower than the read rate.

Figure 1: DC output proportional to display value



The DC output is proportional to the display value.

Figure2: DC output proportional to scaling value

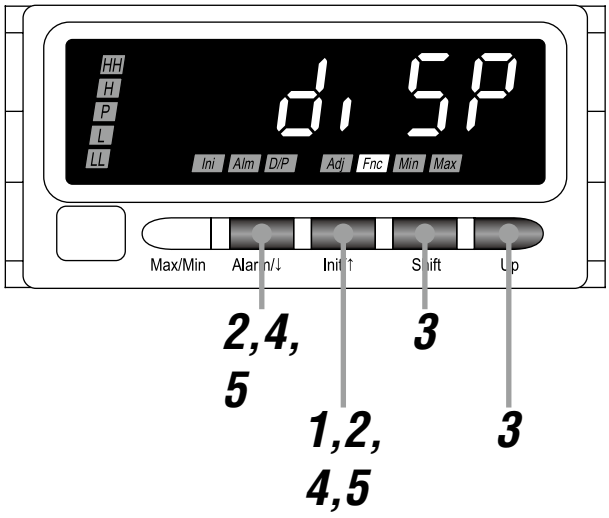


The DC output is proportional to the measured value.

IMPORTANT

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

7.1 OPERATING PROCEDURE

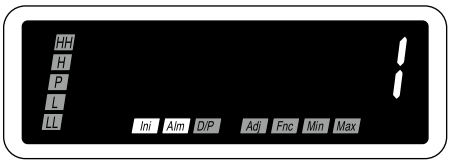


NOTE

- Procedures to change 'DISP' to 'SCLE' are described here.
- To change 'SCLE' to 'DISP', the procedures are same. Select 'DISP' in Step 3.

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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.

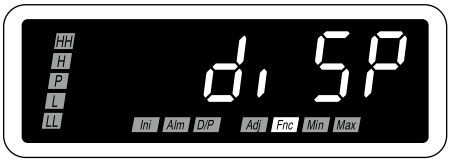


NOTE

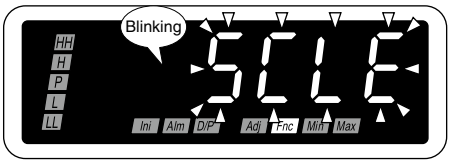
'1' or '100' is indicated depending on the setting.

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

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



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



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

- And the next parameter setting is indicated.

NOTE

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

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

8. 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 -99999 to 999999 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).
Alarm tone	Buzzer sound at alarm. Alarm tone OFF or ON.
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	ALn2	Dual alarm	Alarm output code 1: ALn4
	ALn4	Quad alarm	Alarm output code 2: ALn2
Alarm setpoint	-99999 to 999999	-99999 to 999999	LL alarm setpoint: -00000 L alarm setpoint: 00000 H alarm setpoint: 00000 HH alarm setpoint: 00000
Trip action	LnLo	Lo trip	LL, L trip action: LnLo
	LnHi	Hi trip	HH, H trip action: LnHi
Deadband (hysteresis)	0000 to 9999	0000 – 9999	0001
ON delay time	00 to 99	0 – 99 seconds	00
Coil at alarm	rYEn	Coil energized at alarm	rYEn
	rYdn	Coil de-energized at alarm	
Alarm tone	oFF	Alarm tone OFF	oFF
	on	Alarm tone ON	
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

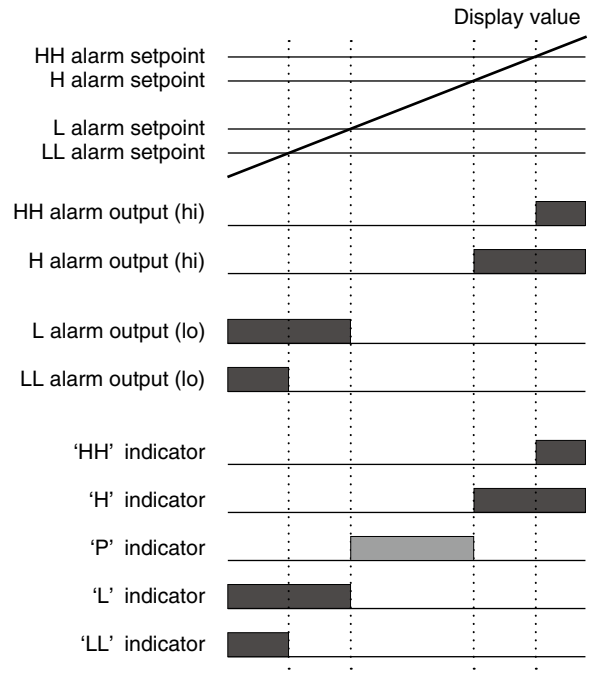
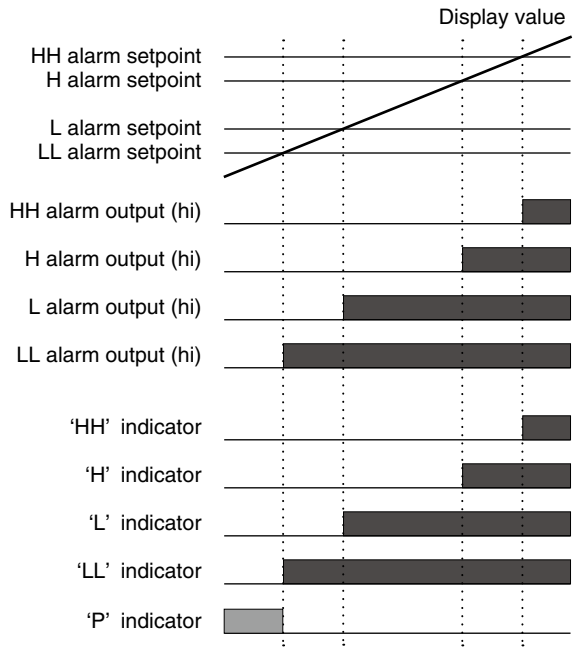


Figure 2: All trip points set to high setting



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)

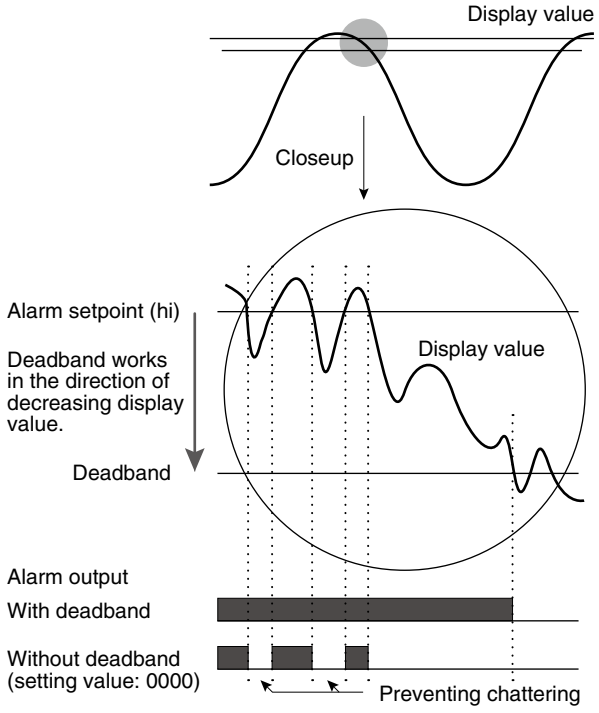
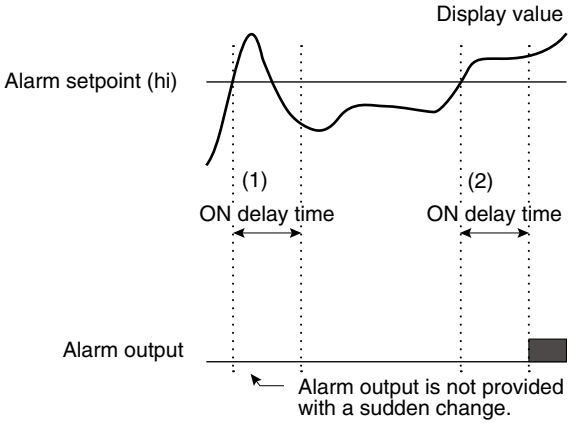


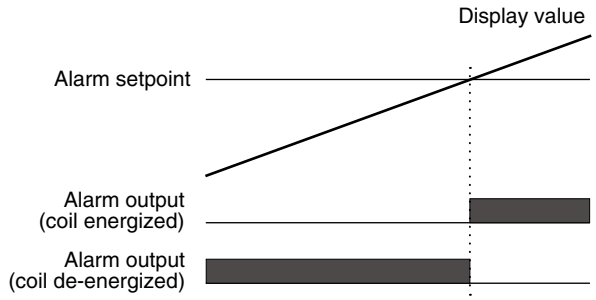
Figure 4: ON delay time



(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.

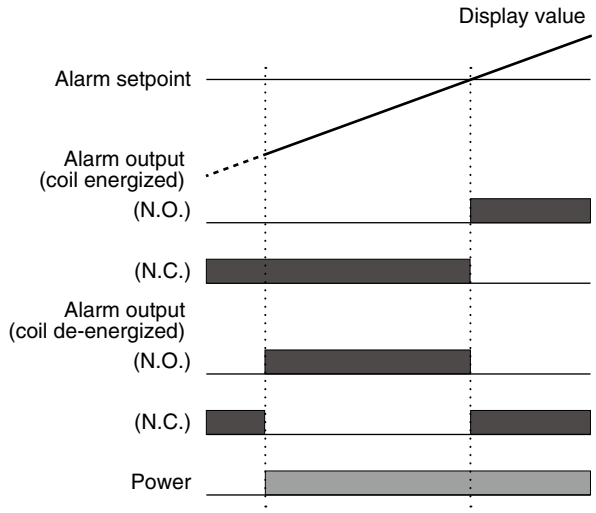
Figure 5: Coil at alarm

■ **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

- The alarm point, trip action, ON delay time and coil at alarm are reset to the default values and all alarm setpoints are disabled (reset to '------' status) when the input type has been changed.
- The trip action, ON delay time and coil at alarm are reset to the default values when the alarm point has been changed. The current setpoints are held when quad alarm is changed to dual alarm. The current L and H setpoints are held but the LL and HH setpoints are returned to the previously set values when dual alarm is changed to quad alarm. However when a current setpoint is '------', it is returned to the previous one in any case.

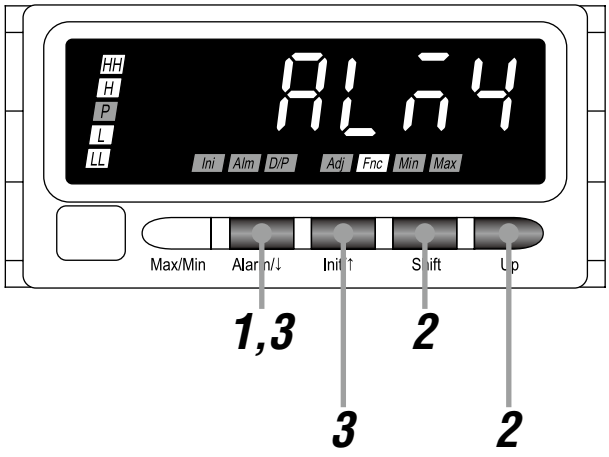
NOTE

- Alarm Setting Mode is locked with the alarm output code '0' no-alarm-output type.
- Alarm point is fixed at '2' when the alarm output code '2' is specified.

8.1 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.

8.1.1 OPERATING PROCEDURE

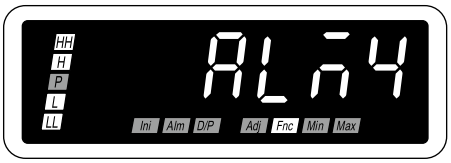


NOTE

- 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.

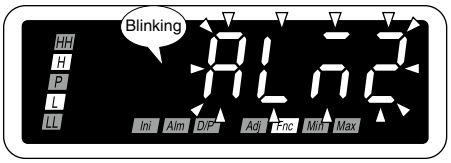


NOTE

- '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 -99999 to 999999 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 “8.2 ALARM SETPOINT”.

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

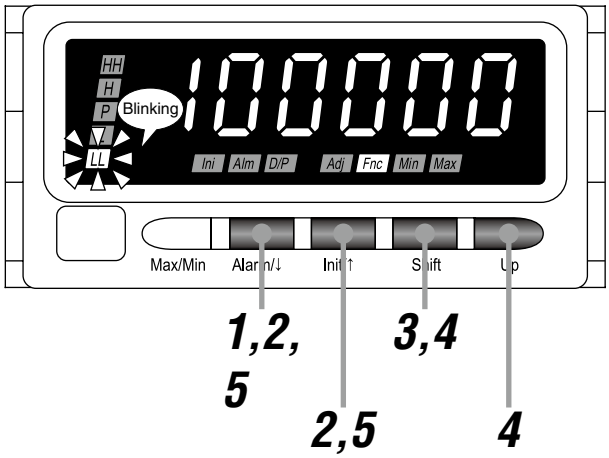
8.2 ALARM SETPOINT

Alarm setpoints can be set within the range of -99999 to 999999. However the alarm is not provided in setting the setpoint beyond the set display scaling range. Set the setpoints within the valid range. All alarm setpoints are disabled (reset to '------' status) when the input type has been changed.

8.2.1 ALARM SETPOINT LIST

PARAMETER	DEFAULT VALUE
LL alarm setpoint	-100000
L alarm setpoint	300000
H alarm setpoint	700000
HH alarm setpoint	900000

8.2.2 OPERATING PROCEDURE

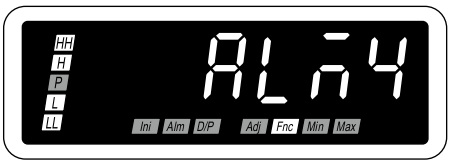


NOTE

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

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

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

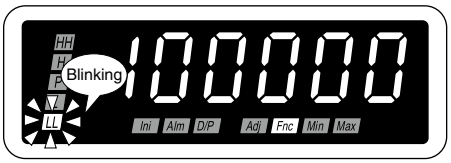


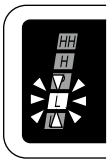
NOTE

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

2 Press Alarm/↓ or 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

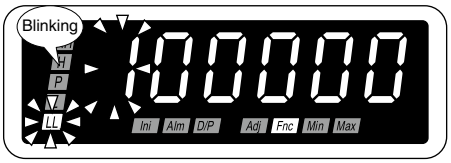
■ HH alarm setpoint

NOTE

The setpoint is indicated within the range of -99999 to 999999 depending on the setting.

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

- The sixth 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 -99999 to 999999.

IMPORTANT

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

NOTE

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

5 Press Alarm/↓ or 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 alarm tone 'OFF' or 'ON') will be indicated depending on the setting.

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

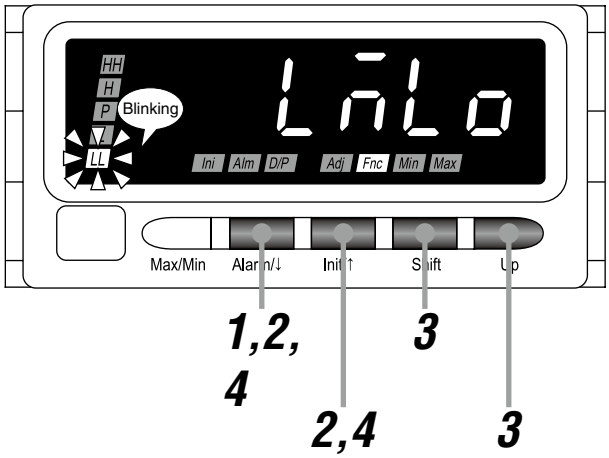
■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "8.3 TRIP ACTION (LO/HI)".

