Digital Panel Meters 47 Series

DC INPUT DIGITAL PANEL METER

(5 1/2 digit, LCD display type)

Model: 47DV

OPERATING MANUAL

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CONTENTS

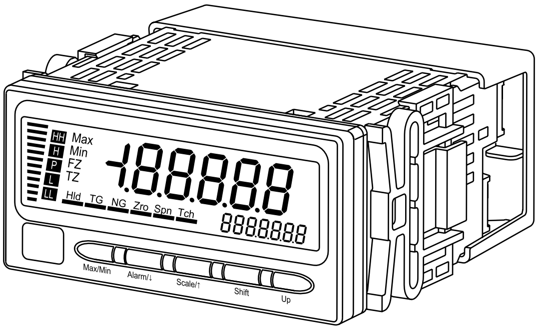
1. INTRODUCTION

1.1 BEFORE USE....

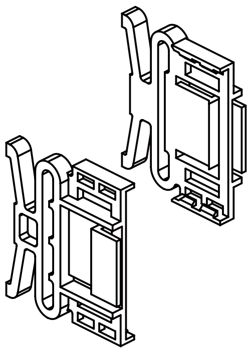
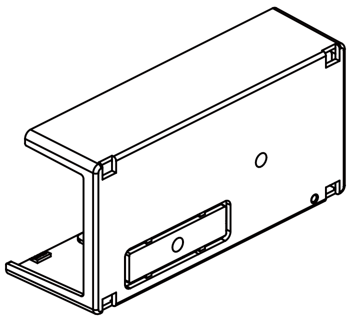
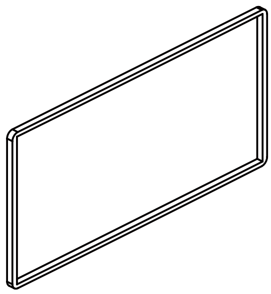
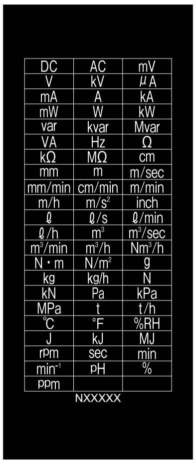
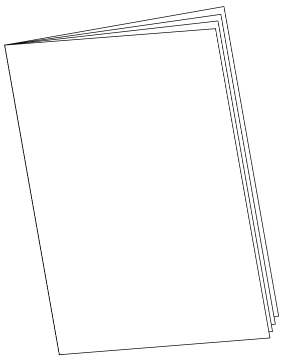
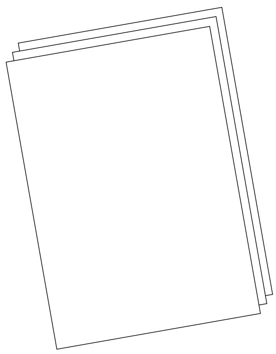
Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.

■ PACKAGE INCLUDES

Digital panel meter



Accessories

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

■ MODEL NO.

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

1.2 SAFETY PRECAUTIONS (that must be observed)

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

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

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

Indicates prohibitions.	Indicates mandatory cautions.	Indicates cautions.

⚠ WARNING

CAUTION	For safety, make sure that wiring is performed by qualified personnel only. • Failure to do so may result in a fire, electric shock or injury.
CAUTION ELECTRIC SHOCK	Do not touch the terminals while the power is on. • Doing so may result in electric shock.
MANDATORY CAUTION	Check the connection diagram carefully before wire connection. • Failure to do so may result in malfunction, a fire or electric shock.
MANDATORY CAUTION	Provide safety measures outside of the unit to ensure safety in the whole system if an abnormality occurs due to malfunction of the unit or another external factor affecting the unit's operation.
PROHIBITION TO BE WET	Do not splash water on the unit except for the front panel installed correctly. • Doing so may result in a fire, electric shock or injury.
MANDATORY CAUTION	Stop using the unit immediately if smokes, unusual smell or abnormal noises come(s) from it. • Using the unit continuously may result in a fire or electric shock.
MANDATORY CAUTION	Stop using the unit if it is dropped or damaged. • Using the unit continuously may result in a fire or electric shock.

MANDATORY CAUTION

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

PROHIBITION

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

⚠ CAUTION

PROHIBITION TO DISCOMPOSE

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

PROHIBITION

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

MANDATORY CAUTION

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

MANDATORY CAUTION

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

PROHIBITION

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

PROHIBITION

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

PROHIBITION

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

1.3 POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

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

Electromagnetic Compatibility (EMC) Directive
EN 61326-1
Low Voltage Directive
EN 61010-1
Measurement Category II (input, alarm output)
Installation Category II (power)
Pollution degree 2
Input or excitation supply or DC output to alarm output to power: Reinforced insulation (300 V)
Input or excitation supply to DC output: Basic insulation (300 V)
RoHS Directive
EN 50581

- This equipment is suitable for Pollution Degree 2, Measurement Category II (input and alarm output, transient voltage 2500 V) and Installation Category II (transient voltage 2500 V). Reinforced insulation (input or excitation supply or DC output to alarm output to power: 300 V) and basic insulation (input or excitation supply to DC output: 300 V) are maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be 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.
- M-System's products conforming to the EU Directives conforms to the standards required based on the premise that they are built into various equipment, apparatus or control panels to use. Because the EMC performance depends on the configuration, wiring or arrangement of the equipment, apparatus and control panels you build, it is necessary for you to make such equipment, apparatus or control panels to conform finally to the CE Marking by yourselves.

⚠ CAUTION

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

■ ENVIRONMENT

Install the unit within the installation specifications.

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

■ LCD

- Do not apply physical impact to the display. Doing so may damage the LCD.
- If a liquid substance running off from the LCD by its breakage should adhere to the skin, rinse it under running water immediately for more than 15 minutes. If it should reach the eye, rinse it under running water immediately and consult a doctor.
- The display is designed to provide the optimal legibility when viewed from the viewing angles. Please note that the display may not be viewed from outside the angles, which is a basic feature of a LCD panel.

■ INFRARED INTERFACE

- Prepare Infrared Communication Adaptor (model: COP-IRU) separately for the infrared communication.
- Transmission distance between the 47DV and the COP-IRU is maximum 1 meter.
- Communication can be affected by sunlight, fluorescent lightings employing inverter technology and so forth. Try at a shorter distance if communication is not established.
- Clean the infrared interface. If it is dirty or dusty, it may malfunction.
- The COP-IRU can communicate with single panel meter only. Do not turn more than one panel meter on to Infrared Communication Mode.
- The communication time may depend on PC performance or environment.

■ 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 M-System.
- 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 RELATED MANUALS AND PRODUCTS

1.4.1 RELATED MANUALS

Refer to the following manuals as necessary.

■ CONFIGURE PARAMETERS BY USING PC

47DCFG PC Configurator Software Users Manual Install the unit within the installation specifications.

■ TO READ/WRITE DATA AND CONFIGURE PARAMETERS VIA MODBUS COMMUNICATION

Modbus Protocol Reference Guide for 47Dx

The above manuals are downloadable at M-System's web site: http://www.m-system.co.jp/.

1.4.2 RELATED PRODUCTS

Prepare the following products as necessary.

■ TO CONFIGURE PARAMETERS BY USING PC

PC Configurator Software (model: 47DCFG)
Downloadable freely at M-System's web site: http://www.m-system.co.jp/.

■ TO READ/WRITE 47DCFG CONFIGURATIONS VIA INFRARED COMMUNICATION

Infrared Communication Adaptor (model: COP-IRU) (optional)
It may take time to read/write configurations or monitor. It is convenient to fix the COP-IRU with L Type Holder (optional).

■ TO READ/WRITE DATA OR CONFIGURE PARAMETERS WITH UPPER PC OR PLC VIA MODBUS COMMUNICATION

- With upper Modbus-RTU
  RS-232-C/RS-485 Converter (model: R2K-1) or Transmission Level Converter (model: LK1) (optional)
- With upper Modbus/TCP
  Ethernet Communication Adaptor (model: 72EM2-M4) (optional)

■ TO USE CONNECTOR FOR BCD OUTPUT AND CONNECTOR TERMINAL BLOCK

- Connector
  Special Cable (model: HDR40) (optional)
- Terminal block
  Connector Terminal Block (model: CNT) (optional)

■ TO USE 2-WIRE TRANSMITTER (SMART TRANSMITTER, HART) REQUIRING MINIMUM 250 Ω RECEPTION RESISTANCE

- Precision Resistor Module (model: REM2-250) (optional)

IMPORTANT

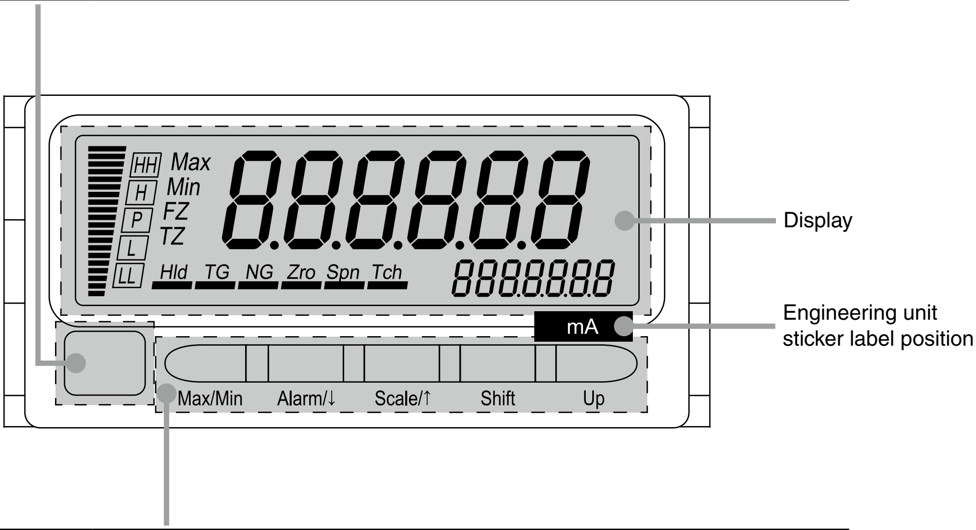
To use the REM2-250, specify the input code '1' DC voltage and set the input type to '1-5V'.

The specification sheet of each product is downloadable at M-System's web site: http://www.m-system.co.jp/.

1.5 COMPONENT IDENTIFICATION

■ FRONT VIEW

COMPONENT	FUNCTION
Infrared interface	Used to configure parameters with a PC using PC Configurator Software (model: 47DCFG) and Infrared Communication Adaptor (model: COP-IRU). (Refer to 31. CONFIGURING PARAMETERS VIA INFRARED COMMUNICATION.)



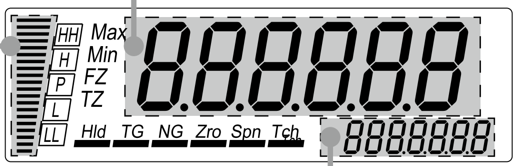
BUTTON	FUNCTION
Max/Min	Used to switch the main display to show the present value, MAX value or MIN value, and to reset the MAX and MIN values. Also used to cancel a set item.
Alarm/↓	Used to confirm and configure the alarm setpoints, to move on to Alarm and other Setting Modes; or to shift through setting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

NOTE

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

■ DISPLAY

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



COMPONENT	FUNCTION
Bargraph	Indicates present signal level against the scaled range. 20 LED segments divided by 10. (Refer to 7. SETTING BARGRAPH.)

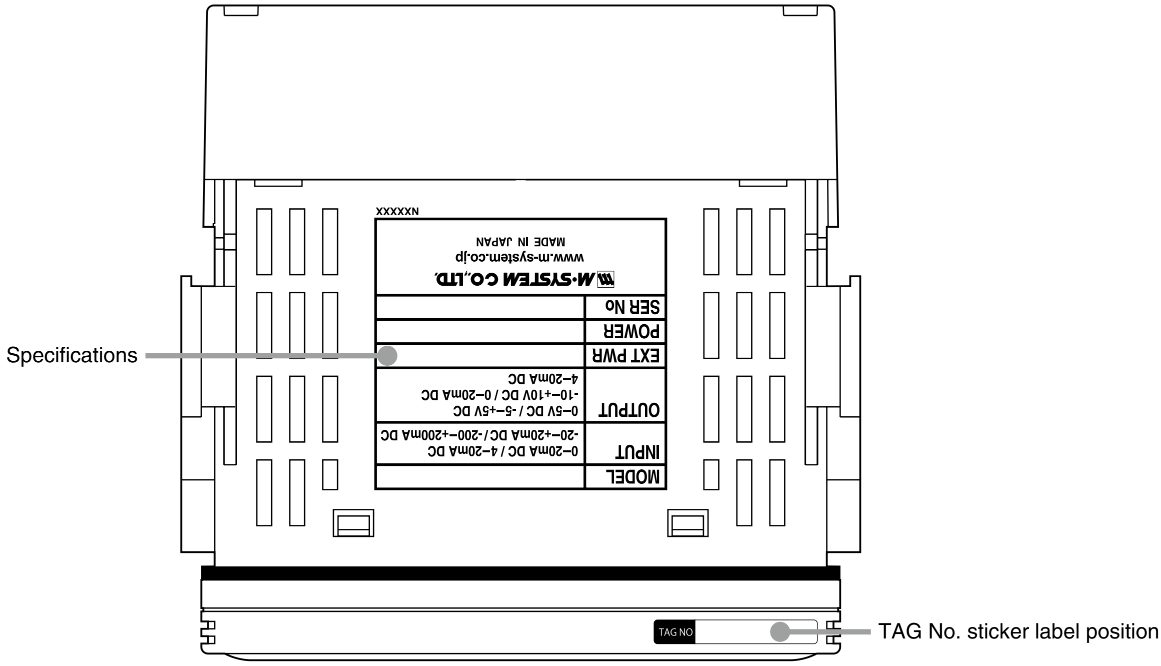
COMPONENT	FUNCTION
Sub display	Indicates the present parameter ID, alarm setpoints and bank No., or over- or under-input with 'S.ERR' indication.

INDICATOR	MODE	FUNCTION
Status	Measuring	Indicates MAX or MIN value. 'Max' or 'Min' indicator turns on. (Refer to 27. RETAINING MAX AND MIN VALUES.)
		Indicates Forced Zero mode. 'FZ' indicator turns on. (Refer to 26. FORCING THE PRESENT DISPLAY VALUE TO ZERO.)
		Indicates Tare Adjustment mode. 'TZ' indicator turns on. (Refer to 26. FORCING THE PRESENT DISPLAY VALUE TO ZERO.)

INDICATOR	MODE	FUNCTION
Alarm	Setting	Indicates parameters in Alarm Setting Mode. (Refer to 9. BASIC ALARM SETTING.)
		'HH', 'H', 'L' or 'LL' indicator blinks corresponding to the P output setting. (Refer to 11.1 P OUTPUT.)
	Confirming and configuring alarm setpoints	'HH', 'H', 'L' or 'LL' indicator blinks in confirming and configuring each alarm setpoint. (Refer to 25. CONFIRMING AND CONFIGURING 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 Scaling Setting Mode. 'Zro' or 'Spn', and 'Tch' indicators turn on in combination depending on the parameters.
		Teach Calibration 'Zro' or 'Spn' indicator turns on and 'Tch' indicator blinks in red. (Refer to 33.1 TEACH CALIBRATION.)
		'NG' indicator blinks when a parameter is within invalid range while setting.
	Confirming and configuring alarm setpoints	'NG' indicator blinks when a setpoint is within invalid range while setting.
	Measuring	'Hld' indicator turns on with the HOLD signal ON with the event trigger input or the BCD output. (Refer to 21. SETTING EVENT TRIGGER INPUT and 22. SETTING BCD OUTPUT.)
		'TG' indicator turns on with the TIMING signal ON with the event trigger input. (Refer to 21. SETTING EVENT TRIGGER INPUT.)

■ TOP VIEW

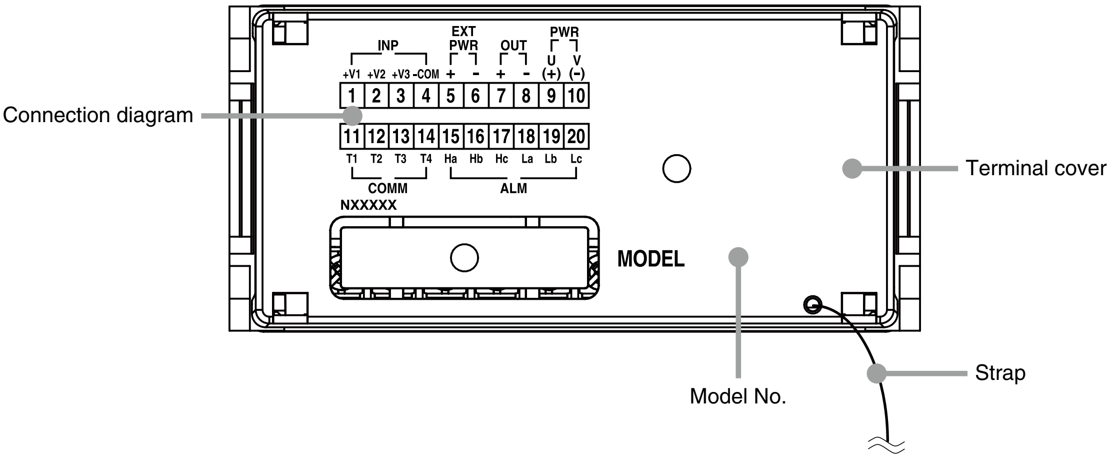


NOTE

- 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 M-System's Hotline.

■ REAR VIEW

• With Terminal Cover

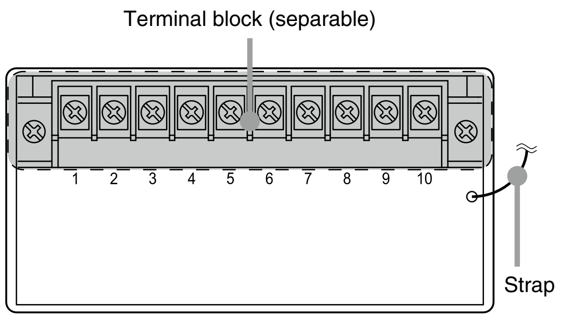


NOTE

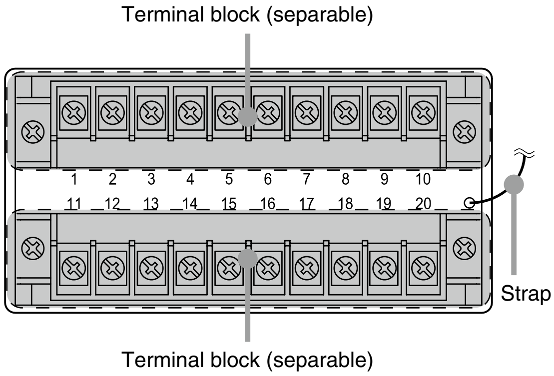
- The connection diagram depends on the specifications.
- The MODEL shows the same as that in the specification label on the top of the unit.

• Without Terminal Cover

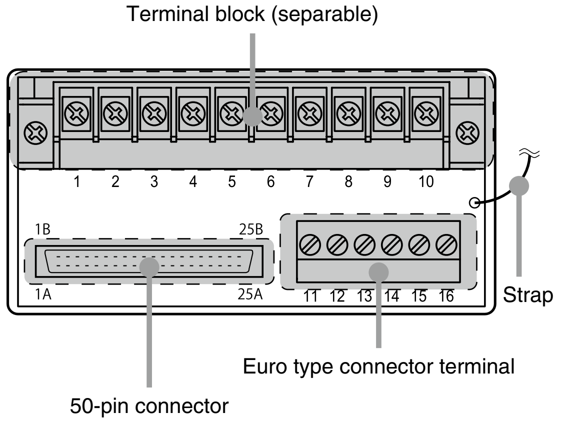
No Options



Alarm Output, RS-485 / Modbus



BCD Output, Event Trigger Input, Alarm Output (Photo MOSFET Relay)

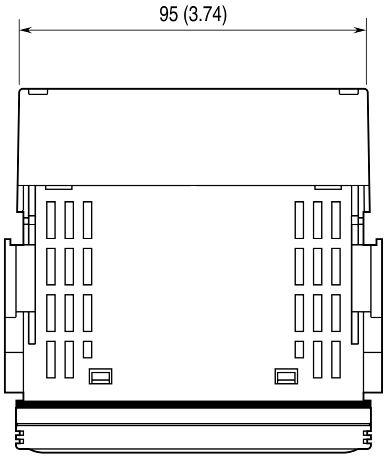


1.6 INSTALLATION

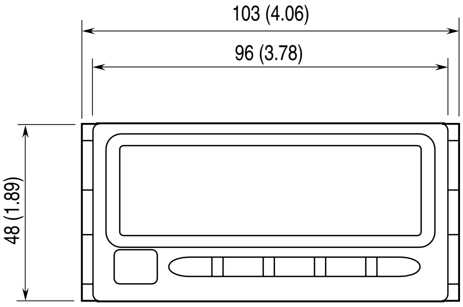
1.6.1 EXTERNAL DIMENSIONS

unit: mm (inch)

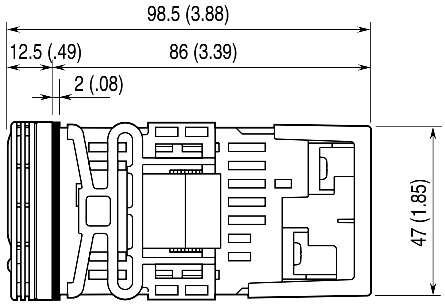
■ **TOP VIEW**



■ **FRONT VIEW**

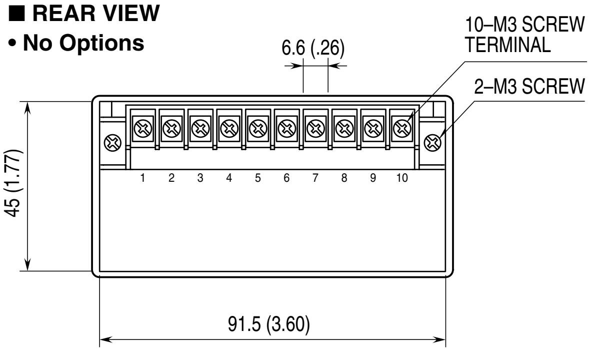


■ **SIDE VIEW**

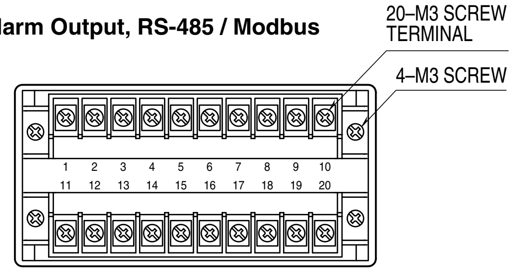


■ **REAR VIEW**

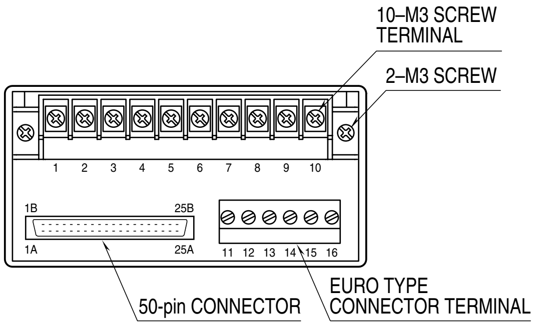
• **No Options**



• **Alarm Output, RS-485 / Modbus**

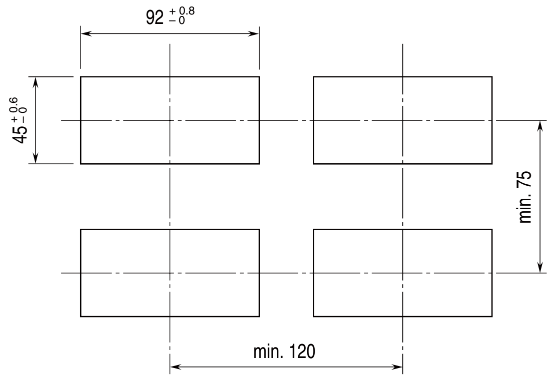


• **BCD Output, Event Trigger Input, Alarm Output (Photo MOSFET Relay)**



1.6.2 PANEL CUTOUT DIMENSIONS

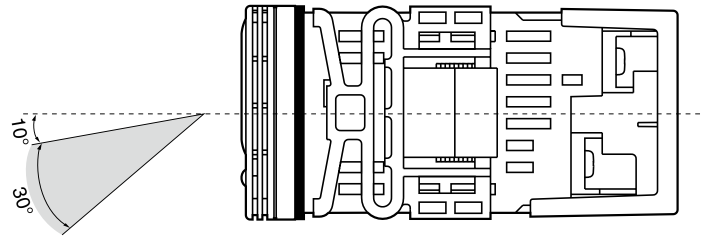
unit: mm



Panel thickness: 1.6 to 8.0 mm

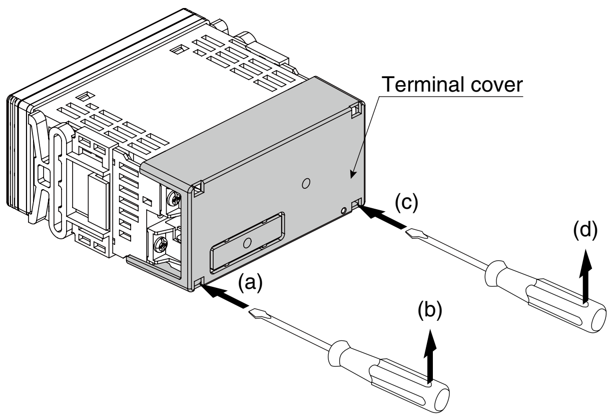
1.6.3 VIEWING ANGLE

The display is designed to provide the optimal legibility when viewed from the angles as shown below.

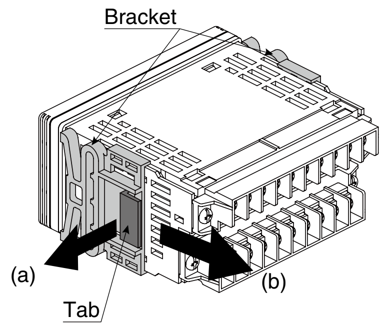


1.6.4 INSTALLATION

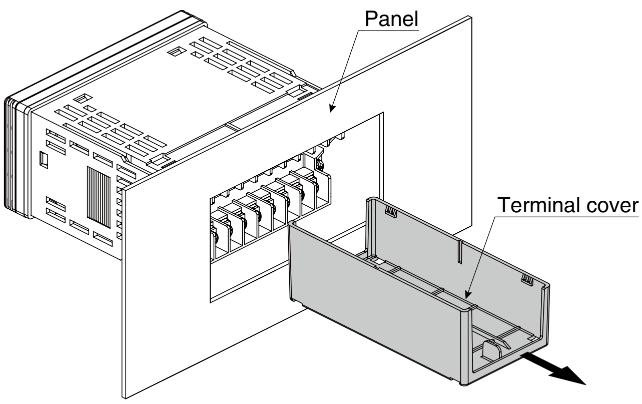
(1) Remove the terminal cover.
  (a) Insert the minus tip of a screwdriver into a hole at the lower left corner of the cover.
  (b) Pull the handle upward.
  (c) Then insert the screwdriver into a hole at the lower right corner.
  (d) Pull the handle upward to separate the terminal cover.



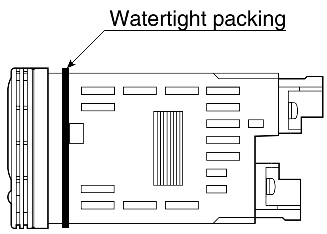
(2) Remove the mounting brackets.
  (a) Flip a tab of a bracket.
  (b) Then pull the bracket toward the terminal block to remove it.



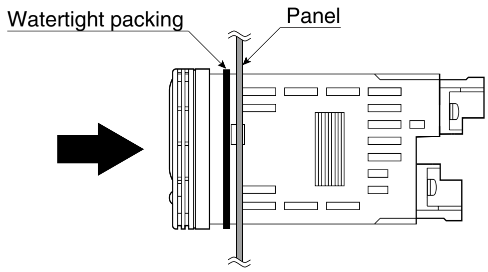
(3) Put the terminal cover through the panel cutout.



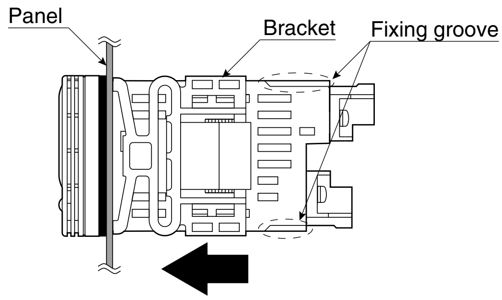
(4) Make sure that the watertight packing is placed behind the front cover regardless of necessity of water-tightness.



(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.

1.7 WIRING INSTRUCTIONS

1.7.1 CAUTION IN WIRING

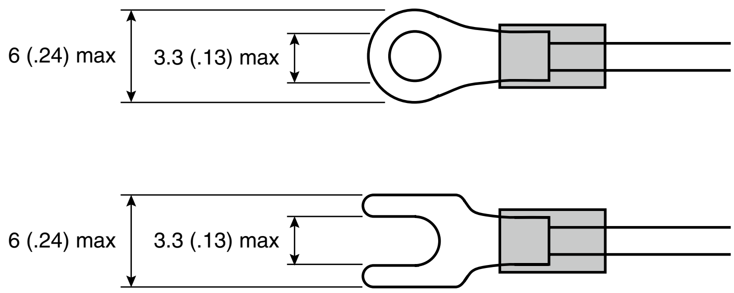
• For safety, make sure that wiring is performed by qualified personnel only.
• In order to prevent potential electric shock, wire the unit after turning off the power supply and making sure that the power is not supplied to the cable.
• Be sure to confirm the name and polarity of each terminal before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

1.7.2 SOLDERLESS TERMINAL AND WIRE

■ INPUT, EXCITATION SUPPLY, DC OUTPUT, ALARM OUTPUT (RELAY), NETWORK INTERFACE AND POWER INPUT

• 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

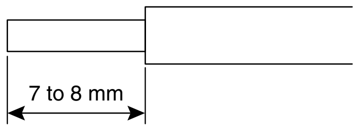
• Insulated solderless terminals are recommended.
• In using non-insulated solderless terminals, cover them with insulating caps or tubes.
• Ring tongue terminals are recommended rather than spade tongue terminals to prevent from falling off.

■ EVENT TRIGGER INPUT AND ALARM OUTPUT (PHOTO MOSFET RELAY)

• APPLICABLE WIRE SIZE

Solid: 0.5 to 1.25 mm^2 (max. 1.3 dia.)

Stranded: 0.5 to 1.25 mm^2 (max. 1.3 dia.)



IMPORTANT

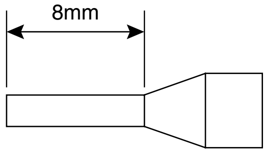
- Tinning wire ends may cause contact failure and therefore is not recommended.
- Expose wire conductors by 7 to 8 mm (0.28 to 0.31”).

• RECOMMENDED FERRULE

The following Phoenix Contact terminals are recommended.

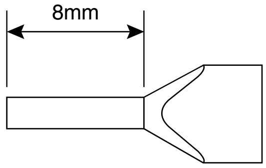
• For single-wire

CROSS-SECTION AREA	MODEL
0.5 to 0.75 mm^2	AI 0,75-8 GY
0.75 to 1.0 mm^2	AI 1,0-8 RD
1.0 to 1.5 mm^2	AI 1,5-8 BK



• For twin-wire

CROSS-SECTION AREA	MODEL
0.5 to 0.75 mm^2	AI-TWIN 2X 0,75-8 GY
0.75 to 1.0 mm^2	AI-TWIN 2X 1,0-8 RD
1.0 to 1.5 mm^2	AI-TWIN 2X 1,5-8 BK

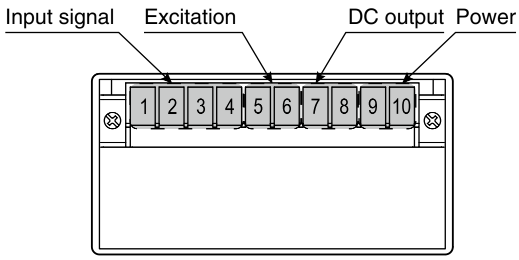


Torque: 0.51 N·m

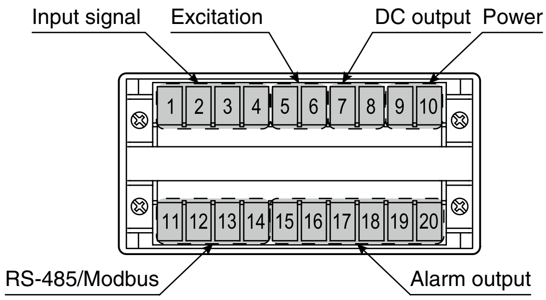
Recommended manufacturer: Phoenix Contact GmbH & Co., KG

1.7.3 TERMINAL ASSIGNMENT

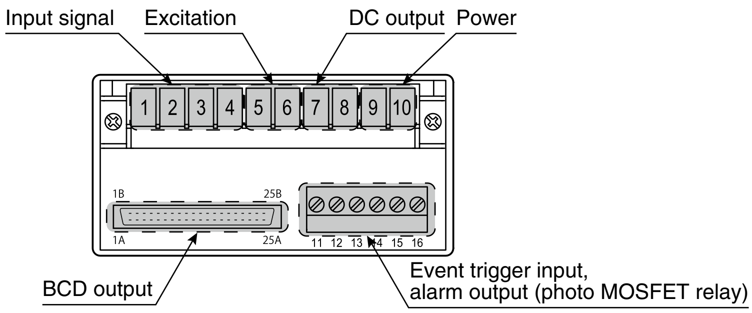
■ **NO OPTIONS**



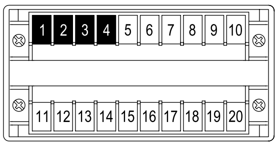
■ **ALARM OUTPUT, RS-485 / MODBUS**



■ **BCD OUTPUT, EVENT TRIGGER INPUT, ALARM OUTPUT (PHOTO MOSFET RELAY)**



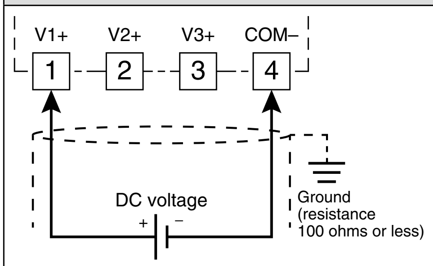
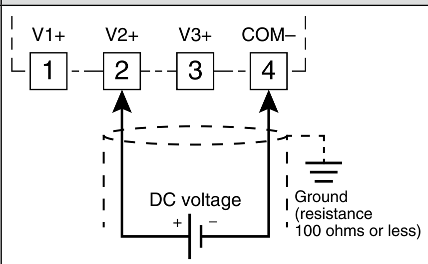
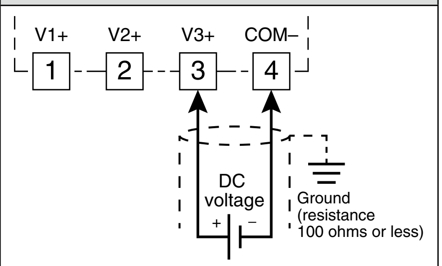
1.7.4 WIRING INPUT SIGNAL

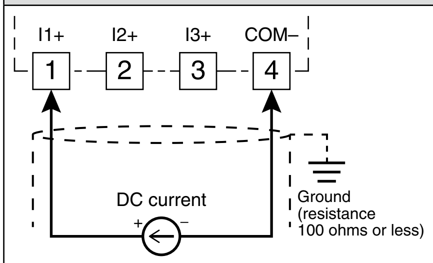
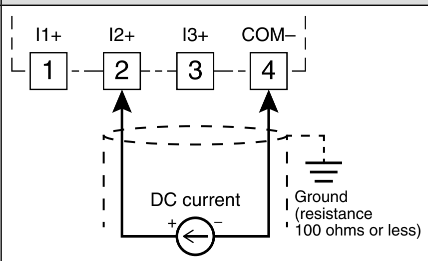
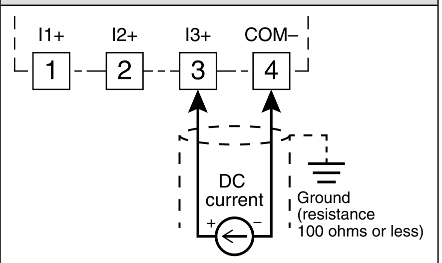


Connect DC voltage or current signal wires. Be careful that the input terminal assignment depends on the input code and type.

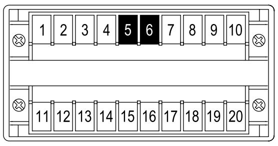
IMPORTANT

- Be sure to confirm the input polarity in wiring. Wrong connection may result in malfunction of the unit.
- In order to prevent potential electric shock, wire the unit after cutting the input signal and making sure that the power is not supplied to the cable.
- 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.

INPUT CODE: 1		
INPUT TYPE: 200V	INPUT TYPE: 20V	INPUT TYPE: 1-5V, -5-5V
MEASURING RANGE: -200 to +200 V	MEASURING RANGE: -20 to +20 V	MEASURING RANGE: 1 – 5 V, -5 to +5 V
		

INPUT CODE: 2		
INPUT TYPE: 200MA	INPUT TYPE: 20MA	INPUT TYPE: 4-20MA, 0-20MA
MEASURING RANGE: -200 to +200 mA	MEASURING RANGE: -20 to +20 mA	MEASURING RANGE: 4 – 20 mA, 0 – 20 mA
		

1.7.5 WIRING EXCITATION SUPPLY



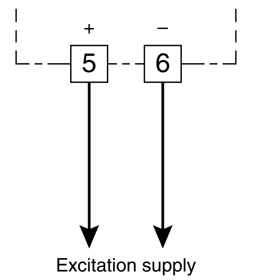
+12 V or +24 V voltage is output depending on the specified excitation supply code.

CODE	OUTPUT VOLTAGE	CURRENT RATING	SHORTCIRCUIT PROTECTION	
			CURRENT LIMITED	PROTECTED TIME DURATION
1	12 – 16 V DC with no load 10.8 V DC minimum at 80 mA	≤ 84 mA DC	90 mA max.	No limit
2	24 – 28 V DC with no load 22 V DC minimum at 20 mA	≤ 22 mA DC	30 mA max.	No limit

IMPORTANT

- Connect a device with the current rating within the specifications.
- Do not connect anything when the excitation supply is not used.
- Besides using the excitation supply together with the input, these terminals can be used as independent sensor excitation. Be aware that the excitation supply is not isolated with the input.

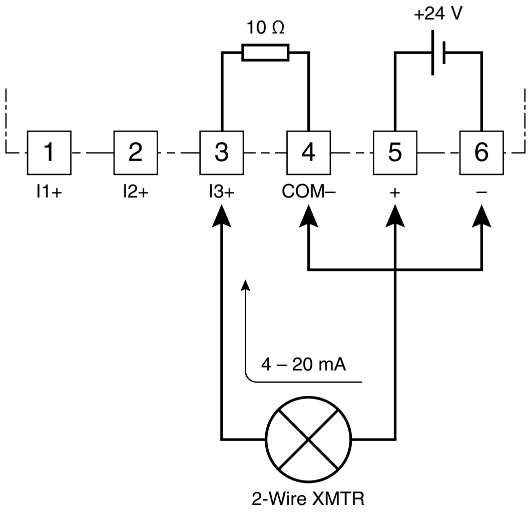
Excitation supply code: 1, 2



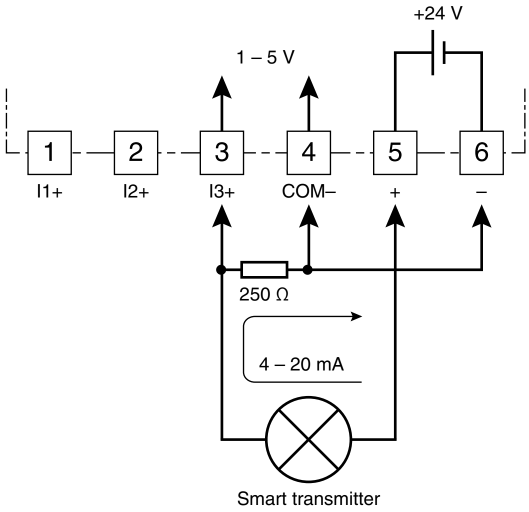
■ **CONNECTION EXAMPLES**

(1) 2-WIRE

• For use with a two-wire transmitter



• For use with a smart transmitter



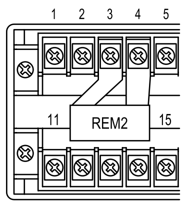
* Choose DC voltage input (model: 47DV-1x2x-xx).

NOTE

• Calculate supply power to a 2-wire transmitter using minimum voltage 22 V at 20 mA DC load. The voltage after deducting voltage drop by connected reception resistance (10 or 250 Ω) and leadwire resistance from 22 V will be supply power to the 2-wire transmitter.

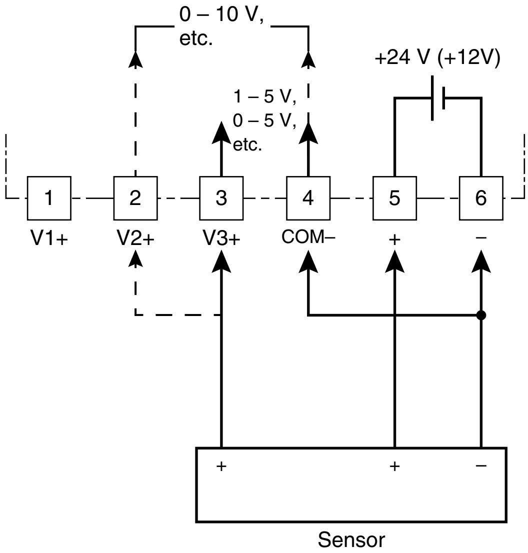
• Choose DC voltage input (code '1') when minimum 250 Ω reception resistance is required for use with a smart transmitter (e.g. HART). Prepare a Precision Resistor Module (model: REM2-250) separately.

• Attach the Precision Resistor Module as shown in the figure on the right. Use non-insulated (sleeveless) solderless terminals.

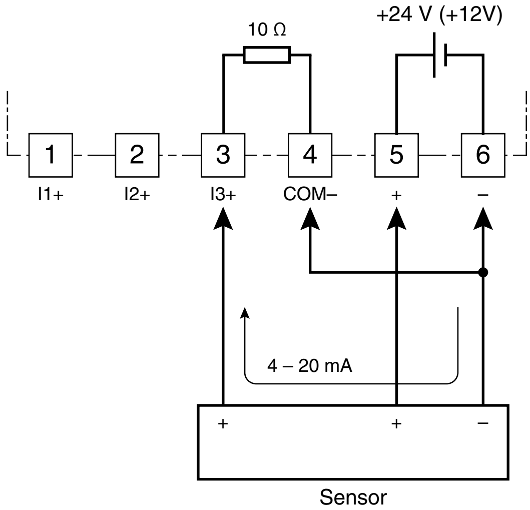


(2) 3-WIRE

• For DC voltage input

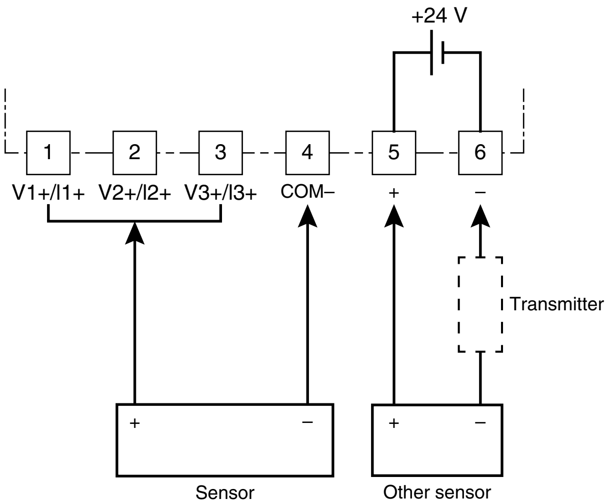


• For DC current input

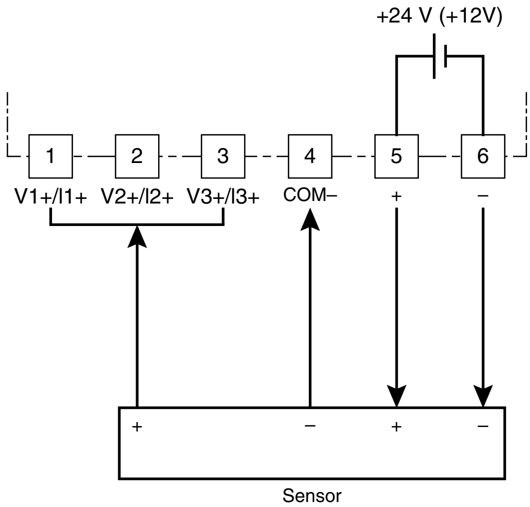


(3) OTHERS

• For use of the excitation supply for other sensor



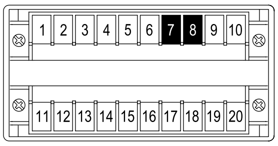
• For 4-wire use



NOTE

- Be aware that the excitation supply is not isolated with the input.
- For using with 4-wire, use the one, which is isolated between output circuit of sensor and power supply. If not isolated, it is not available except input signal is plus (+) side and the measurement range is 1 to 5 V, -5 to +5 V, 4 to 20 mA or 0 to 20 mA.

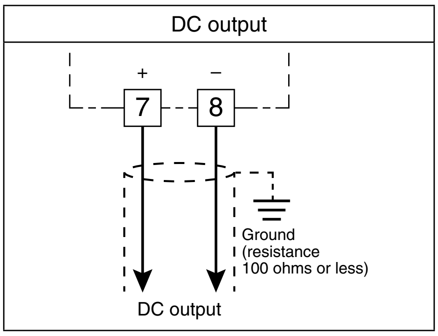
1.7.6 WIRING DC OUTPUT



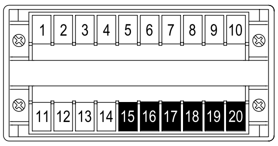
Voltage or current signal is output.

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.



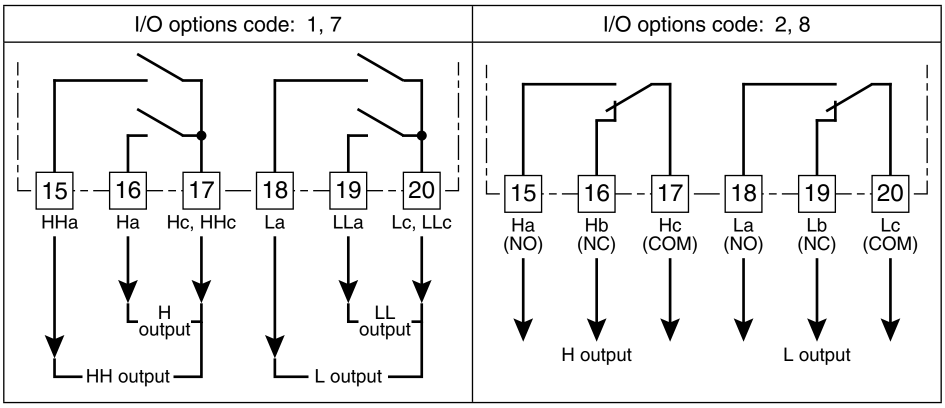
1.7.7 WIRING ALARM OUTPUT (RELAY)



Two or four alarm contacts are output depending on the specified I/O option code.

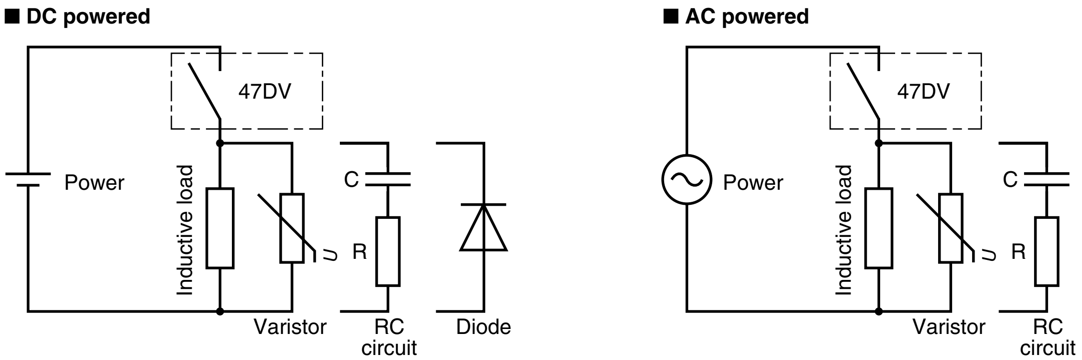
IMPORTANT

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



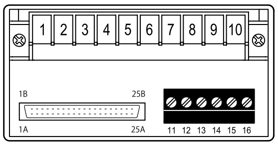
NOTE

Example of contact protection circuit with inductive load



* It is effective to connect a varistor across a load with the supply voltage 24 to 28 V, and across a contact with 100 to 200 V.

1.7.8 WIRING ALARM OUTPUT (PHOTO MOSFET RELAY)

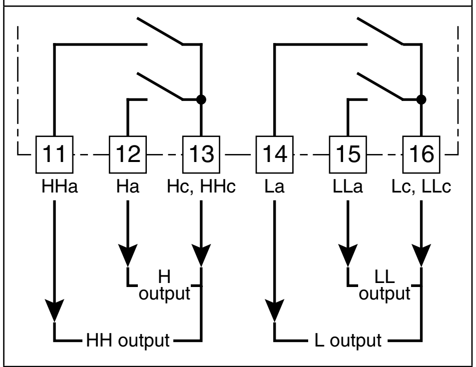


Four alarm contacts are output.

IMPORTANT

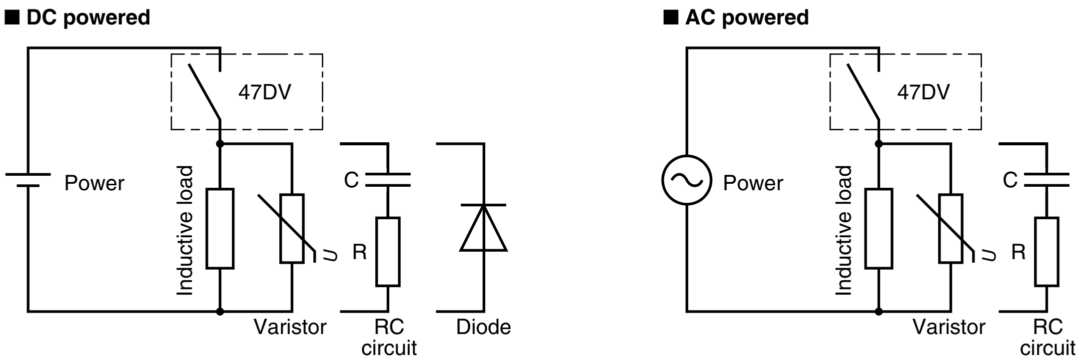
- Connect load within the specifications.
- With inductive load such as an external relay or a motor, insert a CR circuit (for AC or DC power), a diode (for DC power) or a varistor (for AC or DC power) in parallel to protect the contacts and eliminate noise.

I/O options code: 3, 9



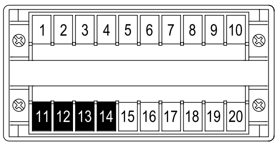
NOTE

Example of contact protection circuit with inductive load



* It is effective to connect a varistor across a load with the supply voltage 24 to 28 V, and across a contact with 100 to 120 V.

1.7.9 WIRING NETWORK INTERFACE

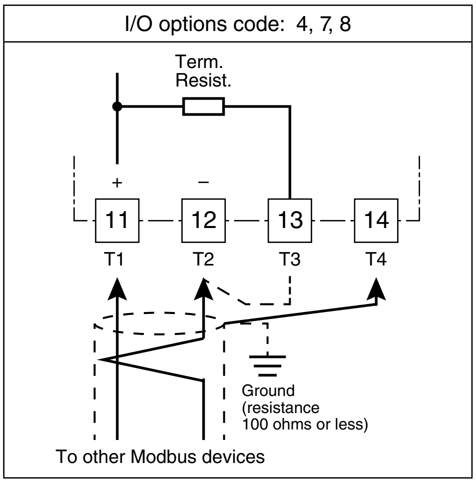


Writing/reading each measured value and configurations is available with a PC or PLC via Modbus communication.

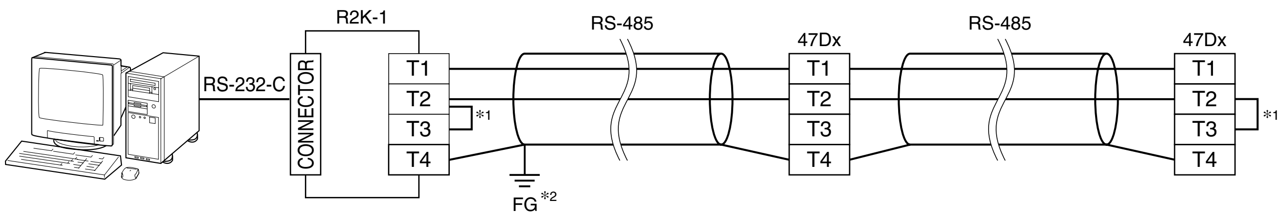
Transmission	Half-duplex, asynchronous, no procedure
Interface	Conforms to TIA/EIA-485-A
Max. transmission distance	500 meters
Baud rate	1200, 2400, 4800, 9600, 19200, 38400 bps
Protocol	Modbus-RTU
Node address	1 to 247
Max. number of nodes	31 (except the master)
Media	Shielded twisted-pair cable (CPEV-S 0.9 dia.)

IMPORTANT

- Internal terminating resistor is used when the device is at the end of a transmission line.
- Install shield cables to all sections and ground them at single point for noise protection.
- Connect in a daisy chain.
- Be sure to confirm the polarity in wiring.
- Use duplex or triplex shield cables.



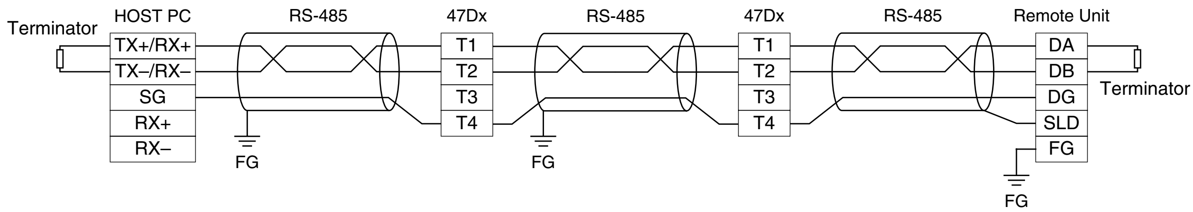
■ COMMUNICATION CABLE CONNECTIONS



*1 Internal terminating resistor is used when the device is at the end of a transmission line.
*2 Install shield cables to all sections and ground them at single point.

NOTE

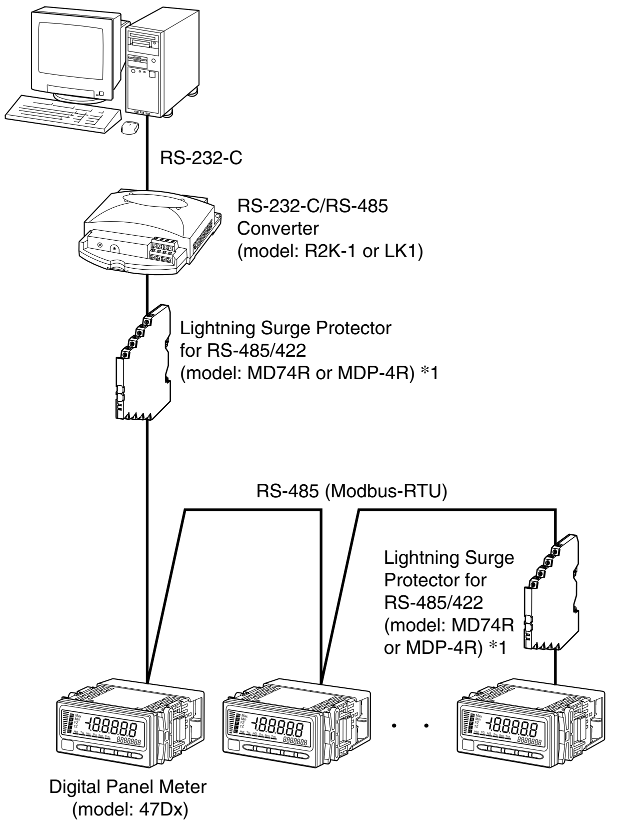
Refer to the connection diagram as shown below to wire triplex shield cables.



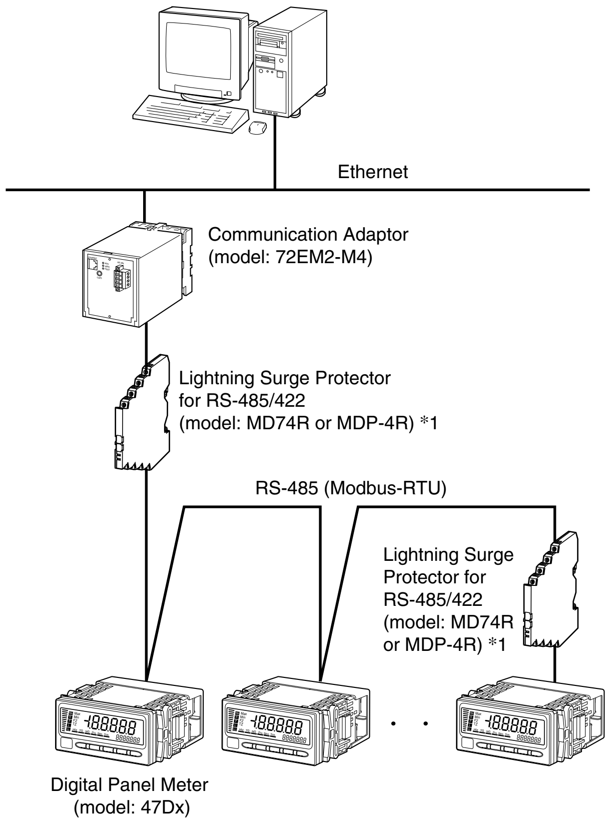
* Connect terminating resistors at both ends of the transmission line. When the 47DV is located at the end, close across the terminals T2 and T3 with a leadwire.

■ SYSTEM CONFIGURATION EXAMPLES

• RS-485 / RS-232-C

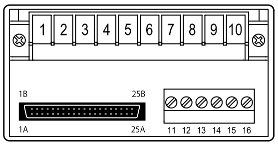


• RS-485 / Ethernet



*1 Insert lightning surge protectors recommended in this example if necessary.

1.7.10 WIRING BCD OUTPUT

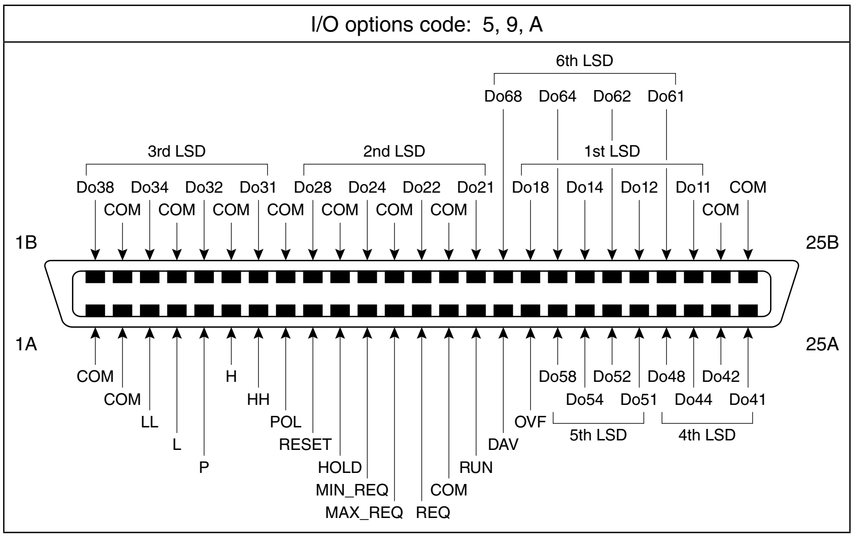


BCD data in 6 digits and 5 alarm contacts including the P status are output.

SIGNAL ID		ITEM	RATING
Input	REQ, MIN_REQ, MAX_REQ, HOLD, RESET	Input signals	Dry contact or NPN open collector
		Input current	≤ 3 mA
		Sensing	6 V
		Contact detecting	≤ 1.5 V at ON; ≥ 3 V at OFF
Output	DATA (Do11 to Do68), POL, OVF, DAV, RUN	Output signals	NPN open collector
		Max. load voltage	24 V DC
		Max. load current	10 mA
		Saturation voltage	≤ 0.3 V
		Leakage current	≤ 500 μA
	HH, H, P, L, LL	Alarm output signals	NPN open collector
		Max. load voltage	24 V DC
		Max. load current	50 mA
		Saturation voltage	≤ 1.1 V
		Leakage current	≤ 500 μA

IMPORTANT

- Prepare the HDR40 and CNT separately for the BCD output.
- Refer to CONNECTOR PIN ASSIGNMENT to prepare a cable by yourselves.
- The connector model No. is HDR-EC50LFDT1-SLE+ (Honda Tsushin Kogyo Co., Ltd.).
- Be sure to confirm the polarity in wiring.
- Make sure that the saturation voltage (residual voltage) of an input device meets the detecting levels of the unit. Otherwise the unit may not operate correctly.
- Connect load within the specifications.

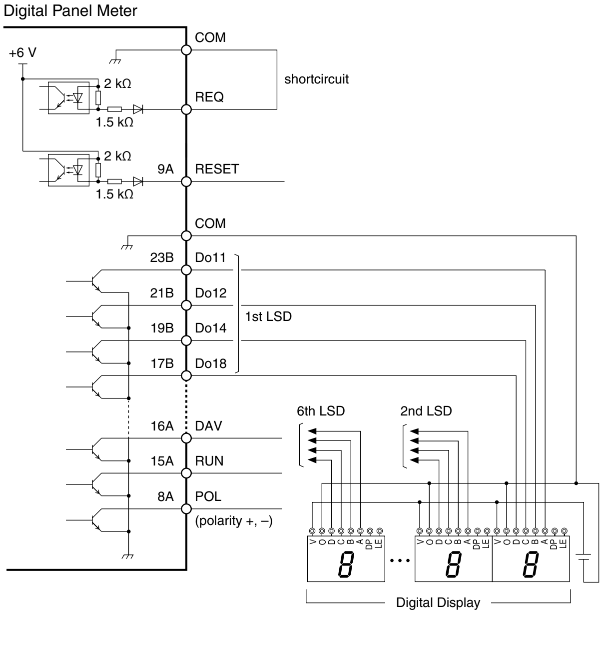


■ CONNECTOR PIN ASSIGNMENT

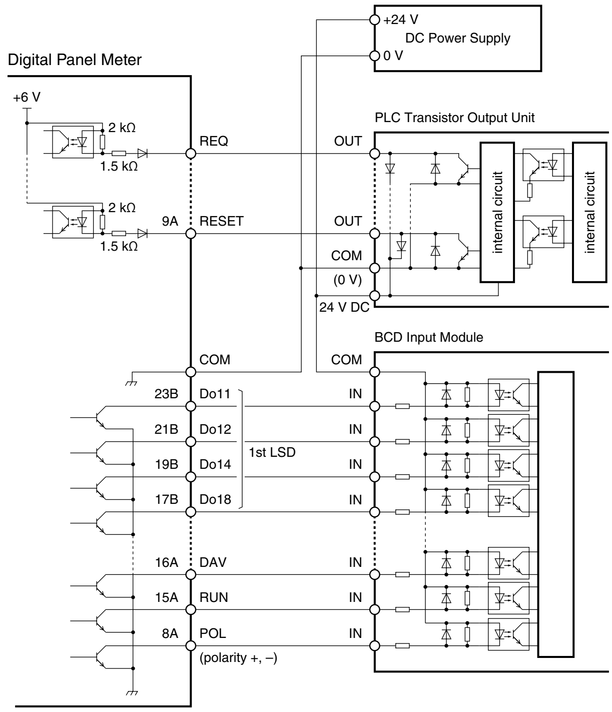
PIN NO.	ASSIGNMENT	FUNCTION	PIN NO.	ASSIGNMENT	FUNCTION
1A	COM	GND (0 V)	1B	Do38	BCD output data 8×10^2
2A	COM	GND (0 V)	2B	COM	GND (0 V)
3A	LL	LL alarm	3B	Do34	BCD output data 4×10^2
4A	L	L alarm	4B	COM	GND (0 V)
5A	P	P alarm	5B	Do32	BCD output data 2×10^2
6A	H	H alarm	6B	COM	GND (0 V)
7A	HH	HH alarm	7B	Do31	BCD output data 1×10^2
8A	POL	BCD polarity	8B	COM	GND (0 V)
9A	RESET	Reset data	9B	Do28	BCD output data 8×10^1
10A	HOLD	Hold data	10B	COM	GND (0 V)
11A	MIN_REQ	Request minimum reading data	11B	Do24	BCD output data 4×10^1
12A	MAX_REQ	Request maximum reading data	12B	COM	GND (0 V)
13A	REQ	Request BCD data	13B	Do22	BCD output data 2×10^1
14A	COM	GND (0 V)	14B	COM	GND (0 V)
15A	RUN	Run	15B	Do21	BCD output data 1×10^1
16A	DAV	Data valid	16B	Do68	BCD output data 8×10^5
17A	OVF	BCD overflow/underflow (‘S.ERR’)	17B	Do18	BCD output data 8×10^0
18A	Do58	BCD output data 8×10^4	18B	Do64	BCD output data 4×10^5
19A	Do54	BCD output data 4×10^4	19B	Do14	BCD output data 4×10^0
20A	Do52	BCD output data 2×10^4	20B	Do62	BCD output data 2×10^5
21A	Do51	BCD output data 1×10^4	21B	Do12	BCD output data 2×10^0
22A	Do48	BCD output data 8×10^3	22B	Do61	BCD output data 1×10^5
23A	Do44	BCD output data 4×10^3	23B	Do11	BCD output data 1×10^0
24A	Do42	BCD output data 2×10^3	24B	COM	GND (0 V)
25A	Do41	BCD output data 1×10^3	25B	COM	GND (0 V)

■ BCD OUTPUT CONNECTION EXAMPLES

• Connected to a digital display



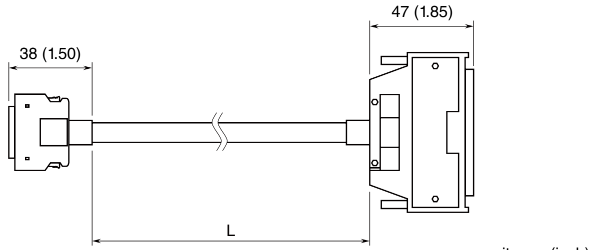
• Connected to a PLC



■ BCD OUTPUT CONNECTION EXAMPLES

<table>
<tr><th>MODEL</th><th>EXTERNAL DIMENSIONS</th><th>FCN CONNECTOR PIN ASSIGNMENT</th></tr>
<tr><td>HDR40</td><td>

■ TO 47Dx ■ TO CONNECTING DEVICE



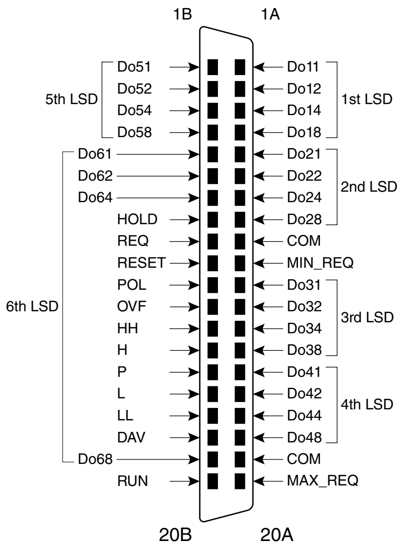
unit: mm (inch)

Connector type: HDR-E50MAG1
(Honda Tsushin Kogyo Co., Ltd.)
Cover type: HDR-E50LPAS
(Honda Tsushin Kogyo Co., Ltd.)

FCN connector (40 pins, female)
Connector type: FCN-361J40-AU
(Fujitsu Component Ltd.)
Cover type: FCN-360C040-B
(Fujitsu Component Ltd.)

	HDR40-05	HDR40-20
L	50 cm (19.7 in)	2 meters (6.6 ft)

</td><td>



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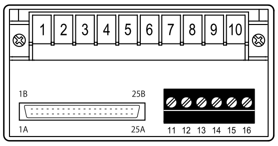
1.7.11 WIRING EVENT TRIGGER INPUT

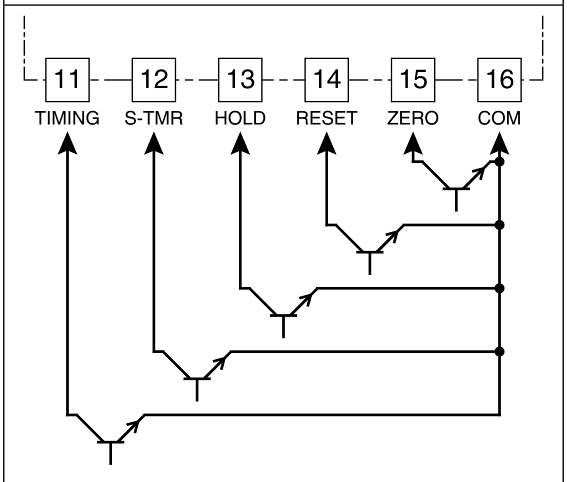


Control contacts are input.

SIGNAL ID	ITEM	RATING
TIMING S-TMR HOLD RESET ZERO	Event trigger input	Dry contact or NPN open collector
	Input current	≤ 3 mA
	Sensing	6 V
	Contact detecting	≤ 1.5 V at ON; ≥ 3 V at OFF
	Detecting time	≥ 64 ms

IMPORTANT

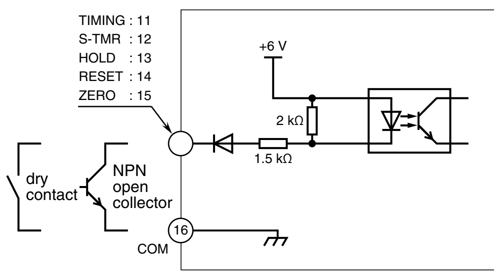
- Be sure to confirm the polarity in wiring.
- Make sure that the saturation voltage (residual voltage) of an input device meets the detecting levels of the unit. Otherwise the unit may not operate correctly.



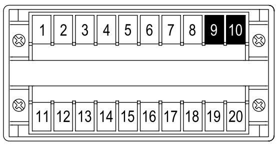
■ TERMINAL ASSIGNMENT

TERMINAL NO.	SIGNAL	FUNCTION
11	TIMING	Timing
12	S-TMR	Startup timer
13	HOLD	Hold data
14	RESET	Reset data
15	ZERO	Forced zero
16	COM	GND (0 V)

■ CONNECTION EXAMPLE



1.7.12 WIRING POWER

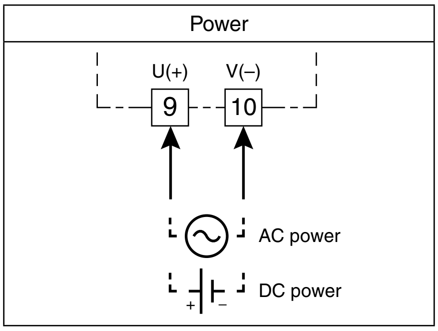


Connect power according to the power input code. The power specifications are shown in the following table.

CODE	RATING	PERMISSIBLE RANGE
M2	100 to 240 V AC	85 to 264 V AC, 50/60 Hz Max. 12 VA
R	24 V DC	±10% approx. 3.5 W
P	110 V DC	85 to 150 V DC approx. 3.5 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.



1.7.13 INSTALLING/SEPARATING TERMINAL BLOCK

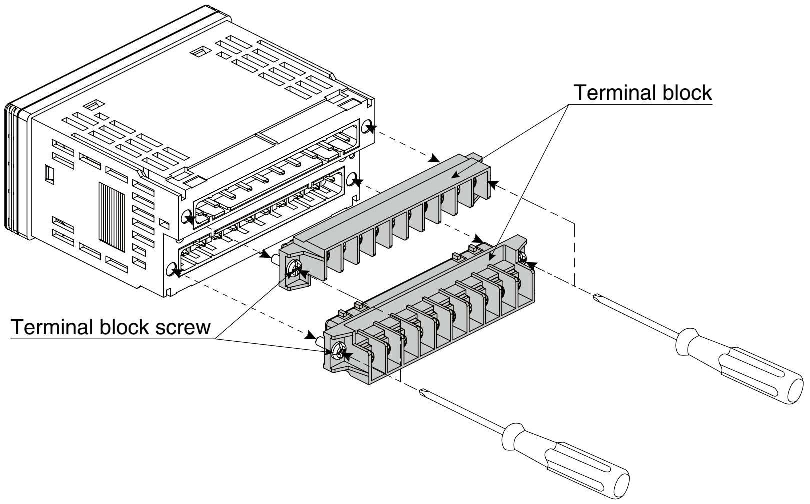
■ INPUT, EXCITATION SUPPLY, DC OUTPUT, ALARM OUTPUT (RELAY), NETWORK INTERFACE AND POWER INPUT

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.

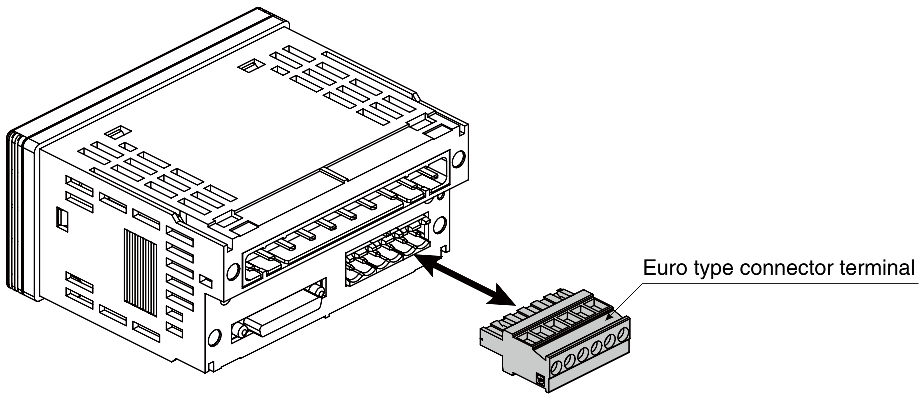


■ EVENT TRIGGER INPUT AND ALARM OUTPUT (PHOTO MOSFET RELAY)

The Euro type connector terminal block is separable. To install, confirm the direction and insert the upper terminal block. Pinch the sides to pull out, or insert the minus tip of a screwdriver into both side spaces alternately between the body and the terminal block (terminal No. 11 and 16 sides) to remove.