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

8.3 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.

8.3.1 OPERATING PROCEDURE

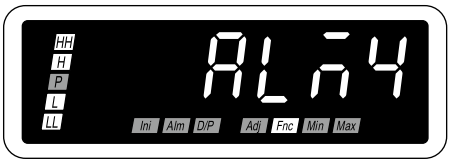


NOTE

- 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.

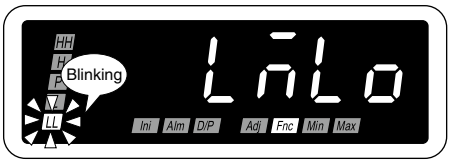


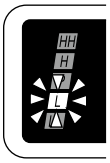
NOTE

- '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.**

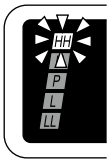
- 'LMLO' is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.





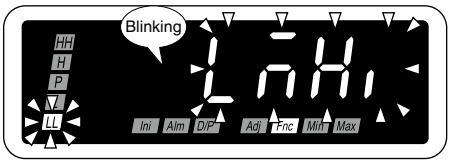
■ L trip action

■ 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 -99999 to 999999 depending on the setting.

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

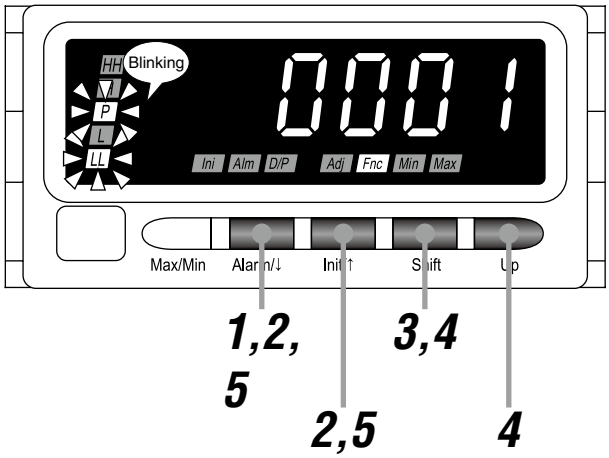
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "8.4 DEADBAND".

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

8.4 DEADBAND

Once a high (low) trip alarm is ON, the alarm stays ON until the data becomes lower (higher) than a certain range from the setpoint, which prevents the alarm output from chattering when the display value fluctuates slightly near the setpoint. This range is called deadband (hysteresis) and can be set within the range of 0000 to 9999. The default value is 0001.
The unit counts up input pulses but not down unless the control input function is set to "invert count". A provided alarm output is not canceled until the count is reset. Basically the deadband is not needed to be set.

8.4.1 OPERATING PROCEDURE

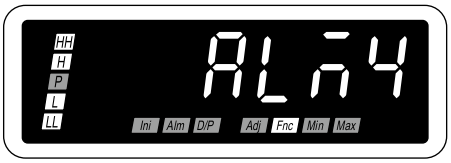


NOTE

- 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.

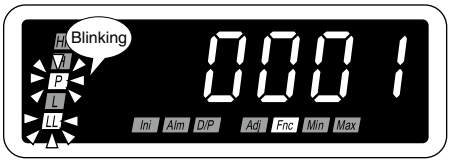


NOTE

- '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.

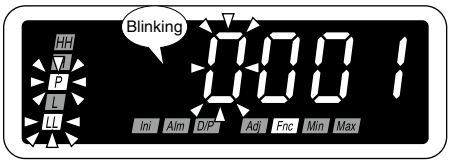


NOTE

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.

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.

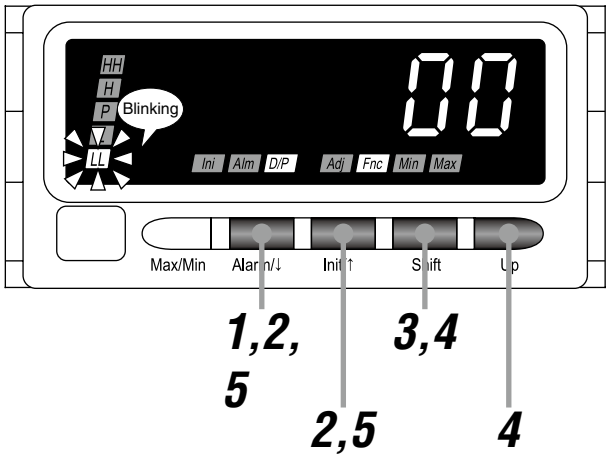
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "8.5 ON DELAY TIME".

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

8.5 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.
The unit counts up input pulses but not down unless the control input function is set to "invert count". A provided alarm output is not canceled until the count is reset. Basically the ON delay time is not needed to be set.

8.5.1 OPERATING PROCEDURE

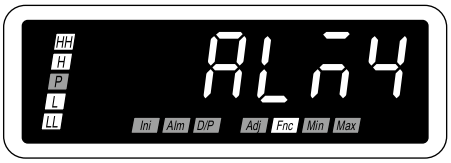


NOTE

- 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.

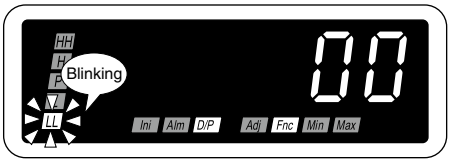


NOTE

- '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.



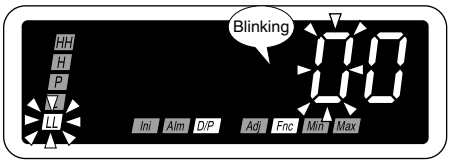
■ L ON delay time ■ H ON delay time ■ HH ON delay time

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.

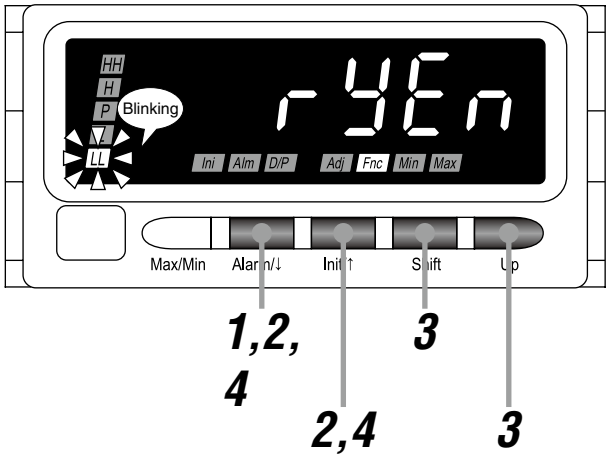
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "8.6 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)".

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

8.6 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.

8.6.1 OPERATING PROCEDURE

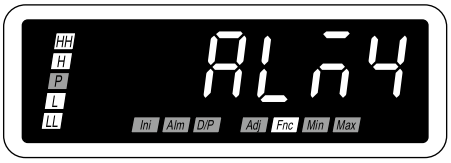


NOTE

- 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.

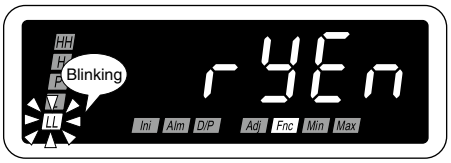


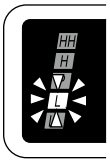
NOTE

- '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.**

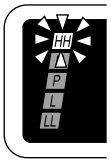
- 'RYEN' is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.





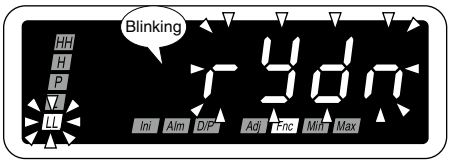
■ L coil at alarm

■ 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 LL (L, H or HH) alarm tone 'OFF' or 'ON' will be indicated 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 "8.7 ALARM TONE".

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

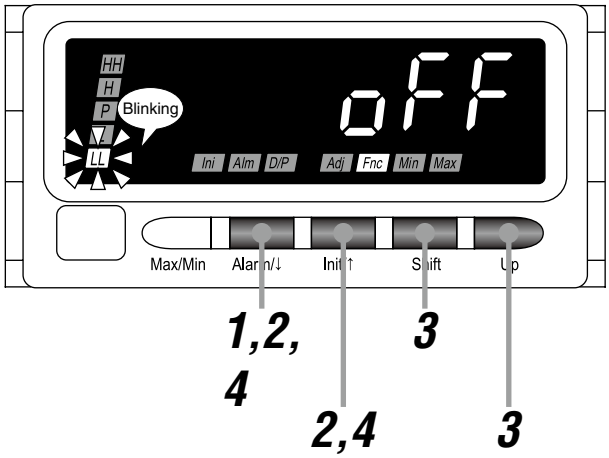
8.7 ALARM TONE

An alarm can be notified by a buzzer sound. Alarm tone 'OFF' or 'ON' can be selected.
The default setting is alarm tone 'OFF'.

NOTE

- Even with alarm tone option 'without', the alarm tone 'ON' can be selected. However the buzzer is not sounded.
- The tone type and volume are fixed.
- The volume depends on individual units.

8.7.1 OPERATING PROCEDURE

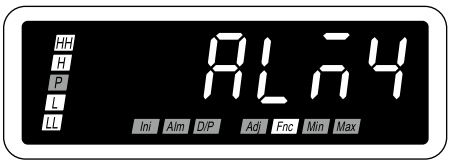


NOTE

- Procedures to change 'OFF' to 'ON' are described here.
- To change 'ON' to 'OFF', the procedures are same. Select 'OFF' in Step 3.
- With "Dual alarm" selected for the alarm point parameter, the LL and HH alarm tones 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.

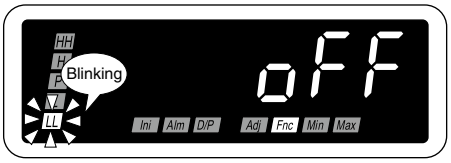


NOTE

- '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.

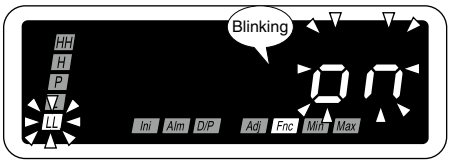
2 **Press Alarm/↓ or Init/↑ button to go to the setting of the LL (L, H or HH) alarm tone.**

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



■ L alarm tone ■ H alarm tone ■ HH alarm tone

3 **Press Shift or Up button to select '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 L (H or HH) alarm setpoint (or main display blinking at alarm) will be indicated within the range of -99999 to 999999 (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) coil at alarm 'RYEN' or 'RYDN' will be indicated depending on the setting.

5 **■ TO GO ON TO SET ANOTHER ALARM TONES,**
Repeat operation from Step 2.

■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "8.8 MAIN DISPLAY BLINKING AT ALARM".

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

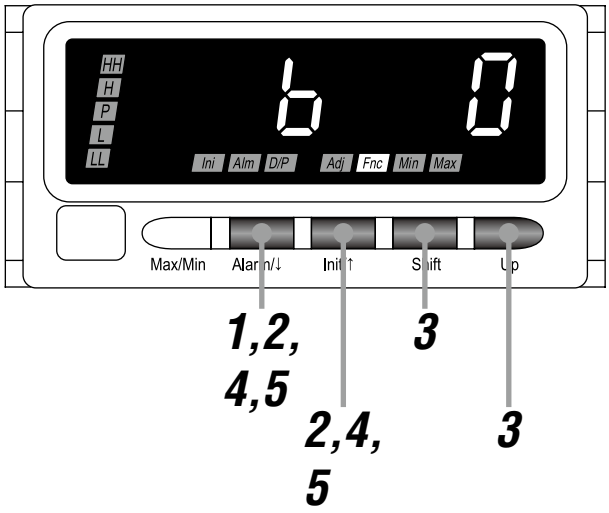
8.8 MAIN DISPLAY BLINKING AT ALARM

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	

8.8.1 OPERATING PROCEDURE

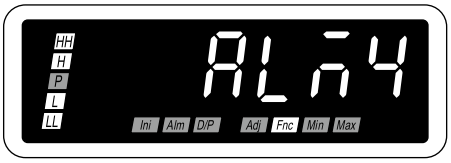


NOTE

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.

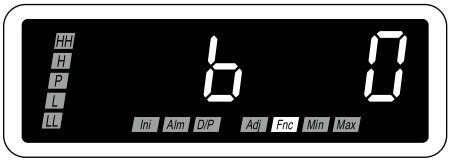


NOTE

- '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.

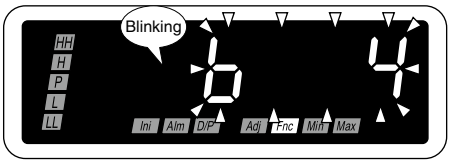


NOTE

'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 alarm tone 'OFF' or '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.**

9. SETTING SCALING FACTOR

The scaling factor of pulse division can be set within the range of 1/1 ('D00001') to 1/99999 ('D99999').
The default setting is 1/1.

NOTE

- When the scaling factor is set to other than 1/1, set the display scaling with the scaled values.
- With the input type set to "counting scaled to 1/100", set the display scaling with the scaled values after scaled to 1/100.
- For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set "input type" to "1 (no counting scaling)".

9.1 SCALING FACTOR

It is convenient to use the scaling factor to increase the display digit number.
For instance, in order to indicate the flow rate in 1 m^3, count 1 for 10 pulses, in spite of the pulse unit of the flow meter 0.1 m^3/p, you can set the scaling factor to 1/1 (default) and the ratio between the input and display scalings to 1/10, or set the scaling factor to 1/10 and the ratio to 1/1. The former method gives max. 5-digit indication and the latter max. 6-digit. In this way, to indicate count 1 for 10 pulses, setting the scaling factor will give more digit numbers to indicate.

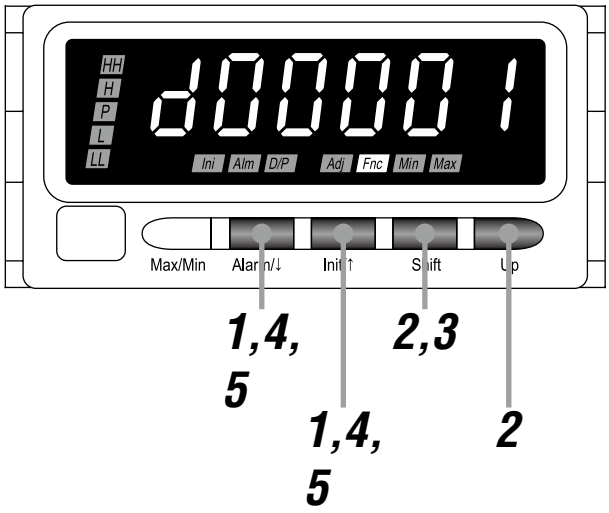
■ SCALING FACTOR 1/1

Input scaling: count 0 – 999999
Display scaling: 0 – 99999 m^3 (max. 5 digits)
Scaling factor: 1/1

■ SCALING FACTOR 1/10

Input scaling: count 0 – 999999
Display scaling: 0 – 999999 m^3 (max. 6 digits)
Scaling factor: 1/10

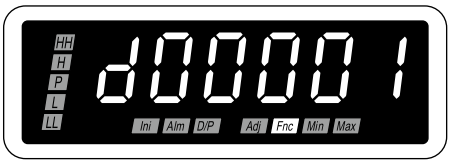
9.2 OPERATING PROCEDURE



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.**

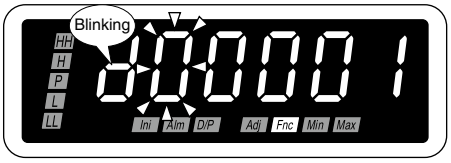


- The scaling factor is indicated.
- 'Fnc' indicator turns on.

NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' depending on the setting.

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



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

3 **Press Shift and Up buttons to set the scaling factor.**

- Set within the range of 'D00001' to 'D99999'.

NOTE

Setting to 'D00000' is not available. Return the setting within the range of 'D00001' to 'D99999'.

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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the overflow count mode 'OV 0', 'OV 1' or 'OV H' will be indicated depending on the setting.
• Press Init/↑ button, and the version indication will be indicated.

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

10. SETTING OVERFLOW COUNT MODE

The overflow count mode “reset and restart at 0”, “reset and restart at 1” or “hold at 100%” can be selected (table below).

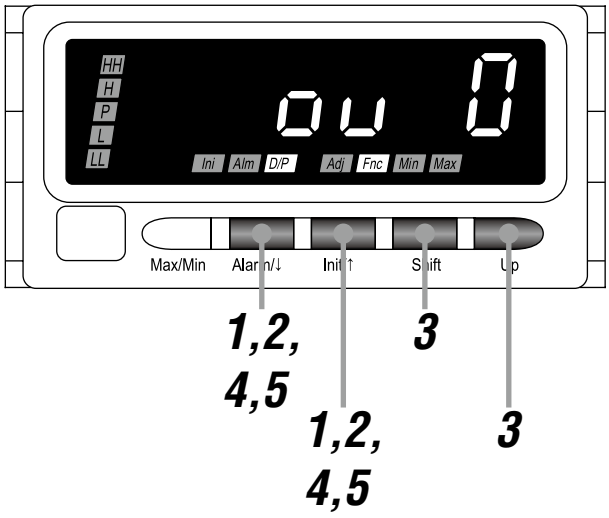
■ OVERFLOW COUNT MODE

DISPLAY	FUNCTION	COUNT ACTION	DEFAULT VALUE
ou 0	Reset and restart at 0	When the display value exceeds the set display scaling value B, the unit resets the count to the set display scaling value A, and restarts counting.	ou 0
ou 1	Reset and restart at 1	When the display value exceeds the set display scaling value B, the unit resets the count to the set display scaling value A + display value per count*1, and restarts counting.	
ou H	Hold at 100%	When the display value exceeds the set display scaling value B, the unit holds the value and the indication blinks.	

*1 Display value per count.

e.g. With the input scaling count 0 – 1000 and display scaling 0.0 – 8500.0 m^3, the display value per count is 8.5 m^3. The reset display value after the overflow is 8.5 m^3. With the scaling factor, the scaled display value per count is indicated. With the display value with 1/100 scaling set to “1/100 scaled value × 100”, the scaled display value per count × 100 is indicated.

10.1 OPERATING PROCEDURE

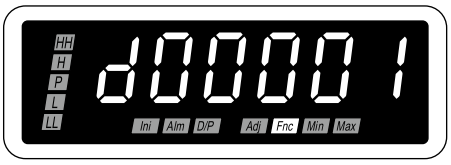


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

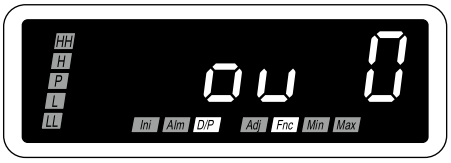


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' depending on the setting.

2 **Press Alarm/↓ or Init/↑ button to go to the overflow count mode setting.**

- The overflow count mode is indicated.
- 'D/P' and 'Fnc' indicators turn on.

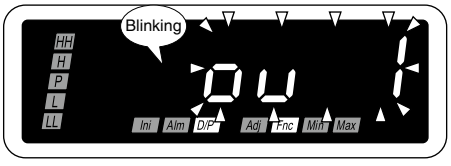


NOTE

'OV 0', 'OV 1' or 'OV H' is indicated depending on the setting.

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

- Select one among 'OV 0', 'OV 1' and 'OV H'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the control input function 'DI R', 'DI H' or 'DI S' will be indicated depending on the setting.
• Press Init/↑ button, and the scaling factor will be indicated within the range of 'D00001' to 'D99999' depending on the setting.

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

11. SETTING CONTROL INPUT FUNCTION

Turning ON the control input terminals while in Measuring Mode resets, holds or inverts the count (table below).

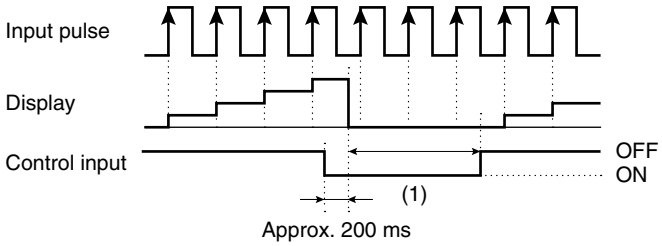
■ CONTROL INPUT FUNCTION

DISPLAY	FUNCTION	COUNT ACTION	DEFAULT VALUE
di r	Reset count	The display value is reset while the control input terminals are turned ON (Figure 1).	di r
di H	Hold count	The display value is held while the control input terminals are turned ON (Figure 2).	
di S	Invert count	The display value is inverted while the control input terminals are turned ON (Figure 3).	

■ DISPLAY VALUE WITH CONTROL INPUT ON/OFF

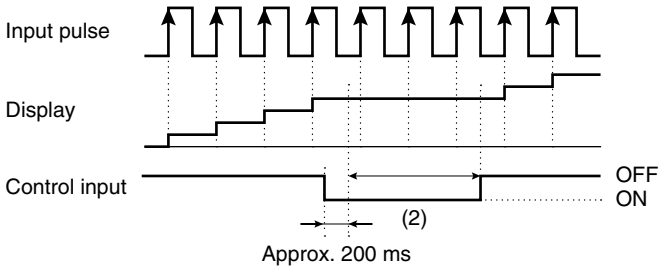
The display value changes as shown in Figures 1 to 3 when the control input terminals are turned ON or OFF while in measuring.
The DC and alarm outputs respond to each action.

Figure 1: Reset count



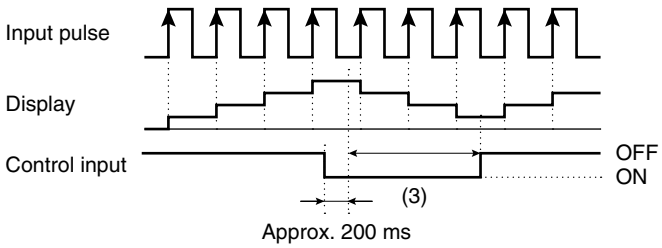
(1) In approximately 200 milliseconds after the control input terminals are turned ON, the display value is reset to the set display scaling value A and held until they are OFF. After the terminals are turned OFF, the unit restarts counting when an input pulse train is detected.

Figure 2: Hold count



(2) In approximately 200 milliseconds after the control input terminals are turned ON, the display value is held until they are OFF. After the terminals are turned OFF, the unit restarts counting when an input pulse train is detected.

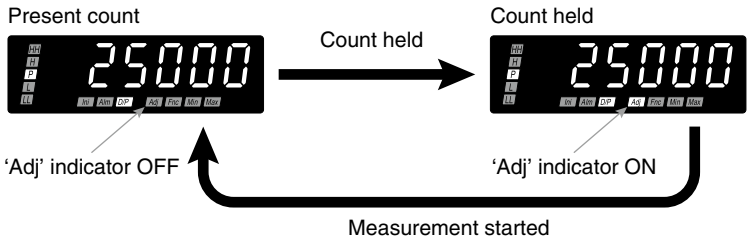
Figure 3: Invert count



(3) In approximately 200 milliseconds after the control input terminals are turned ON, the display value is inverted every time an input pulse train is detected until they are OFF. After the terminals are turned OFF, the unit restarts counting from the inverted value when an input pulse train is detected.

■ **OPERATING PROCEDURE TO TURN ON/OFF CONTROL INPUT TERMINALS**

- Turn ON the control input terminals in Measuring Mode, and the count will act according to the setting.
- Turn OFF the control input terminals to start measuring.

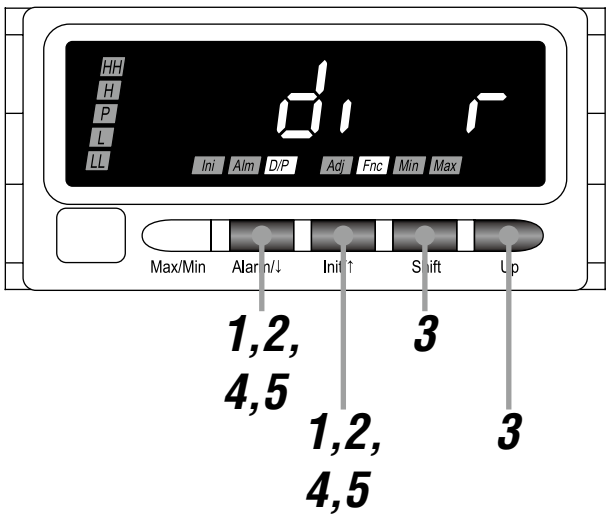


*1 Display example with "hold count". Display depends on the settings and input.

NOTE

- 'D/P' indicator turns on according to the input even while the control input terminals are turned ON.
- Resetting the count is available also with a front button. Refer to 19.3 RESETTING COUNT for details.
- When the count is below the default value (set display scaling value A) in inverting, the unit holds the value with the overflow count mode set to "hold at 100%", or restarts to invert from max. count (set display scaling value B) following the default value with the overflow count mode set to "reset and restart at 0"

11.1 OPERATING PROCEDURE

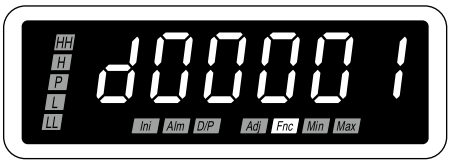


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

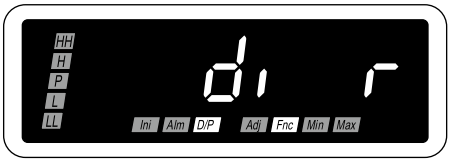


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' depending on the setting.

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

- The control input function is indicated.
- 'D/P' and 'Fnc' indicators turn on.

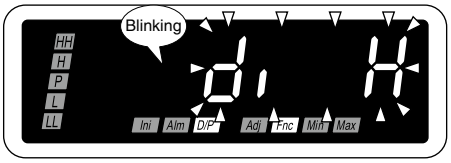


NOTE

'DI R', 'DI H' or 'DI S' is indicated depending on the setting.

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

- Select one among 'DI R', 'DI H' and 'DI S'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the counted pulse edge 'EG UP', 'EG DN' or 'EG UD' will be indicated depending on the setting.
• Press Init/↑ button, and the overflow count mode 'OV 0', 'OV 1' or 'OV H' 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. SETTING COUNTED PULSE EDGE

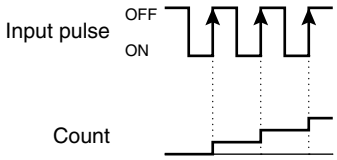
Detecting “rise” (‘EG UP’) of input pulse edges, “sink” (‘EG DN’) or “rise and sink” (‘EG UD’) can be selected.
The default setting is “rise”.

12.1 COUNTING ON PULSE EDGES

The relationship between input pulse according to the type and count is as shown in the following figures. Normally choose “sink” for an open collector input and “rise” for a voltage pulse.

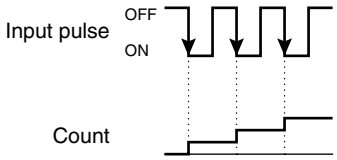
■ OPEN COLLECTOR

• Detecting rise



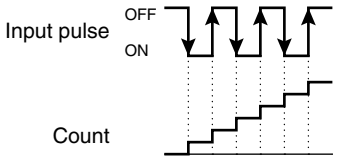
Detecting input pulse ON → OFF

• Detecting sink



Detecting input pulse OFF → ON

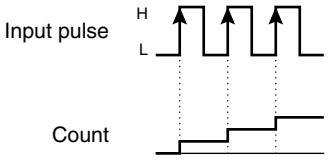
• Detecting rise and sink



Count 2 for 1 pulse

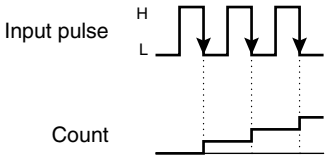
■ VOLTAGE PULSE

• Detecting rise



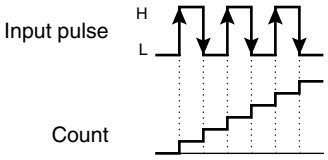
Detecting input pulse L → H

• Detecting sink



Detecting input pulse H → L

• Detecting rise and sink

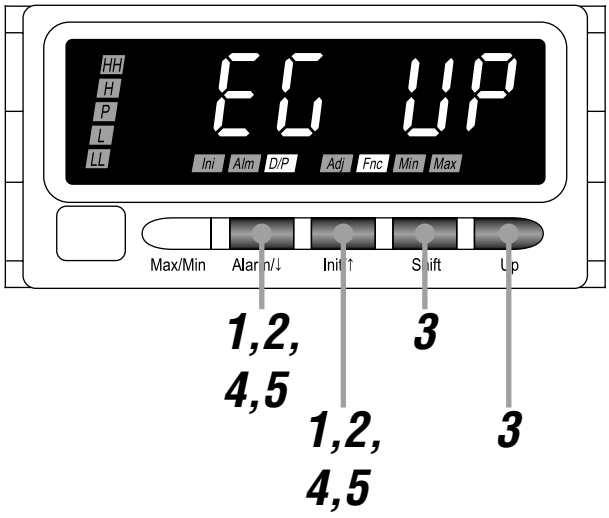


Count 2 for 1 pulse

NOTE

With the counted pulse edge set to “rise and sink”, count 2 is equivalent to one pulse.

12.2 OPERATING PROCEDURE

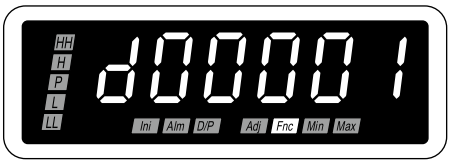


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

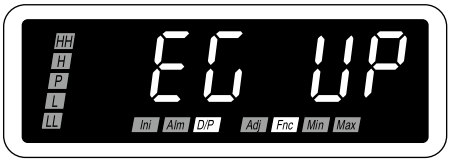


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' depending on the setting.

2 **Press Alarm/↓ or Init/↑ button to go to the counted pulse edge setting.**

- The counted pulse edge is indicated.
- 'D/P' and 'Fnc' indicators turn on.