IMPORTANT

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

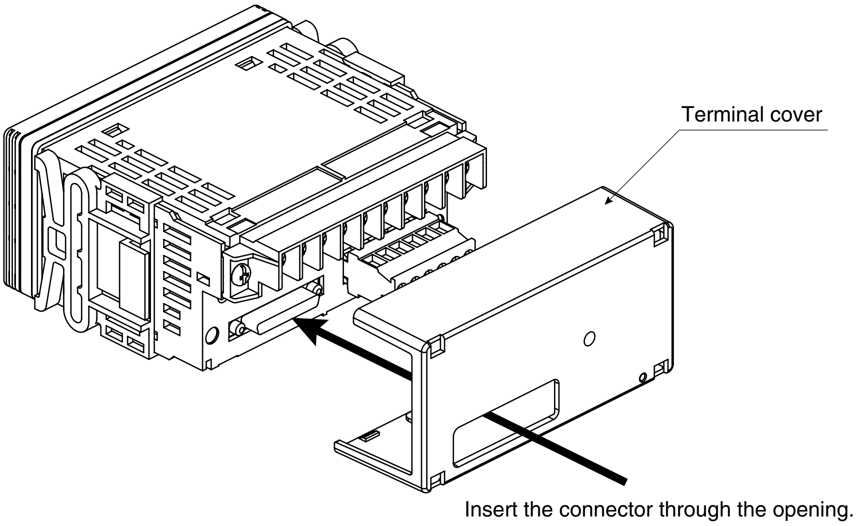


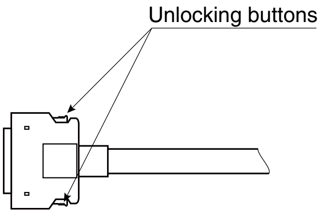
■ **BCD OUTPUT**

Insert the connector for the BCD output through the terminal cover opening until it clicks into place. Press the unlocking buttons on the right and left sides of the connector to remove.

IMPORTANT

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



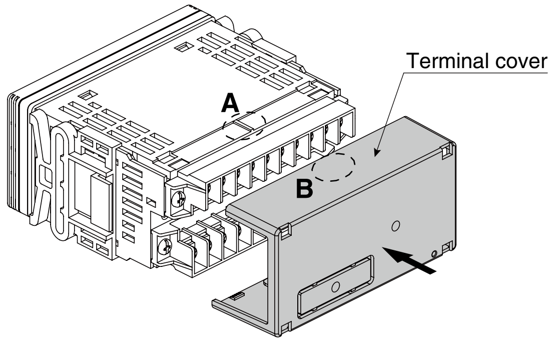


1.7.14 ATTACHING/REMOVING TERMINAL COVER

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

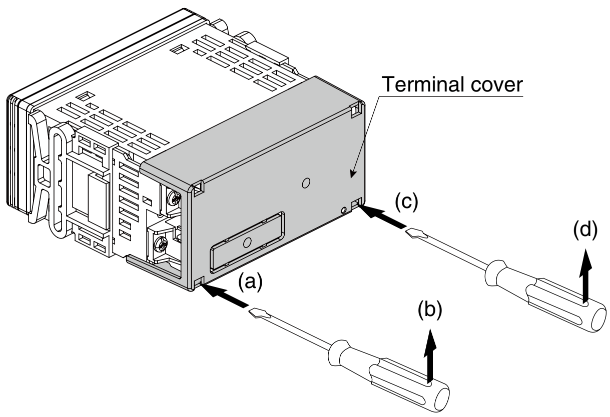
■ ATTACHING TERMINAL COVER

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



■ REMOVING TERMINAL COVER

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



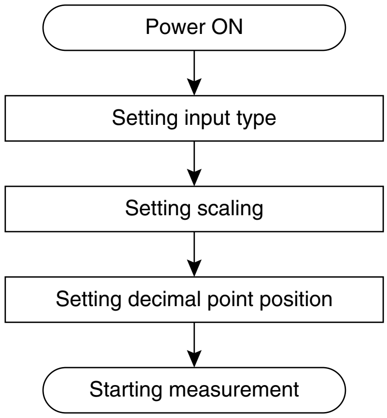
2. BASIC SETTING AND OPERATION

2.1 BASIC SETTING

This section describes flow and procedure of the basic setting.
The following shows the flow and procedure to set the input to 0 – 10 V DC and the display to 0.00 – 1000.00 m^3 with the input code ‘1’ as an example.

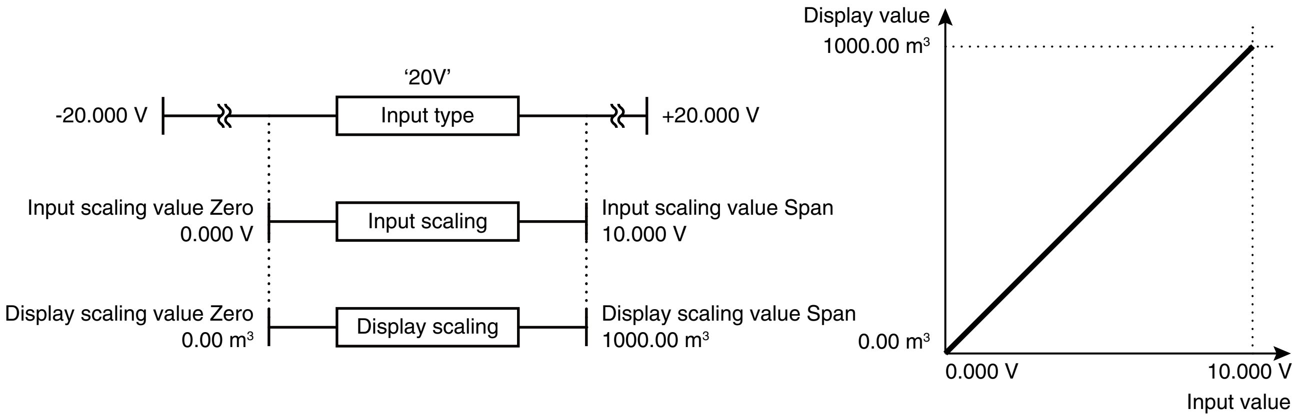
2.1.1 BASIC SETTING FLOW

The basic setting is as shown in the following flowchart.



2.1.2 RELATION AMONG INPUT TYPE, INPUT SCALING AND DISPLAY SCALING

The relation among input type, input scaling and display scaling is as shown in the following figure and chart.



Input type: Type of input signal to 47DV (measuring range)
Input scaling: 0% input value (input scaling value Zero) and 100% input value (input scaling value Span)
Display scaling: 0% display value (display scaling value Zero) and 100% display value (display scaling value Span)

2.1.3 BASIC SETTING PROCEDURE

The following shows the procedure to set the input to 0 – 10 V DC and the display to 0.00 – 1000.00 m^3 with the input code '1' as an example. Set values meeting signals of an equipment to use. Refer to 3. SETTING INPUT TYPE for details of setting.

■ PARAMETER LIST FOR BASIC SETTING

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

PARAMETER	SETTING VALUE	SUB DISPLAY	FUNCTION INDICATOR	SETTING
Input type	20V	INTYPE	----	Measuring range: -20 – +20 V
Input scaling value Zero	000.000*1	IN-A	Zro, Tch	0% input: 0.000 V
Display scaling value Zero	000000*1	DISP-A	Zro	0% display: 0.00 m^3
Input scaling value Span	010.000*1	IN-B	Spn, Tch	100% input: 10.000 V
Display scaling value Span	100000*1	DISP-B	Spn	100% display: 1000.00 m^3
Decimal point position	000.00	D-POINT	----	2 decimal places (10^{-2})

*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 Scale/↑ 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 input scaling value Zero, display scaling value Zero, input scaling value Span and display scaling value Span.**

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

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

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

2.2 BASIC SETTING OPERATION AND INSTRUCTIONS

This section describes basic operation and instructions when setting parameters.

2.2.1 BASIC SETTING OPERATION

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

■ **NUMERICAL VALUE SETTING**

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

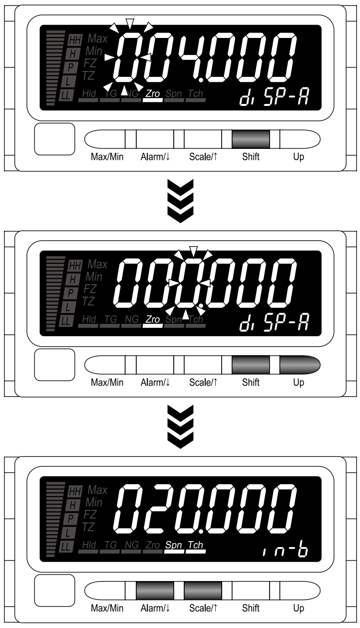
- The most significant digit starts blinking.

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

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

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

- The next or previous parameter setting is indicated.

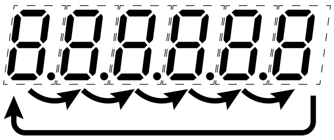


*1 Display depands on the specifications and settings.

NOTE

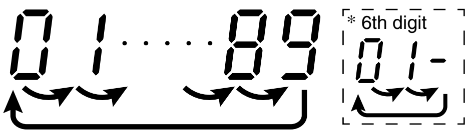
■ **SHIFTING DIGITS**

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



■ **SETTING A NUMERICAL VALUE**

- Each time pressing Up button, the numeral is incremented by 1. In setting an alarm setpoint, the indication following ‘9’ will be ‘-’.
- The negative sign (-) must be set to the 6th digit. For example, set ‘-004.00’ instead of ‘-4.00’.

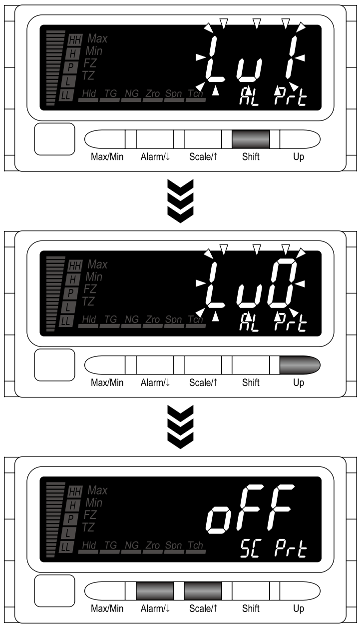


■ SETTING VALUE SELECTION

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 Scale/↑ button to apply the new setting.**
- The next or previous parameter setting is indicated.



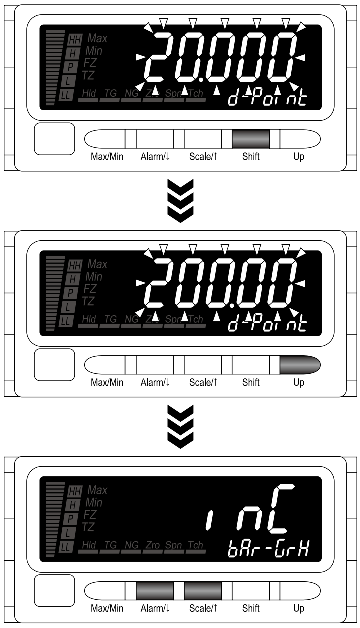
*1 Display depands on the specifications and settings.

■ DECIMAL POINT POSITION SELECTION

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

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

3 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**
- The next or previous parameter setting is indicated.

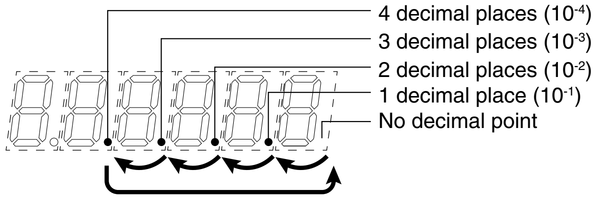


*1 Display depands on the specifications and settings.

NOTE

■ MOVING THE DECIMAL POINT

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



■ DECIMAL POINT POSITION

"No decimal point" to "4 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION
20000	No decimal point
2000.0	1 decimal place (10^{-1})
200.00	2 decimal places (10^{-2})
20.000	3 decimal places (10^{-3})
2.0000	4 decimal places (10^{-4})

2.2.2 INSTRUCTIONS ON BASIC OPERATION

■ SUB DISPLAY

- Alarm setpoints and bank No. can be confirmed in Measuring Mode.
- Maximum 7 alphanumeric characters show a parameter ID in each Setting Mode. Refer to each OPERATING PROCEDURE, 36.3 PARAMETER LIST and 36.4 PARAMETER MAP for the display.
- The sub display is hereafter called SD.

■ LOCKOUT LEVEL

- Alarm Setting Mode and Advanced Setting Mode have 3 lockout levels. Configurable parameters depend on the levels. All parameters can be configured with 'LV0', partial parameters cannot be configured with 'LV1', and all cannot with 'LV2'.
- The lockout level 'LV0' or 'LV1' is shown in each OPERATING PROCEDURE in Alarm Setting and Advanced Setting Modes. Refer to 32. LIMITING BUTTON OPERATION to change the lockout level.

LV0 Configurable with the level 'LV0'.

LV1 Configurable with the level 'LV0' or 'LV1' (default).

■ INVALID PARAMETERS

- 'NG' indicator starts blinking when a parameter is within invalid range. Return the setting within the valid range.
- Setting the following parameters beyond the setting range is invalid: display scaling values Zero and Span, bargraph lower and upper limits, analog outputs 0% and 100%, alarm setpoints, device address, T1.5 and T3.5 timers.
- Setting the negative sign (-) to a digit other than the leftmost one is invalid.

■ IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…

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

■ TO ABORT A SETTING…

- Hold down Max/Min button for 1 second or more, and the blinking setting value will be turned on without applying the last changes. Hold down the button while in the Teach Calibration, and the display will return to Measuring Mode.
- If you get lost in a setting mode, you can execute initialization. (Refer to 35.2 INITIALIZING SETTING VALUES.)

■ **IN MOVING ON TO EACH SETTING MODE FROM MEASURING MODE**

- The last measured values or status are held for the DC and alarm outputs, and the BCD output is indefinite.
- Some alarm indicators turn on with parameter display. The alarm indication is due to the last status before mode transition held but does not show the unit failure.
- Mode transition is not available while 'P.ERR' is indicated. Eliminate the cause of the error and operate again. Refer to 35.1 ERROR MESSAGES for details.

■ **ORDER TO DISPLAY PARAMETERS**

- Some parameters may not be displayed depending on the lockout settings, I/O option and DC output.
- Refer to 6. PARAMETER CONFIGURATION for details.

■ **TO TURN OFF POWER**

- Delay power off for 10 seconds or more after changing of settings including the one set with the ZERO signal.

3. SETTING INPUT TYPE

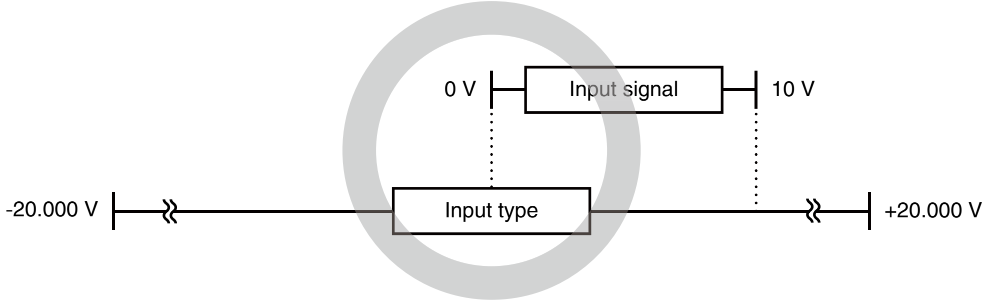
Set input type according to the signal range of an input device to connect.
Choose an input type so that the signal range of the device is the same as the measuring range of the input type or within the setting range.

e.g. Input signal 0 – 10 V DC
→ Within setting range of input type ‘20V’, ±20 V
Choose ‘20V’.

■ CONFIGURATION EXAMPLES

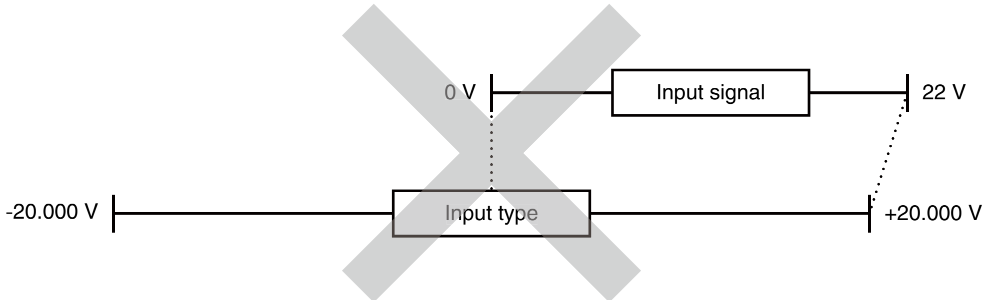
Configurable

- Input signal 0 – 10 V DC, input type ‘20V’ (measuring range -20 to +20 V)



Not configurable

- Input signal 0 – 22 V DC, input type ‘20V’ (measuring range -20 to +20 V)



IMPORTANT

- Setting beyond the setting range of an input type is not available.
- Even small input signal can be set within the setting range of an input type, however the accuracy will be worse. Choose appropriate input type and code.
- The input and display scaling values, bargraph lower and upper limits, analog outputs 0% and 100% 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 of the current bank No. are disabled (reset to ‘------’ status). Also other alarm parameters (trip action, deadband, OFF delay time and coil at alarm) except for the ones concerning the P status are reset to the default values. It is recommended to record the current settings as necessary.

3.1 INPUT TYPE LIST

Input type can be changed within the same input code.

■ INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

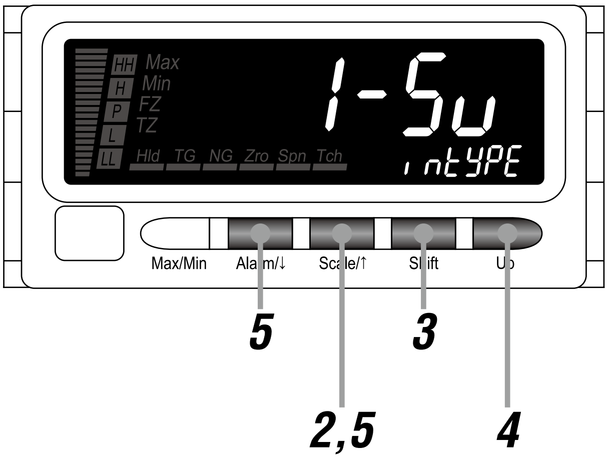
MAIN DISPLAY	FUNCTION	SETTING RANGE	OPERATIONAL RANGE	DEFAULT VALUE
1-5V	Measuring range 1 – 5 V	1.0000 – 5.0000 V	0.6 – 5.4 V	1-5V
-5-5V	Measuring range -5 – +5 V	-5.000 – +5.000 V	-6 – +6 V	
20V	Measuring range -20 – +20 V	-20.000 – +20.000 V	-24 – +24 V	
200V	Measuring range -200 – +200 V	-200.00 – +200.00 V	-240 – +240 V	

■ INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

MAIN DISPLAY	FUNCTION	SETTING RANGE	OPERATIONAL RANGE	DEFAULT VALUE
4-20MA	Measuring range 4 – 20 mA	4.000 – 20.000 mA	2.4 – 21.6 mA	4-20MA
0-20MA	Measuring range 0 – 20 mA	0.000 – 20.000 mA	-2 – +22 mA	
20MA	Measuring range -20 – +20 mA	-20.000 – +20.000 mA	-24 – +24 mA	
200MA	Measuring range -200 – +200 mA	-200.00 – +200.00 mA	-240 – +240 mA	

3.2 OPERATING PROCEDURE

Procedures to change ‘1-5V’ (measuring range 1 – 5 V) (default) to ‘20V’ (measuring range -20 to +20 V) are described here.



NOTE

The left figure shows a display example (default value of input code ‘1’). The display depends on the and settings. Refer to 3.1 INPUT TYPE LIST for details.

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

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

■ Immediately after power on (all indicators on)

■ Measuring Mode

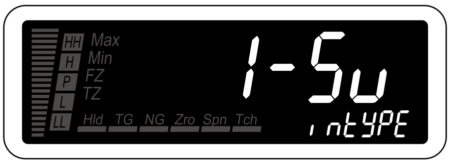
*1 Display depends on the settings and input.

NOTE

- Indication ‘S.ERR’ may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to “enabled”.

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

- The input type is indicated.
- The SD indicates ‘INTYPE’.

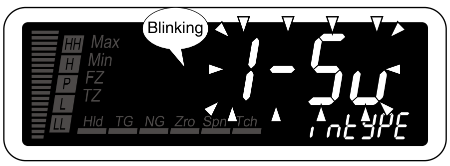


NOTE

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

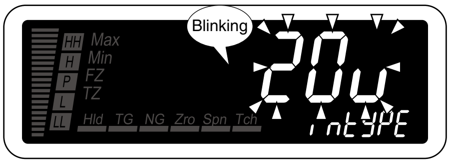
3 **Press Shift button to shift the display into the setting standby mode.**

- The indication ‘1-5V’ starts blinking, to which you can apply changes.



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

• Select ‘20V’ (measuring range -20 to +20 V).



NOTE

Refer to 3.1 INPUT TYPE LIST for selectable input types.

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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the input scaling value Zero will be indicated (‘IN-A’ on the SD).
• Press Scale/↑ button, and the bargraph upper limit will be indicated (‘BAR-H’ on the SD), the bargraph type will be indicated (‘BAR-GRH’ on the SD) with the bargraph type set to “no bargraph”, or the analog output 100% adjustment will be indicated (‘AADJ H’ on the SD) with DC output (DC output code ‘1’).

6 **■ TO GO ON TO SET THE INPUT SCALING VALUE ZERO,**
Skip to Step 3 in “4.1 STEP 1. INPUT SCALING VALUE ZERO”.

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

NOTE

■ INPUT TYPE

• Input type cannot be changed across different input codes (input code 1 to 2 for example).

■ 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 15. 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 35.2 INITIALIZING SETTING VALUES.)

4. SETTING SCALING VALUES

■ INPUT SCALING

Input scaling means setting an input value within the setting range of the selected input type.
The input scaling values include Zero and Span.

- Input scaling value Zero is minimum value (0%) of input signal.
- Input scaling value Span is maximum value (100%) of input signal.

e.g. Input signal 0 – 10 V DC

Input scaling value Zero	0 V
Input scaling value Span	10 V

■ SETTING INPUT SCALING VALUES

Set the input scaling values with 5 significant digits within the setting ranges, disregarding the decimal point.

e.g. (1) Input type '4-20MA', input signal 4 – 20 mA DC

Setting range	4.000 – 20.000 (5 significant digits)
Input scaling value Zero	004000
Input scaling value Span	020000

e.g. (2) Input type '20MA', input signal -5 to +5 mA DC

Setting range	-20.000 to +20.000 (5 significant digits)
Input scaling value Zero	-05000
Input scaling value Span	005000

IMPORTANT

- Set 'input scaling value Zero < input scaling value Span'.
- Setting beyond the setting range of the set input type is not available.
- The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
- Input scaling value Zero and input scaling value Span can be adjusted by applying actual input signals. Refer to 33.1 TEACH CALIBRATION for details.

■ DISPLAY SCALING

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

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

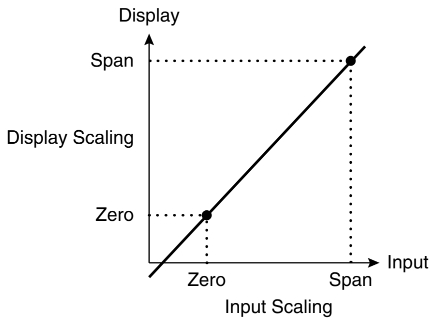
e.g. Display value 0.00 – 1000.00 m^3

Display scaling value Zero	0.00 m^3
Display scaling value Span	1000.00 m^3
Decimal point position	000.00 (2 decimal places)

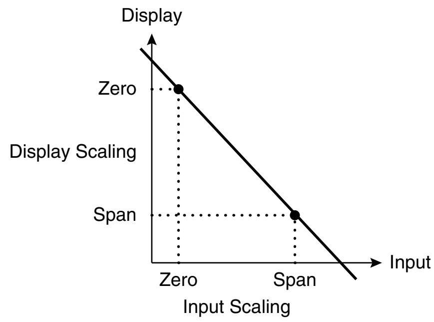
IMPORTANT

- The bargraph lower and upper limits change according to changes of the display scaling values. The bargraph lower limit is reset to the same value as the display scaling value Zero, and the upper limit is reset to the same value as the display scaling value Span. After setting the display scaling values, the bargraph lower and upper limits can be set arbitrarily.
- When the high-pass filter is set to "ON", the display scaling range is reset to the one with 0 as 50% regardless of the display scaling settings. Refer to 18. DETECTING STEEP INPUT CHANGES for details.
- Both normal scaling (display scaling value Zero < display scaling value Span) and inverted scaling (display scaling value Zero > display scaling value Span) can be set within the range of -20000 to 100000.

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



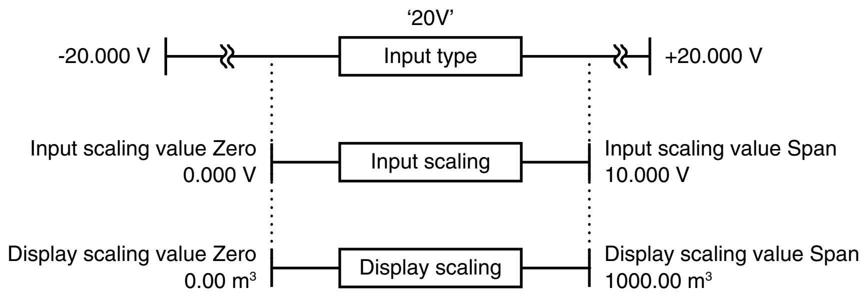
■ Inverted Scaling
The display value decreases when the input signal increases.



■ RELATION BETWEEN INPUT SCALING AND DISPLAY SCALING

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

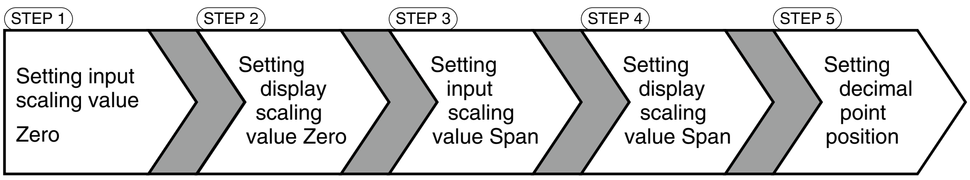
e.g. To display 0 – 10 V DC input as 0.00 – 1000.00 m^3



■ PROCEDURE TO SET SCALING VALUES

- Flow in setting scaling values

5-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 0 – 10 V DC, and the display scaling to 0.00 – 1000.00 m^3 as an example.

4.1 STEP 1. INPUT SCALING VALUE ZERO

4.1.1 INPUT SCALING LIST

Input scaling default values and setting ranges per input code 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. Set the values with 5 significant digits within the setting ranges, disregarding the decimal point.

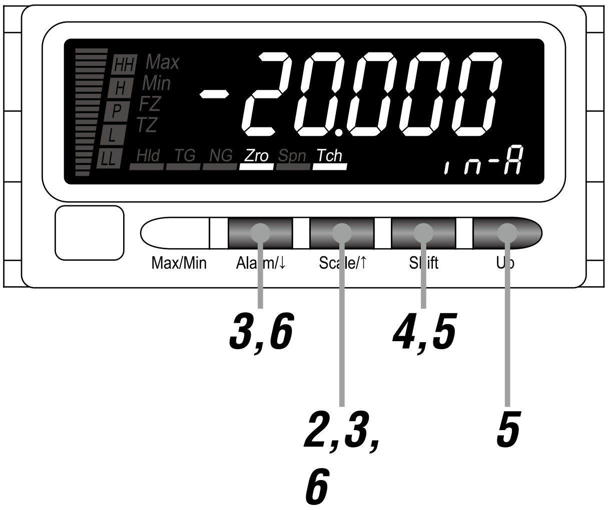
■ INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE	SETTING RANGE
1 to 5 V (1-5V)	Input scaling value Zero: 0 1.0000 Input scaling value Span: 05.0000	1.0000 – 5.0000 V
-5 to +5 V (-5-5V)	Input scaling value Zero: -05.000 Input scaling value Span: 005.000	-5.000 – +5.000 V
±20 V (20V)	Input scaling value Zero: -20.000 Input scaling value Span: 020.000	-20.000 – +20.000 V
±200 V (200V)	Input scaling value Zero: -200.00 Input scaling value Span: 0200.00	-200.00 – +200.00 V

■ INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE	SETTING RANGE
4 to 20 mA (4-20MA)	Input scaling value Zero: 004.000 Input scaling value Span: 020.000	4.000 – 20.000 mA
0 to 20 mA (0-20MA)	Input scaling value Zero: 000.000 Input scaling value Span: 020.000	0.000 – 20.000 mA
±20 mA (20MA)	Input scaling value Zero: -20.000 Input scaling value Span: 020.000	-20.000 – +20.000 mA
±200 mA (200MA)	Input scaling value Zero: -200.00 Input scaling value Span: 0200.00	-200.00 – +200.00 mA

4.1.2 OPERATING PROCEDURE



NOTE

The left figure shows a display example (default value of input type '20V'). The display depends on the and settings. Refer to 4.1.1 INPUT SCALING LIST for details.

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.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to "enabled".

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

NOTE

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

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

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

NOTE

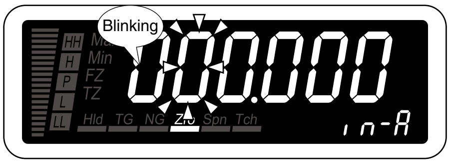
Skip to Step 7 if the default value is acceptable.

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

- The sixth digit starts blinking, to which you can apply changes.
- 'Tch' indicator turns off.

5 **Press Shift and Up buttons to set to '000.000'.**

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



NOTE

- '000.000' is a display example. Set any value within the setting range.
- The decimal point position depends on the decimal point position setting. Set the input scaling value Zero with 5 significant digits within the setting ranges, disregarding the decimal point.
- The negative sign (-) must be set to the 6th digit. For example, set '-004.00' instead of '-4.00'.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the display scaling value Zero will be indicated ('DISP-A' on the SD).
- Press Scale/↑ button, and the input type will be indicated ('INTYPE' on the SD).

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

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

NOTE

■ INPUT SCALING SETTING

- Do not set 'input scaling value Zero ≥ input scaling value Span'.

■ IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…

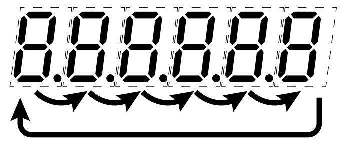
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 15. 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 35.2 INITIALIZING SETTING VALUES.)

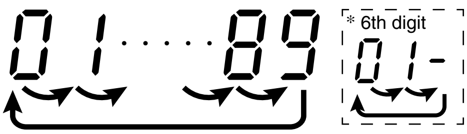
■ SHIFTING DIGITS

- 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.



4.2 STEP 2. DISPLAY SCALING VALUE ZERO

4.2.1 DISPLAY SCALING LIST

Display scaling default values and setting ranges per input code 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.

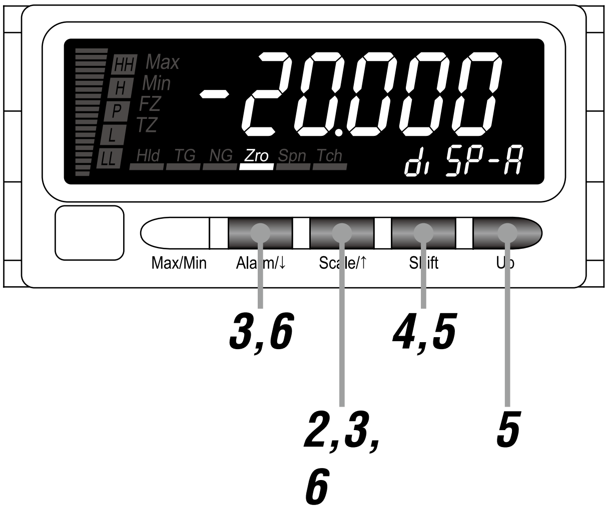
■ INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE	SETTING RANGE
1 to 5 V (1-5V)	Display scaling value Zero: 0 1.0000 Display scaling value Span: 05.0000	-20000 to 100000
-5 to +5 V (-5-5V)	Display scaling value Zero: -05.000 Display scaling value Span: 005.000	
±20 V (20V)	Display scaling value Zero: -20.000 Display scaling value Span: 020.000	
±200 V (200V)	Display scaling value Zero: -200.00 Display scaling value Span: 0200.00	

■ INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE	SETTING RANGE
4 to 20 mA (4-20MA)	Display scaling value Zero: 004.000 Display scaling value Span: 020.000	-20000 to 100000
0 to 20 mA (0-20MA)	Display scaling value Zero: 000.000 Display scaling value Span: 020.000	
±20 mA (20MA)	Display scaling value Zero: -20.000 Display scaling value Span: 020.000	
±200 mA (200MA)	Display scaling value Zero: -200.00 Display scaling value Span: 0200.00	

4.2.2 OPERATING PROCEDURE



NOTE

The left figure shows a display example (default value of input type '20V'). The display depends on the settings. Refer to 4.2.1 DISPLAY SCALING LIST for details.

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.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to "enabled".

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

NOTE

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

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

- The display scaling value Zero is indicated.
- The SD indicates 'DISP-A'.
- 'Zro' indicator turns on.

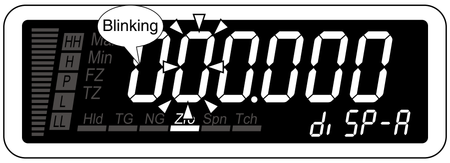
NOTE

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 '000.000'.**



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

NOTE

• '000.000' is a display example. Set any value within the range of -20000 to 100000.
• The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
• 'NG' indicator starts blinking when the set value is within invalid range. Return the setting within the valid range.
• The negative sign (-) must be set to the 6th digit. For example, set '-004.00' instead of '-4.00'.

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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the input scaling value Span will be indicated ('IN-B' on the SD).
• Press Scale/↑ button, and the input scaling value Zero will be indicated ('IN-A' on the SD).

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

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

NOTE

■ IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…

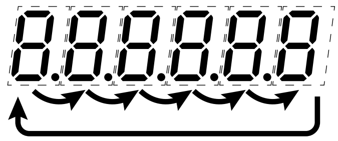
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 15. 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 35.2 INITIALIZING SETTING VALUES.)

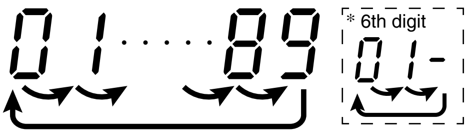
■ SHIFTING DIGITS

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



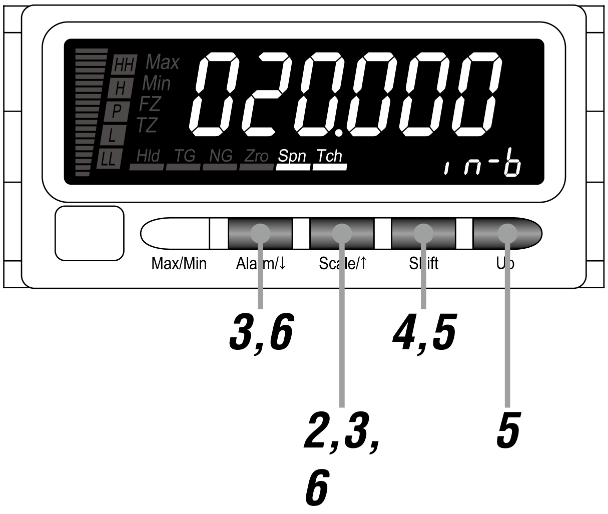
■ SETTING A NUMERICAL VALUE

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



4.3 STEP 3. INPUT SCALING VALUE SPAN

4.3.1 OPERATING PROCEDURE



NOTE

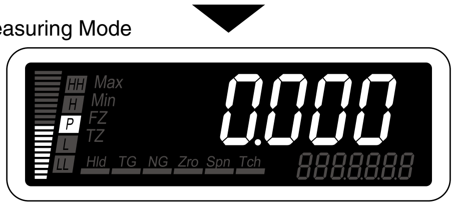
The left figure shows a display example (default value of input type ‘20V’). The display depends on the settings. Refer to 4.1.1 INPUT SCALING LIST for details.

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

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

■ Immediately after power on (all indicators on)

■ Measuring Mode



*1 Display depends on the settings and input.

NOTE

- Indication ‘S.ERR’ may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to “enabled”.

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

- The input type is indicated.
- The SD indicates ‘INTYPE’.

NOTE

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

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

- The input scaling value Span is indicated.
- The SD indicates ‘IN-B’.
- ‘Spn’ and ‘Tch’ indicators turn on.

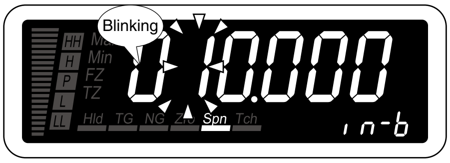
NOTE

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.
- ‘Tch’ indicator turns off.

5 **Press Shift and Up buttons to set to ‘010.000’.**



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

NOTE

- ‘010.000’ is a display example. Set any value within the setting range.
- The decimal point position depends on the decimal point position setting. Set the input scaling value Span with 5 significant digits within the setting ranges, disregarding the decimal point.
- The negative sign (-) must be set to the 6th digit. For example, set ‘-004.00’ instead of ‘-4.00’.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the display scaling value Span will be indicated (‘DISP-B’ on the SD).
- Press Scale/↑ button, and the display scaling value Zero will be indicated (‘DISP-A’ on the SD).

7 ■ **TO GO ON TO SET THE DISPLAY SCALING VALUE SPAN,**
Skip to Step 3 in “4.4 STEP 4. DISPLAY SCALING VALUE SPAN.”

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

NOTE

■ **INPUT SCALING SETTING**

- Do not set ‘input scaling value Zero ≥ input scaling value Span’.

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**

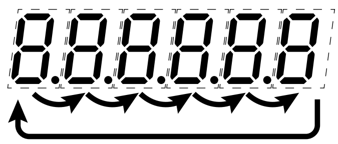
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 15. 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 35.2 INITIALIZING SETTING VALUES.)

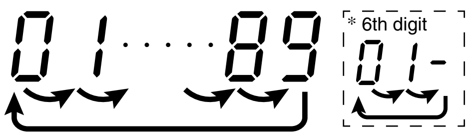
■ **SHIFTING DIGITS**

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



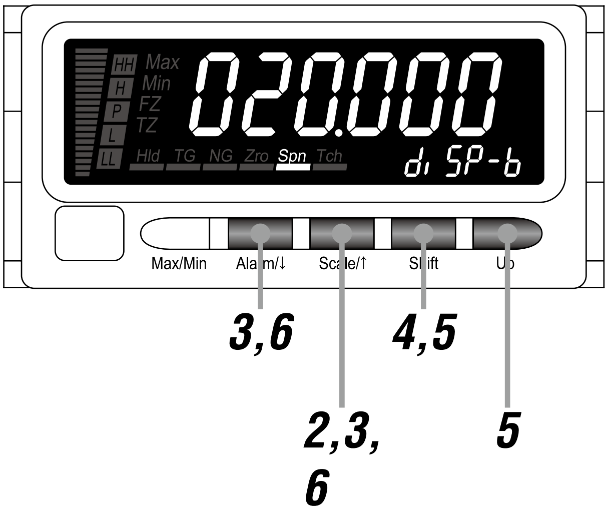
■ **SETTING A NUMERICAL VALUE**

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



4.4 STEP 4. DISPLAY SCALING VALUE SPAN

4.4.1 OPERATING PROCEDURE



NOTE

The left figure shows a display example (default value of input type ‘20V’). The display depends on the settings. Refer to 4.2.1 DISPLAY SCALING LIST for details.

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

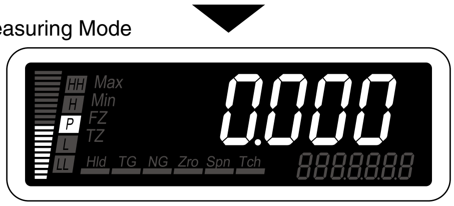
- All the indications turn on for approximately 3 seconds and then the display moves on to Measuring Mode.

NOTE

- Indication ‘S.ERR’ may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to “enabled”.

■ Immediately after power on (all indicators on)

■ Measuring Mode



*1 Display depends on the settings and input.

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

- The input type is indicated.
- The SD indicates ‘INTYPE’.

NOTE

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

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

- The display scaling value Span is indicated.
- The SD indicates ‘DISP-B’.
- ‘Spn’ indicator turns on.

NOTE

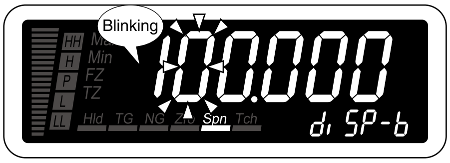
Skip to Step 7 if the default value is acceptable.

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 ‘100.000’.**

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



NOTE

- ‘100.000’ is a display example. Set any value within the range of -20000 to 100000.
- The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
- ‘NG’ indicator starts blinking when the set value is within invalid range. Return the setting within the valid range.
- The negative sign (-) must be set to the 6th digit. For example, set ‘-004.00’ instead of ‘-4.00’.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the decimal point position will be indicated (‘D-POINT’ on the SD).
- Press Scale/↑ button, and the input scaling value Span will be indicated (‘IN-B’ on the SD).

7 ■ **TO GO ON TO SET THE DECIMAL POINT POSITION,**

Skip to Step 3 in “4.5 STEP 5. DECIMAL POINT POSITION”.

■ **TO QUIT,**

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

NOTE

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**

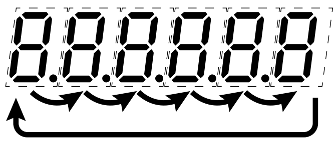
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 15. 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 35.2 INITIALIZING SETTING VALUES.)

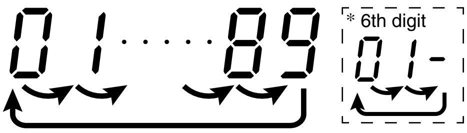
■ **SHIFTING DIGITS**

- 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.



4.5 STEP 5. DECIMAL POINT POSITION

4.5.1 DECIMAL POINT POSITION LIST

Default values of decimal point position per input type 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.

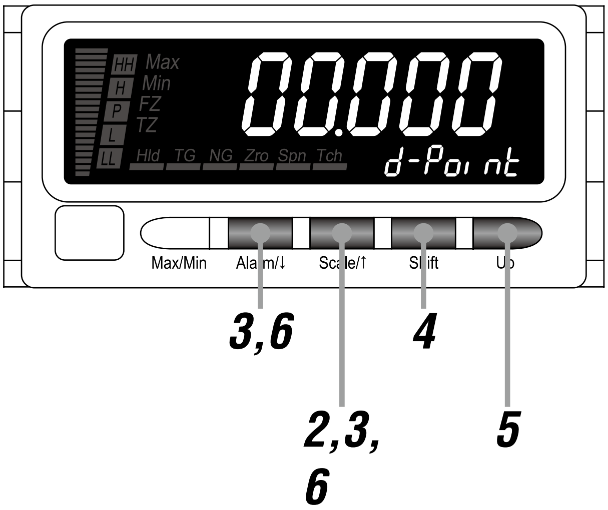
■ INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
1 to 5 V (1-5V)	5.0000 4 decimal places (10^{-4})
-5 to +5 V (-5-5V)	05.000 3 decimal places (10^{-3})
±20 V (20V)	20.000 3 decimal places (10^{-3})
±200 V (200V)	200.00 2 decimal places (10^{-2})

■ INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
4 to 20 mA (4-20MA)	20.000 3 decimal places (10^{-3})
0 to 20 mA (0-20MA)	20.000 3 decimal places (10^{-3})
±20 mA (20MA)	20.000 3 decimal places (10^{-3})
±200 mA (200MA)	200.00 2 decimal places (10^{-2})

4.5.2 OPERATING PROCEDURE



NOTE

The left figure shows a display example (last 5 digits of the set display scaling value Span). The display depends on the settings. Refer to 4.5.1 DECIMAL POINT POSITION LIST for details.

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.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- The SD indicates the bank No. with the bank switching set to "enabled".

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

NOTE

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

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

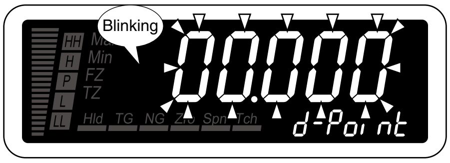
- The decimal point position is indicated.
- The SD indicates ‘D-POINT’.

NOTE

- The set display scaling value Span is indicated. When ‘100000’ is set, ‘00000’ (last 5 digits) is indicated. A negative sign is indicated.
- Skip to Step 7 if the default value is acceptable.

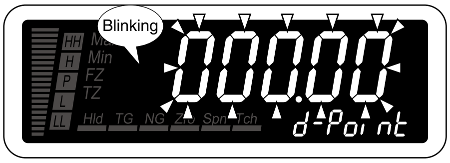
4 **Press Shift button to shift the display into the setting standby mode.**

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



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

- Select 2 decimal places (10^{-2}).
- 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 “4 decimal places”.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the bargraph type will be indicated (‘BAR-GRH’ on the SD).
- Press Scale/↑ button, and the display scaling value Span will be indicated (‘DISP-B’ on the SD).

7

■ **TO GO ON TO SET THE BARGRAPH TYPE,**
Skip to Step 2 in "7.1 BARGRAPH TYPE."

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

NOTE

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**

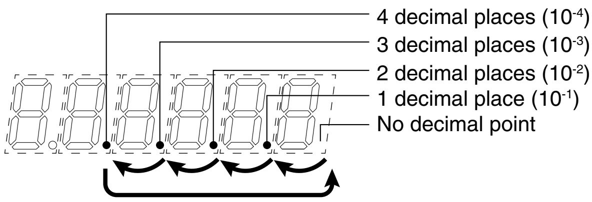
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 15. 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 35.2 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 "4 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION
00000	No decimal point
0000.0	1 decimal place (10^{-1})
000.00	2 decimal places (10^{-2})
00.000	3 decimal places (10^{-3})
0.0000	4 decimal places (10^{-4})

5. OPERATION

Make sure that 0.00 - 1000.00 m^3 is correctly indicated according to the input 0 – 10 V DC provided. The operation without using external control signals including the event trigger input is described here.

IMPORTANT

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

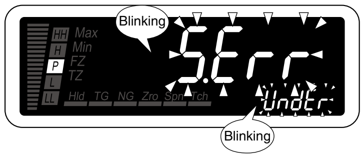
1 **Apply 0 V input (0%) and make sure that 0.00 m^3 is indicated.**

*1 Display depends on the settings and input.

NOTE

■ **WHEN THE FOLLOWING IS INDICATED…**

- When ‘S.ERR’ is indicated, the input is not applied correctly. Check the input wiring, equipment and signal. When the SD indicates ‘UNDER’, the input signal is under the specification voltage/current. And when the SD indicates ‘OVER’, the input is over the specification voltage/current.
- When the indication is shifted with ‘FZ’ and/or ‘TZ’ indicators on, the Forced Zero or Tare Adjustment is being executed. Cancel the Forced Zero and Tare Adjustment. (Refer to 26. FORCING THE PRESENT DISPLAY VALUE TO ZERO.)



■ **WHEN THE INDICATION DOES NOT CHANGE…**

- MAX or MIN value is indicated with ‘Max’ or ‘Min’ indicator on. Cancel the MAX/MIN Value Display mode. (Refer to 27. RETAINING MAX AND MIN VALUES.)

■ **ALARM INDICATORS**

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

■ **DISPLAY COLOR**

- The main display color depends on the settings of the display color and setpoints.

2 **Apply 5 V input (50%) and make sure that 500.00 m^3 is indicated.**

3 **Apply 10 V input (100%) and make sure that 1000.00 m^3 is indicated.**

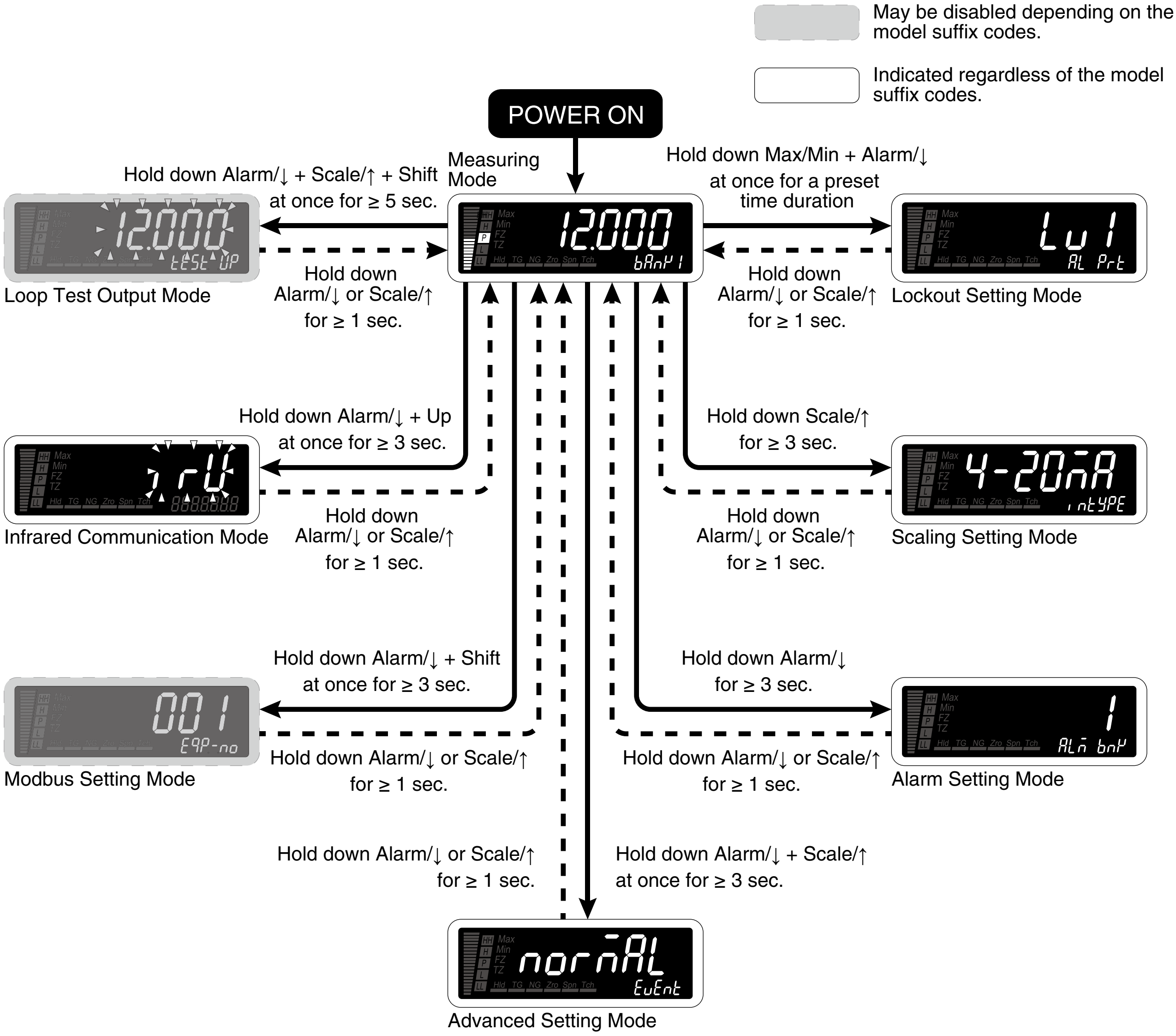
6. PARAMETER CONFIGURATION

■ MODE

Parameters can be grouped in several modes.
The 47DV 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 can be indicated, and alarm setpoints can be indicated and set in Measuring Mode. Also Forced Zero and Tare Adjustment can be executed and canceled in this mode. When the power is supplied, the unit operates in Measuring Mode.	Measuring
Scaling Setting	Basic settings such like input type, input scaling and display scaling, and also Teach Calibration, bargraph settings, analog output settings and analog output adjustments can be performed.	Measuring stopped
Alarm Setting	Alarm setpoints, trip action, deadband, ON delay time and bank No. can be set.	
Advanced Setting	Averaging time, low-end cutout and display color can be set. Also the firmware version can be confirmed.	
Modbus Setting	Device address, baud rate and parity bit can be set.	
Infrared Communication	Used to configure parameters with a PC.	
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 Scale/↑ button for 3 seconds or more.
To Alarm Setting Mode	Hold down Alarm/↓ button for 3 seconds or more.
To Advanced Setting Mode	Hold down Alarm/↓ + Scale/↑ buttons at once for 3 seconds or more.
To Modbus Setting Mode	Hold down Alarm/↓ + Shift buttons at once for 3 seconds or more.
To Infrared Communication Mode	Hold down Alarm/↓ + Up buttons at once for 3 seconds or more.
To Lockout Setting Mode	Hold down Max/Min + Alarm/↓ buttons at once for a preset time duration.
To Loop Test Output	Hold down Alarm/↓ + Scale/↑ + Shift buttons at once for 5 seconds or more.

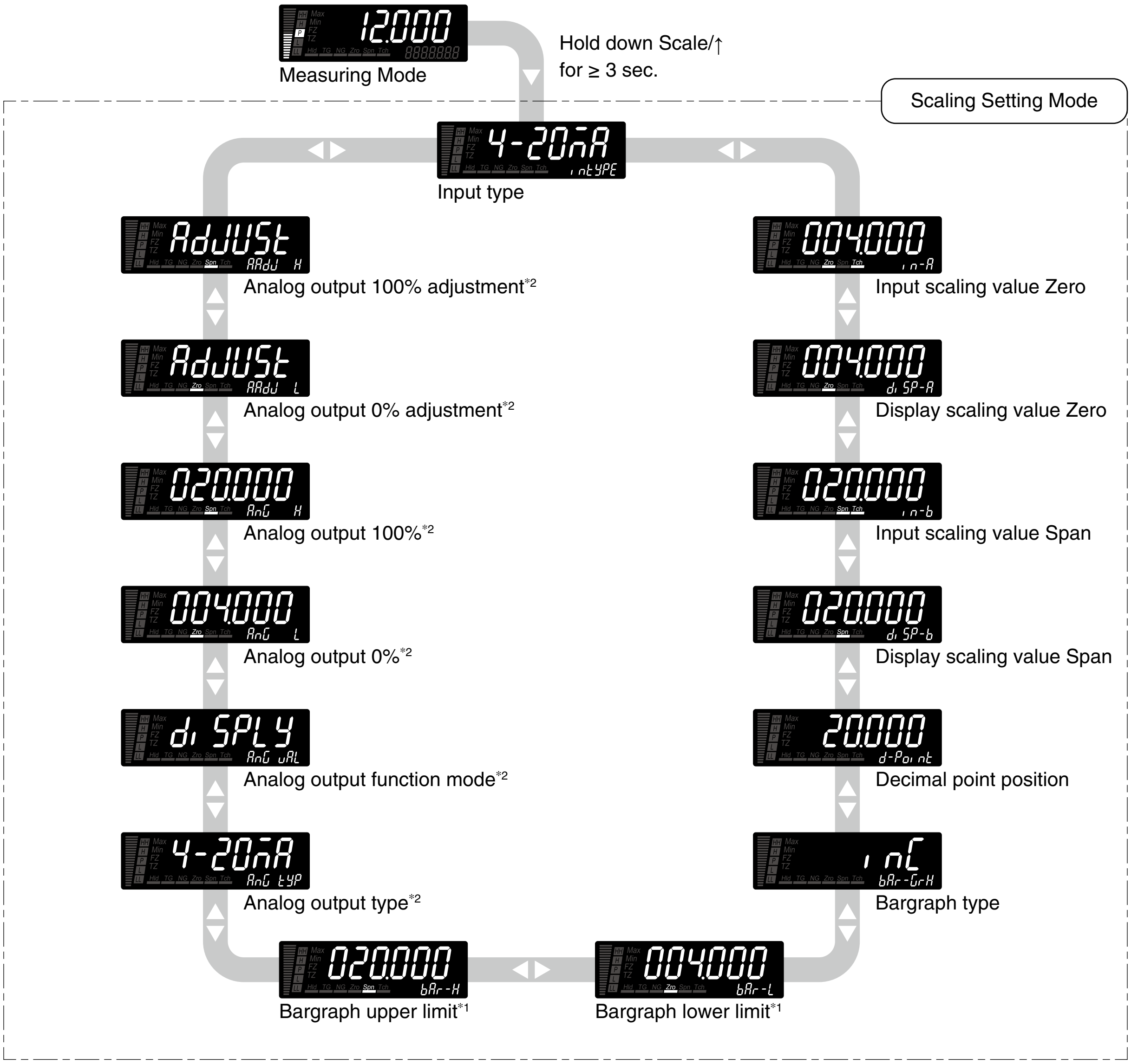
■ TRANSITION FROM EACH MODE TO MEASURING MODE

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

■ SHIFTING THROUGH SETTING PARAMETERS

(1) Parameter shifting in Scaling Setting Mode

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



*1 Disabled with “no bargraph” selected for the bargraph type parameter.
*2 Disabled with no-DC-output type (DC output code ‘0’).

NOTE

- The display depends on the specifications and settings. The above displays show default values with the input code ‘2’ and type ‘4-20MA’.
- Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

(2) Parameter shifting in Alarm Setting Mode

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

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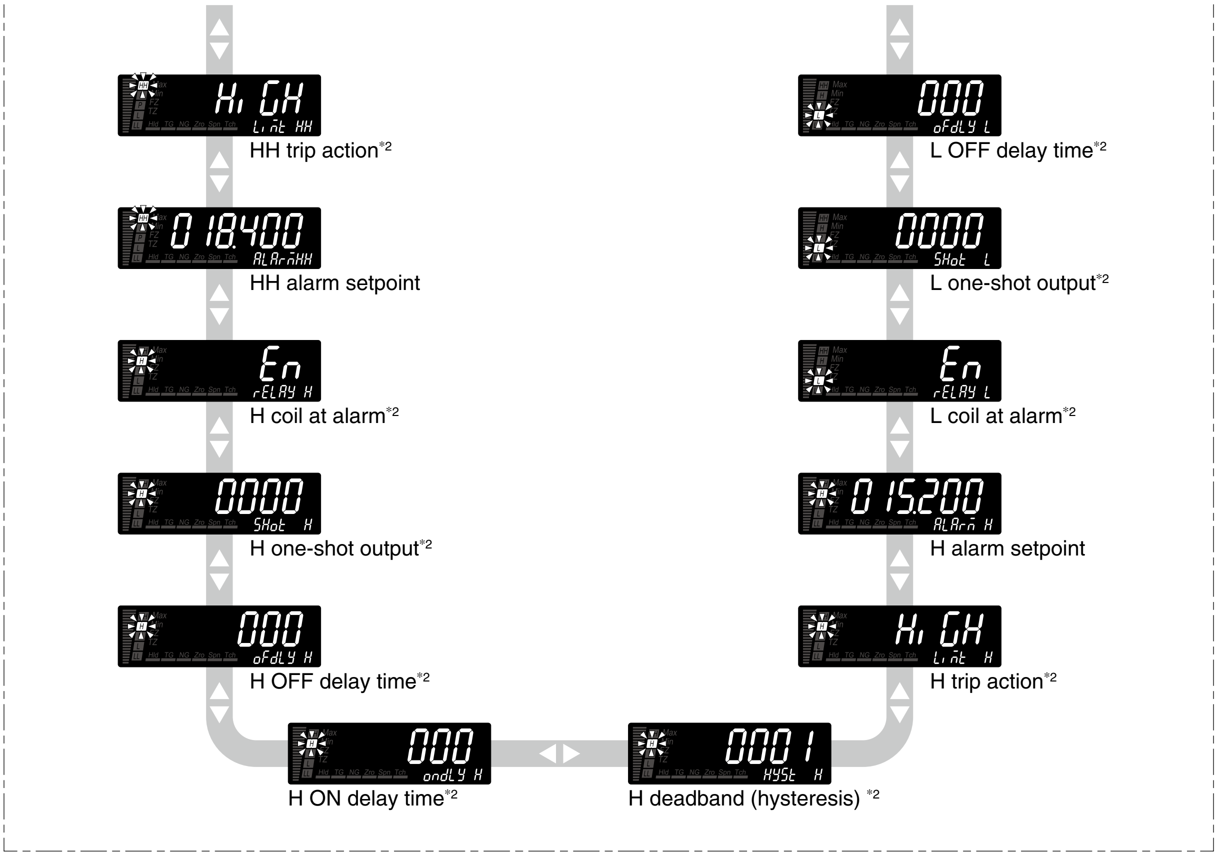


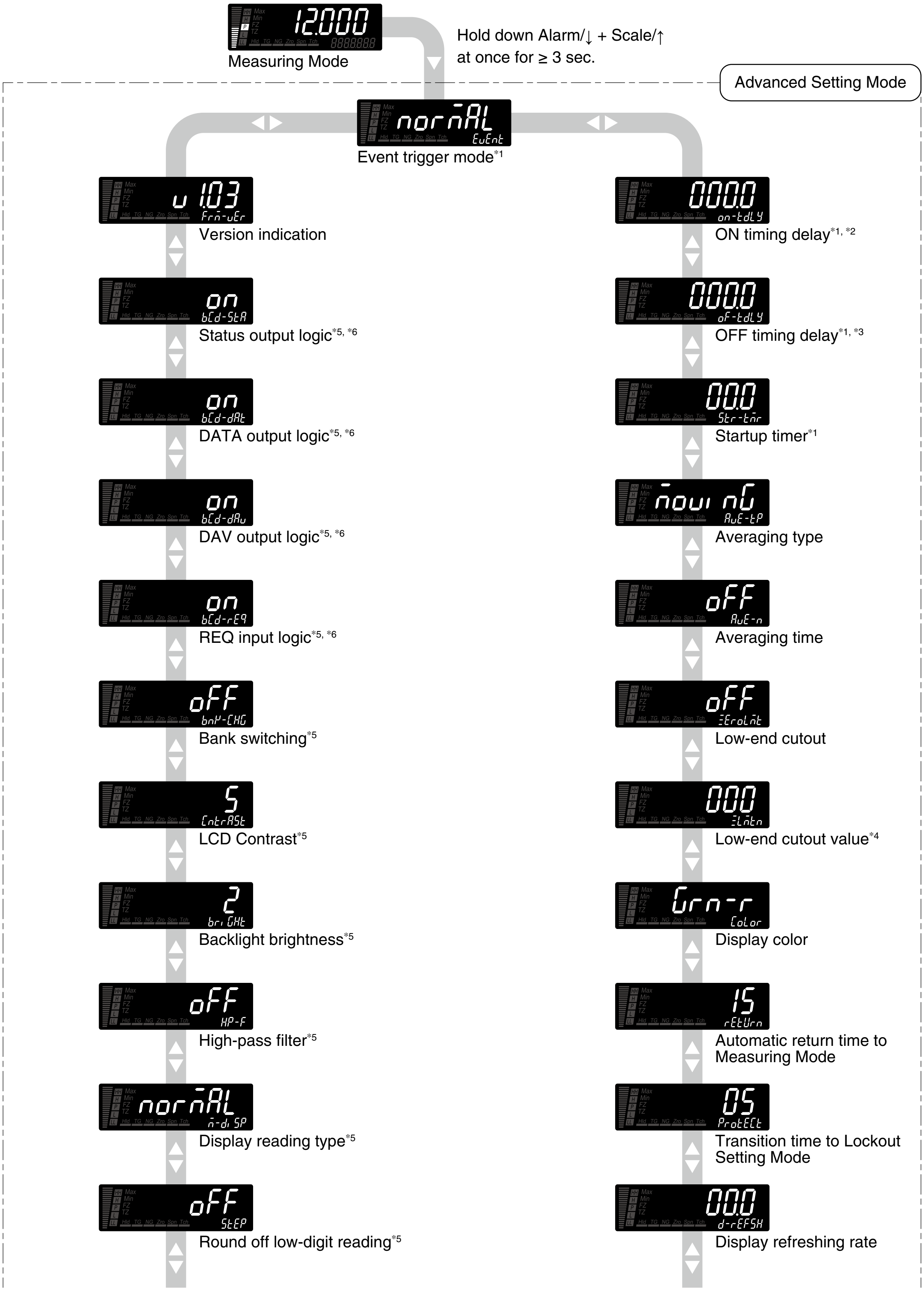
*1 Enabled with “enabled via the front button control” selected for the bank switching parameter.
*2 Enabled with “completely unlock Alarm Setting Mode” selected for the alarm setting lockout parameter.

NOTE

- The display depends on the specifications and settings. The above displays show default values with the input code ‘2’ and type ‘4-20MA’.
- Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

(3) Parameter shifting in Advanced Setting Mode

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



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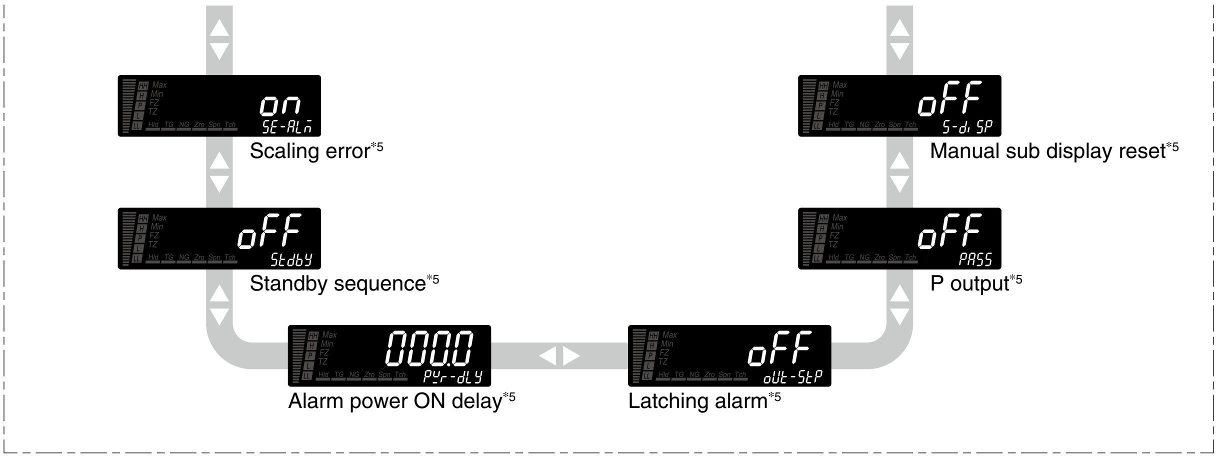


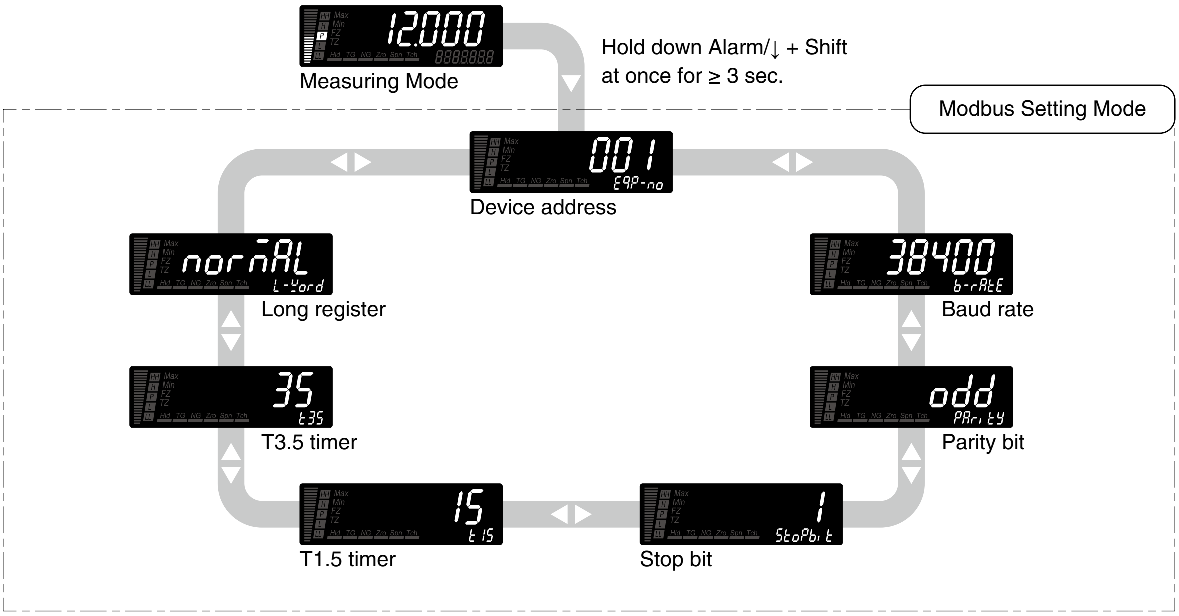
*1 Enabled with the I/O option code '6' or 'A' (event tripper input).
*2 Disabled with "normal" selected for the event trigger mode parameter.
*3 Disabled with "normal" or "sampling hold" selected for the event trigger mode parameter.
*4 With the cutout set to OFF, the low-end cutout value setting is locked.
*5 Enabled with "completely unlock Advanced Setting Mode" selected for the advanced setting lockout parameter.
*6 Enabled with the I/O option code '5' , '9' or 'A' (BCD output).

NOTE

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

(4) Parameter shifting in Modbus Setting Mode

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



NOTE

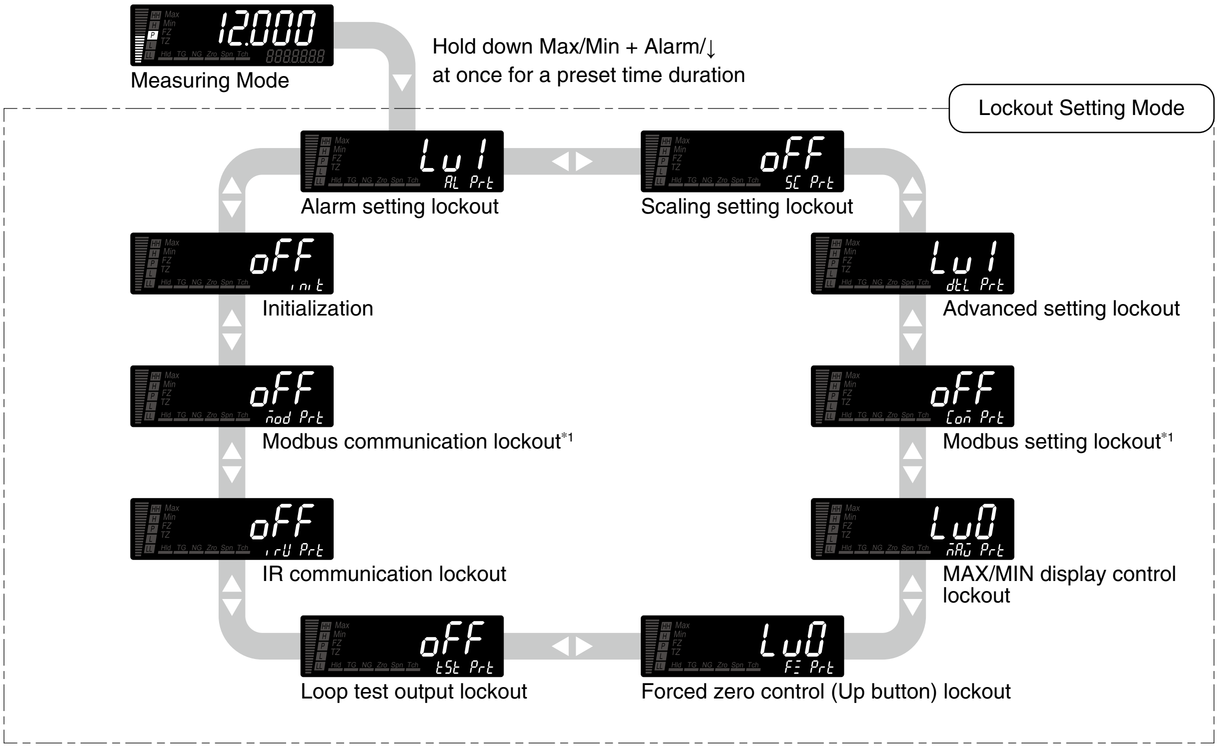
- The display depends on the specifications and settings. The above displays show default values.
- Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

(5) Parameter shifting in Infrared Communication Mode

There is no parameter shifting in this mode.

(6) Parameter shifting in Lockout Setting Mode

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



*1 Enabled with the I/O option code '4' , '7' or '8' (network interface).

NOTE

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

---

(7) Parameter shifting in Loop Test Output Mode

There is no parameter shifting in this mode.

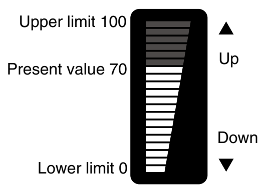
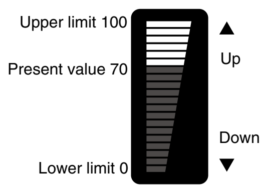
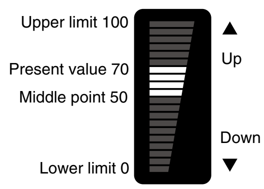
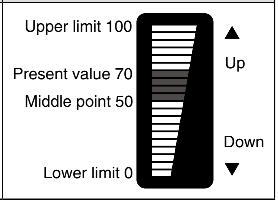
7. SETTING BARGRAPH

A bargraph with 20 segments divided by 10 is in the left on the display, which shows the signal level of the indicated value (present, MAX or MIN value) against the scaled range. The bargraph range is set with the bargraph lower and upper limits. The bargraph type can be selected among those shown in the following table.
The bargraph lower and upper limits can be set within the range of -20000 to 100000.

■ BARGRAPH TYPE

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
inC	Unidirectional bar	inC
inCr	Unidirectional bar (reverse LCD)	
dEv	Bidirectional bar	
dEvr	Bidirectional bar (reverse LCD)	
oFF	No bargraph	

■ BARGRAPH IMAGE

UNIDIRECTIONAL	UNIDIRECTIONAL (REVERSE LCD)	BIDIRECTIONAL	BIDIRECTIONAL (REVERSE LCD)
			

IMPORTANT

- The bidirectional bar shows deviation in both directions from the middle point between the lower and upper limits.
- The number of the LED segments is 20 divided by 10. The bar increases or decreases by 2 segments.
- In setting 'bargraph upper limit < bargraph lower limit', the bargraph image is upside down of the above ones.

■ SETTING RANGE OF BARGRAPH LOWER AND UPPER LIMITS

The bargraph lower and upper limits can be set within the range of -20000 to 100000.
The default values per input type are as shown in the following tables.

• INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
1 to 5 V (1-5V)	Bargraph lower limit: 010000 Bargraph upper limit: 050000
-5 to +5 V (-5-5V)	Bargraph lower limit: -05000 Bargraph upper limit: 005000
±20 V (20V)	Bargraph lower limit: -20000 Bargraph upper limit: 020000
±200 V (200V)	Bargraph lower limit: -20000 Bargraph upper limit: 020000

• INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

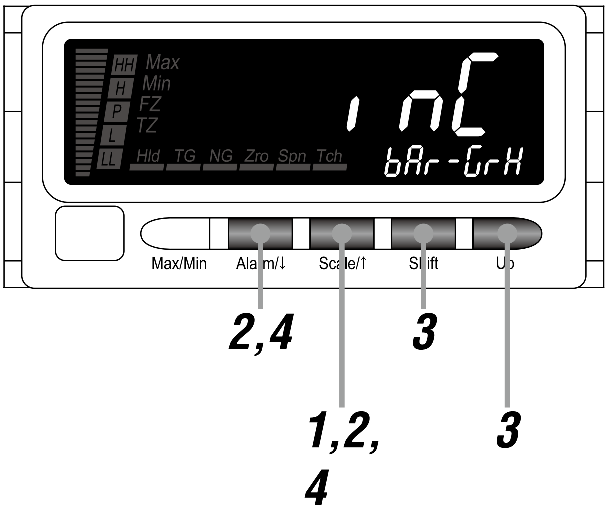
INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
4 to 20 mA (4-20MA)	Bargraph lower limit: 004000 Bargraph upper limit: 020000
0 to 20 mA (0-20MA)	Bargraph lower limit: 000000 Bargraph upper limit: 020000
±20 mA (20MA)	Bargraph lower limit: -20000 Bargraph upper limit: 020000
±200 mA (200MA)	Bargraph lower limit: -20000 Bargraph upper limit: 020000

IMPORTANT

- The bargraph lower and upper limits 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.
- The bargraph lower and upper limits change according to changes of the display scaling values. The bargraph lower limit is reset to the same value as the display scaling value Zero, and the upper limit is reset to the same value as the display scaling value Span. After setting the display scaling values, the bargraph lower and upper limits can be set arbitrarily.
- It is recommended to use the bargraph lower and upper limits within the set display scaling range.