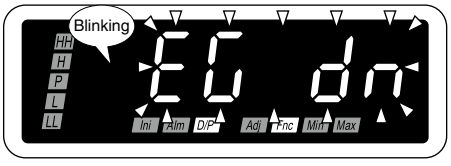


NOTE

'EG UP', 'EG DN' or 'EG UD' is indicated depending on the setting.

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

- Select one among 'EG UP', 'EG DN' and 'EG UD'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the present/max/min count memory 'MMOFF' or 'MM ON' will be indicated depending on the setting.
• Press Init/↑ button, and the control input function 'DI R', 'DI H' or 'DI S' will be indicated depending on the setting.

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

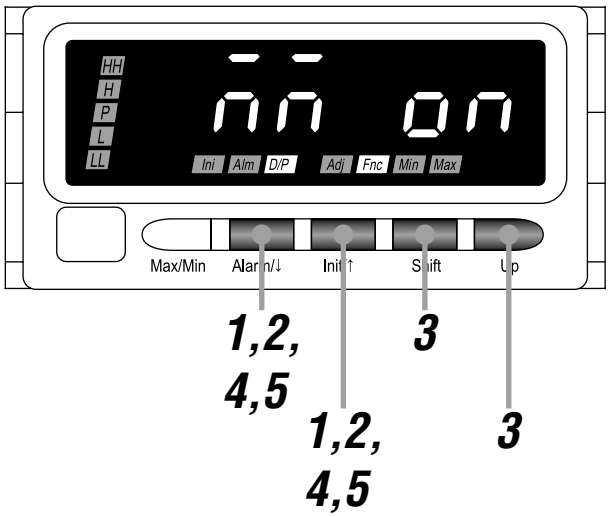
13. SETTING PRESENT/MAX/MIN COUNT MEMORY

The present, max. and min. counts can be “stored at power turned off” (‘MM ON’) or “discarded at power turned off” (‘MMOFF’).
The default setting is “counts stored at power turned off”.

NOTE

The default setting is “discarded at power turned off” in the firmware version lower than V1.06.

13.1 OPERATING PROCEDURE

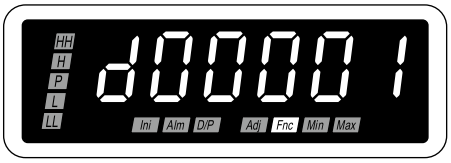


NOTE

- Procedures to change ‘MM ON’ to ‘MMOFF’ are described here.
- To change ‘MMOFF’ to ‘MM ON’, the procedures are same. Select ‘MM ON’ 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 scaling factor is indicated.
- ‘Fnc’ indicator turns on.

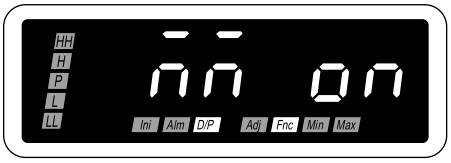


NOTE

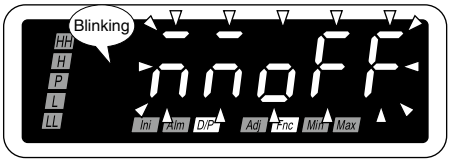
The scaling factor is indicated within the range of ‘D00001’ to ‘D99999’ depending on the setting.

2 **Press Alarm/↓ or Init/↑ button to go to the present/max/min count memory setting.**

- ‘MM ON’ is indicated.
- ‘D/P’ and ‘Fnc’ indicators turn on.



3 **Press Shift or Up button to select ‘MMOFF’.**



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 value with 1/100 scaling 'D 1' or 'D 100' will be indicated depending on the setting.
• Press Init/↑ button, and the counted pulse edge 'EG UP', 'EG DN' or 'EG UD' will be indicated depending on the setting.

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

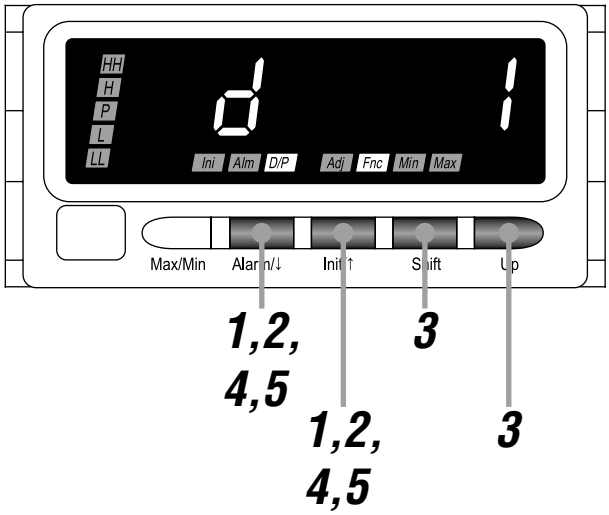
14. SETTING DISPLAY VALUE WITH 1/100 SCALING

When the input type is set to “counting scaled to 1/100”, the display value can be set to “1/100 scaled value” (‘D 1’) or “1/100 scaled value × 100” (‘D 100’).
The default setting is “1/100 scaled value”.

NOTE

- With “1/100 scaled value” setting, 1 is indicated for 100-pulse input, and with “1/100 scaled value × 100”, 100 is indicated. Even with 150-pulse input, for example, 1 is indicated with “1/100 scaled value” setting, and 100 is indicated with “1/100 scaled value × 100”.
- With the input type set to “no counting scaling”, this setting is disabled.
- For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set “input type” to “1 (no counting scaling)”.

14.1 OPERATING PROCEDURE

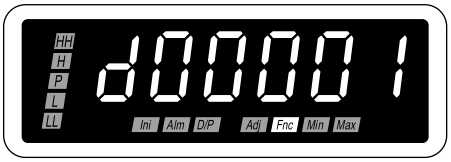


NOTE

- Procedures to change ‘D 1’ to ‘D 100’ are described here.
- To change ‘D 100’ to ‘D 1’, the procedures are same. Select ‘D 1’ 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 scaling factor is indicated.
- ‘Fnc’ indicator turns on.

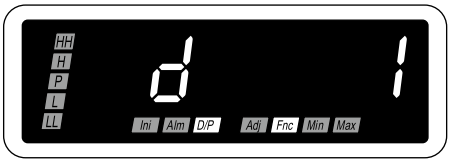


NOTE

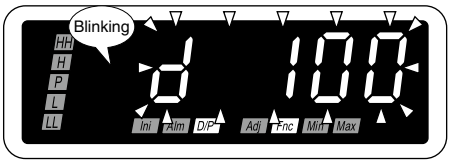
The scaling factor is indicated within the range of ‘D00001’ to ‘D99999’ depending on the setting.

2 **Press Alarm/↓ or Init/↑ button to go to the display value with 1/100 scaling setting.**

- ‘D 1’ is indicated.
- ‘D/P’ and ‘Fnc’ indicators turn on.



3 **Press Shift or Up button to select 'D 100'.**



4 **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 present/max/min count memory 'MMOFF' or 'MM 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.**

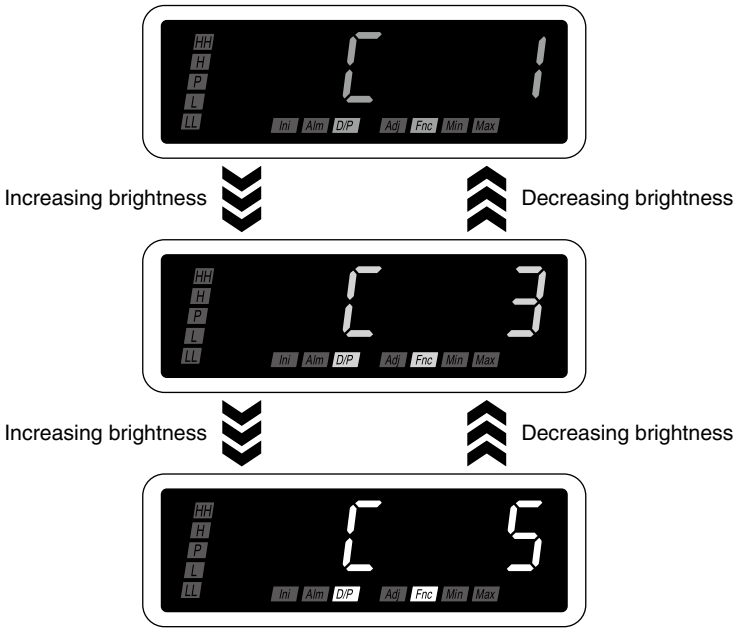
15. ADJUSTING BRIGHTNESS OF DISPLAY

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

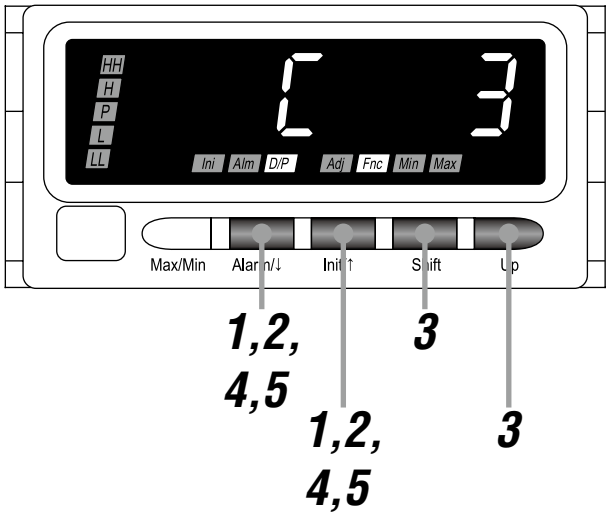
■ DISPLAY BRIGHTNESS

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



15.1 OPERATING PROCEDURE

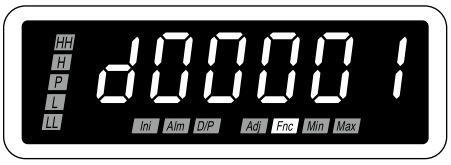


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

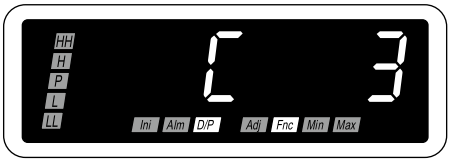


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' 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.

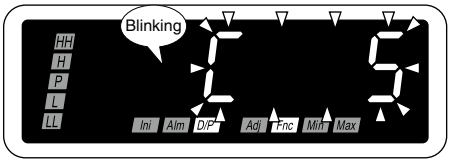


NOTE

'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 display value with 1/100 scaling 'D 1' or 'D 100' 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. 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).

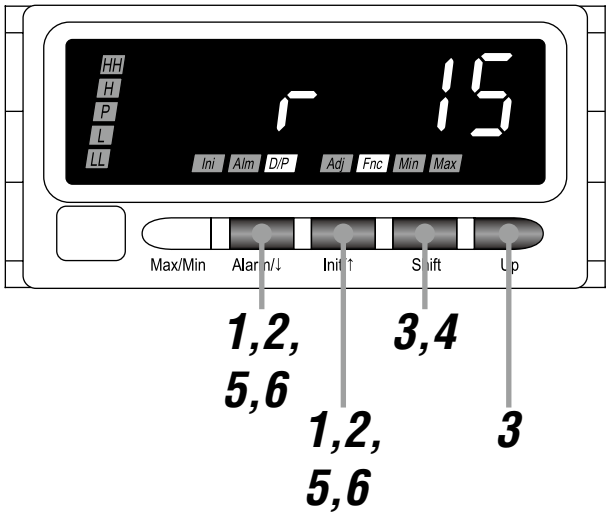
■ TABLE 1: AUTOMATIC RETURN TIME

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

16.1 OPERATING PROCEDURE

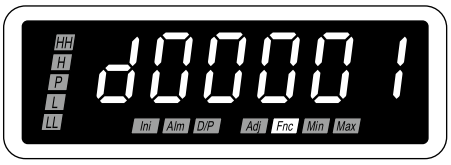


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

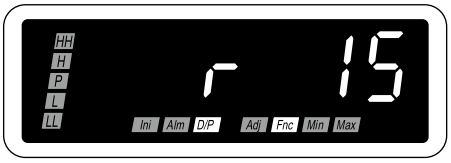


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' 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.

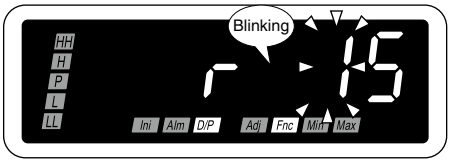


NOTE

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.**

17. ADJUSTING DISPLAY REFRESHING RATE

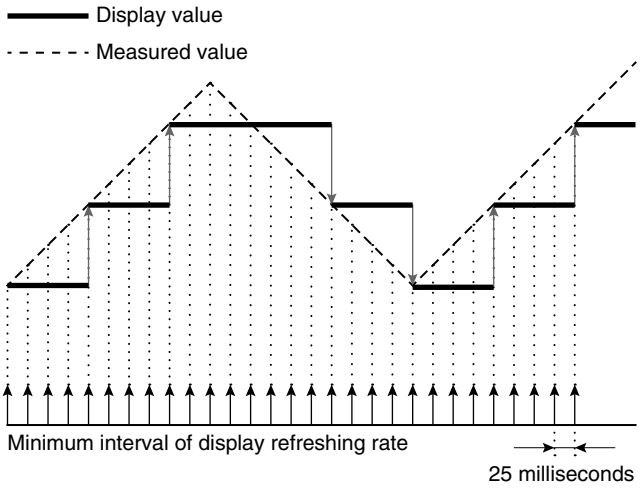
The display refreshing rate can be set within the range of 0.1 to 99.9 seconds. With this value set to 00.0, the refreshing rate will be 25 milliseconds (table below). When the input signal changes rapidly, the display refreshing rate can be slowed to suppress the display flickering.

■ DISPLAY REFRESHING RATE

DISPLAY	FUNCTION	DEFAULT VALUE
F000	25 milliseconds	F000
F001 to F999	0.1 to 99.9 seconds	

■ DISPLAY REFRESHING IMAGE

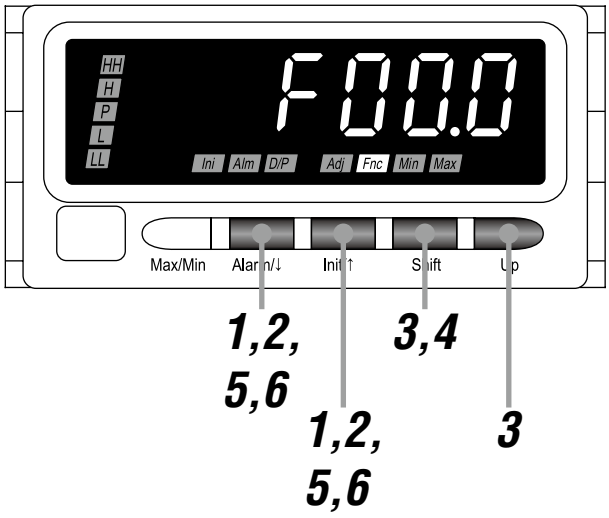
e.g. Refreshing rate 0.1 seconds



NOTE

- The alarm and DC outputs, and MAX/MIN values may not respond if the counter overflows and restarts counting quicker than the display refreshing rate.
- The display refreshing rate setting affects the DC output when the analog output function mode is set to “proportional to the display value”. Refer to 7. SETTING ANALOG OUTPUT FUNCTION for details.

17.1 OPERATING PROCEDURE

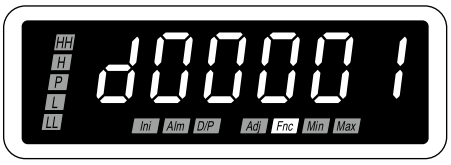


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

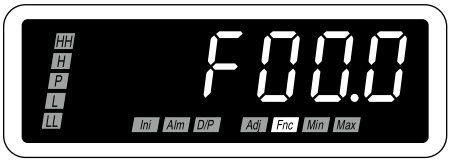


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' 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.

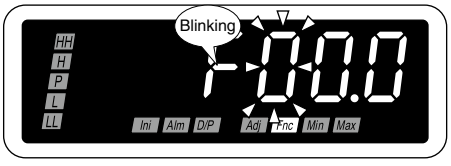


NOTE

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 transition time to Lockout Setting Mode will be indicated within the range of 'P 00' to 'P 99' depending on the setting.

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

18. LOOP TESTING

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

18.1 LOOP TEST OUTPUT RANGE

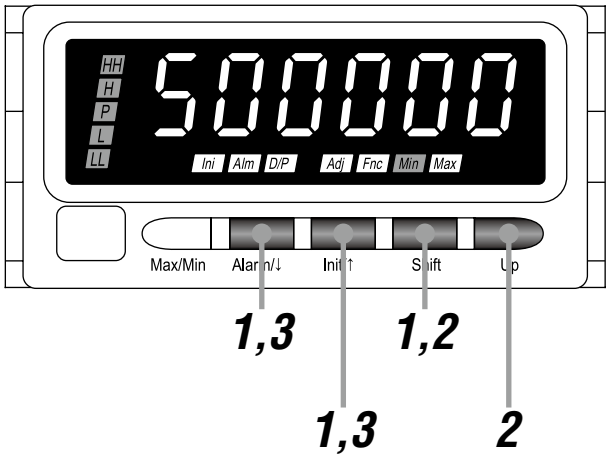
-10 to +110% of the display scaling span can be set manually. Setting below -99999 or over 999999 is not available.

e.g. With the display scaling values 0.00 to 100.00, setting manually within the range of -10.00 to 110.00 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.

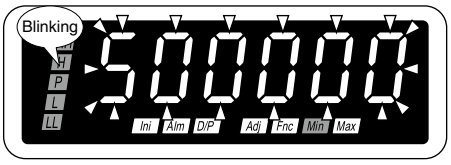
18.2 OPERATING PROCEDURE



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.

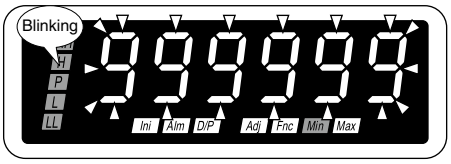
NOTE

The specified decimal point position is applied.

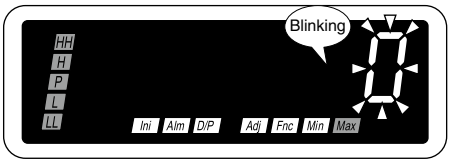
2 **Press Shift and Up buttons to adjust the display value.**

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

■ Increasing display value



■ Decreasing display value



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

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

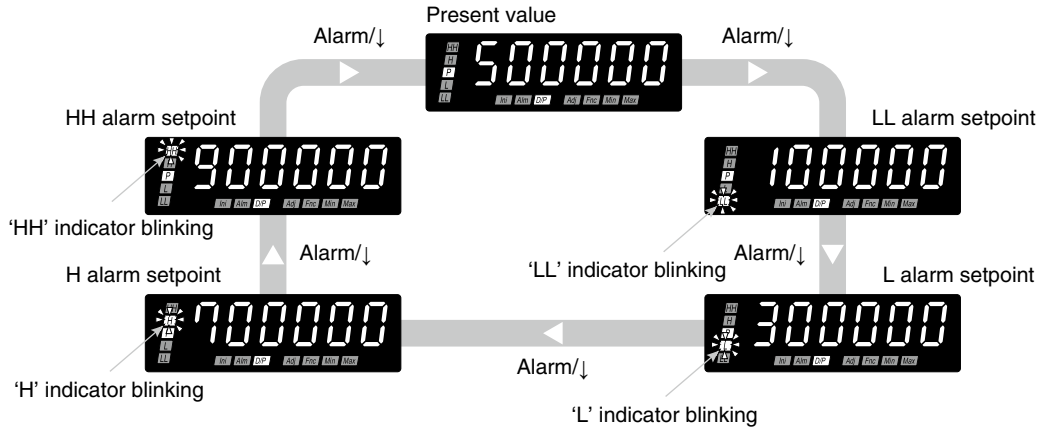
19. USEFUL FUNCTIONS

19.1 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

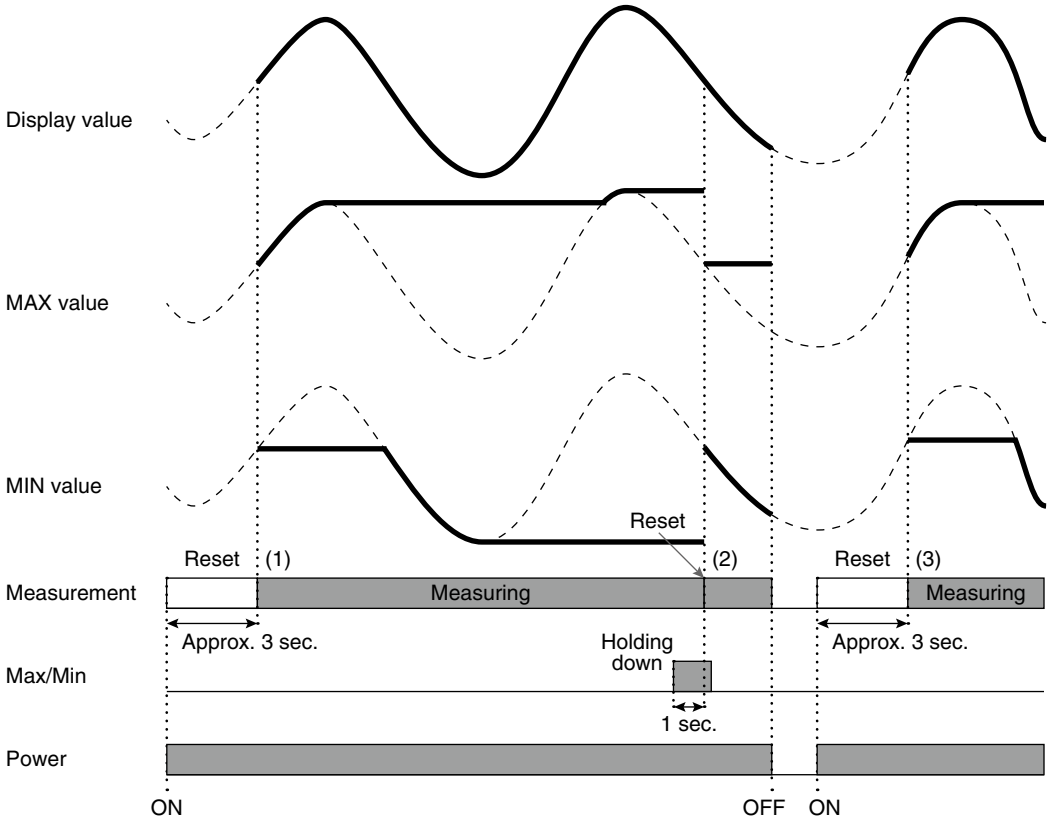
- With the alarm output code '2' (SPDT relay contact, 2 points) or "Dual alarm" selected for the alarm point parameter, the LL and HH alarm setpoints are not indicated.
- The alarm setpoints can be confirmed even when MAX or MIN value is indicated. After confirmation, the indication will be back to MAX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

19.2 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. The following figures show the count action when the present/max/min count memory is set to “counts discarded at power turned off”. When it is set to “counts stored at power turned off”, the internal memory is not reset in (1) and (3).

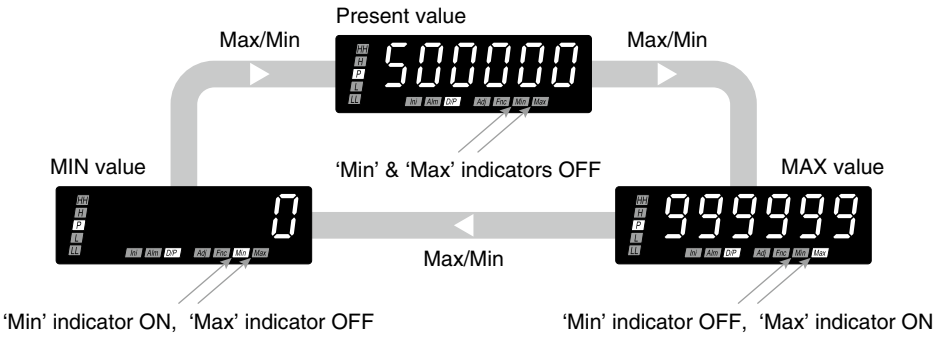


(1) The internal memory is reset for approx. 3 seconds after the power is on, and the unit starts to measure MAX and MIN values.
(2) Hold down Max/Min button for 1 second or more to reset the MAX and MIN values and then the unit starts to measure MAX and MIN values again.
(3) The internal memory is reset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



*1 Display depends on the settings and input.

NOTE

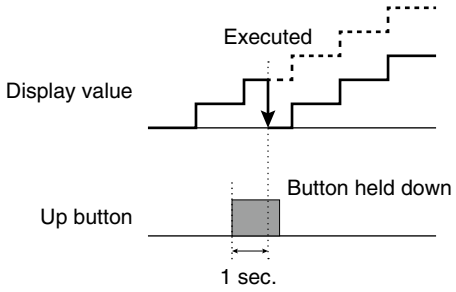
Pressing Max/Min button while in confirming the alarm setpoints switches the indicators however the alarm setpoint indication is maintained.

19.3 RESETTING COUNT

Holding down Up button for 1 second or more while in Measuring Mode resets the display value. Resetting with the control input terminals is also available. Refer to 11. SETTING CONTROL INPUT FUNCTION for details.

■ DISPLAY VALUE IN RESETTING COUNT

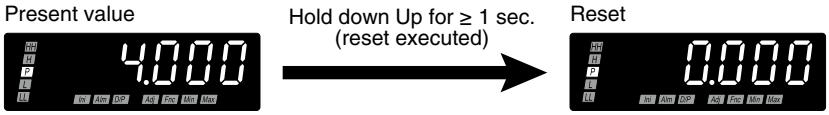
The display value changes as shown in the following figure when the count reset is executed while in measuring.



Hold down Up button to reset the display value to the set display scaling value A.

■ OPERATING PROCEDURE TO RESET COUNT

Hold down Up button for 1 second or more in Measuring Mode to reset the display value.



*1 Display depends on the settings and input.

NOTE

- Resetting the count can be executed while in the MAX/MIN Value Display mode.
- Resetting the count can be executed while in confirming the alarm setpoints.

19.4 LIMITING BUTTON OPERATION

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

■ LOCKOUT SETTING

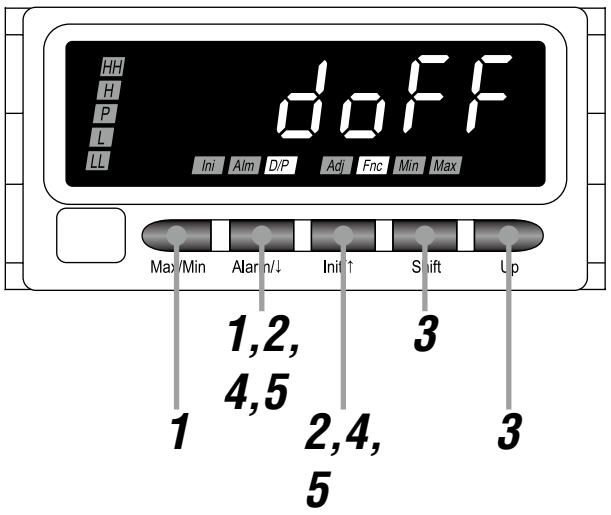
Following 5 lockout settings are available.

PARAMETER	INDICATORS	DISPLAY	FUNCTION	DEFAULT VALUE
Alarm setting lockout	D/P, Fnc	AoFF	Unlock Alarm Setting Mode	AoFF
		A on	Lock Alarm Setting Mode	
Scaling setting lockout		SoFF	Unlock Scaling Setting Mode	SoFF
		S on	Lock Scaling Setting Mode	
Advanced setting lockout		doFF	Unlock Advanced Setting Mode	doFF
		d on	Lock Advanced Setting Mode	
Count resetting lockout (Up button function)		CoFF	Unlock (Enable) Reset Count operation	C on
		C on	Lock (Disable) Reset Count operation	
Loop test output lockout		toFF	Unlock Loop Test Output Mode	toFF
		t on	Lock Loop Test Output Mode	

NOTE

Factory default (initial setting) is “Unlock (Enable) Reset Count operation” for count resetting lockout when version display is lower than V1.07.

19.4.1 OPERATING PROCEDURE

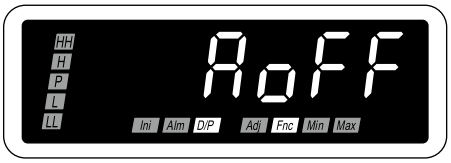


NOTE

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

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

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

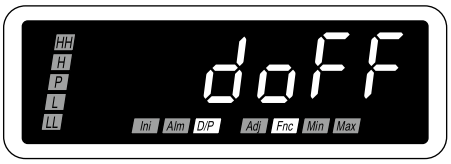


NOTE

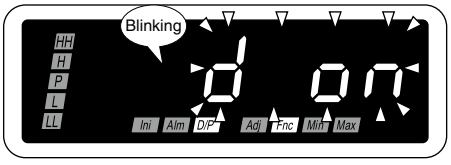
- 'AOFF' or 'A ON' is indicated depending on the setting.
- With no-alarm-output type, the scaling setting lockout 'SOFF' or 'S ON' is indicated depending on the setting.

2 **Press Alarm/↓ or 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

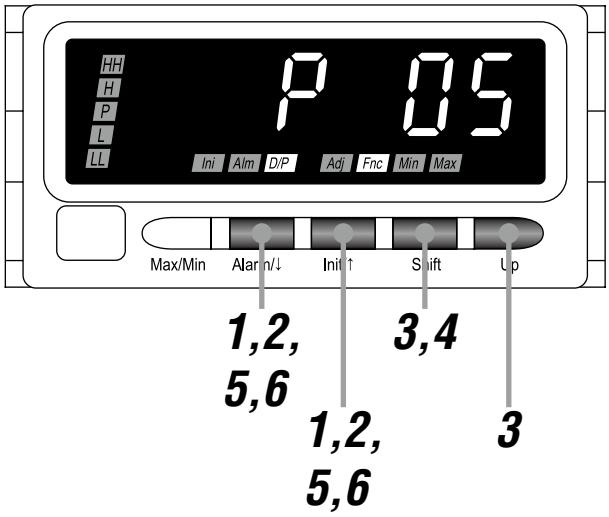
• Press Alarm/↓ button, and the count resetting lockout ‘COFF’ or ‘C ON’ will be indicated depending on the setting.
• Press Init/↑ button, and the scaling setting lockout ‘SOFF’ or ‘S ON’ will be indicated depending on the setting.