7.1 BARGRAPH TYPE

7.1.1 OPERATING PROCEDURE



NOTE

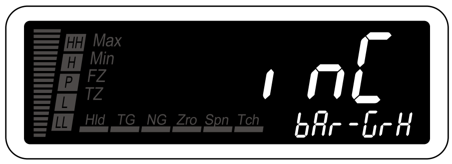
The following figures are display examples. The displays depend on the specifications and settings.

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

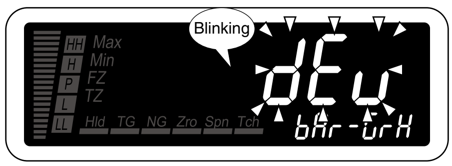
2 **Press Alarm/↓ or Scale/↑ button to go to the bargraph type setting.**

- The bargraph type is indicated.
- The SD indicates 'BAR-GRH'.



3 **Press Shift and Up buttons to select the bargraph type.**

- Select one among 'INC', 'INCR', 'DEV', 'DEVR' and 'OFF'.



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

- And the next parameter setting is indicated.

NOTE

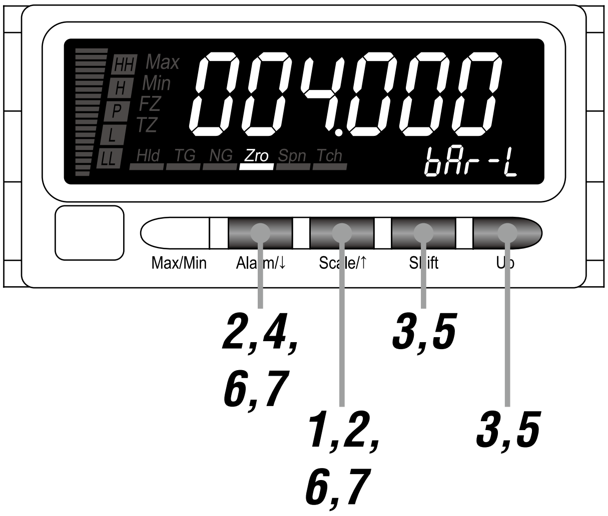
- Press Alarm/↓ button, and the bargraph lower limit will be indicated ('BAR-L' on the SD), or the input type ('INTYPE' on the SD) or the analog output type ('ANG TYP' on the SD) will be indicated with the bargraph type set to "no bargraph".
- Press Scale/↑ button, and the decimal point position will be indicated ('D-POINT' on the SD).

5 ■ **TO GO ON TO SET THE BARGRAPH LOWER LIMIT/UPPER LIMIT,**
Skip to Step 2 in "7.2 BARGRAPH LOWER LIMIT/UPPER LIMIT".

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

7.2 BARGRAPH LOWER LIMIT/UPPER LIMIT

7.2.1 OPERATING PROCEDURE



NOTE

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

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

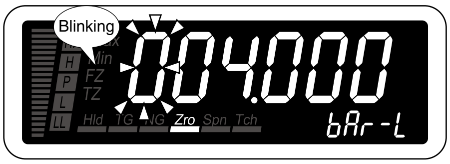
- The input type is indicated.
- The SD indicates 'INTYPE'.

2 **Press Alarm/↓ or Scale/↑ button to go to the bargraph lower limit setting.**

- The bargraph lower limit is indicated.
- The SD indicates 'BAR-L'
- 'Zro' indicator turns on.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the bargraph lower limit.**

- The sixth digit starts blinking, to which you can apply changes.
- Set within the range of -20000 to 100000.



NOTE

Set the bargraph lower limit with the decimal point position set in the decimal point position setting.

4 **Press Alarm/↓ button to apply the new value and go to the bargraph upper limit setting.**

- The bargraph lower limit is registered.
- The bargraph upper limit is indicated.
- The SD indicates 'BAR-H'.
- 'Zro' indicator turns off and 'Spn' turns on.

5 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the bargraph upper limit.**

- The sixth digit starts blinking, to which you can apply changes.
- Set within the range of -20000 to 100000.

NOTE

Set the bargraph upper limit with the decimal point position set in the decimal point position setting.

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

- The bargraph upper limit is registered and the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the input type will be indicated ('INTYPE' on the SD), or the analog output type will be indicated ('ANG TYP' on the SD).
- Press Scale/↑ button, and the bargraph lower limit will be indicated ('BAR-L' on the SD).

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

8. SETTING ANALOG OUTPUT

The DC current or voltage output can be selected among those shown in Table 1. The analog outputs 0% and 100% can be set within the range of -20000 to 100000. Also the analog 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.

■ TABLE 1: ANALOG OUTPUT TYPE

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
4-20mA	Output range 4 to 20 mA	4-20mA
0-5V	Output range 0 to 5 V	
5V	Output range -5 to +5 V	
10V	Output range -10 to +10 V	
0-20mA	Output range 0 to 20 mA	

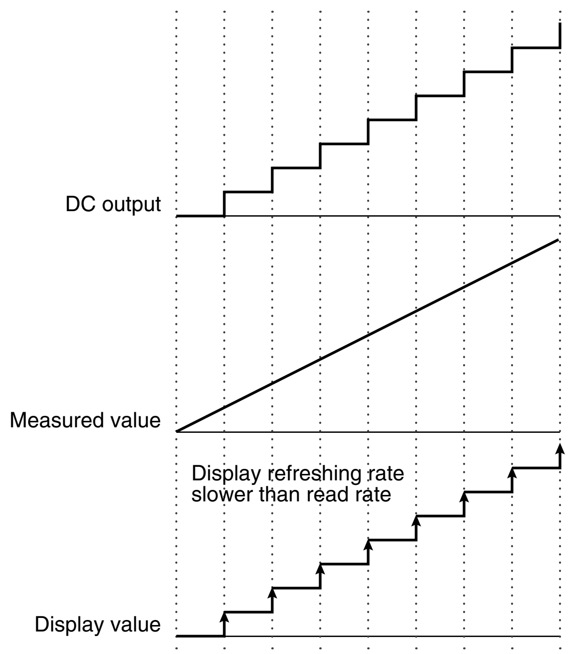
■ TABLE 2: ANALOG OUTPUT FUNCTION

ANALOG OUTPUT	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
Proportional to display value	diSPLY	DC output proportional to the display value affected by event trigger mode, averaging time, forced zero, tare adjustment, low-end cutout, display refreshing rate, round-off low-digit reading and high-pass filter (Figure 1).	diSPLY
Proportional to scaling value	SCALE	DC output proportional to the display value affected by event trigger mode and averaging time (Figure 2).	

■ DIFFERENCE OF ANALOG OUTPUT FUNCTIONS

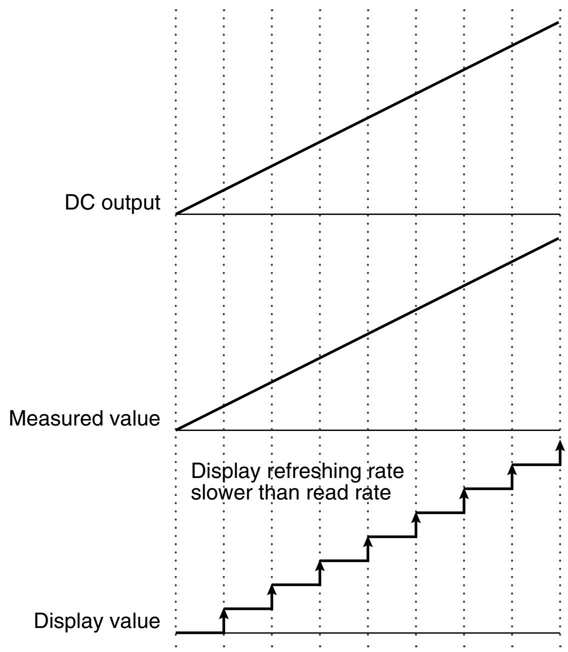
Figures 1 and 2 show the difference of DC output functions, taking the display refreshing rate for example.

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.

■ SETTING RANGE OF ANALOG OUTPUTS 0% AND 100%

The analog outputs 0% and 100% can be set within the range of -20000 to 100000. The default values per input type are as shown in the following tables.

• INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
1 to 5 V (1-5V)	Analog output 0%: 010000 Analog output 100%: 050000
-5 to +5 V (-5-5V)	Analog output 0%: -05000 Analog output 100%: 005000
±20 V (20V)	Analog output 0%: -20000 Analog output 100%: 020000
±200 V (200V)	Analog output 0%: -20000 Analog output 100%: 020000

• INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

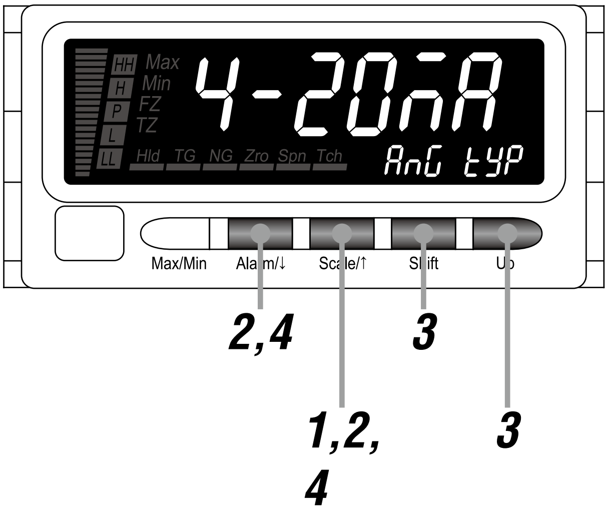
INPUT TYPE (MAIN DISPLAY)	DEFAULT VALUE
4 to 20 mA (4-20MA)	Analog output 0%: 004000 Analog output 100%: 020000
0 to 20 mA (0-20MA)	Analog output 0%: 000000 Analog output 100%: 020000
±20 mA (20MA)	Analog output 0%: -20000 Analog output 100%: 020000
±200 mA (200MA)	Analog output 0%: -20000 Analog output 100%: 020000

IMPORTANT

- The operational range of the DC output is -10 to +110% of the output span after analog output 0% and 100% adjustments.
- The output is saturated at approximately -10% or +110%.
- The analog outputs 0% and 100% 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.
- The analog outputs 0% and 100% can be set to any value, however it is recommended to use them within the set display scaling range.

8.1 ANALOG OUTPUT TYPE

8.1.1 OPERATING PROCEDURE



NOTE

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

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

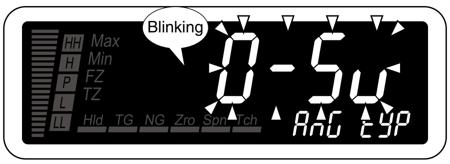
- The input type is indicated.
- The SD indicates 'INTYPE'.

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

- The analog output type is indicated.
- The SD indicates 'ANG TYP'.

3 **Press Shift and Up buttons to select the analog output type.**

- Select one among '4-20MA', '0-5V', '5V', '10V' and '0-20MA'



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the analog output function mode will be indicated ('ANG VAL' on the SD).
- Press Scale/↑ button, and the bargraph upper limit will be indicated ('BAR-H' on the SD), or the bargraph type will be indicated ('BAR-GRH' on the SD) with the bargraph type set to "no bargraph".

5 ■ **TO GO ON TO SET THE ANALOG OUTPUT FUNCTION MODE,**

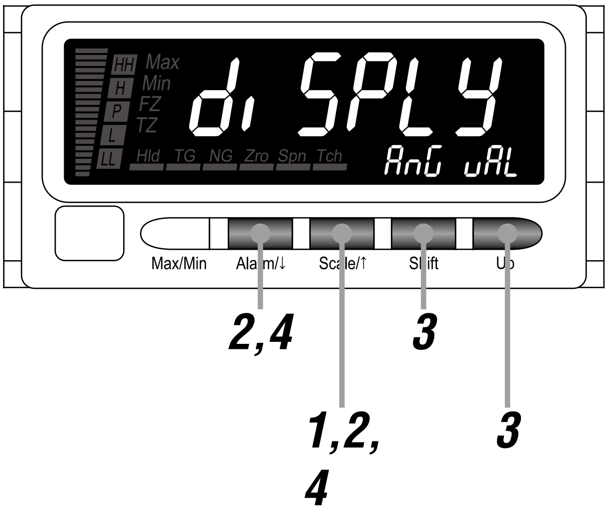
Skip to Step 2 in “8.2 ANALOG OUTPUT FUNCTION MODE”.

■ **TO QUIT,**

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

8.2 ANALOG OUTPUT FUNCTION MODE

8.2.1 OPERATING PROCEDURE



NOTE

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

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

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

- The analog output function mode is indicated.
- The SD indicates 'ANG VAL'

3 **Press Shift and Up buttons to select the analog output function mode.**

- Select 'DISPLY' or 'SCALE'.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the analog output 0% will be indicated ('ANG L' on the SD).
- Press Scale/↑ button, and the analog output type will be indicated ('ANG TYP' on the SD)..

5 ■ **TO GO ON TO SET THE ANALOG OUTPUTS 0% AND 100%,**

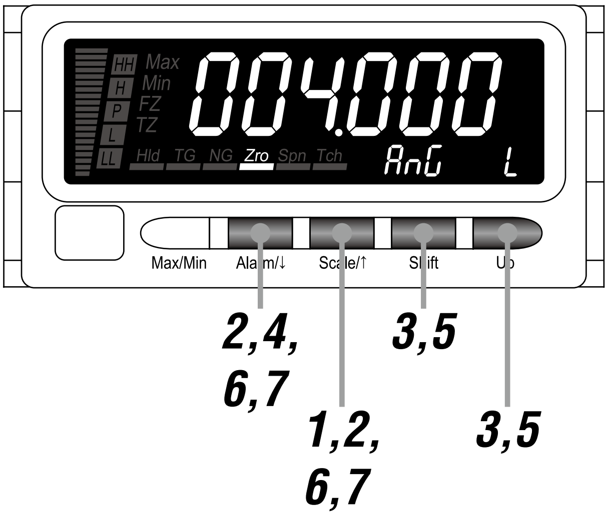
Skip to Step 2 in "8.3 ANALOG OUTPUT 0% / ANALOG OUTPUT 100%."

■ **TO QUIT,**

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

8.3 ANALOG OUTPUT 0% / ANALOG OUTPUT 100%

8.3.1 OPERATING PROCEDURE



NOTE

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

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

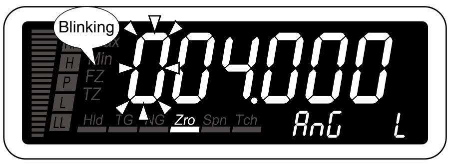
- The input type is indicated.
- The SD indicates 'INTYPE'.

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

- The analog output 0% is indicated.
- The SD indicates 'ANG L'
- 'Zro' indicator turns on.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the analog output 0%.**

- The sixth digit starts blinking, to which you can apply changes.
- Set within the range of -20000 to 100000.



NOTE

Set the analog output 0% with the decimal point position set in the decimal point position setting.

4 **Press Alarm/↓ button to apply the new value and go to the analog output 100% setting.**

- The analog output 0% is registered.
- The analog output 100% is indicated.
- The SD indicates 'ANG H'.
- 'Zro' indicator turns off and 'Spn' turns on.

5 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the analog output 100%.**

- The sixth digit starts blinking, to which you can apply changes.
- Set within the range of -20000 to 100000.

NOTE

Set the analog output 100% with the decimal point position set in the decimal point position setting.

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

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

NOTE

- Press Alarm/↓ button, and the analog output 0% adjustment will be indicated ('AADJ L' on the SD).
- Press Scale/↑ button, and the analog output 0% will be indicated ('ANG L' on the SD).

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

9. BASIC ALARM SETTING

The alarm output configuration includes “basic setting” to configure basic parameters such like alarm output pattern, alarm setpoints, trip action, ON and OFF delay time and coil at alarm, “bank” to save max. 8 sets of setpoints to switch as necessary, and “advanced setting” to configure the advanced alarm operation. This section describes the “basic setting”. You can configure parameters as alarm conditions as shown in Tables 1 and 2. Figures 2 to 9 show alarm examples using each parameter.

■ TABLE 1: ALARM OUTPUT PARAMETERS

PARAMETER	FUNCTION
Alarm output pattern	Normal or zone pattern is selectable (Figure 2 & 3). In the normal setting, alarm trips according to the setpoint and the trip action (direction) setting. In the zone setting, alarm trips and resets between each setpoint.
Alarm setpoint	Setpoint value within the range of -20000 to 100000 for the display value.
Trip action	High or low trip is selectable with the alarm output pattern set to “normal”. Configuring typical L/H trip setting or all trip points to high or low setting (Figure 4) is available. With the alarm output pattern set to “zone”, the trip action setting is disregarded.
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 5). 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 and starting current (Figure 6).
OFF delay time	Alarm output is canceled when the display value returns to the value to cancel the alarm and stayed for the specified time duration, which prevents the alarm output from being canceled by a rapid or sudden change such like external disturbance (Figure 7).
One-shot output	Alarm outputs can be provided as one-shot pulses (Figure 8).
Coil at alarm	Alarm output logic, coil energized or de-energized at alarm (Figure 9).
Main display blinking at alarm	Main display blinking interval at alarm can be selected among 4 intervals (Table 2).

■ TABLE 2: SETTING VALUES

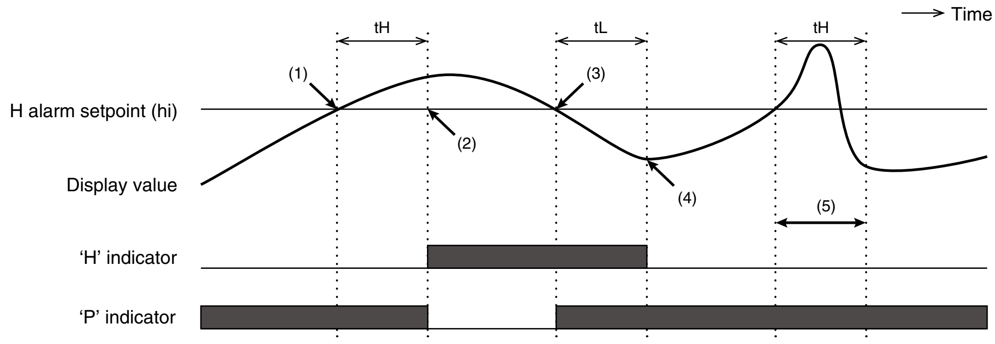
PARAMETER	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
Alarm output pattern	normAL	Normal	normAL
	ZonE	Zone	
Alarm setpoint	-20000 to 100000	-20000 to 100000	Refer to 9.2.1 ALARM SETPOINT LIST for details.
Trip action*1	LoW	Lo trip	LL, L trip action: LoW
	HiGH	Hi trip	HH, H trip action: HiGH
Deadband (hysteresis)*1	0000 to 9999	0000 – 9999	0001
ON delay time*1, *2	000 to 999	0.0 – 99.9 seconds	000
OFF delay time*1, *2	000 to 999	0.0 – 99.9 seconds	000
One-shot output*1, *2	0000 to 9999	0000 (normal contact output), 0.1 – 999.9 seconds	0000
Coil at alarm*1, *2	En	Coil energized at alarm	En
	dE	Coil de-energized at alarm	
Main display blinking at alarm	0	No blinking	0
	1	Blinking in 1.0 second intervals	
	2	Blinking in 0.5 second intervals	
	3	Blinking in 0.3 second intervals	

*1 Selectable only at alarm setting lockout level ‘LV0’ (“completely unlock Alarm Setting Mode”).
*2 Configurable for the P status.

■ ALARM ACTION BASICS

Alarm trip operates in relation to the display value. Alarm indicators, except for 'P' indicator, do not turn on until all parameters (display value, deadband, ON delay time elapsed) of the setpoint become true. Display color is switched accordingly with "green (normal) to red (alarm)" or "red (normal) to green (alarm)" selected for the display color parameter. 'P' indicator normally turns on when no other indicators are on. It turns off during 'no measuring' status in the event trigger mode, during the alarm power ON delay time period and during the standby sequence period. 'P' indicator, as an exception, remains on during ON/OFF delay time even when another alarm indicator may be on (Figure 1).

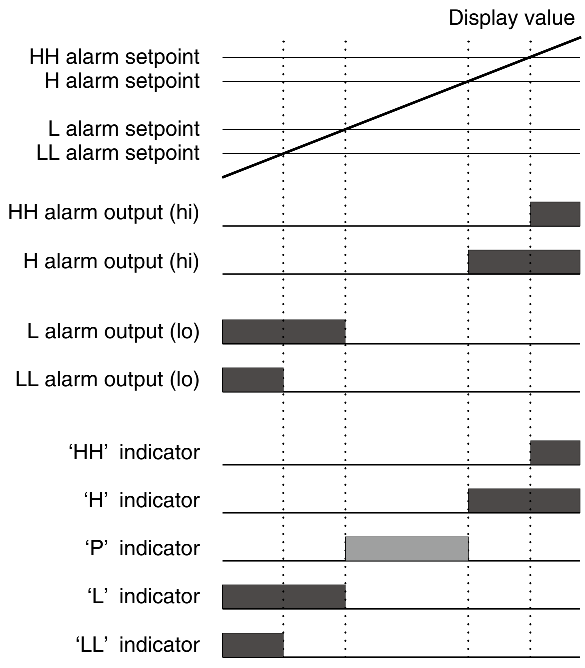
Figure 1: Example of high alarm trip and indicators action with ON/OFF delay time



H setpoint / high trip, tH = H ON delay time, tL = H OFF delay time

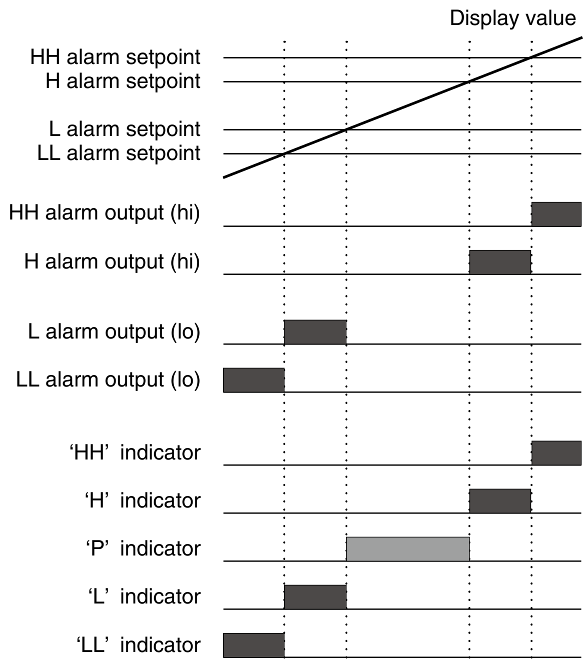
(1) ON delay time is triggered when the display value exceeds the H setpoint.
Alarm is handled as 'non-confirmed' during ON delay or OFF delay time period. 'P' indicator always turns on during this non-confirmed time period.
(2) 'H' indicator turns on after the ON delay time tH has elapsed. 'P' indicator turns off.
(3) OFF delay time is triggered when the display value falls below the H setpoint. 'P' indicator turns on.
(4) 'H' indicator turns off after the OFF delay time tL has elapsed.
(5) ON delay time is triggered again but is reset within the ON delay time period. 'H' indicator remains off.

Figure 2: Normal setting



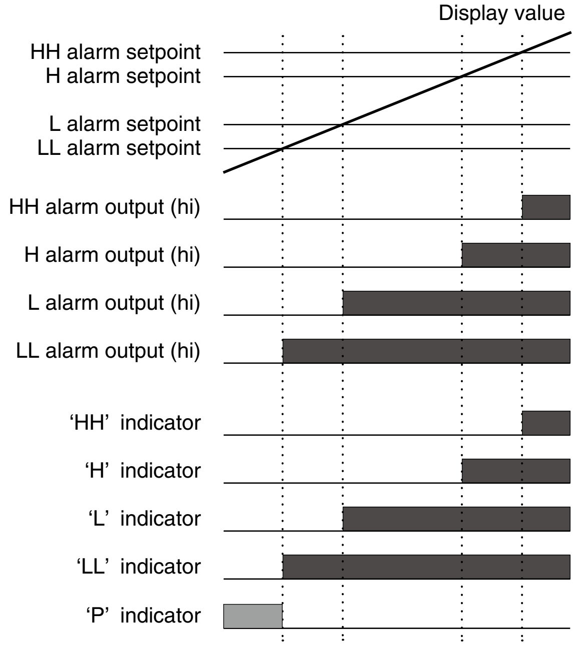
In the normal setting, alarm trips according to the setpoint and the trip action (direction) setting. The P status means the zone where the LL, L, H and HH alarm outputs are OFF.

Figure 3: Zone setting



In the zone setting, alarm trips and resets between each setpoint. Alarm trip action setting is disregarded with zone alarm.

Figure 4: All trip points set to high setting (normal 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 5: Deadband (hysteresis)

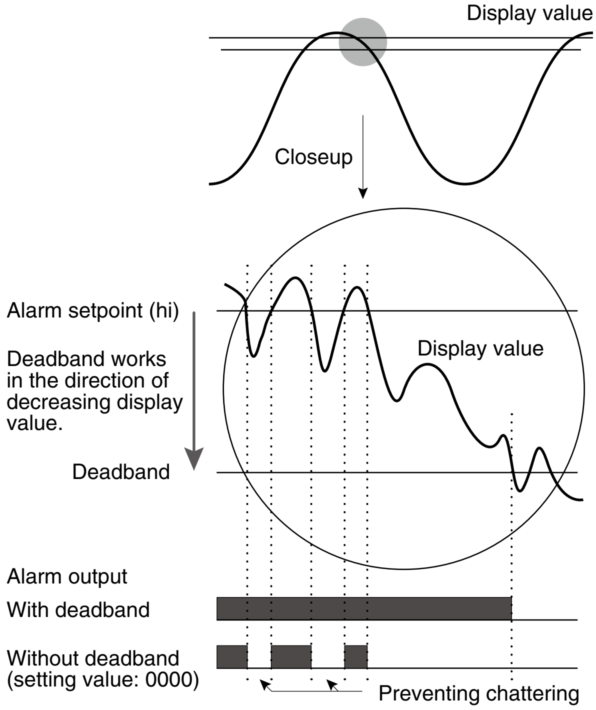
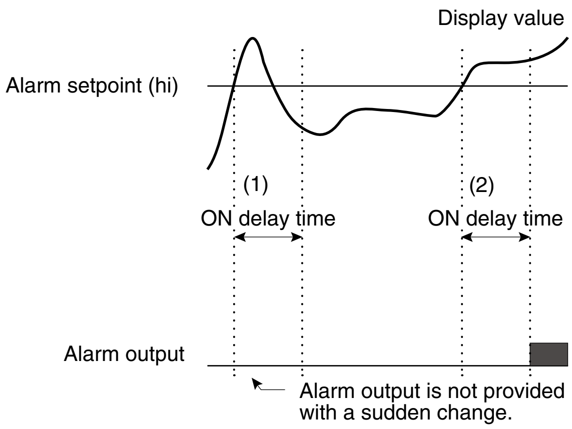
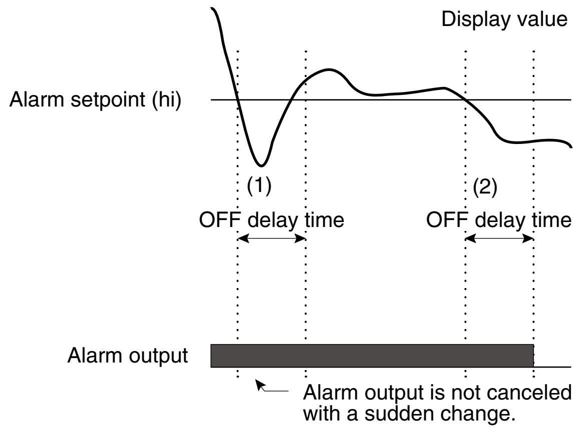


Figure 6: ON delay time



(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.

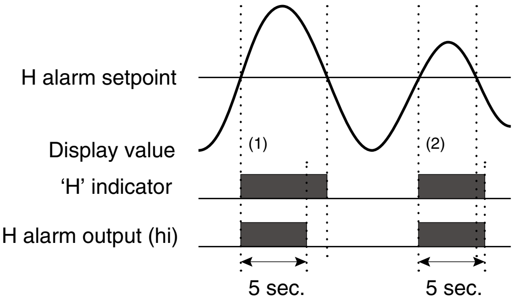
Figure 7: OFF delay time



(1) The display value once falls below the alarm setpoint but exceeds it during OFF delay time period. Therefore alarm output is not canceled.
(2) The display value falls below the setpoint and stays over the OFF delay time period. Therefore alarm output is canceled.

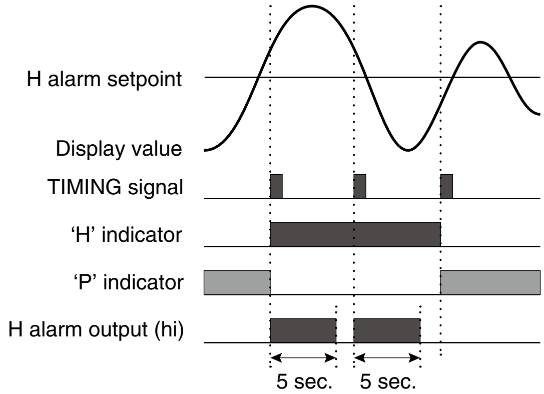
Figure 8: One-shot output

Without event trigger input or with event trigger mode set to “normal”



(1) When the display value exceeds the setpoint, alarm output is provided for the set time period. ‘H’ indicator turns on until the display value falls below the setpoint.
(2) Even when the display value exceeds but falls below the setpoint within the set one-shot output time period, alarm output is provided for the set time period. ‘H’ indicator also turns on for this time period.

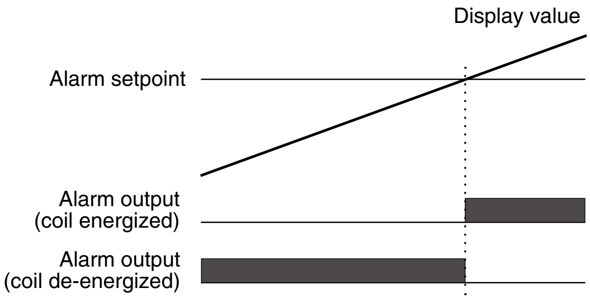
With event trigger mode set to other than “normal” e.g. Sampling hold



When the TIMING signal is ON and the display value exceeds the setpoint, alarm output is provided for the set time period. The one-shot output is provided again with the TIMING signal ON as long as the display value exceeds the setpoint. ‘H’ indicator turns on when the TIMING signal is ON and the display value exceeds the setpoint until the next TIMING signal is ON and the alarm is canceled.

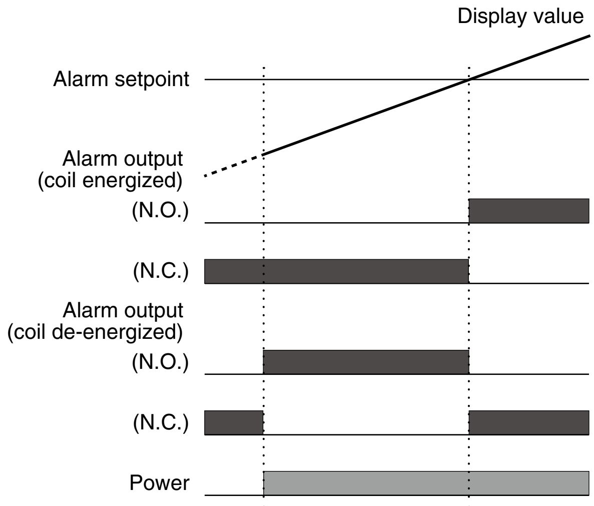
Figure 9: Coil at alarm

I/O option code ‘1’, ‘3’, ‘7’ or ‘9’ (N.O. relay or photo MOSFET relay, 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”.

I/O option code ‘2’ or ‘8’ (SPDT relay, 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.

NOTE

- All parameters can be set regardless of alarm output options. The alarm indicators turn on according to the operation even without alarm output. The settings of the one-shot output and coil at alarm do not affect the alarm indicators in this case.
- With the alarm output pattern set to “normal”, when indication ‘-20000’ blinks, all the low alarm outputs are provided, and when ‘100000’ blinks, all the high alarm outputs are provided.
- With the alarm output pattern set to “zone”, when indication ‘-20000’ or ‘100000’ blinks, the alarm output in the zone nearest to the blinking value is provided.
- When ‘S.ERR’ is indicated, the alarm output depends on the scaling error setting. Refer to 11.5 ALARM TRIP ACTION AT OVER-RANGE for details.
- The trip action, deadband, OFF delay time and coil at alarm except for those concerning the P status are reset to the default values and all alarm setpoints are disabled (reset to ‘------’ status) when the input type has been changed.

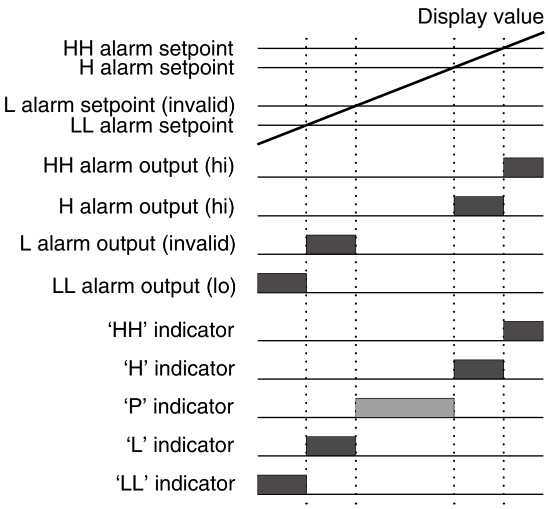
9.1 ALARM OUTPUT PATTERN

The alarm output pattern, normal output ('NORMAL') where alarm trips according to the setpoint, or zone output ('ZONE') where alarm trips and resets between each setpoint, can be selected. The default setting is normal output.

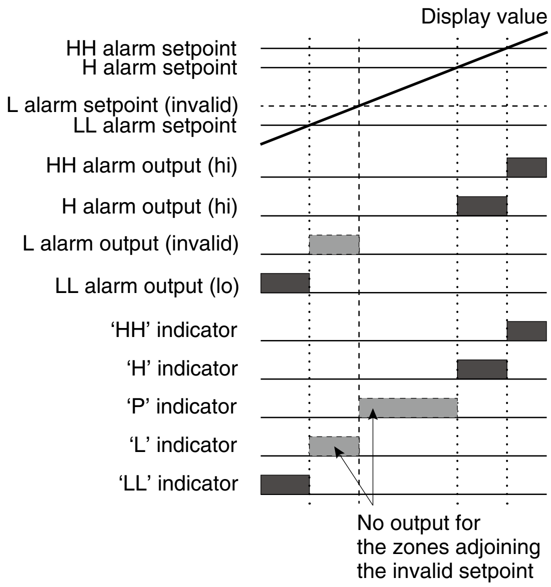
IMPORTANT

- Alarm trip action setting is disregarded with zone alarm.
- If a setpoint is set to invalid ('------'), no output is provided for the zones adjoining the setpoint (e.g. P and L are not provided with L set to invalid).

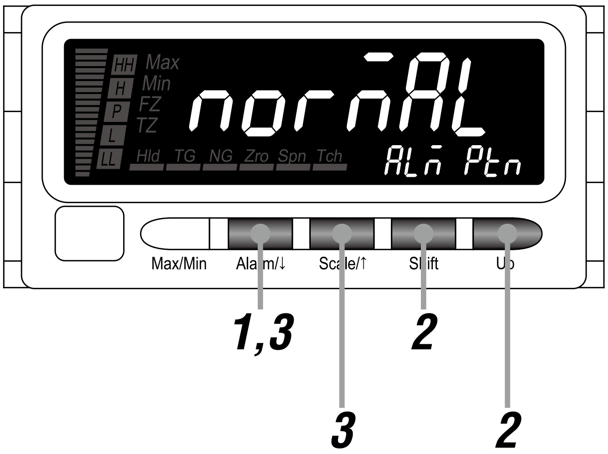
■ TYPICAL ZONE SETTING



■ ZONE SETTING WITH INVALID SETPOINT AT L



9.1.1 OPERATING PROCEDURE LV1



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.**

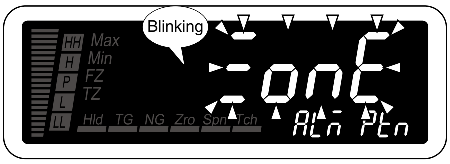
- The alarm output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD). Press Alarm/↓ button to go to the alarm output pattern setting.

2 **Press Shift and Up buttons to select the alarm output pattern.**

- Select 'NORMAL' or 'ZONE'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL alarm setpoint will be indicated ('ALARMLL' on the SD).
- Press Scale/↑ button, and the main display blinking at alarm will be indicated ('ALMBLNK' on the SD), or the bank No. will be indicated ('ALM BNK' on the SD) with the bank switching set to "enabled via the front button control".

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

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

9.2 ALARM SETPOINT

Alarm setpoints can be set within the range of -20000 to 100000. However the alarm is not provided in setting the setpoint beyond the operational range of the input type. Set the setpoints within the valid range. All alarm setpoints of the current bank No. are disabled (reset to '------' status) when the input type has been changed.