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

19.5 TRANSITION TIME TO LOCKOUT SETTING MODE

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

19.5.1 OPERATING PROCEDURE

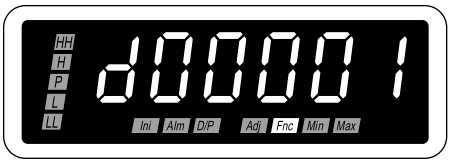


NOTE

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 scaling factor is indicated.
- 'Fnc' indicator turns on.

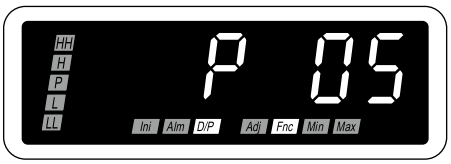


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' 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.

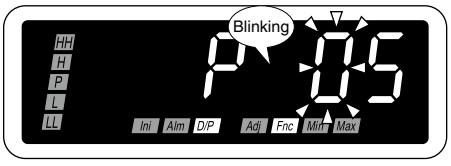


NOTE

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 display refreshing rate will be indicated within the range of 'F00.0' to 'F99.9' 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.**

20. USER CALIBRATION

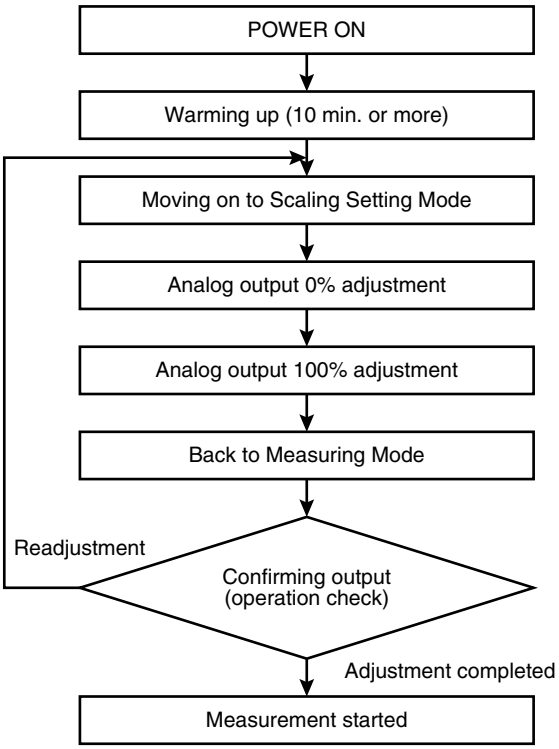
To compensate deviation between the DC output and a device on site, use "Analog Output Adjustment" function.
The unit is calibrated correctly at shipment and therefore there is normally no need for customers to calibrate it.

20.1 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 do 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.

20.1.1 ANALOG OUTPUT ADJUSTMENT FLOW

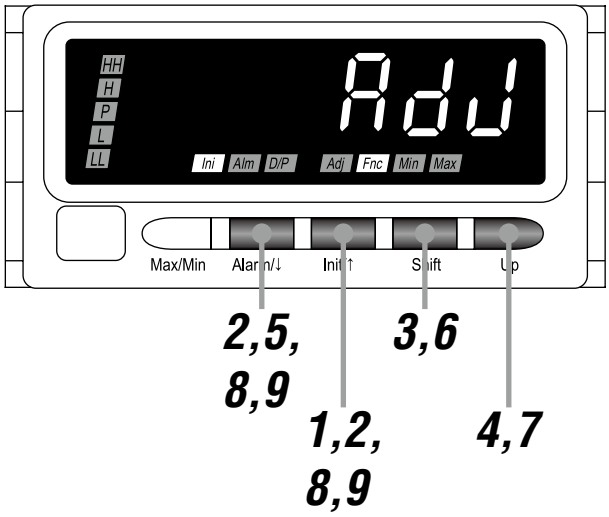
The Analog Output Adjustment is carried out as shown in the following flowchart.



IMPORTANT

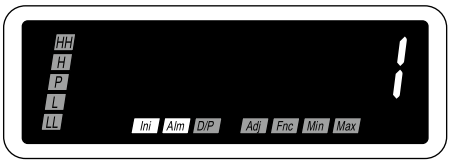
- Warm up measuring instruments, equipment and other devices on site for the time specified in each manual, and operate the unit in a stable condition.
- Adjustable ranges:
  Analog output 0% adjustment -5 to +100%
  Analog output 100% adjustment 0 to 105%
- Adjust analog output 100% in the following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

20.1.2 OPERATING PROCEDURE



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

- The input type is indicated.
- 'Ini' and 'Alm' indicators turn on.



IMPORTANT

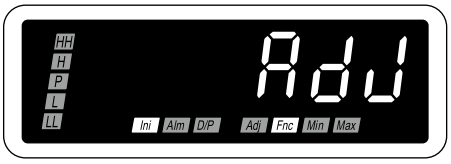
Warm up the unit for 10 minutes or more before carrying out the Analog Output Adjustment.

NOTE

'1' or '100' is indicated depending on the setting.

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

- The analog output 0% adjustment is indicated.
- 'Ini' and 'Fnc' indicators turn ON.

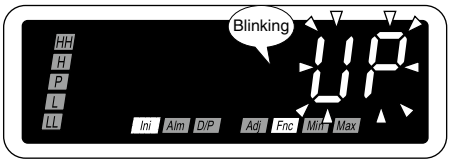


NOTE

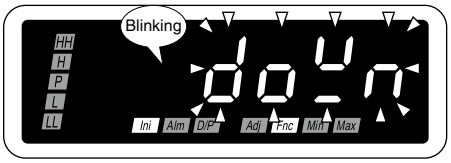
Skip to Step 5 when the analog output 0% adjustment is not necessary.

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

■ Increasing output



■ Decreasing output



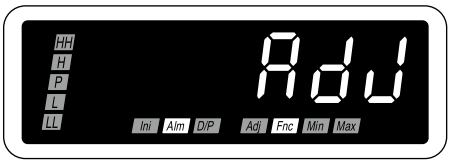
4 **Press Up button until the desired output value.**

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 +100%.

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.
- 'Alm' and 'Fnc' indicators turn on.

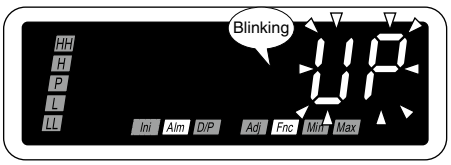


NOTE

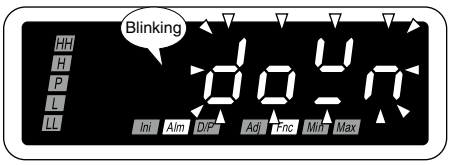
Skip to Step 9 when the analog output 100% adjustment is not necessary.

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

■ Increasing output



■ Decreasing output



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

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 0 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 '1' or '100' will be indicated depending on the setting.
- 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.**

21. 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.

22. TROUBLESHOOTING

22.1 ERROR MESSAGES

MAIN DISPLAY	ERROR MESSAGE	WHAT TO DO
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.

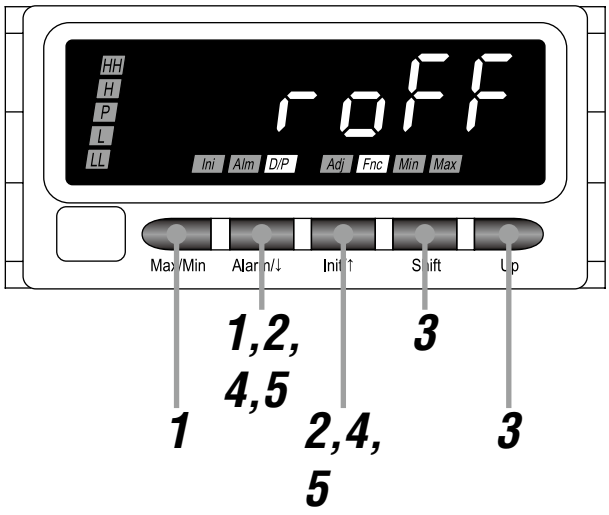
22.2 INITIALIZING SETTING VALUES

To restart setting from the default state, initialization can be used. Refer to attached 23.3 PARAMETER LIST for the default values.

IMPORTANT

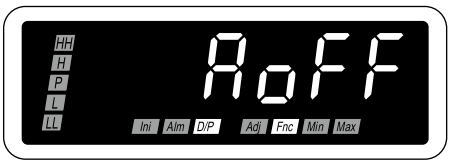
- Currently set parameters will be lost after an initialization. It is recommended to record the parameters before initialization.
- Even if the unit is shipped with the specified parameters with the option code '/SET', such parameters will be lost after an initialization. Be careful that the initialization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

22.2.1 OPERATING PROCEDURE



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

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

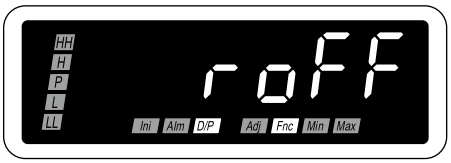


NOTE

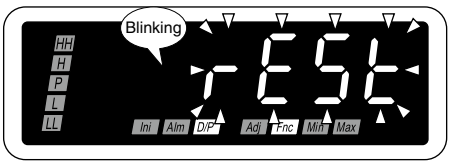
- 'AOFF' or 'A ON' is indicated depending on the setting.
- With no-alarm-output type, the scaling setting lockout 'SOFF' or 'S ON' is indicated depending on the setting.

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

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

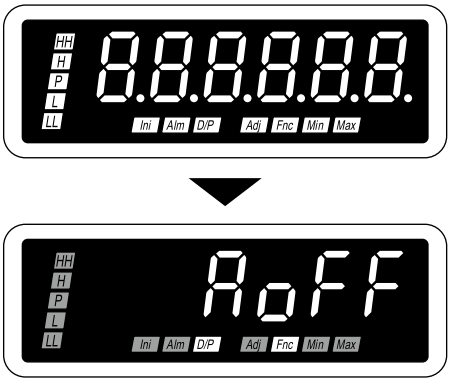


3 **Press Shift or Up button to select 'REST'.**



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

- All the indications turn on for approximately 12 seconds and then the next parameter setting is indicated.



NOTE

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

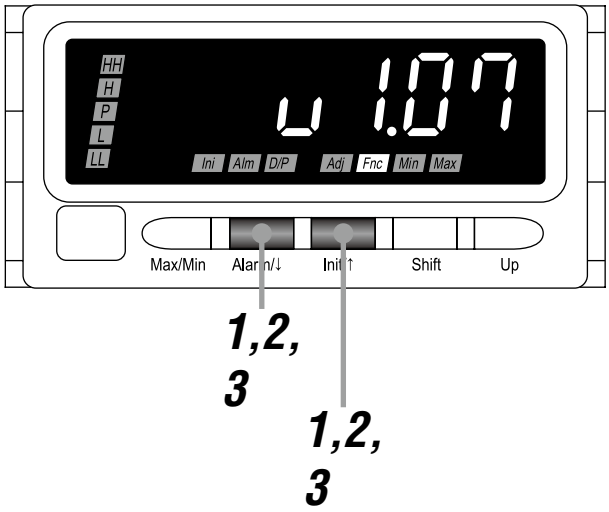
5 **Hold down Alarm/↓ or Init/↑ button for 1 second or more to return to Measuring Mode.**

22.3 CONFIRMING FIRMWARE VERSION

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

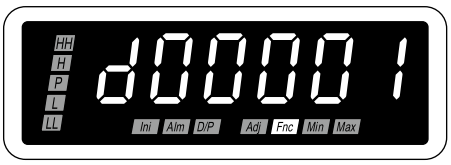
- The display is different from the one described in the operating manual.
- The firmware version is necessary to consult us for troubles.

22.3.1 OPERATING PROCEDURE



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

- The scaling factor is indicated.
- 'Fnc' indicator turns on.

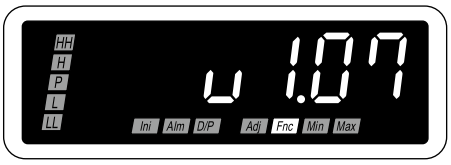


NOTE

The scaling factor is indicated within the range of 'D00001' to 'D99999' 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.**

23. APPENDICES

23.1 SPECIFICATIONS

■ GENERAL SPECIFICATIONS

Construction		Panel flush mounting
Degree of protection		IP66; Applicable to the front of the panel meter mounted according to the specified panel cutout.
Connection		M3 separable screw terminal (torque 0.6 N·m)
Screw terminal		Nickel-plated steel (standard) or stainless steel
Housing material		Flame-resistant resin (gray)
Isolation		Input to DC output to HH output or H output to L output or LL output to power
Setting (front button)	Scaling setting mode	Input type, input scaling value A and B, display scaling value A and B, decimal point position, analog output function mode, analog output 0% adjustment, analog output 100% adjustment
	Alarm setting mode	Alarm point, HH, H, L and LL alarm setpoint, HH, H, L and LL trip action, HH, H, L and LL deadband (hysteresis), HH, H, L and LL ON delay time, HH, H, L and LL coil at alarm, HH, H, L and LL alarm tone, main display blinking at alarm
	Advanced setting mode	Scaling factor, overflow count mode, control input function, counted pulse edge, present/max/min count memory, display value with 1/100 scaling, brightness, automatic return time to Measuring Mode, transition time to Lockout Setting Mode, display refreshing rate, version indication
	Lockout setting mode	Alarm setting lockout, scaling setting lockout, advanced setting lockout, count resetting lockout, loop test output lockout, initialization
	Loop test output	----
Lockout setting		Prohibiting certain operations; protecting settings

■ DISPLAY

Display		16 mm (.63) high, 6 digits, 7-segment LED
Display range		-99999 to 999999
Decimal point position		10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5},or none
Zero indication		Higher-digit zeros are suppressed
Overflow count modes	Reset	Reset and restart at 0 or 1 (scaling values at factory setting)
	Hold	Hold at 100%; display blinking
Input indication		'D/P' turns on for 1 second after a valid pulse train has been detected (applied to 1/100 scaled signal if the input type is selected). 'Adj' turns on with control input.
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

Sensor excitation		12 V DC ±10%, 30 mA Current limit protection at approx. 60 mA	
Open collector	Maximum frequency	100 Hz 10 kHz for Input type setting of 1/100 counting scale	
	Minimum pulse width requirements	5 µsec. for both ON and OFF	
	Detecting voltage/current	Approx. 8 V DC @ 1.6 mA	
	Detecting levels	≤ 300 Ω / 0.6 V for ON; ≥ 10 kΩ / 4.5 V for OFF	
Voltage pulse	Maximum frequency	100 Hz 10 kHz for Input type setting of 1/100 counting scale	
	Minimum pulse width requirements	5 µsec. for both ON and OFF	
	Voltage range	0 – 5 through 26.4 V ±5 – ±26.4 V (equal amplitude at both poles)	
	Waveform	Square (detecting sinking pulse edges)	
	Input impedance	≥ 10 kΩ	
	Low level	-26.4 – +0.6 V DC	
	High level	4.5 – 26.4 V DC	
Mechanical contact	Maximum frequency	1 Hz	
	Minimum pulse width requirements	500 msec. for both ON and OFF	
	Detecting voltage/current	Approx. 8 V DC @ 1.6 mA	
	Detecting levels	≤ 300 Ω / 0.6 V for ON; ≥ 10 kΩ / 4.5 V for OFF	
Control input		Reset count, hold count or invert count (selectable function)	
	Open collector	Detecting voltage	12 V DC ±10%
		Detecting levels	≤ 0.6 V for ON; ≥ 4.5 V for OFF
		Detecting time	≥ 200 msec.
	Voltage output type	Voltage range	0 – 5 through 26.4 V ±5 – ±26.4 V (equal amplitude at both poles)
		Low level	-26.4 – +0.6 V DC
		High level	4.5 – 26.4 V DC
		Detecting time	≥ 200 msec.