9.2.1 ALARM SETPOINT LIST

Default values of alarm setpoints are as shown in the following tables.

■ INPUT CODE: 1 [MODEL: 47DV-1XXX-XX]

PARAMETER	DEFAULT VALUE
LL alarm setpoint	014000
L alarm setpoint	022000
H alarm setpoint	038000
HH alarm setpoint	046000

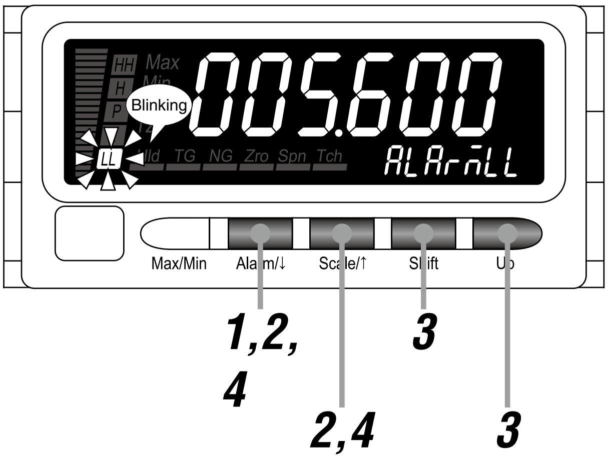
■ INPUT CODE: 2 [MODEL: 47DV-2XXX-XX]

PARAMETER	DEFAULT VALUE
LL alarm setpoint	005600
L alarm setpoint	008800
H alarm setpoint	015200
HH alarm setpoint	018400

NOTE

- Alarm setpoints can be set also in Measuring Mode. Refer to 25. CONFIRMING AND CONFIGURING ALARM SET-POINTS for details.
- The default values of the LL and HH setpoints are '------' for dual alarm output option (SPDT relay, 2 points).
- The default values of all setpoints are '------' for no alarm output option.

9.2.2 OPERATING PROCEDURE LV1



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

---

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

- The LL (L, H or HH) alarm setpoint is indicated.
- The SD indicates 'ALARMLL' ('ALARM L', 'ALARM H' or 'ALARM-HH').
- 'LL' ('L', 'H' or 'HH') indicator starts blinking.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the LL (L, H or HH) alarm setpoint.**

- The sixth digit starts blinking, to which you can apply changes.
- Set within the range of -20000 to 100000.

IMPORTANT

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

NOTE

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

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

• And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the L (H or HH) alarm setpoint ('ALARM L', 'ALARM H' or 'ALARMHH' on the SD), or the display blinking at alarm ('ALMBLNK' on the SD) will be indicated. Or the LL (L, H or HH) trip action will be indicated ('LIMT LL', 'LIMT L', 'LIMT H' or 'LIMT HH' on the SD) with the alarm setting lockout set to "completely unlock Alarm Setting Mode".
- Press Scale/↑ button, and the alarm output pattern ('ALM PTN' on the SD), or the LL (L or H) setpoint ('ALARMLL', 'ALARM L' or 'ALARM H' on the SD) will be indicated. Or the alarm output pattern ('ALM PTN' on the SD) or the LL (L or H) coil at alarm ('RELAYLL', 'RELAY L' or 'RELAY H' on the SD) will be indicated with the alarm setting lockout set to "completely unlock Alarm Setting Mode".

---

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

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

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

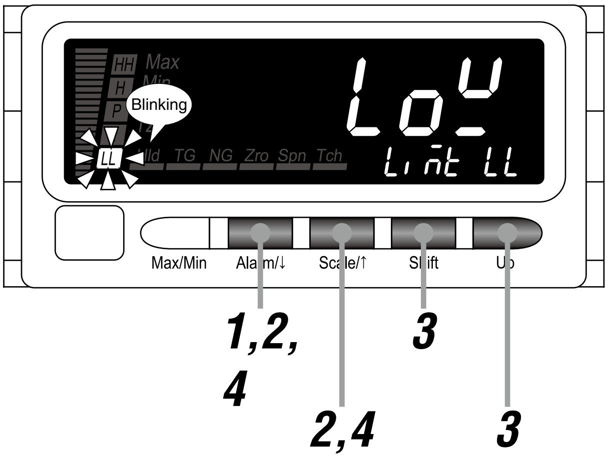
9.3 TRIP ACTION (LO/HI)

The trip action low 'LOW' or high 'HIGH' 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.

NOTE

This setting is disregarded with the alarm output pattern set to "ZONE".

9.3.1 OPERATING PROCEDURE LV0



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.**

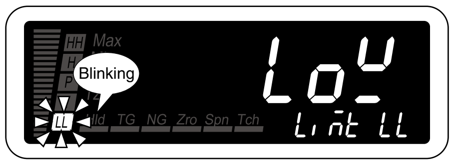
- The alarm output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

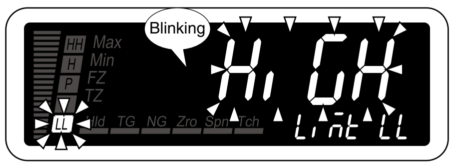
2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H or HH) trip action setting.**

- The LL (L, H or HH) trip action is indicated.
- The SD indicates 'LIMT LL' ('LIMT L', 'LIMT H' or 'LIMT HH').
- 'LL' ('L', 'H' or 'HH') indicator starts blinking.



3 **Press Shift and Up buttons to select the LL (L, H or HH) trip action.**

- Select 'LOW' or 'HIGH'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H or HH) deadband will be indicated ('HYST LL', 'HYST L', 'HYST H' or 'HYST HH' on the SD).
- Press Scale/↑ button, and the LL (L, H or HH) alarm setpoint will be indicated ('ALARMLL', 'ALARM L', 'ALARM H' or 'ALARMHH' on the SD).

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

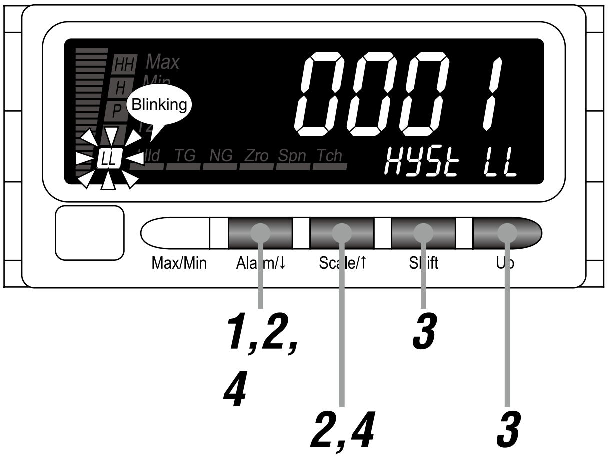
■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "9.4 DEADBAND".

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

9.4 DEADBAND

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

9.4.1 OPERATING PROCEDURE LV0



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

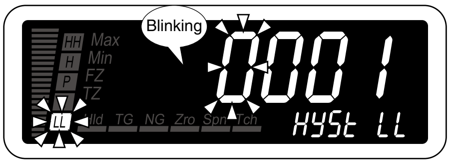
With the bank switching set to "enabled via the front button control," the bank No. is indicated ('ALM BNK' on the SD).

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

- The LL (L, H or HH) deadband is indicated.
- The SD indicates 'HYST LL' ('HYST L', 'HYST H' or 'HYST HH').
- 'LL' ('L', 'H' or 'HH') indicator starts blinking.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the LL (L, H or HH) deadband.**

- The forth digit starts blinking, to which you can apply changes.
- Set within the range of 0000 to 9999.



NOTE

Set the deadband for the setpoint. The decimal point is not indicated.

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

• And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H or HH) ON delay time will be indicated ('ONDLYLL', 'ONDLY L', 'ONDLY H' or 'ONDLYHH' on the SD).
- Press Scale/↑ button, and the LL (L, H or HH) trip action will be indicated ('LIMT LL', 'LIMT L', 'LIMT H' or 'LIMT HH' on the SD).

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

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

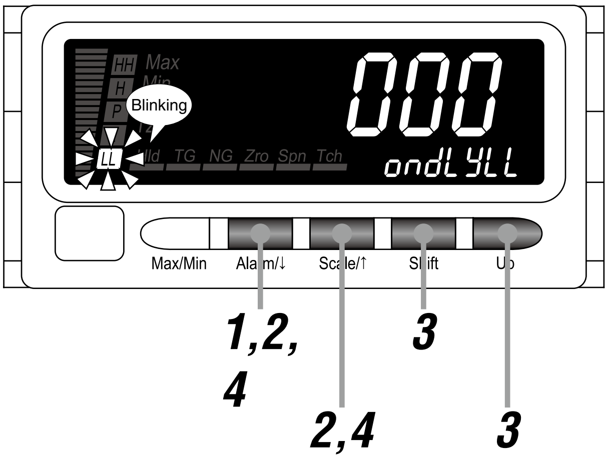
■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

9.5 ON DELAY TIME

Alarm output is provided when the display value exceeds the setpoint and stayed for the specified time duration, which prevents the alarm output from being provided by a sudden change such like external disturbance and starting current. This time duration is called ON delay time and can be set within the range of 0.0 to 99.9 seconds. The default value is 0.0 second. The ON delay time is configurable also for the P status.

9.5.1 OPERATING PROCEDURE

LV0



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

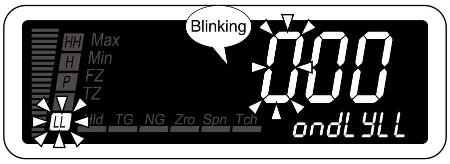
With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

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

- The LL (L, H, HH or P) ON delay time is indicated.
- The SD indicates 'ONDLYLL' ('ONDLY L', 'ONDLY H', 'ONDLYHH' or 'ONDLY P').
- 'LL' ('L', 'H', 'HH' or 'P') indicator starts blinking.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the LL (L, H, HH or P) ON delay time.**

- The third digit starts blinking, to which you can apply changes.
- Set within the range of 000 to 999.



NOTE

The decimal point is not indicated. Set as 'setting value × 100 milliseconds'.

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

• And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H, HH or P) OFF delay time will be indicated (‘OFDLYLL’, ‘OFDLY L’, ‘OFDLY H’, ‘OFDLYHH’ or ‘OFDLY P’ on the SD).
- Press Scale/↑ button, and the LL (L, H or HH) deadband (‘HYST LL’, ‘HYST L’, ‘HYST H’ or ‘HYST HH’ on the SD), or the HH coil at alarm (‘RELAYHH’ on the SD) will be indicated.

---

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

■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in “9.6 OFF DELAY TIME.”

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

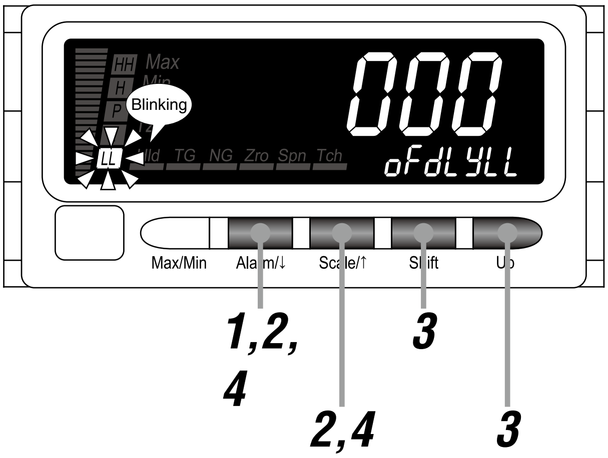
9.6 OFF DELAY TIME

Alarm output is canceled when the display value returns to the value to cancel the alarm and stays for the specified time duration, which prevents the alarm output from being canceled by a rapid or sudden change such like external disturbance. This time duration is called OFF delay time and can be set within the range of 0.0 to 99.9 seconds. The default value is 0.0 second. The OFF delay time is configurable also for the P status.

NOTE

The one-shot output setting prevails the OFF delay time.

9.6.1 OPERATING PROCEDURE LV0



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

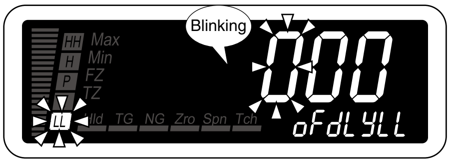
With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

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

- The LL (L, H, HH or P) OFF delay time is indicated.
- The SD indicates 'OFDLYLL' ('OFDLY L', 'OFDLY H', 'OFDLYHH' or 'OFDLY P').
- 'LL' ('L', 'H', 'HH' or 'P') indicator starts blinking.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the LL (L, H, HH or P) OFF delay time.**

- The third digit starts blinking, to which you can apply changes.
- Set within the range of 000 to 999.



NOTE

The decimal point is not indicated. Set as 'setting value × 100 milliseconds'.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H, HH or P) one-shot output will be indicated ('SHOT LL', 'SHOT L', 'SHOT H', 'SHOT HH' or 'SHOT P' on the SD).
- Press Scale/↑ button, and the LL (L, H, HH or P) ON delay time will be indicated ('ONDLYLL', 'ONDLY L', 'ONDLY H', 'ONDLYHH' or 'ONDLY P' on the SD).

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

■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.7 ONE-SHOT OUTPUT".

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

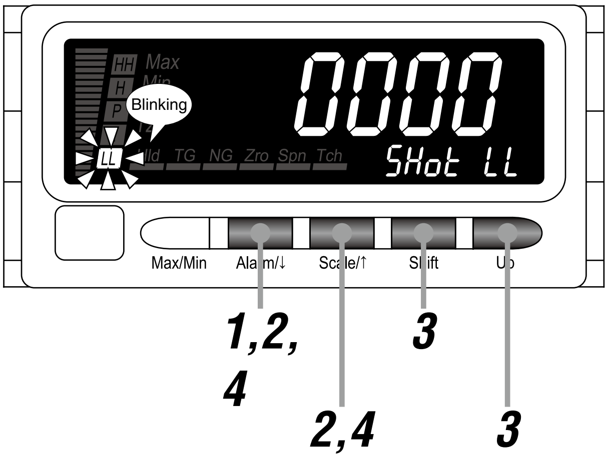
9.7 ONE-SHOT OUTPUT

Alarm outputs can be provided as one-shot pulses. The one-shot output can be set within the range of 0.1 to 999.9 seconds. Set 0000 to provide normal contact outputs. The default value is 0000. The one-shot output is configurable also for the P status.

NOTE

- The one-shot output setting prevails the OFF delay time.
- The display value and alarm indicators after a one-shot output provided are the same as those at the normal contact output. If the display is set to blink in alarm, it starts blinking when the alarm output turns ON, and stops blinking (on) when it is OFF, which enables the one-shot output status to be easily recognized.

9.7.1 OPERATING PROCEDURE LV0



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

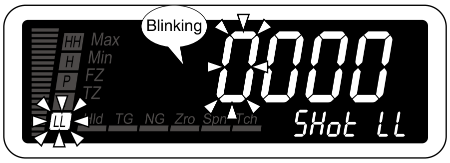
NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H, HH or P) one-shot output setting.**

- The LL (L, H, HH or P) one-shot output is indicated.
- The SD indicates 'SHOT LL' ('SHOT L', 'SHOT H', 'SHOT HH' or 'SHOT P').
- 'LL' ('L', 'H', 'HH' or 'P') indicator starts blinking.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the LL (L, H, HH or P) one-shot output.**



- The forth digit starts blinking, to which you can apply changes.
- Set within the range of 0000 to 9999.

NOTE

The decimal point is not indicated. Set as ‘setting value × 100 milliseconds’.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H, HH or P) coil at alarm will be indicated (‘RELAYLL’, ‘RELAY L’, ‘RELAY H’, ‘RELAYHH’ or ‘RELAY P’ on the SD).
- Press Scale/↑ button, and the LL (L, H, HH or P) OFF delay time will be indicated (‘OFDLYLL’, ‘OFDLY L’, ‘OFDLY H’, ‘OFDLYHH’ or ‘OFDLY P’ on the SD).

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

■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in “9.8 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)”.

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

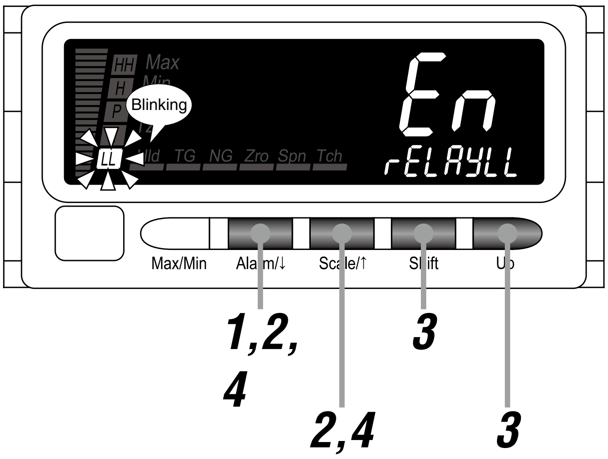
9.8 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)

Alarm output logic can be selected. This parameter is called energizing direction and coil energized 'EN' or de-energized 'DE' at alarm can be selected. In selecting coil de-energized at alarm, the alarm output logic is inverted. The default setting is coil energized. The coil at alarm is configurable also for the P status.

NOTE

Even when this setting is changed, operation of the alarm indicators is not reversed.

9.8.1 OPERATING PROCEDURE LV0



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.**

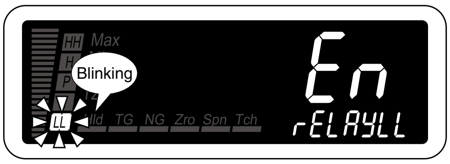
- The alarm output pattern is indicated.
- The SD indicates 'ALM PTN'.

NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

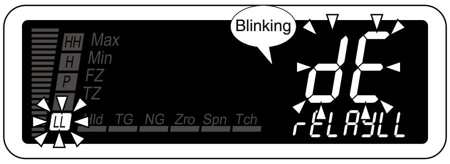
2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H, HH or P) coil at alarm setting.**

- The LL (L, H, HH or P) coil at alarm is indicated.
- The SD indicates 'RELAYLL' ('RELAY L', 'RELAY H', 'RELAYHH' or 'RELAY P').
- 'LL' ('L', 'H', 'HH' or 'P') indicator starts blinking.



3 **Press Shift and Up buttons to select the LL (L, H, HH or P) coil at alarm.**

- Select 'EN' or 'DE'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the L (H or HH) setpoint ('ALARM L', 'ALARM H' or 'ALARMHH' on the SD), P ON delay time ('ONDLY P' on the SD) or the main display blinking at alarm ('ALMBLNK' on the SD) will be indicated.
- Press Scale/↑ button, and the LL (L, H, HH or P) one-shot output will be indicated ('SHOT LL', 'SHOT L', 'SHOT H', 'SHOT HH' or 'SHOT P' on the SD).

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

■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.9 MAIN DISPLAY BLINKING AT ALARM".

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

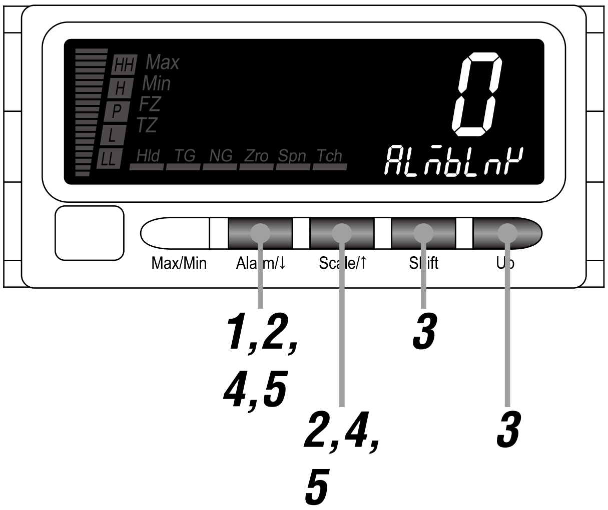
9.9 MAIN DISPLAY BLINKING AT ALARM

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

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
0	No blinking	0
1	Blinking in 1.0 second intervals	
2	Blinking in 0.5 second intervals	
3	Blinking in 0.3 second intervals	

9.9.1 OPERATING PROCEDURE LV1



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 output pattern is indicated.
- The SD indicates 'ALM PTN'.

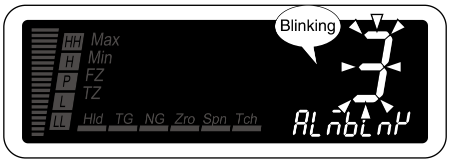
NOTE

With the bank switching set to "enabled via the front button control", the bank No. is indicated ('ALM BNK' on the SD).

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

- The main display blinking at alarm is indicated.
- The SD indicates 'ALMBLNK'.

3 **Press Shift or Up button to select the main display blinking at alarm.**



- Select one among '0', '1', '2' and '3'.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the alarm output pattern will be indicated ('ALM PTN' on the SD), or the bank copy will be indicated ('BNK CPY' on the SD) with the bank switching set to "enabled via the front button control".
- Press Scale/↑ button, and the HH setpoint will be indicated ('ALARMHH' on the SD), or the P coil at alarm will be indicated ('RELAY P' on the SD) with the alarm setting lockout set to "completely unlock Alarm Setting Mode".

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

10. BANK SETTING

The 47DV has 8 areas (banks) to save a set of preset alarm setpoints. Switching them enables the setpoints to be changed easily. This bank switching can be “enabled via the front button control” or “enabled via Modbus communication” (Table 1).
Set to “disabled” to prohibit switching.
With “enabled via the front button control” selected, the bank copy (Table 2) and bank No. parameters are selectable.

■ TABLE 1: BANK SWITCHING

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	Disabled	oFF
HEY	Enabled via the front button control	
Con	Enabled via Modbus communication	

NOTE

- With “disabled”, the SD indicates none in Measuring Mode.
- With “enabled via the front button control” or “enabled via Modbus communication”, the SD indicates the current bank No. (‘BANK1’ through ‘BANK8’) in Measuring Mode.
- When the setting is changed from “enabled via the front button control” or “enabled via Modbus communication” to “disabled”, the alarm setpoints are switched to the ones of ‘BANK1’.
- Refer to Modbus Protocol Reference Guide for 47Dx for the bank switching via Modbus communication.

■ TABLE 2: BANK COPY

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	No copying	oFF
on	Copy current bank value to all banks	

IMPORTANT

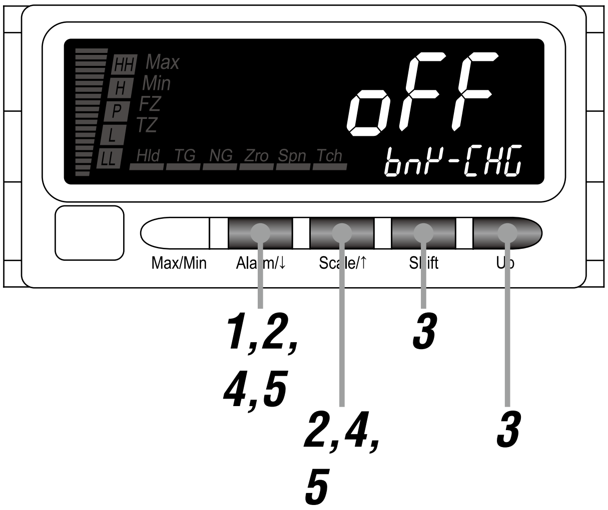
- The bank copy is enabled with “enabled via the front button control” selected for the bank switching parameter.
- Select a bank No. to copy its setpoints and execute the bank copy, and then the LL, L, H and HH setpoints are copied to all banks.

■ BANK NO.

Specify a bank No. to use registered setpoints or change preset ones.
Bank No. 1 to 8 can be specified. The default value is 1.

10.1 BANK SWITCHING

10.1.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

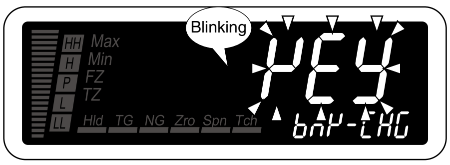
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the bank switching setting.**

- The bank switching is indicated.
- The SD indicates 'BNK-CHG'.

3 **Press Shift and Up buttons to select the bank switching.**

- Select one among 'OFF', 'KEY' and 'COM'.



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

- And the next parameter setting is indicated.

NOTE

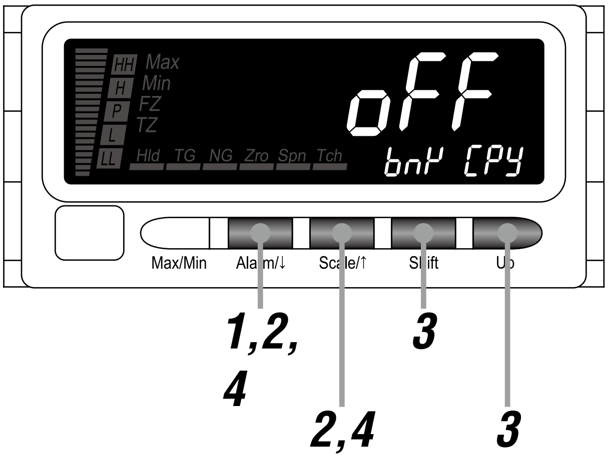
- Press Alarm/↓ button, and the firmware version indication will be indicated ('FRM-VER' on the SD), or the REQ input logic will be indicated ('BCD-REQ' on the SD) with the I/O option code '5', '9' or 'A'
- Press Scale/↑ button, and the LCD contrast will be indicated ('CNTRAST' on the SD).

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

10.2 BANK COPY

10.2.1 OPERATING PROCEDURE

LV1



NOTE

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

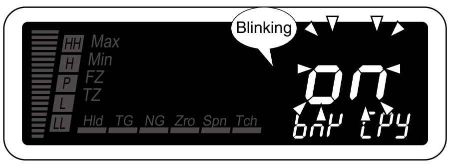
1 **Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.**

- The bank No. is indicated.
- The SD indicates 'ALM BNK'.

2 **Press Alarm/↓ or Scale/↑ button to go to the bank copy setting.**

- The bank copy is indicated.
- The SD indicates 'BNK CPY'.

3 **Press Shift and Up buttons to select 'ON'.**



4 **Press Alarm/↓ or Scale/↑ button to execute the bank copy.**

- The alarm setpoints of the current bank are copied to all banks and the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the bank No. will be indicated ('ALM BNK' on the SD).
- Press Scale/↑ button, and the main display blinking at alarm will be indicated ('ALMBLNK' on the SD).

5 ■ **TO GO ON TO SET THE BANK NO.,**

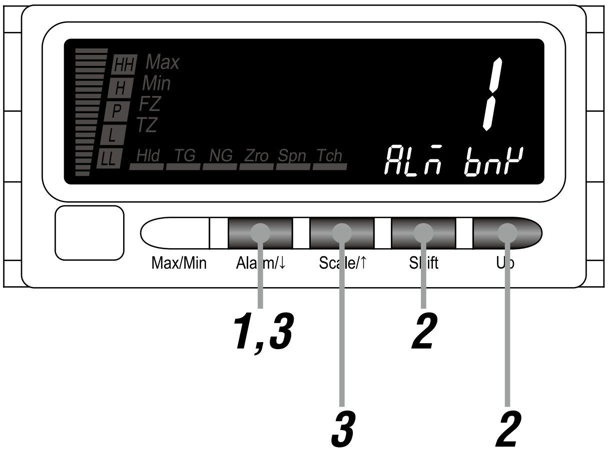
Skip to Step 2 in “10.3 BANK NO.”

■ **TO QUIT,**

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

10.3 BANK NO.

10.3.1 OPERATING PROCEDURE LV1



NOTE

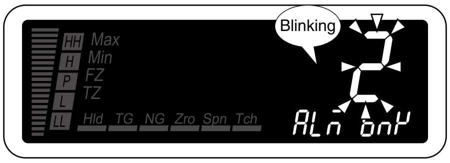
The following figures are display examples. The displays depend on the settings.

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

- The bank No. is indicated.
- The SD indicates 'ALM BNK'.

2 **Press Shift and Up buttons select the bank No.**

- Select one among '1' through '8'.



3 **Press Alarm/↓ or Scale/↑ button to apply the bank No.**

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the alarm output pattern will be indicated ('ALM PTN' on the SD).
- Press Scale/↑ button, and the bank copy will be indicated ('BNK CPY' on the SD).

4 **■ TO GO ON TO SET THE ALARM SETPOINT,**
Skip to Step 2 in "9.2 ALARM SETPOINT".

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

11. ADVANCED ALARM SETTING

Advanced alarm operation can be set. You can configure parameters as shown in Tables 1 and 2. Figures 1 to 4 show alarm examples.

■ TABLE 1: ADVANCED ALARM OUTPUT PARAMETERS

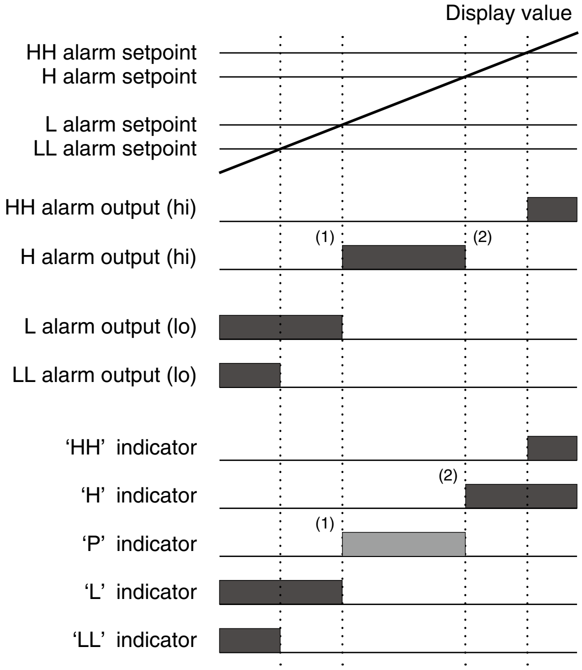
PARAMETER	FUNCTION
P output	Alarm outputs are normally assigned to the LL, L, H and HH alarms and there is not an output for the P status. However the P output can be assigned to an output instead of one of the alarm points (Figure 1).
Latching alarm	The alarm output ON except for the P output can be held (Figure 2). Whether the output is held with the display reading continued to accept measured values, or both output and reading are held, can be selected. In order to reset the latching, set the latching alarm to “no latching,” turn off the power and restart, or provide the RESET signal.
Alarm power ON delay	The measuring can begin after waiting for the delay time from power on (Figure 3).
Standby sequence	The outputs can stand by until the input enters P zone from power on (Figure 4).
Scaling error	An alarm trip when ‘S.ERR’ is indicated can be set.

■ TABLE 2: SETTING VALUES

PARAMETER	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
P output	oFF	No P output	oFF
	LL	Alarm setpoint LL	
	L	Alarm setpoint L	
	H	Alarm setpoint H	
	HH	Alarm setpoint HH	
Latching alarm	oFF	No latching	oFF
	oUt	Output latched / measuring continued	
	ALL	Output latched / measuring stopped	
Alarm power ON delay	0000 to 9999	0.0 – 999.9 seconds	0000
Standby sequence	oFF	Output immediately at the startup	oFF
	on	Output standing by until the input enters P zone	
Scaling error	on	Alarm trip action valid at over-range	on
	oFF	No alarm trip action at over-range	

Figure 1: P output

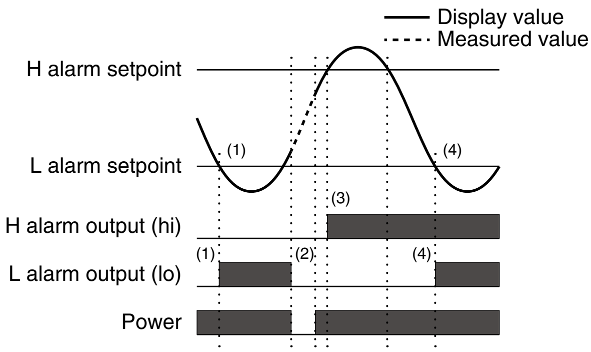
■ **P OUTPUT ASSIGNED TO H ALARM OUTPUT**



(1) The P status in the range between the L and the H setpoints is output using the H alarm output. 'H' indicator does not turn on.
(2) The H alarm output is not provided when the display value exceeds the H setpoint. However 'H' indicator turns on.

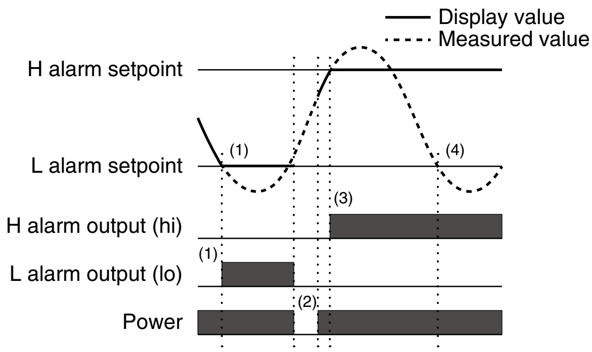
Figure 2: Latching alarm

■ **OUTPUT LATCHED / MEASURING CONTINUED**



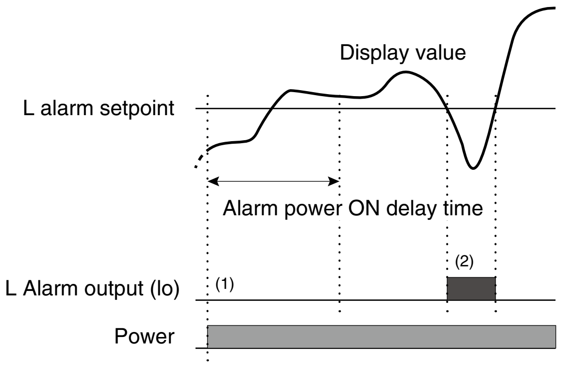
(1) The L alarm output is provided when the measured value falls below the L setpoint. The output is held even when it exceeds the L setpoint. The display value corresponds to the measured value.
(2) When the power is turned off and restarted, the alarm output is reset.
(3) The H alarm output is provided when the measured value exceeds the H setpoint. The output is held even when it falls below the H setpoint. The display value corresponds to the measured value.
(4) The L alarm output is provided when the measured value falls below the L setpoint. The output is held even when it exceeds the L setpoint. The display value corresponds to the measured value.

■ **OUTPUT LATCHED / MEASURING STOPPED**



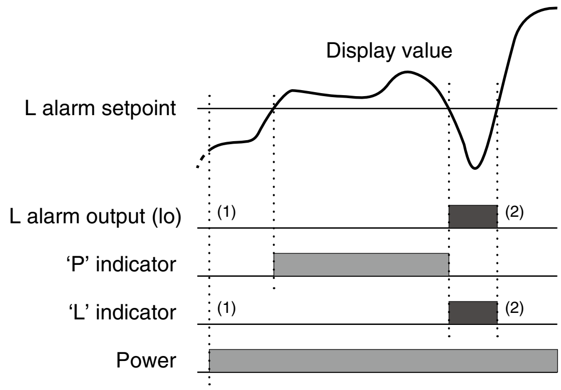
(1) The L alarm output is provided when the measured value falls below the L setpoint. The output is held even when it exceeds the L setpoint. The display value is also held (measurement stopped).
(2) When the power is turned off and restarted, the alarm output is reset. The display value corresponds to the measured value.
(3) The H alarm output is provided when the measured value exceeds the H setpoint. The output is held even when it falls below the H setpoint. The display value is also held (measurement stopped).
(4) The L alarm output is not provided when the input falls below the L setpoint.

Figure 3: Alarm power ON delay



(1) During the alarm power ON delay time period from power on, the alarm output is not provided even when the display value becomes below the L setpoint.
(2) After the alarm power ON delay time is elapsed, the alarm output is provided when the display value falls below the L setpoint.

Figure 4: Standby sequence



(1) Until the display value enters the P zone from power on, the alarm output is not provided even when it becomes below the L setpoint.
(2) After the display value enters the P zone, the alarm output is provided when it falls below the L setpoint.

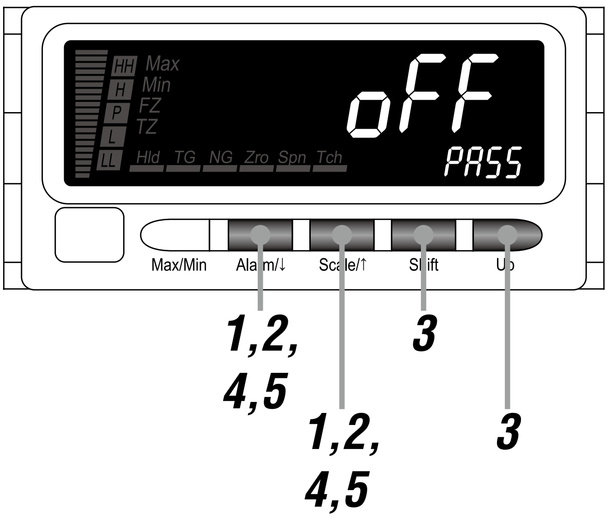
11.1 P OUTPUT

Alarm outputs are normally assigned to the LL, L, H and HH alarms and there is not an output for the P status. However the P output can be assigned to an output instead of one of them. The default setting is “no P output”.

NOTE

- When the P output is assigned, the ON delay time, OFF delay time, one-shot output and coil at alarm of the assigned alarm point operate according to each setting of the P status.
- The operation of the alarm indicators are not changed even when the P output is set.

11.1.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates ‘AVE-TP’.

NOTE

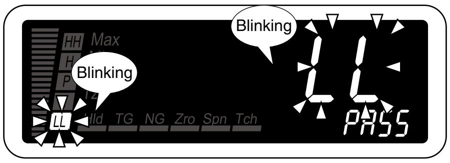
With the I/O option code ‘6’ or ‘A’, the event trigger mode is indicated (‘EVENT’ on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the P output setting.**

- The P output is indicated.
- The SD indicates ‘PASS’.

3 **Press Shift and Up buttons to select the P output.**

- Select one among ‘OFF’, ‘LL’, ‘L’, ‘H’ and ‘HH’.



NOTE

An alarm indicator blinks corresponding to the setting.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the latching alarm will be indicated (‘OUT-STP’ on the SD).
- Press Scale/↑ button, and the manual sub display reset will be indicated (‘S-DISP’ on the SD).