■ 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

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

■ STANDARDS & APPROVALS

EU conformity	EMC Directive EMI EN 61000-6-4 EMS EN 61000-6-2 Low Voltage Directive EN 61010-1 Measurement Category II (alarm output) Installation Category II (power) Pollution degree 2 Input or DC output to alarm output to power: Reinforced insulation (300 V) Input to DC output: Basic insulation (300 V) RoHS Directive
Protection against access to the terminal blocks	Finger protection (VDE 0660-514)

23.2 MODEL NUMBERING

Code number: **47LPQ–[1][2][3][4]–[5][6]**

[1] INPUT
- 1: Open collector or voltage pulse
- 2: Mechanical contact

[2] 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.)

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

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

[5] 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.)

[6] OPTIONS

Alarm Tone
- Blank: Without
- /B: With (selectable only with alarm output)

Other 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-9516)

23.3 PARAMETER LIST

MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Measuring	Present value	-99999 – 999999	HH, H, P, L, LL (D/P)	----	----	*1	User-defined
	MAX value	-99999 – 999999	Max (D/P)	----	----	*1	User-defined
	MIN value	-99999 – 999999	Min (D/P)	----	----	*1	User-defined
	LL alarm setpoint	-99999 – 999999	LL (D/P)	----	----	*1	User-defined
	L alarm setpoint	-99999 – 999999	L (D/P)	----	----	*1	User-defined
	H alarm setpoint	-99999 – 999999	H (D/P)	----	----	*1	User-defined
	HH alarm setpoint	-99999 – 999999	HH (D/P)	----	----	*1	User-defined
Scaling setting	Input type	1, 1/100	Inl, Alm	1, 100	1	----	----
	Input scaling value A	000000	Inl	000000	000000	----	count
	Display scaling value A	-99999 – 999999	Inl, D/P	-99999 to 999999	000000	*1	User-defined
	Input scaling value B	000000 – 999999	Alm	000000 to 999999	999999	----	count
	Display scaling value B	-99999 – 999999	Alm, D/P	-99999 to 999999	999999	*1	User-defined
	Decimal point position	No decimal point, or 10^{-1} to 10^{-5}	D/P	999999, 99999.9, 9999.99, 999.999, 99.9999, 9.99999	999999	----	----
	Analog output function mode	Proportional to the display value, Proportional to the scaling value	Fnc	di.SP, SCLE	di.SP	----	----
	Analog output 0% adjustment	Adjustable range -5 to +100%	Inl, Fnc	AdJ: UP (increasing) doWn (decreasing)	0% output	----	----
	Analog output 100% adjustment	Adjustable range 0 to 105%	Alm, Fnc	AdJ: UP (increasing) doWn (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	-99999 – 999999	LL, Fnc	-99999 to 999999	100000	*1	User-defined
	LL trip action	High trip, low trip	LL, Fnc	LnHi, LnLo	LnLo	----	----
	LL deadband (hysteresis)	0000 – 9999	P, LL, Fnc	0000 to 9999	0001	----	User-defined
	LL ON delay time	00 – 99	LL, D/P, Fnc	00 to 99	00	----	Second
	LL coil at alarm	Coil energized at alarm, de-energized at alarm	LL, Fnc	rYEn, rYdn	rYEn	----	----
	LL alarm tone	OFF, ON	LL, Fnc	oFF, on	on	----	----
	L alarm setpoint	-99999 – 999999	L, Fnc	-99999 to 999999	300000	*1	User-defined
	L trip action	High trip, low trip	L, Fnc	LnHi, LnLo	LnLo	----	----
	L deadband (hysteresis)	0000 – 9999	P, L, Fnc	0000 to 9999	0001	----	User-defined
	L ON delay time	00 – 99	L, D/P, Fnc	00 to 99	00	----	Second
	L coil at alarm	Coil energized at alarm, de-energized at alarm	L, Fnc	rYEn, rYdn	rYEn	----	----
	L alarm tone	OFF, ON	L, Fnc	oFF, on	oFF	----	----

*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: After a valid pulse train has been detected, 'D/P' indicator turns on for 1 second in Measuring Mode.
NOTE 3: INDICATOR: □ = ON, ▯ = Blinking
NOTE 4: For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set "input type" to "1 (no counting scaling)".
NOTE 5: 1 and 2 in the column of Alarm point in Alarm Setting Mode show alarm output codes.
NOTE 6: The indicators in parentheses in the column of Alarm point in Alarm Setting Mode show those with dual alarm selected.

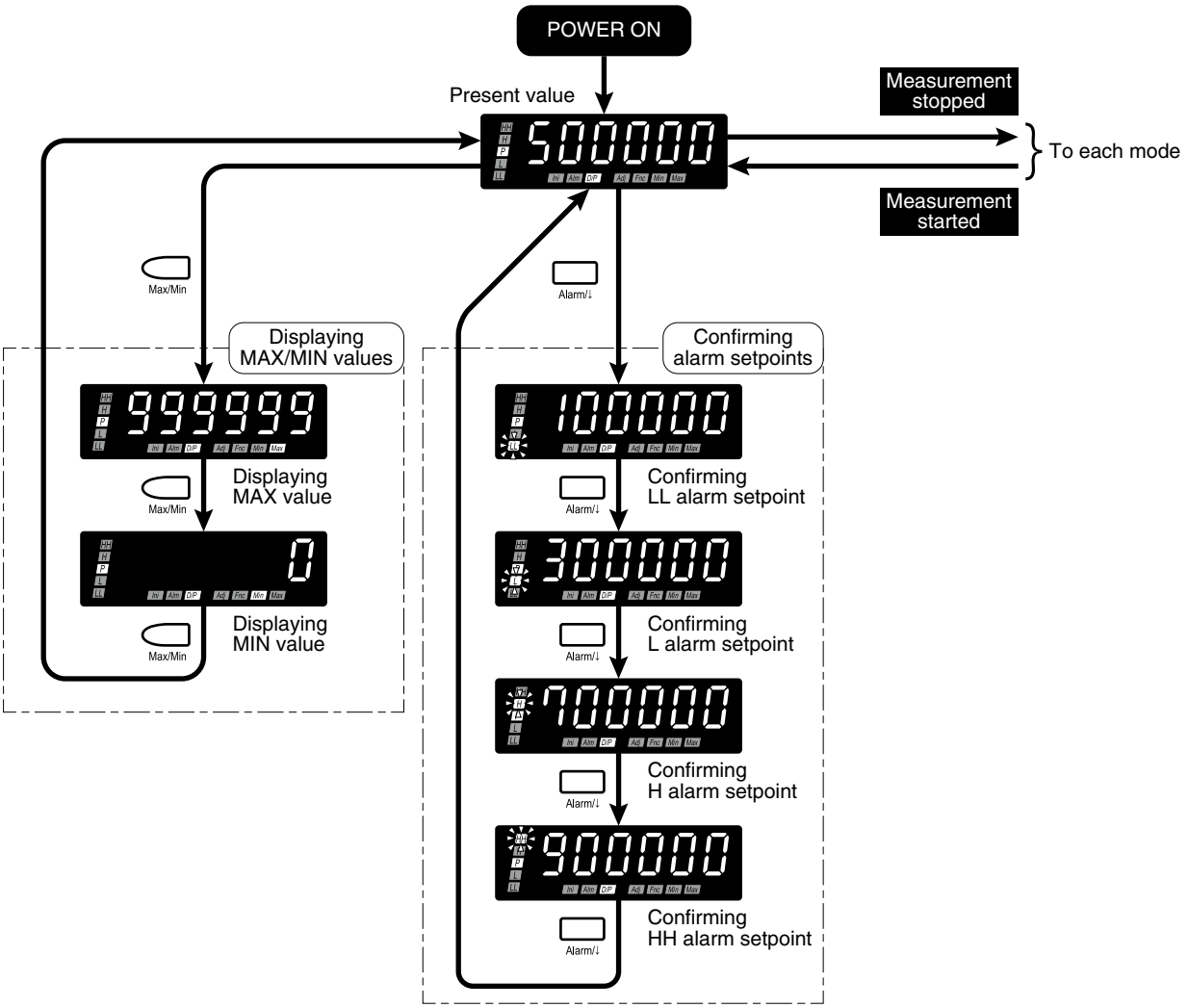
MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Alarm setting	H alarm setpoint	-99999 – 999999	H, Fnc	-99999 to 999999	000000	*1	User-defined
	H trip action	High trip, low trip	H, Fnc	LoHi, LoLo	LoHi	----	----
	H deadband (hysteresis)	0000 – 9999	H, P, Fnc	0000 to 9999	0001	----	User-defined
	H ON delay time	00 – 99	H, D/P, Fnc	00 to 99	00	----	Second
	H coil at alarm	Coil energized at alarm, de-energized at alarm	H, Fnc	rYEn, rYdn	rYEn	----	----
	H alarm tone	OFF, ON	H, Fnc	oFF, on	oFF	----	----
	HH alarm setpoint	-99999 – 999999	HH, Fnc	-99999 to 999999	000000	*1	User-defined
	HH trip action	High trip, low trip	HH, Fnc	LoHi, LoLo	LoHi	----	----
	HH deadband (hysteresis)	0000 – 9999	HH, P, Fnc	0000 to 9999	0001	----	User-defined
	HH ON delay time	00 – 99	HH, D/P, Fnc	00 to 99	00	----	Second
	HH coil at alarm	Coil energized at alarm, de-energized at alarm	HH, Fnc	rYEn, rYdn	rYEn	----	----
	HH alarm tone	OFF, ON	HH, Fnc	oFF, on	oFF	----	----
	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	Scaling factor	1/1 to 1/99999	Fnc	d00001 to d99999	d00001	----	----
	Overflow count mode	Reset and restart at 0, reset and restart at 1, hold at 100%	D/P, Fnc	ou 0, ou 1, ou H	ou 0	----	----
	Control input function	Reset count, hold count, invert count	D/P, Fnc	di r, di H, di S	di r	----	----
	Counted pulse edge	Rise (on –> off), sink (off –> on), rise and sink	D/P, Fnc	EG UP, EG dn, EG Ud	EG UP	----	----
	Present/Max/Min count memory	Counts stored at power turned off, counts discarded at power turned off	D/P, Fnc	nn on, nnoFF	nn on	----	----
	Display value with 1/100 scaling	1/100 scaled value, 1/100 scaled value x 100	D/P, Fnc	d 1, d 100	d 1	----	----
	Brightness	1 (dark) to 5 (bright)	D/P, Fnc	C 1, C 2, C 3, C 4, C 5	C 3	----	----
	Automatic return time to Measuring Mode	00 (automatic return disabled) 01 – 99	D/P, Fnc	r 00 to r 99	r 15	----	Second
	Transition time to Lock-out Setting Mode	00 – 99	D/P, Fnc	P 00 to P 99	P 05	----	Second
	Display refreshing rate	00.0 – 99.9	Fnc	F000 to F999	F000	----	Second
	Version indication	----	Fnc	----	----	----	----
Lockout setting	Alarm setting lockout	OFF, ON	D/P, Fnc	AoFF, A on	AoFF	----	----
	Scaling setting lockout	OFF, ON	D/P, Fnc	SoFF, S on	SoFF	----	----
	Advanced setting lockout	OFF, ON	D/P, Fnc	doFF, d on	doFF	----	----
	Count resetting lockout (Up button function)	OFF, ON	D/P, Fnc	CoFF, C on	C on	----	----
	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	-99999 – 999999	Ini, Alm, D/P, Adj, Fnc, Max / Min	-99999 to 999999 (display blinking)	----	*1	User-defined

*1 Conforms to decimal point position setting.

NOTE 3: INDICATOR: □ = ON, [ ] = Blinking

23.4 PARAMETER MAP

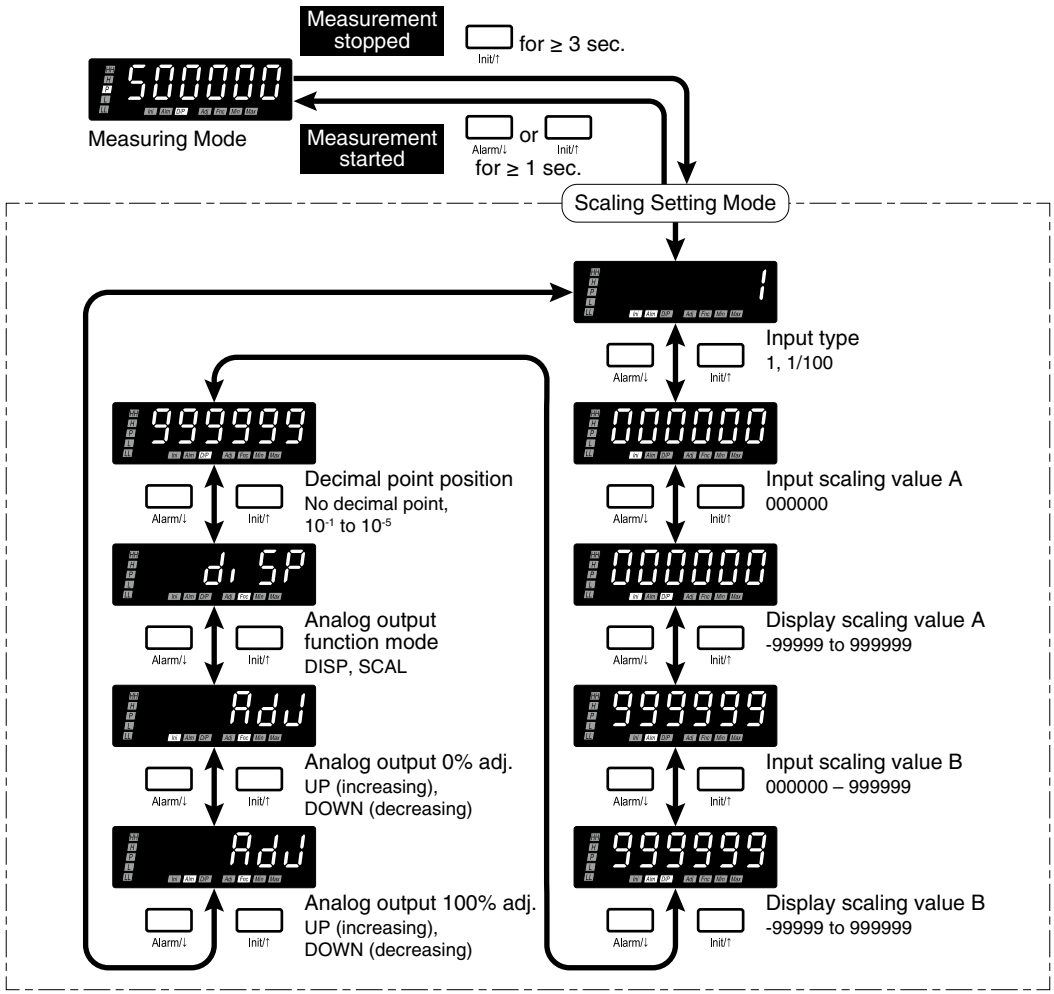
23.4.1 OPERATION IN MEASURING MODE



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.