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

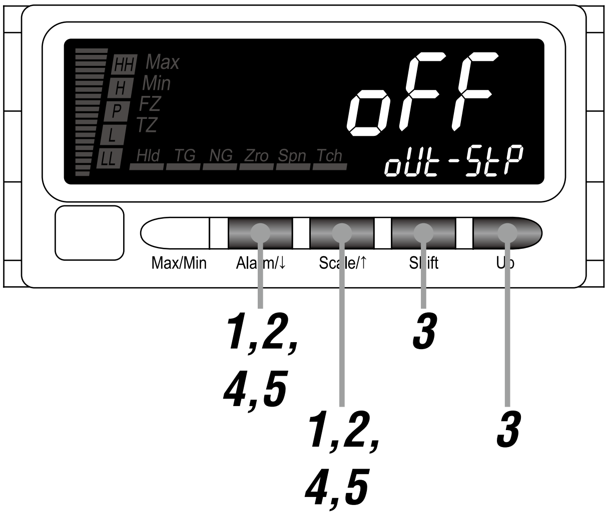
11.2 LATCHING ALARM

The alarm output ON except for the P output can be held, which is called latching alarm. "Output latched / measuring continued" ('OUT') or "output latched / measuring stopped" ('ALL') can be selected. In order to reset the latching, set the latching alarm to "no latching", turn off the power and restart, or provide the RESET signal. The default setting is "no latching".

IMPORTANT

- The P status/output is not latched.
- When the alarm output is ON with the latching alarm set to "output latched / measuring stopped", the display value is held with the measurement stopped. When the input changes significantly and rapidly, the held display value may not conform to the last measured value or setpoint.

11.2.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

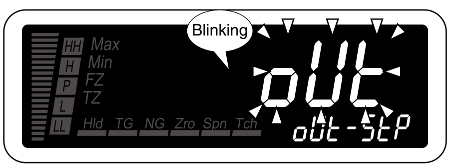
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the latching alarm setting.**

- The latching alarm is indicated.
- The SD indicates 'OUT-STP'.

3 **Press Shift and Up buttons to select the latching alarm.**

- Select one among 'OFF', 'OUT' and 'ALL'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the alarm power ON delay will be indicated (‘PWR-DLY’ on the SD).
• Press Scale/↑ button, and the P output will be indicated (‘PASS’ on the SD).

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

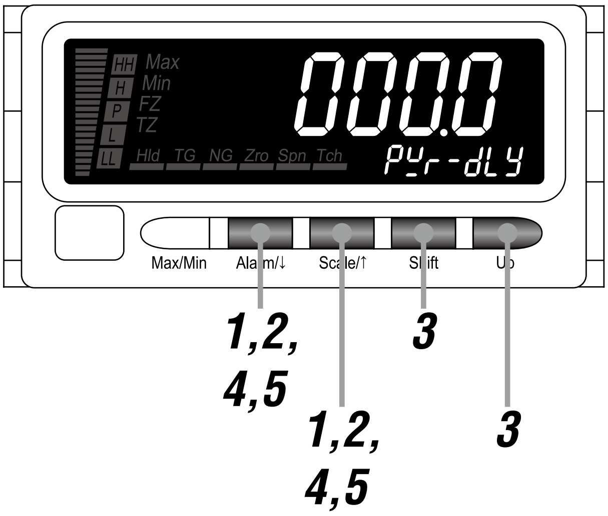
11.3 ALARM POWER ON DELAY

The measuring can begin after waiting for the delay time from power on. This time duration is called alarm power ON delay and can be set within the range of 0.0 to 999.9 seconds. The default value is 0.0 second.

IMPORTANT

The changes on this setting are effective after power off and restart.

11.3.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

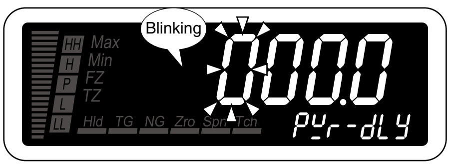
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the alarm power ON delay setting.**

- The alarm power ON delay is indicated.
- The SD indicates 'PWR-DLY'.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the alarm power ON delay.**

- The forth digit starts blinking, to which you can apply changes.
- Set within the range of 000.0 to 999.9.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the standby sequence will be indicated ('STDBY' on the SD).
• Press Scale/↑ button, and the latching alarm will be indicated ('OUT-STP' on the SD).

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

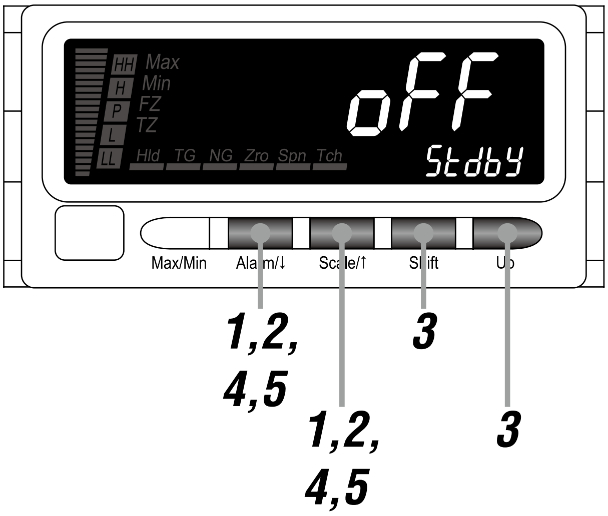
11.4 STANDBY SEQUENCE

The alarm and DC outputs can stand by until the input enters P zone from power on, which is called standby sequence. "Output immediately at the startup" ('OFF') or "output standing by until the input enters P zone" ('ON') can be selected. The default setting is "output immediately at the startup".

IMPORTANT

- Do not set the ON delay time when the standby sequence is set to 'ON'.
- The changes on this setting are effective after power off and restart.

11.4.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

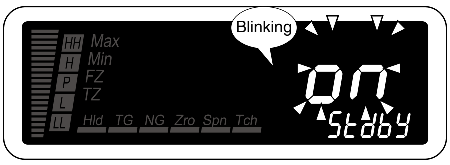
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the standby sequence setting.**

- The standby sequence is indicated.
- The SD indicates 'STDBY'.

3 **Press Shift and Up buttons to select the standby sequence.**

- Select 'OFF' or 'ON'.



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

• And the next parameter setting is indicated.

NOTE

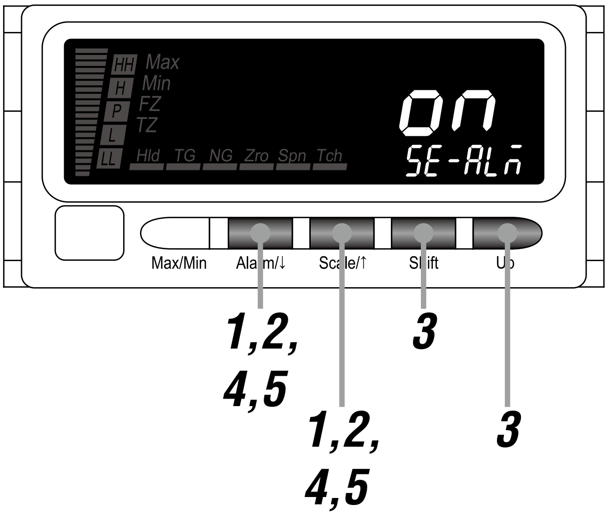
• Press Alarm/↓ button, and the scaling error will be indicated ('SE-ALM' on the SD).
• Press Scale/↑ button, and the alarm power ON delay will be indicated ('PWR-DLY' on the SD).

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

11.5 ALARM TRIP ACTION AT OVER-RANGE

The alarm trip action while ‘S.ERR’ is indicated can be set with the scaling error parameter. When it is set to “alarm trip action valid at over-range” (‘ON’), a high or low alarm output is provided depending on the ‘S.ERR’ direction. When set to “no alarm trip action at over-range” (‘OFF’), all alarm outputs including P output and alarm indicators including ‘P’ indicator are forcibly turned off regardless of the ‘S.ERR’ direction.
The default setting is “alarm trip action valid at over-range”.

11.5.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates ‘AVE-TP’.

NOTE

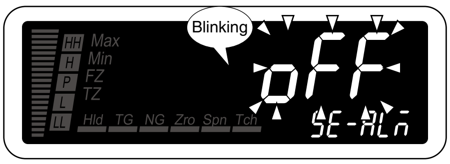
With the I/O option code ‘6’ or ‘A’, the event trigger mode is indicated (‘EVENT’ on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the scaling error setting.**

- The scaling error is indicated.
- The SD indicates ‘SE-ALM’.

3 **Press Shift and Up buttons to select the scaling error.**

- Select ‘ON’ or ‘OFF’.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the round off low-digit reading will be indicated ('STEP' on the SD).
• Press Scale/↑ button, and the standby sequence will be indicated ('STDBY' on the SD).

---

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

12. AVERAGING INPUT

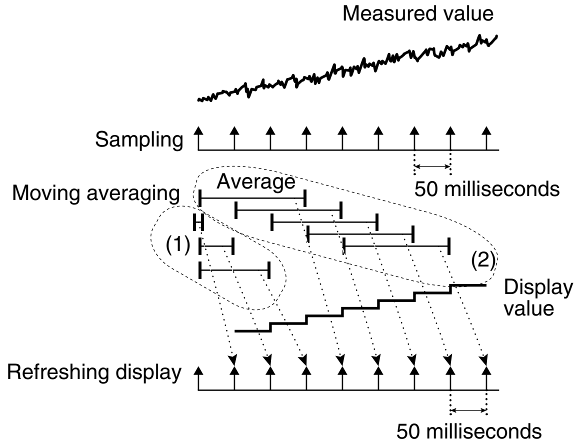
Moving or simple average processing of measured values is configurable (Table 1). Figures 1 and 2 show the difference of the moving average and simple average. The number of samples in averaging can be selected in Table 2.

■ TABLE 1: AVERAGING TYPE

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
MOVING	Moving average	MOVING
SIMPLE	Simple average	

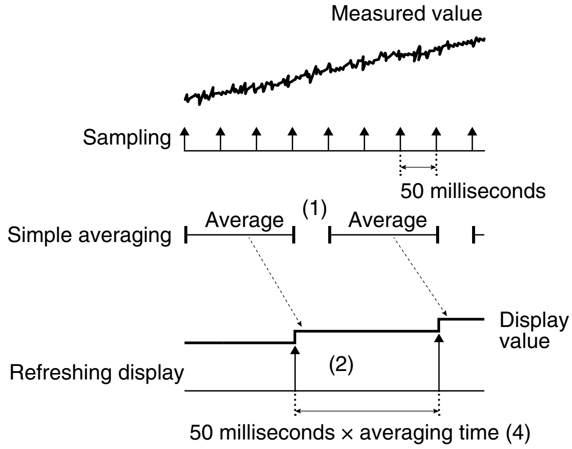
■ DIFFERENCE OF AVERAGING TYPES

Figure 1: Moving average



(1) The moving average operation starts immediately after the power is on, or the averaging type or time is set. Until the sampling No. reaches the set value, all samples are averaged every 50 milliseconds.
(2) After the sampling No. reaches the set value, a new sample is added to be averaged with the oldest one omitted.
(3) Such operation is repeated. The display is updated every sampling period (50 milliseconds, depending on the display refreshing rate).

Figure 2: Simple average



(1) The simple average operation starts immediately after the power is on, or the averaging type or time is set. The set samples are averaged.
(2) The display is updated at the interval of ‘sampling period × averaging time’, depending on the display refreshing rate.

■ **TABLE 2: AVERAGING TIME**

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	No averaging	oFF
2	2 samples (100 millisecond intervals)	
4	4 samples (200 millisecond intervals)	
8	8 samples (400 millisecond intervals)	
16	16 samples (800 millisecond intervals)	
32	32 samples (1.6 second intervals)	
64	64 samples (3.2 second intervals)	
128	128 samples (6.4 second intervals)	
256	256 samples (12.8 second intervals)	
512	512 samples (32.6 second intervals)	

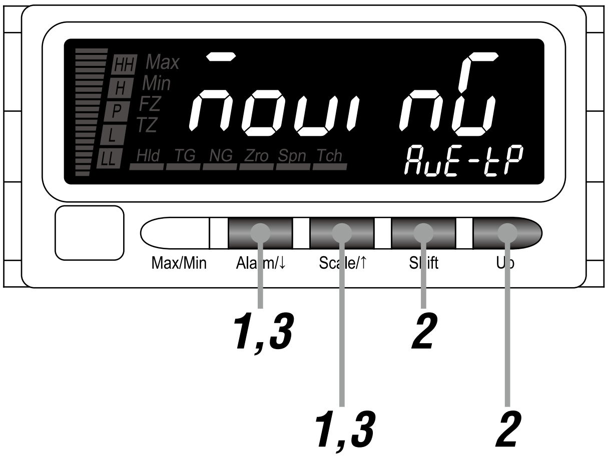
NOTE

The averaging time setting affects the DC output. Refer to 8. SETTING ANALOG OUTPUT for details.

12.1 AVERAGING TYPE

12.1.1 OPERATING PROCEDURE

LV1



NOTE

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

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

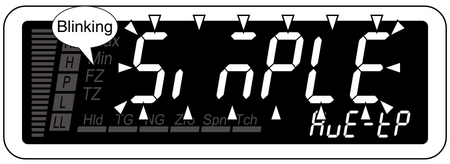
- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD). Press Alarm/↓ button to go to the averaging type setting.

2 **Press Shift and Up buttons to select the averaging type.**

- Select 'MOVING' or 'SIMPLE'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the averaging time will be indicated ('AVE-N' on the SD).
- Press Scale/↑ button, and the firmware version indication will be indicated ('FRM-VER' on the SD), or the startup timer will be indicated ('STR-TMR' on the SD) with the I/O option code '6' or 'A'.

4 ■ **TO GO ON TO SET THE AVERAGING TIME,**

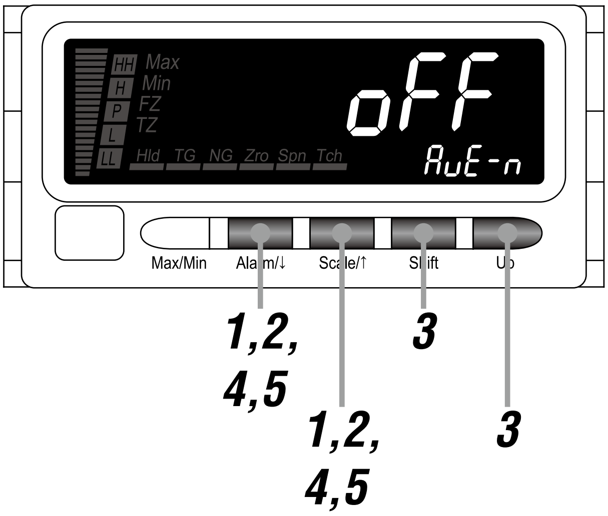
Skip to Step 2 in “12.2 AVERAGING TIME”.

■ **TO QUIT,**

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

12.2 AVERAGING TIME

12.2.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

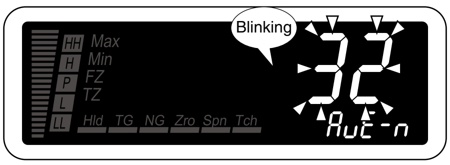
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the averaging time setting.**

- The averaging time is indicated.
- The SD indicates 'AVE-N'.

3 **Press Shift and Up buttons to select the averaging time.**

- Select one among 'OFF', '2', '4', '8', '16', '32', '64', '128', '256' and '512'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the low-end cutout will be indicated (‘ZEROLMT’ on the SD).
- Press Scale/↑ button, and the averaging type will be indicated (‘AVE-TP’ on the SD).

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

13. ELIMINATING FLUCTUATION AROUND “0”

A measured value less than the preset cutout value can be forcibly cut to 0 (figures below). This parameter is called low-end cutout and the value is called low-end cutout value. Enable the low-end cutout first and set the low-end cutout value within the range of 000 to 999. Figures 1 and 2 show difference between low-end cutout ON and absolute value low-end cutout ON. The low-end cutout is effective to eliminate slippage or fluctuation of the display values near zero.

■ LOW-END CUTOUT

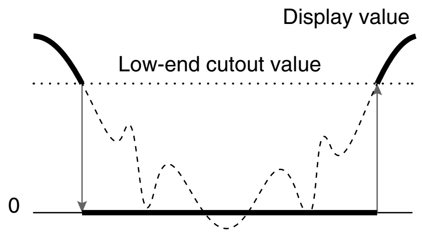
MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	Low-end cutout OFF	oFF
on	Low-end cutout ON	
AbS	Absolute value low-end cutout ON	

■ SETTING RANGE

Set the low-end cutout value for the three lowest digits of the display scaling value within the range of 000 to 999.
The default value is 000.

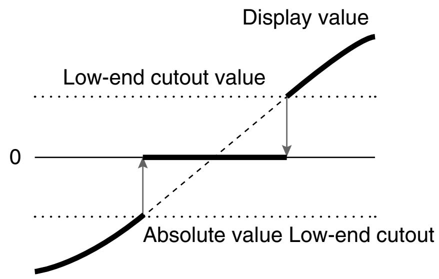
■ DIFFERENCE BETWEEN LOW-END CUTOUT AND ABSOLUTE VALUE LOW-END CUTOUT

Figure 1: Low-end cutout ON



The display value less than the low-end cutout value is forcibly cut to 0.

Figure 2: Absolute value low-end cutout ON



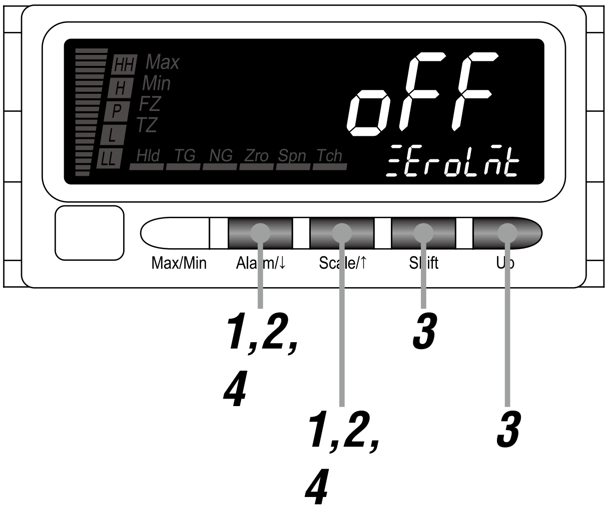
The display value of which the absolute value is less than the low-end cutout value is forcibly cut to 0.

NOTE

- Set the display scaling starting 0 when the low-end cutout is set to ON. Otherwise with the display scaling ±1000 and the low-end cutout value 50, for example, the indication with the scaling value -1000 to 49 will be cut to 0.
- When the display scaling is set to negative to positive range, set the low-end cutout to absolute value low-end cutout ON.
- The low-end cutout setting affects the DC output when the analog output function mode is set to “proportional to the display value”. Refer to 8. SETTING ANALOG OUTPUT for details.

13.1 LOW-END CUTOUT

13.1.1 OPERATING PROCEDURE LV1



NOTE

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

---

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

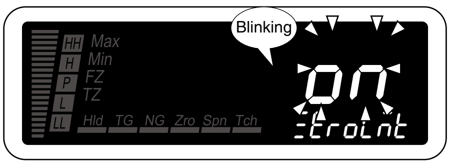
---

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

- The low-end cutout is indicated.
- The SD indicates 'ZEROLMT'.

3 **Press Shift and Up buttons to select the low-end cutout.**

- Select one among 'OFF', 'ON' and 'ABS'.



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

- And the next parameter setting is indicated.

NOTE

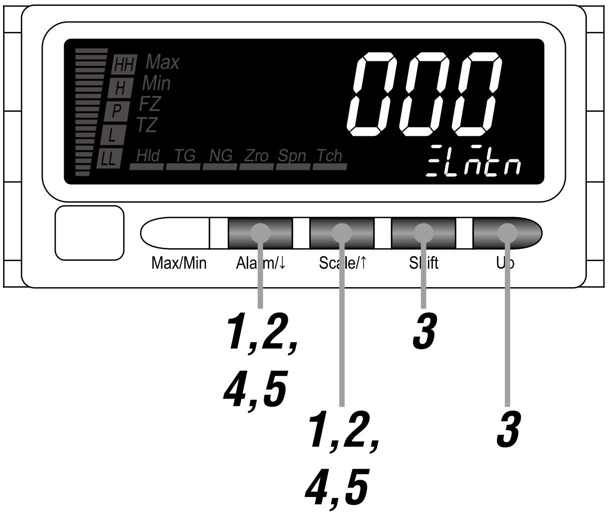
- Press Alarm/↓ button, and the low-end cutout value will be indicated ('ZLMTN' on the SD), or the display color will be indicated ('COLOR' on the SD) with the low-end cutout set to "low-end cutout OFF".
- Press Scale/↑ button, and the averaging time will be indicated ('AVE-N' on the SD).

5 **■ TO GO ON TO SET THE LOW-END CUTOUT VALUE,**
Skip to Step 2 in "13.2 LOW-END CUTOUT VALUE".

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

13.2 LOW-END CUTOUT VALUE

13.2.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

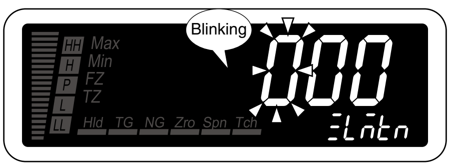
NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The low-end cutout value is indicated.
- The SD indicates 'ZLMTN'.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the low-end cutout value.**



- The third digit starts blinking, to which you can apply changes.
- Set within the range of 000 to 999.

NOTE

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

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the display color will be indicated (‘COLOR’ on the SD).
- Press Scale/↑ button, and the low-end cutout will be indicated (‘ZEROLMT’ on the SD).

---

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

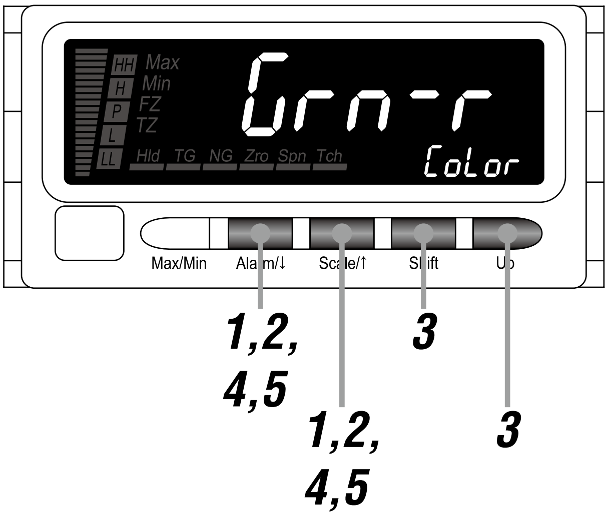
14. SETTING DISPLAY COLOR

The main display color red or green can be selected or switched. The display colors can be switched depending whether in each mode and in the P zone, or in alarm and error status.

■ DISPLAY COLOR

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
Grn-r	Green (normal) to red (alarm)	Grn-r
Grn	Green	
rEd-G	Red (normal) to green (alarm)	
rEd	Red	

14.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The display color is indicated.
- The SD indicates 'COLOR'.

3 **Press Shift and Up buttons to select the display color.**

• Select one among ‘GRN-R’, ‘GRN’, ‘RED-G’ and ‘RED’.

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

• And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the automatic return time to Measuring Mode will be indicated (‘RETURN’ on the SD).
- Press Scale/↑ button, and the low-end cutout value will be indicated (‘ZLMTN’ on the SD), or the low-end cutout will be indicated (‘ZEROLMT’ on the SD) with the low-end cutout set to “low-end cutout OFF”.

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

15. 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 '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

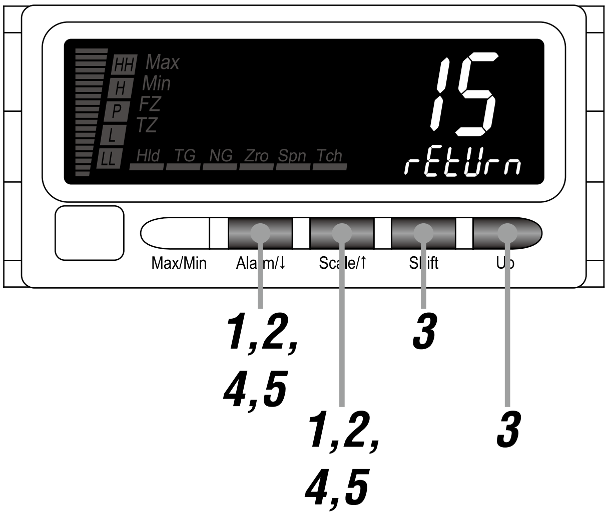
MAIN DISPLAY	FUNCTION	DEFAULT VALUE
00	Automatic return disabled	15
01 to 99	1 to 99 seconds	

■ TABLE 2: AUTOMATIC RETURN IN EACH MODE

MODE	OPERATION	SETTING TIME OUT
Measuring Mode	Confirming and configuring alarm setpoint	Depending on setting*1
	Displaying MAX or MIN value	Disabled
	Executing Forced Zero	Disabled
Scaling Setting Mode		Enabled
Alarm Setting Mode		Enabled
Advanced Setting Mode		Enabled
Modbus Setting Mode		Enabled
Infrared Communication Mode		Disabled
Lockout Setting Mode		Enabled
Loop Test Output Mode		Disabled

*1 Refer to 25.2 MANUAL SUB DISPLAY RESET for details.

15.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

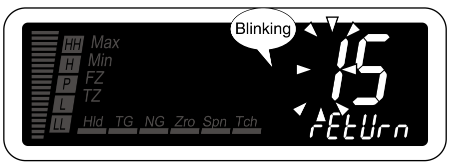
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The automatic return time to Measuring Mode is indicated.
- The SD indicates 'RETURN'.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the automatic return time to Measuring Mode.**

- The second digit starts blinking, to which you can apply changes.
- Set within the range of 00 to 99.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the transition time to Lockout Setting Mode will be indicated ('PROTECT' on the SD).
• Press Scale/↑ button, and the display color will be indicated ('COLOR' on the SD).

---

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

16. ADJUSTING DISPLAY REFRESHING RATE

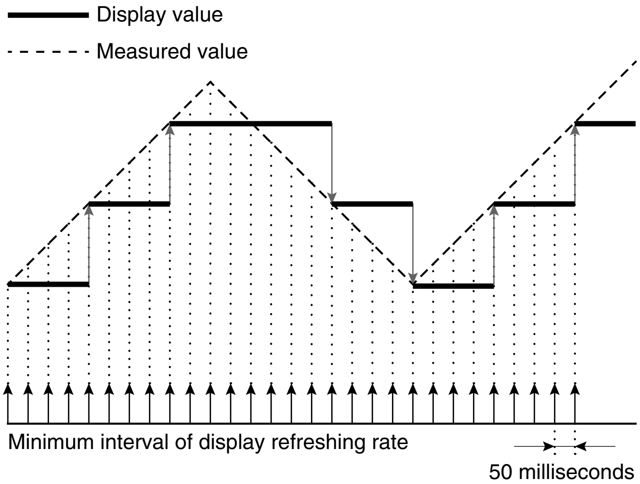
The 47DV measures input signal at the read rate 50 milliseconds. The display refreshing rate can be slower than this rate (figure below) within the range of 0.1 to 99.9 seconds. With this value set to 00.0, the refreshing rate will be the same as the read rate (50 milliseconds) (table below). When the input signal changes rapidly, the display refreshing rate can be slowed to suppress the display flickering.

■ DISPLAY REFRESHING RATE

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
00.0	50 milliseconds	00.0
00.1 to 99.9	0.1 to 99.9 seconds	

■ DISPLAY REFRESHING IMAGE

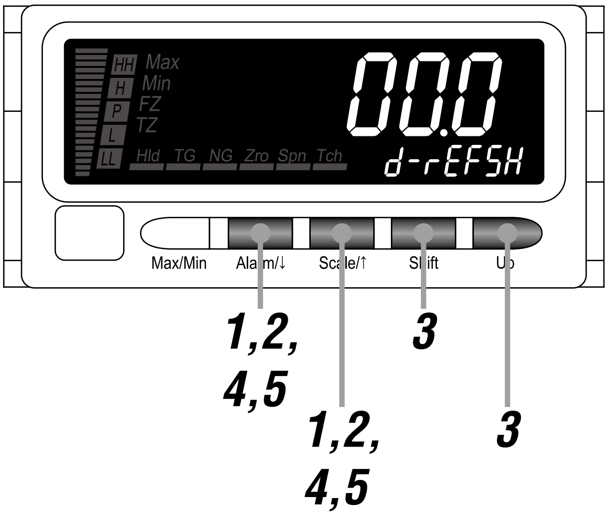
e.g. Refreshing rate 0.2 seconds



NOTE

The display refreshing rate setting affects the DC output when the analog output function mode is set to “proportional to the display value”. Refer to 8. SETTING ANALOG OUTPUT for details.

16.1 OPERATING PROCEDURE LV1



NOTE

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

---

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

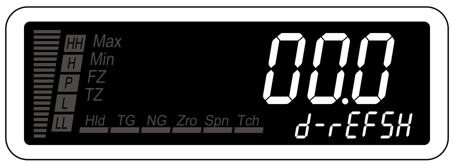
- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

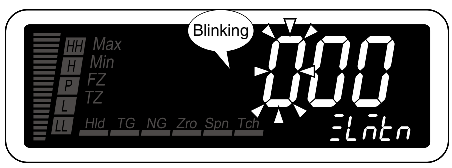
---

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



- The display refreshing rate is indicated.
- The SD indicates 'D-REFSH'.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the display refreshing rate.**



- The third digit starts blinking, to which you can apply changes.
- Set within the range of 00.0 to 99.9.

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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the firmware version indication will be indicated ('FRM-VER' on the SD), or the manual sub display reset will be indicated ('S-DISP' on the SD) with the alarm setting lockout set to "completely unlock Alarm Setting Mode".
- Press Scale/↑ button, and the transition time to Lockout Setting Mode will be indicated ('PROTECT' on the SD).

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

17. ROUNDING OFF LOWEST DIGIT READING

Rounding off the lowest digit reading of the measured value can suppress variation in the display without setting the averaging processing or slowing the display refreshing rate. This round off low-digit reading can be selected among 'OFF' (1), '2', '5' and '10'.

■ ROUND OFF LOW-DIGIT READING

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	No round-off (1)	oFF
2	2	
5	5	
10	10	

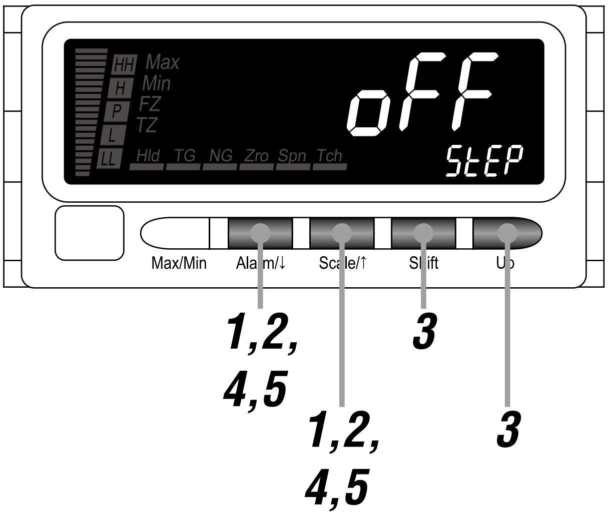
■ INDICATION IN ROUNDING OFF LOW-DIGIT READING

MAIN DISPLAY	LOW-DIGIT INDICATION OF MEASURED VALUE
	0 1 2 3 4 5 6 7 8 9 10
oFF	0 1 2 3 4 5 6 7 8 9 10
2	0 2 4 6 8 10
5	0 5 10
10	0 10

NOTE

The round off low-digit reading setting affects the DC output when the analog output function mode is set to "proportional to the display value". Refer to 8. SETTING ANALOG OUTPUT for details.

17.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

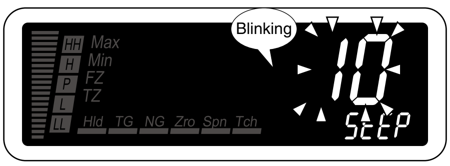
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the round off low-digit reading setting.**

- The round off low-digit reading is indicated.
- The SD indicates 'STEP'.

3 **Press Shift and Up buttons to select the round off low-digit reading.**

- Select one among 'OFF', '2', '5' and '10'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the display reading type will be indicated ('M-DISP' on the SD).
• Press Scale/↑ button, and the scaling error will be indicated ('SE-ALM' on the SD).

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

18. DETECTING STEEP INPUT CHANGES

Only steep changes in the input signals can be detected with mild changes disregarded, which is called high-pass filter.
Deviation between the currently measured input value and the average of the past values is calculated.
Table 2 shows the relationship between the sampling time and the reading.

■ TABLE 1: HIGH-PASS FILTER

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
oFF	High-pass filter OFF	oFF
on	High-pass filter ON	

■ TABLE 2: SAMPLING TIME V.S. READING

SAMPLING TIME	INPUT	READING	REFERENCE USED IN NEXT CALCULATION
1	I_1	$I_1 - I_1 = 0$	$C_1 = I_1$
2	I_2	$I_2 - C_1$	$C_2 = \frac{1}{2}(C_1 + I_2) = \frac{1}{2}(I_1 + I_2)$
3	I_3	$I_3 - C_2$	$C_3 = \frac{1}{2}(C_2 + I_3) = \frac{1}{4}(I_1 + I_2) + \frac{1}{2}I_3$
4	I_4	$I_4 - C_3$	$C_4 = \frac{1}{2}(C_3 + I_4) = \frac{1}{8}(I_1 + I_2) + \frac{1}{4}I_3 + \frac{1}{2}I_4$
:	:	:	:
n	I_n	$I_n - C_{n-1}$	$C_n = \frac{1}{2^{n-1}}(I_1 + I_2) = \frac{1}{2^{n-2}}I_3 + \ldots\ldots + \frac{1}{2}I_n$

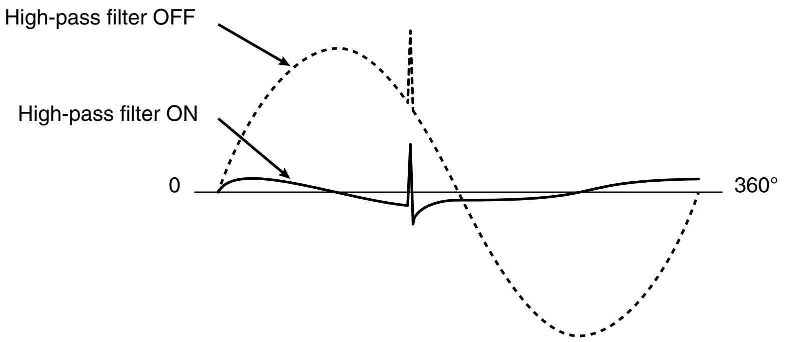
I_n : Input
C^n : Reference value used in the next round of calculation
*1 Comparison is made against the result of last display (calculated) value.

• EXAMPLE (TABLE 3)

SAMPLING TIME	INPUT	READING	REFERENCE USED IN NEXT CALCULATION
1	5.0	5.0 – 5.0 = 0	5.0
2	4.0	4.0 – 5.0 = -1.0	$\frac{1}{2}(5.0 + 4.0) = 4.5$
3	5.5	5.5 – 4.5 = 1.0	$\frac{1}{2}(4.5 + 5.5) = 5.0$
4	4.0	4.0 – 5.0 = -1.0	$\frac{1}{2}(5.0 + 4.0) = 4.5$
5	9.5	9.5 – 4.5 = 5.0	$\frac{1}{2}(4.5 + 9.5) = 7.0$

*2 Analog output may not simply increase/decrease depending upon timing of the input supplied in relation to the sampling rate.

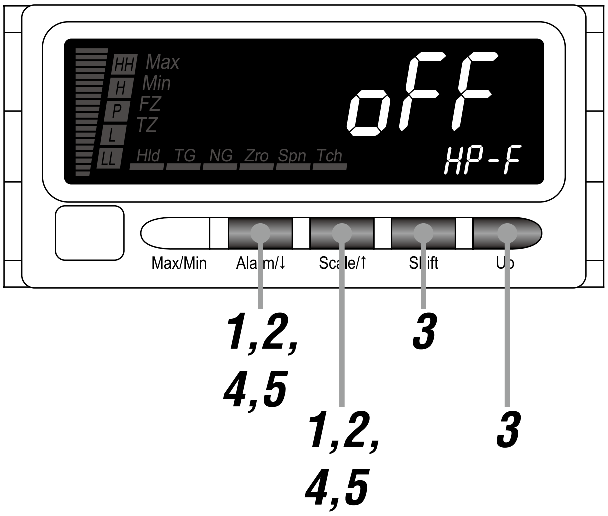
■ OPERATION WITH HIGH-PASS FILTER ON/OFF



NOTE

- When the high-pass filter is set to “ON”, the display scaling range is reset to the one with 0 as 50% regardless of the display scaling settings. It is recommended to set the display scaling values, setpoints (and bargraph lower and upper limits, analog outputs 0% and 100% as necessary), taking account of this.
- The high-pass filter setting affects the DC output when the analog output function mode is set to “proportional to the display value”. Refer to 8. SETTING ANALOG OUTPUT for details.

18.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

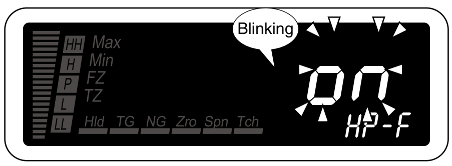
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the high-pass filter setting.**

- The high-pass filter is indicated.
- The SD indicates 'HP-F'.

3 **Press Shift and Up buttons to select the high-pass filter.**

- Select 'OFF' or 'ON'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the backlight brightness will be indicated (‘BRIGHT’ on the SD).
• Press Scale/↑ button, and the display reading type will be indicated (‘M-DISP’ on the SD).