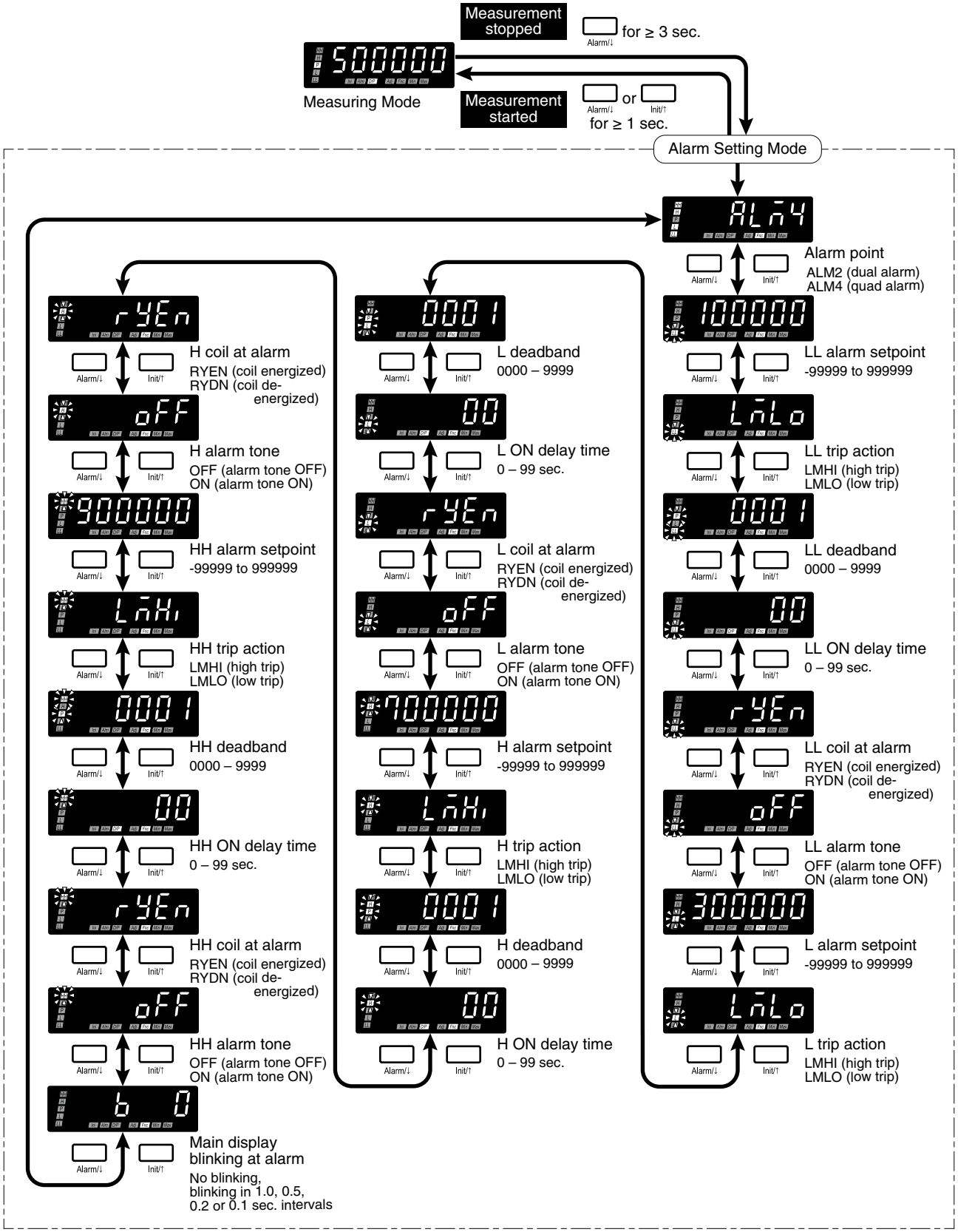
23.4.2 SCALING SETTING MODE



NOTE

- The display depends on the settings and input.
- The analog output parameters are not indicated with no-DC-output type.
- For input code: 2 (model: 47LPQ-2xxx-xx), frequency not lower than approx. 5 Hz is not acquired. Set “input type” to “1 (no counting scaling)”.

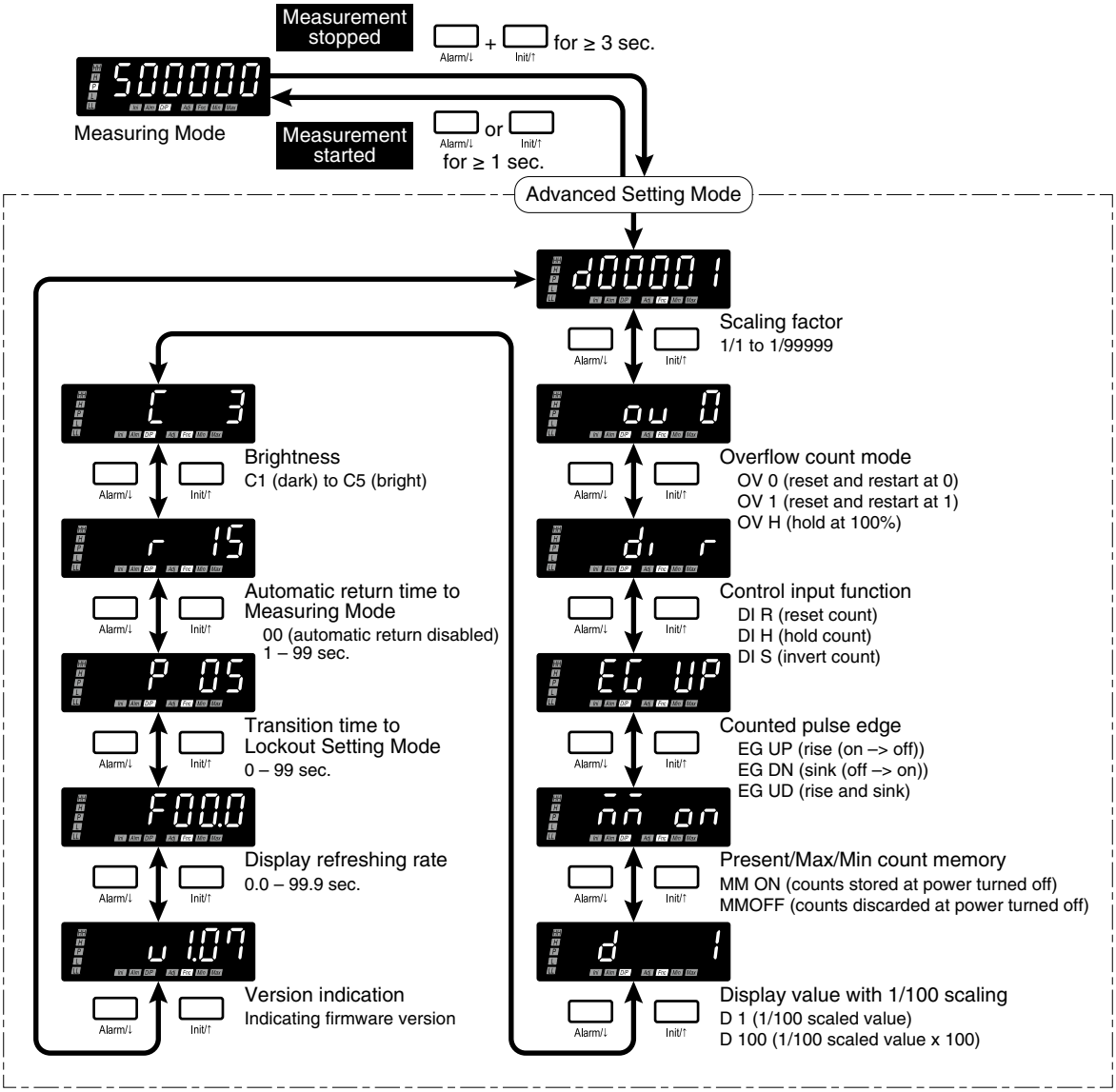
23.4.3 ALARM SETTING MODE



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.

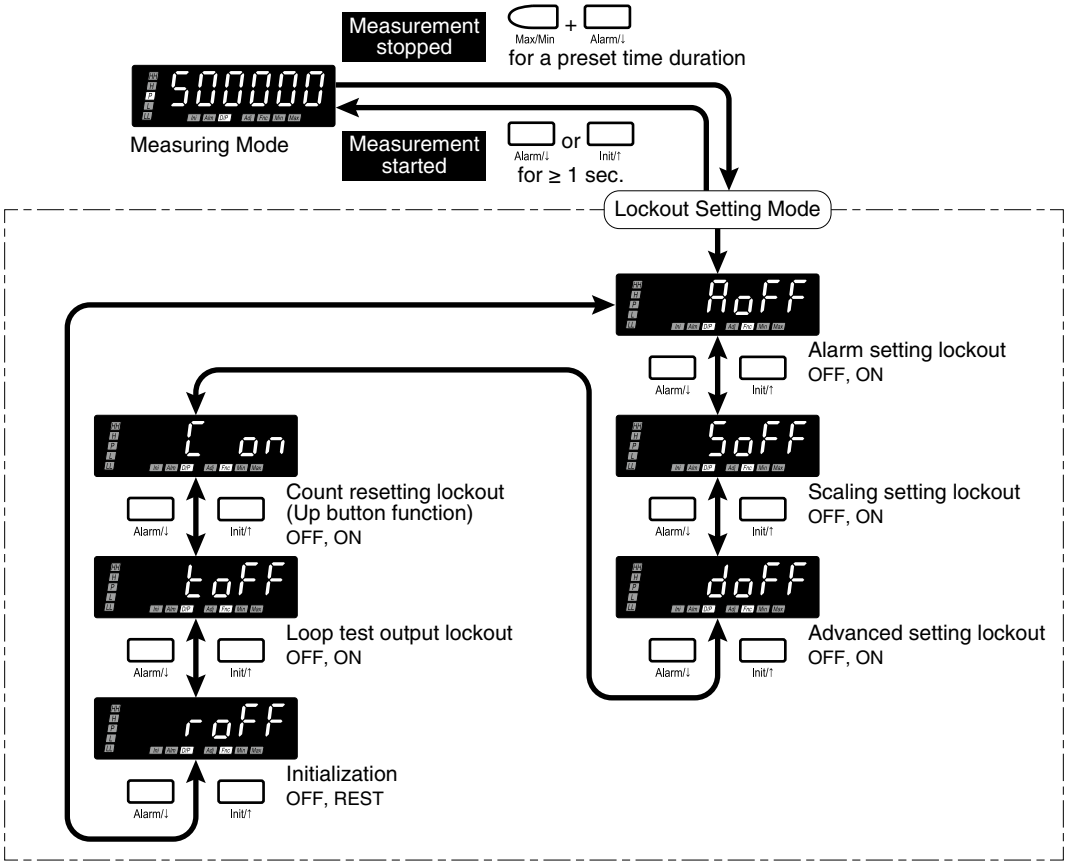
23.4.4 ADVANCED SETTING MODE



NOTE

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

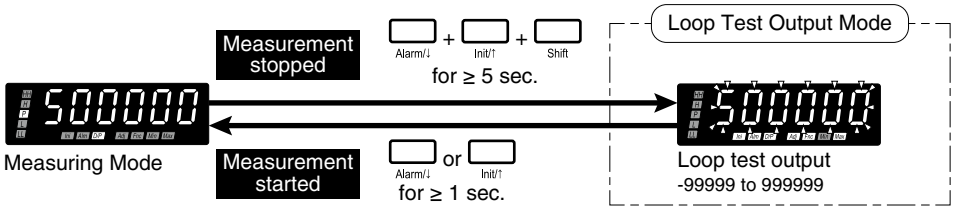
23.4.5 LOCKOUT SETTING MODE



NOTE

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

23.4.6 LOOP TEST OUTPUT MODE

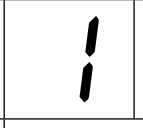
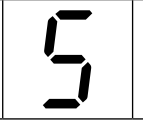
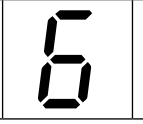


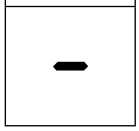
NOTE

The display depends on the settings and input.

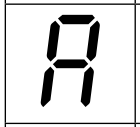
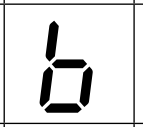
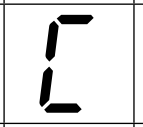
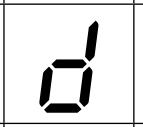
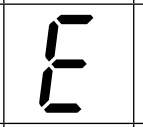
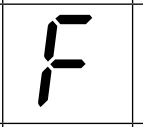
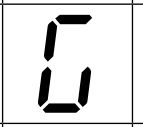
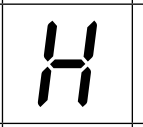
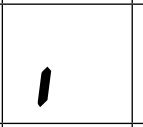
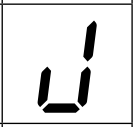
23.5 CHARACTER SET

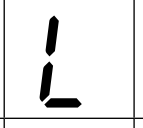
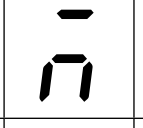
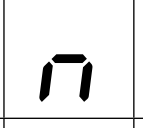
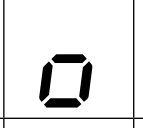
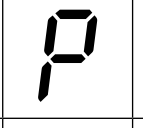
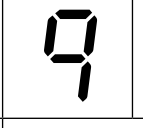
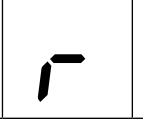
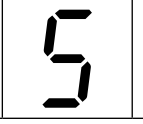
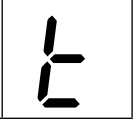
■ **NUMERALS AND NEGATIVE SIGN**

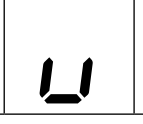
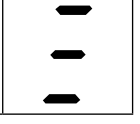
0	1	2	3	4	5	6	7	8	9
									

-


■ **ALPHABET**

A	B	C	D	E	F	G	H	I	J
									

K	L	M	N	O	P	Q	R	S	T
									

U	V	W	X	Y	Z
					

23.6 DIFFERENCES IN FIRMWARE VERSIONS

A certain default setting depends on the firmware versions.

23.6.1 DEFAULT SETTING

■ PRESENT/MAX/MIN COUNT MEMORY

In the firmware version lower than 1.06, “counts discarded at power turned off” is the default setting. Therefore the counts are reset when the power is turned off. In the firmware version 1.06 or later, “counts stored at power turned off” is the default setting.

■ COUNT RESETTING LOCKOUT

In the firmware version lower than 1.07, the counts are reset when UP button is pressed and held mistakenly because “Unlock (Enable) Reset Count operation” is initial setting. In the firmware version 1.07 or later, initial setting is “Lock (Disable) Reset Count operation” so that the counts are not reset when UP button is pressed and held mistakenly.