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

19. ADJUSTING BRIGHTNESS OF DISPLAY

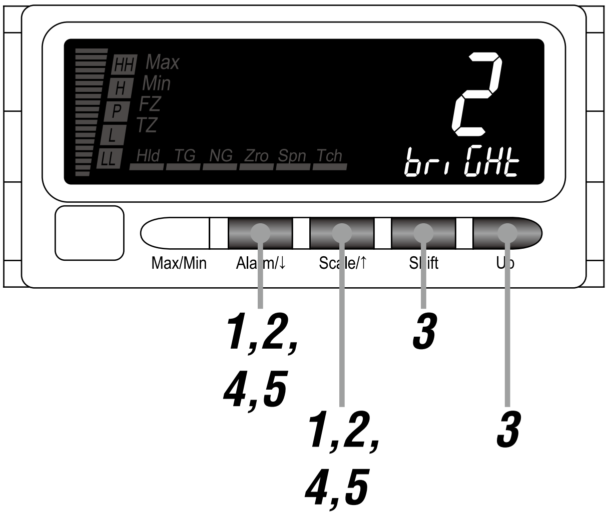
The backlight brightness can be adjusted (figures below).
The brightness can be selected in the following table.

■ BACKLIGHT BRIGHTNESS

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
1	Brightness level 1 (dark)	2
2	Brightness level 2	
3	Brightness level 3 (bright)	

■ ADJUSTMENT IMAGE

19.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

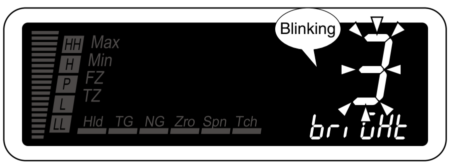
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The backlight brightness is indicated.
- The SD indicates 'BRIGHT'.

3 **Press Shift and Up buttons to select the backlight brightness.**

- Select one among '1', '2' and '3'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the LCD contrast will be indicated ('CNTRAST' on the SD).
• Press Scale/↑ button, and the high-pass filter will be indicated ('HP-F' on the SD).

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

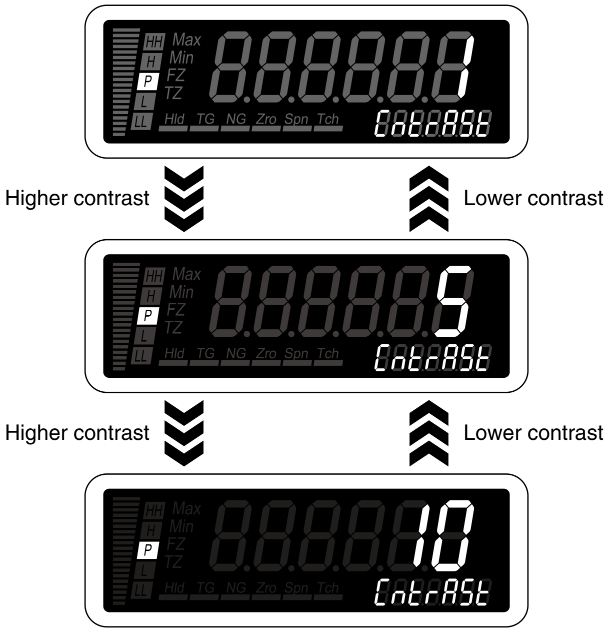
20. ADJUSTING LCD CONTRAST

The LCD contrast can be adjusted at 10 levels.
The contrast can be selected in the following table.

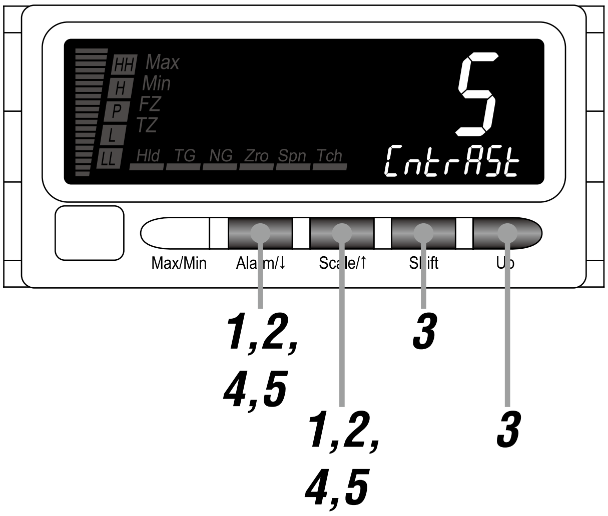
■ LCD CONTRAST

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
1	Contrast level 1 (low)	5
2	Contrast level 2	
3	Contrast level 3	
4	Contrast level 4	
5	Contrast level 5 (middle)	
6	Contrast level 6	
7	Contrast level 7	
8	Contrast level 8	
9	Contrast level 9	
10	Contrast level 10 (high)	

■ ADJUSTMENT IMAGE



20.1 OPERATING PROCEDURE LV0



NOTE

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

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

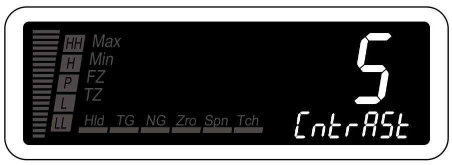
- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

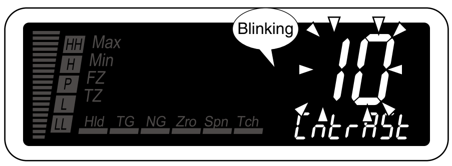
2 **Press Alarm/↓ or Scale/↑ button to go to the LCD contrast setting.**

- The LCD contrast is indicated.
- The SD indicates 'CNTRAST'.



3 **Press Shift and Up buttons to select the LCD contrast.**

- Select one among '1', '2', '3', '4', '5', '6', '7', '8', '9' and '10'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the bank switching will be indicated (‘BNK-CHG’ on the SD).
• Press Scale/↑ button, and the backlight brightness will be indicated (‘BRIGHT’ on the SD).

---

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

21. SETTING EVENT TRIGGER INPUT

External TIMING signals enable synchronous measurement, measurement of the MAX and MIN values and their deviation. The timing to start or finish the measurement can be adjusted with the TIMING signals. This section describes event trigger signals, modes and ON/OFF timing delay.

■ EVENT TRIGGER SIGNALS

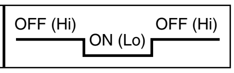
All event trigger signals are negative logic (Table 1).

SIGNAL	FUNCTION	DESCRIPTION
TIMING	Used for various timing hold functions.	• Invalid in the normal mode. • Holds the measured value at the falling edge of the signal in the sampling hold mode. • Measures while the signal is ON and establishes the measured value at the rising edge in the peak hold, valley (bottom) hold and peak-to-peak hold modes.
S-TMR	Startup timer Measuring starts in the predetermined time after detecting the signal turning ON.	No measuring for the preset startup timer period from the falling edge in all modes (Table 2).
HOLD	Reading measured signal stops and the last measured value, MAX and MIN values and output status are held when the signal is turned ON.	• Holds data value at the falling edge of the signal in the normal mode. (Refer to 29. RETAINING MEASUREMENT STATUS.) • Holds the TIMING signal status at the falling edge of the signal in all other modes (Table 3).
RESET	The MAX and MIN values and latching alarm are reset when the signal is turned ON.	• Resets measurement in all modes (Table 4). • Resets MAX/MIN values and latching alarm. (Refer to 30. RESETTING MAX/MIN VALUES AND LATCHING ALARM .)
ZERO	Forced Zero and Tare Adjustment are externally controlled when the signal is turned ON/OFF.	Enables Forced Zero and Tare Adjustment in all modes, similar to the front button control. (Refer to 26. FORCING THE PRESENT DISPLAY VALUE TO ZERO.) The forced zero lockout setting is disregarded.

NOTE

The negative logic (ON at low signal) is as shown in the figure on the right.

Negative logic



• TABLE 2: TIMING SIGNAL V.S. S-TMR SIGNAL

Sampling Hold	Measuring	Measuring	Measuring disabled	Measuring disabled
TIMING S-TMR	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON
Other	Measuring disabled	Measuring (halt)	Measuring disabled	Measuring disabled
TIMING S-TMR	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON

• TABLE 3: TIMING SIGNAL V.S. HOLD SIGNAL

Sampling Hold	Measuring	Measuring	Measuring	Measuring disabled
TIMING HOLD	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON
Other	Measuring	Measuring	Measuring	Measuring disabled
TIMING HOLD	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON

• TABLE 4: TIMING SIGNAL V.S. RESET SIGNAL

Sampling Hold	Measuring --> No Measuring	Measuring --> No Measuring	Measuring disabled	Measuring disabled
TIMING RESET	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON
Other	Measuring disabled	Measuring disabled	Measuring disabled	Measuring disabled
TIMING RESET	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON	OFF ON OFF ON

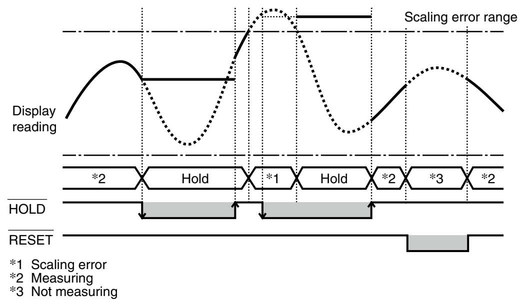
■ EVENT TRIGGER MODE

The event trigger has the following 5 modes (Table 5). The default setting is normal.

MAIN DISPLAY	MODE	FUNCTION
normAL	Normal	Measures continuously (Table 6).
S-HLd	Sampling hold	Holds the measured value at the falling edge of the TIMING signal (Table 7).
P-HLd	Peak hold	Measures and stores the MAX value while the TIMING signal is ON. When the signal is OFF, the stored MAX value is indicated (Table 8).
b-HLd	Valley (bottom) hold	Measures and stores the MIN value while the TIMING signal is ON. When the signal is OFF, the stored MIN value is indicated (Table 9).
PP-HLd	Peak-to-peak hold	Measures and stores MAX and MIN values while the TIMING signal is ON. When the signal is OFF, the stored 'MAX value - MIN value' is indicated (Table 10).

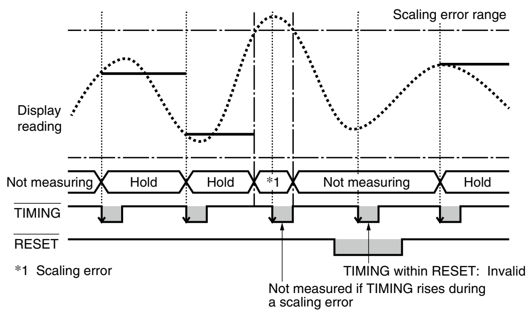
• TABLE 6: NORMAL MODE

TIMING signal	When the TIMING signal is ON, 'TG' indicator turns on, however the signal is invalid. Measures continuously.
HOLD signal	While the HOLD signal is ON, the display reading is held at the measured value at the falling edge of the signal, and the TIMING, S-TMR and ZERO signals are invalid.
Scaling error	During the scaling error, data measuring continues. However the display shows the scaling error. If the HOLD signal turns ON during the scaling error and is maintained after the scaling error is canceled, the display reading changes to the measured value at the falling edge of the signal.
RESET signal	Resets the measured data with the RESET signal ON (no measurement).
DC output	Proportional to the display reading. For no measured data, the value is 0%.



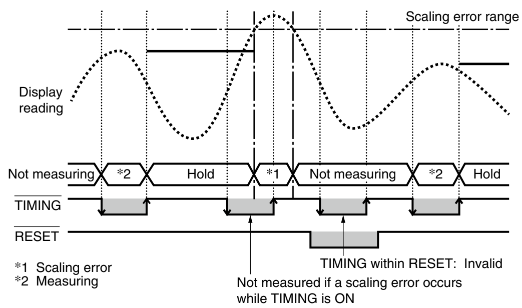
• TABLE 7: SAMPLING HOLD MODE

TIMING signal	Data is measured at the falling edge of the TIMING signal.
HOLD signal	While the HOLD signal is ON, the display reading is held at the measured value at the falling edge of the signal, and the TIMING, S-TMR and ZERO signals are invalid.
Scaling error	Stops data measuring.
RESET signal	Resets the measured data with the RESET signal ON (no measurement). The TIMING signal is invalid.
DC output	Proportional to the display reading. For no measured data, the value is 0%.



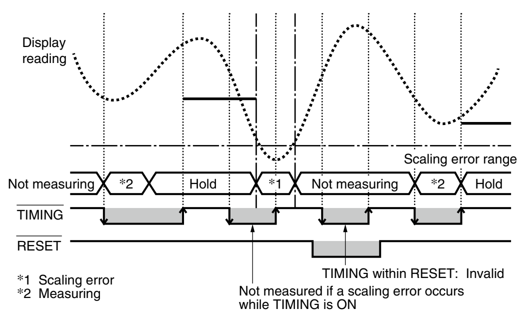
• TABLE 8: PEAK HOLD MODE

TIMING signal	While the TIMING signal is ON, the MAX value within the period is measured and stored, and is established at the rising edge of the signal.
HOLD signal	While the HOLD signal is ON, the display reading is held at the last measured value at the falling edge of the signal, and the TIMING, S-TMR and ZERO signals are invalid.
Scaling error	Stops data measuring.
RESET signal	Resets the measured data with the RESET signal ON (no measurement). The TIMING signal is invalid.
DC output	Proportional to the display reading. For no measured data, the value is 0%.



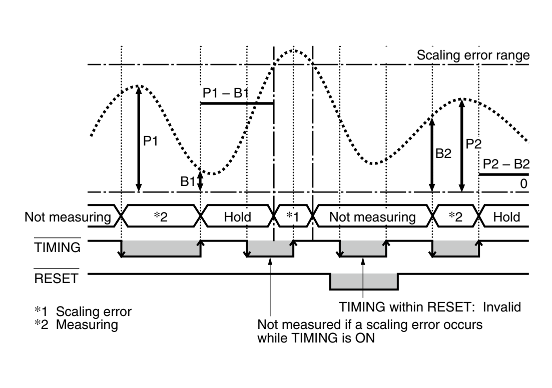
• TABLE 9: VALLEY (BOTTOM) HOLD MODE

TIMING signal	While the TIMING signal is ON, the MIN value within the period is measured and stored, and is established at the rising edge of the signal.
HOLD signal	While the HOLD signal is ON, the display reading is held at the last measured value at the falling edge of the signal, and the TIMING, S-TMR and ZERO signals are invalid.
Scaling error	Stops data measuring.
RESET signal	Resets the measured data with the RESET signal ON (no measurement). The TIMING signal is invalid.
DC output	Proportional to the display reading. For no measured data, the value is 0%.



• TABLE 10: PEAK-TO-PEAK HOLD MODE

TIMING signal	While the TIMING signal is ON, the difference between the MAX and MIN values with-in the period is measured and stored, and is established at the rising edge of the signal.
HOLD signal	While the HOLD signal is ON, the display reading is held at the last measured value at the falling edge of the signal, and the TIMING, S-TMR and ZERO signals are invalid.
Scaling error	Stops data measuring.
RESET signal	Resets the measured data with the RESET signal ON (no measurement). The TIMING signal is invalid.
DC output	Proportional to the display reading. For no measured data, the value is 0%.



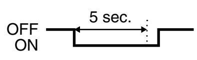
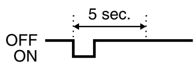
NOTE

- While the TIMING signal is ON, 'TG' indicator turns on (right figure).
- The HOLD signal is ineffective when the RESET signal is ON.
- Except in the normal mode, the one-shot output is provided every measurement timing regardless of the display refreshing rate.
- When the ZERO signal is ON, the Forced Zero and Tare Adjustment can be executed or canceled regardless of the Forced Zero control lockout setting.
- The RESET signal does not affect the reference point measured by the Forced Zero and Tare Adjustment while they are executed.
- The Forced Zero and Tare Adjustment can be executed or canceled with the ZERO signal while in MAX/MIN Value Display mode or in confirming the alarm setpoints.
- The Forced Zero and Tare Adjustment cannot be executed or canceled with the ZERO signal while 'S.ERR' is indicated.
- The Forced Zero and Tare Adjustment cannot be executed or canceled for no measured data (RESET signal ON).
- The Forced Zero and Tare Adjustment cannot be executed or canceled with the ZERO signal while the HOLD signal is ON.
- The MAX and MIN values can be reset with the RESET signal ON regardless of the MAX/MIN display control lockout setting.
- The MAX and MIN values cannot be indicated with the front button control for no measured data.
- The MAX and MIN values are updated at the falling edge of the TIMING signal and indicated with the front button control in the sampling hold mode.
- The MAX and MIN values while the TIMING signal is ON are indicated with the front button control in the modes except the normal and sampling hold modes.

■ ON TIMING DELAY/OFF TIMING DELAY

Logical switching of the TIMING signal is delayed for the preset delay time from the physical signal change. After the preset ON/OFF timing delay, the measurement is started and the measured value is held, or the measurement is finished (Table 11). The ON/OFF timing delay can be set within the range of 0.0 to 999.9 seconds. The default value is 0.0 second.

• TABLE 11: ON/OFF TIMING DELAY

	Available	Unavailable
$\overline{\text{TIMING}}$		

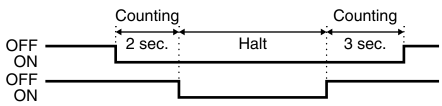
NOTE

- When another TIMING signal turns ON during the ON or OFF timing delay period, the previous TIMING signal is canceled.
- Set the ON timing delay time shorter than the period when the TIMING signal is ON.
- The ON timing delay and OFF timing delay are disabled with "normal" selected for the event trigger mode parameter.
- The OFF timing delay is disabled with "sampling hold" selected for the event trigger mode parameter.

■ STARTUP TIMER

When the S-TMR signal turns ON within the period of the ON/OFF timing delay, thus counting time of the ON/OFF timing delay is halted during the startup timer period, and then restarted after the period is elapsed (Table 12). The startup timer can be set within the range of 0.0 to 99.9 seconds. The default value is 0.0 second.

• TABLE 12: STARTUP TIMER

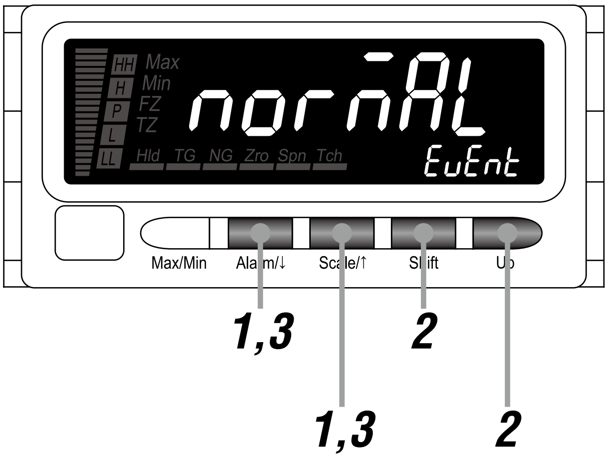
	Available
$\overline{\text{TIMING}}$ $\overline{\text{S-TMR}}$	

NOTE

The startup timer can be set in the normal mode, however when the S-TMR is ON, the measurement is stopped during the timer period.

21.1 EVENT TRIGGER MODE

21.1.1 OPERATING PROCEDURE LV1



NOTE

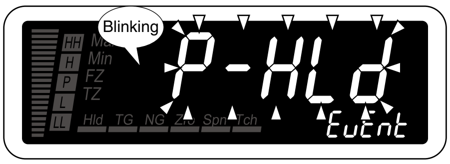
The following figures are display examples. The displays depend on the settings.

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

- The event trigger mode is indicated.
- The SD indicates 'EVENT'.

2 **Press Shift and Up buttons to select the event trigger mode.**

- Select one among 'NORMAL', 'S-HLD', 'P-HLD', 'B-HLD' and 'PP-HLD'.



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

- And the next parameter setting is indicated.

NOTE

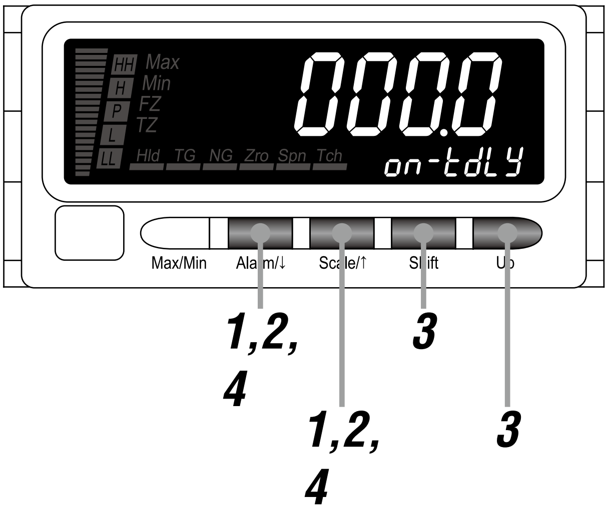
- Press Alarm/↓ button, and the ON timing delay will be indicated ('ON-TDLY' on the SD), or the startup timer will be indicated ('STR-TMR' on the SD) with the event trigger mode set to "normal".
- Press Scale/↑ button, and the firmware version indication will be indicated ('FRM-VER' on the SD).

4 ■ **TO GO ON TO SET THE ON TIMING DELAY,**
Skip to Step 2 in “21.2 ON TIMING DELAY”.

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

21.2 ON TIMING DELAY

21.2.1 OPERATING PROCEDURE LV1



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

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

- The event trigger mode is indicated.
- The SD indicates 'EVENT'.

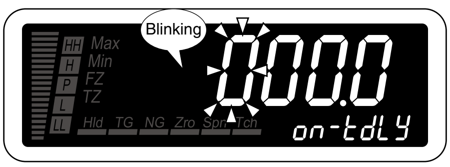
2 **Press Alarm/↓ or Scale/↑ button to go to the ON timing delay setting.**

- The ON timing delay is indicated.
- The SD indicates 'ON-TDLY'.

> **NOTE**
> The ON timing delay is disabled with "normal" selected for the event trigger mode parameter.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the ON timing delay.**

- The forth digit starts blinking, to which you can apply changes.
- Set within the range of 000.0 to 999.9.



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

• And the next parameter setting is indicated.

NOTE

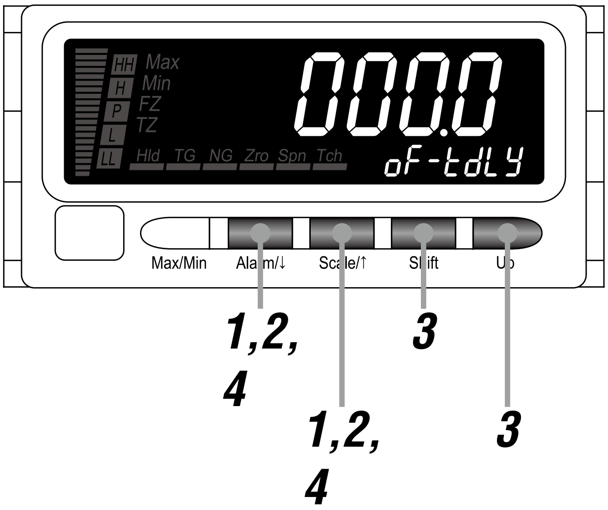
- Press Alarm/↓ button, and the OFF timing delay will be indicated ('OF-TDLY' on the SD), or the startup timer will be indicated ('STR-TMR' on the SD) with the event trigger mode set to "sampling hold".
- Press Scale/↑ button, and the event trigger mode will be indicated ('EVENT' on the SD).

5 **■ TO GO ON TO SET THE OFF TIMING DELAY,**
Skip to Step 2 in "21.3 OFF TIMING DELAY".

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

21.3 OFF TIMING DELAY

21.3.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The event trigger mode is indicated.
- The SD indicates ‘EVENT’.

2 **Press Alarm/↓ or Scale/↑ button to go to the OFF timing delay setting.**

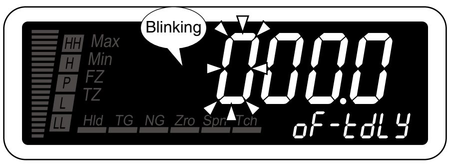
- The OFF timing delay is indicated.
- The SD indicates ‘OF-TDLY’.

NOTE

The OFF timing delay is disabled with “normal” or “sampling hold” selected for the event trigger mode parameter.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the OFF timing delay.**

- The forth digit starts blinking, to which you can apply changes.
- Set within the range of 000.0 to 999.9.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the startup timer will be indicated ('STR-TMR' on the SD).
• Press Scale/↑ button, and the ON timing delay will be indicated ('ON-TDLY' on the SD).

---

5 **■ TO GO ON TO SET THE STARTUP TIMER,**

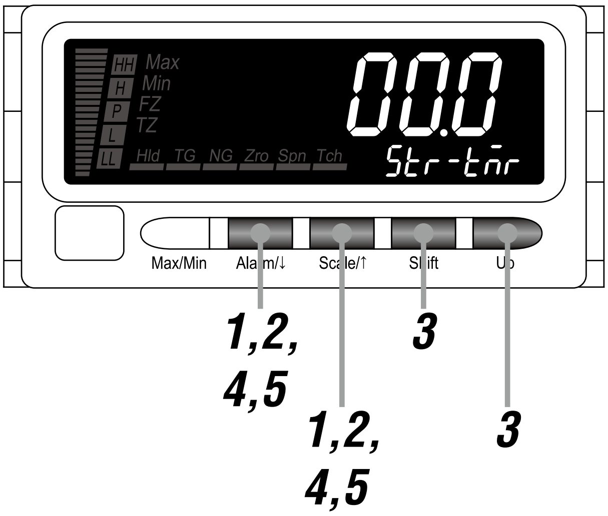
Skip to Step 2 in "21.4 STARTUP TIMER".

■ TO QUIT,

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

21.4 STARTUP TIMER

21.4.1 OPERATING PROCEDURE LV1



NOTE

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

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

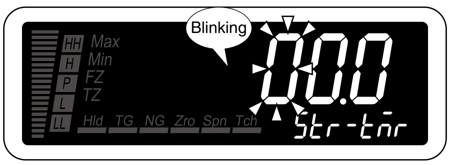
- The event trigger mode is indicated.
- The SD indicates ‘EVENT’.

2 **Press Alarm/↓ or Scale/↑ button to go to the startup timer setting.**

- The startup timer is indicated.
- The SD indicates ‘STR-TMR’.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the startup timer.**

- The third digit starts blinking, to which you can apply changes.
- Set within the range of 00.0 to 99.9.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the averaging type will be indicated ('AVE-TP' on the SD).
• Press Scale/↑ button, and the OFF timing delay will be indicated ('OF-TDLY' on the SD), the event trigger mode will be indicated ('EVENT' on the SD) with the event trigger mode set to "normal", or the ON timing delay will be indicated ('ON-TDLY' on the SD) with the event trigger mode set to "sampling hold".

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

22. SETTING BCD OUTPUT

Measured values can be taken in a PLC or a large scaled display. The BCD output, 5 alarm outputs including the P status output can be provided. Also with external contact signals, the measured value can be held, and MAX/MIN values and latching alarm can be reset. The input and output logic can be set.

■ BCD OUTPUT SIGNALS

- A request signal (REQ, MAX_REQ, or MIN_REQ) from an external device including a PLC is required to read out the BCD data. Refer to Table 1 for the signals.
- The DATA signal (Do11 to Do68) is established in approximately 30 milliseconds upon detecting the falling pulse edge of a request signal and the DAV signal turns ON. Read in the data while the DAV is ON.
  The RUN signal turns OFF in case of errors other than the scaling error. The DATA and DAV signals turn OFF while the RUN signal is OFF.
  The last measured value is held when the HOLD signal turns ON.
  All BCD signals turn OFF when the RESET signal turns ON.
  The OVF signal turns ON in case of the scaling error.
- While in Loop Test Output Mode, the analog/alarm outputs are provided according to the display reading, even when a request signal is turned ON.
- The LL, L, H and HH signals turn ON/OFF according to the respective alarm status. The P signal does likewise.

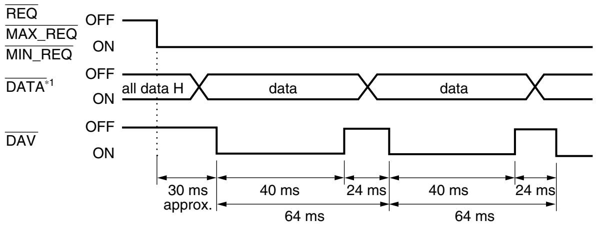
NOTE

- The BCD output includes the P status output. The alarm output set with the P output parameter can be also provided.
- The Forced Zero and Tare Adjustment cannot be executed or canceled for no measured data (RESET signal ON).
- The MAX and MIN values can be reset with the RESET signal ON regardless of the MAX/MIN display control lockout setting.
- The front button control of the MAX and MIN values does not affect the BCD output. Provide the MAX_REQ or MIN_REQ signal.
- Present, MAX and MIN values can be output even while 'S.ERR' is indicated.

• TABLE 1: BCD SIGNALS

SIGNAL			FUNCTION
Input	REQ	Request BCD data	Valid data in approximately 30 milliseconds after detecting the signal's rising edge.
	MIN_REQ	Request minimum reading data	Valid MIN value data in approximately 30 milliseconds after detecting the signal's rising edge.
	MAX_REQ	Request maximum reading data	Valid MAX value data in approximately 30 milliseconds after detecting the signal's rising edge.
	HOLD	Hold data	Reading measured signal stops and the last value is held when the HOLD signal is turned ON.
	RESET	Reset data	• ALL BCD data turn OFF when the RESET signal is turned ON. • MAX and MIN values and latching alarm are reset.
Output	DATA (Do11 to Do68)	BCD output data (6 digits)	BCD output data in 6 digits
	POL	BCD polarity	Polarity of BCD data. ON = (-), OFF = (+)
	OVF	BCD overflow/underflow	Output given at overflow or underflow (scaling error)
	DAV	Data valid	Means the BCD data is valid. ON = valid, OFF = invalid
	RUN	Run	• Means the meter is functioning. • OFF = error except the scaling error • No DAV or DATA output is given when the RUN signal is not provided.
	HH	HH alarm trip output	Follows HH alarm output.
	H	H alarm trip output	Follows H alarm output.
	P	P status output	Follows P status.
	L	L alarm trip output	Follows L alarm output.
	LL	LL alarm trip output	Follows LL alarm output.

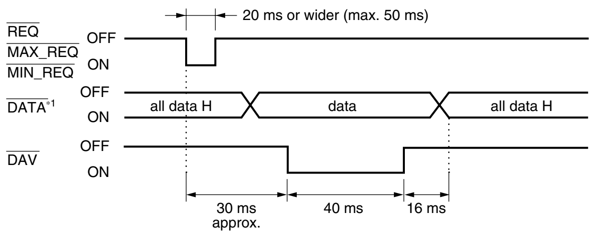
• Timing Chart for Continuous Data Output



Measured data is output every 64 milliseconds while one of the request signals (REQ, MAX_REQ or MIN_REQ) remains ON.

Note) For the event trigger modes, the data value is the same as the display.

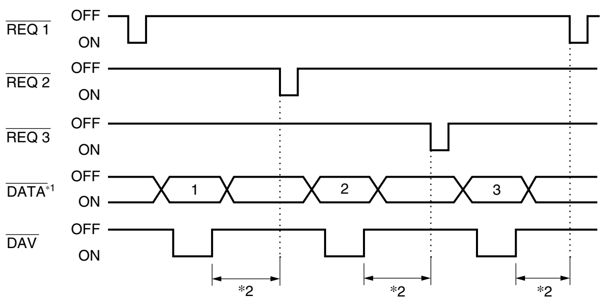
• Timing Chart for Single Sampling Cycle Data Output

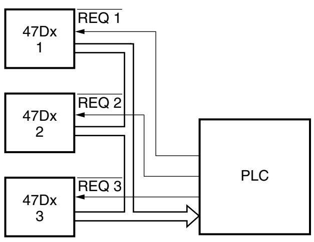


When one of the request signals (REQ, MAX_REQ or MIN_REQ) is given and its width is between 20 and 50 milliseconds, the DATA signal is established and the DAV signal is given in approximately 30 milliseconds from the falling edge of the request signal.

Note) Read in the data to a PLC at the timing of the DAV signal. The DAV is turned OFF in 40 milliseconds. The DATA signal is turned OFF in 16 milliseconds after that.

• Output is provided via open collector, enabling wired-OR gate configuration





The wired-OR connection is available for the DATA, POL, OVF, DAV, RUN, HH, H, P, L and LL signals when their logic is negative.

*1 DATA includes BCD Output, POL, OVF, HH, H, P, L, LL and RUN.
*2 Wait for at least 20 ms between DAV turning off and the next REQ signal.

■ I/O LOGIC

The input/output logic is selectable for the following 4 parameters.

PARAMETER	SUB DISPLAY	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
REQ input logic	bCd-rEq	on	Request valid at ON	on
		oFF	Request valid at OFF	
DAV output logic	bCd-dAv	on	Data valid at ON	on
		oFF	Data valid at OFF	
DATA output logic	bCd-dAt	on	Negative logic open collector	on
		oFF	Positive logic open collector	
Status output logic*1	bCd-StA	on	Valid at ON	on
		oFF	Valid at OFF	

*1 Output logic for RUN, POL, OVF, HH, H, P, L and LL

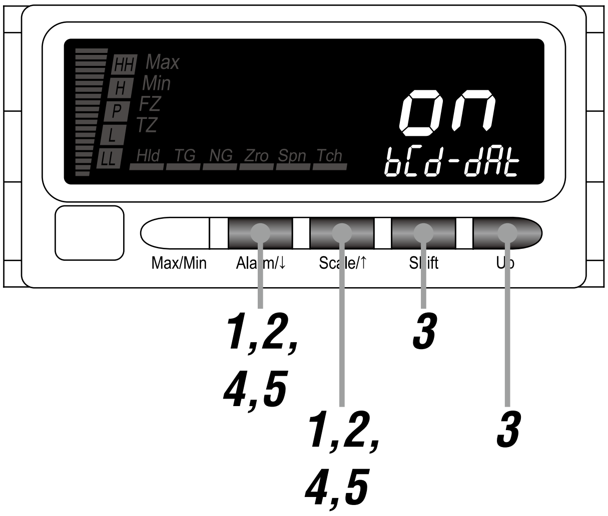
NOTE

- A change of the DAV output logic is effective after the next request signal ON.
- The HOLD and RESET signal logics are negative, not configurable.
- ON/OFF of the positive and negative logics is as shown in the right table.

Negative logic (default)	OFF (Hi) ON (Lo) OFF (Hi)
Positive logic	OFF (Lo) ON (Hi) OFF (Lo)

22.1 BCD LOGIC

22.1.1 OPERATING PROCEDURE LV0



NOTE

Procedures to set the DATA output logic are described here. To set other I/O logics, the procedures are same.

---

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

The event trigger mode is indicated ('EVENT' on the SD) with the I/O option code 'A'.

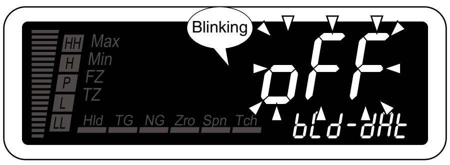
---

2 **Press Alarm/↓ or Scale/↑ button to go to the DATA output logic setting.**

- The DATA output logic is indicated.
- The SD indicates 'BCD-DAT'.

3 **Press Shift and Up buttons to select the DATA output logic.**

- Select 'ON' or 'OFF'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the status output logic will be indicated (‘BCD-STA’ on the SD).
• Press Scale/↑ button, and the DAV output logic will be indicated (‘BCD-DAV’ on the SD).

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

23. SETTING MODBUS COMMUNICATION

Data readout and parameter configuration of the 47DV with a PLC or a PC are available via Modbus communication. This manual describes setting procedures of the device address, baud rate, parity bit, stop bit, long register and timers. Refer to Modbus Protocol Reference Guide for 47Dx for the protocols and commands.

■ PARAMETERS

PARAMETER	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
Device address	001 to 247	Device address	001
BAUD RATE	1200	1200 bps	38400
	2400	2400 bps	
	4800	4800 bps	
	9600	9600 bps	
	19200	19200 bps	
	38400	38400 bps	
Parity bit	odd	Odd	odd
	EvEn	Even	
	nonE	None	
Stop bit	1	1 bit	1
	2	2 bits	
T1.5 timer	01 to 60	Protocol operating timer, T1.5	15
T3.5 timer	01 to 60	Protocol operating timer, T3.5	35
Long register	norMAL	Low-digit word at lower address	norMAL
	SWAP	High-digit word at lower address	

IMPORTANT

- Modbus setting changes are enabled only after the power supply has been turned off and on.
- The T1.5 and T3.5 timers are specified as 1.5 and 3.5 characters times in Modbus standard specifications. These parameters are not necessary to be changed normally.
- It is also possible to change the settings via Modbus communication.
- A communication error occurs in moving on to each Setting Mode with the front button control during the Modbus communication.

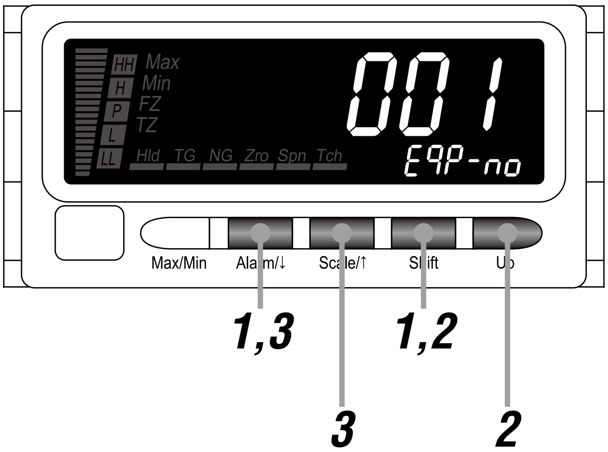
NOTE

■ CAUTIONS IN MODBUS COMMUNICATION

- The alarm indicators after a one-shot output provided, set in Alarm Setting Mode, are the same as those at the normal contact output.
- Even when the coil at alarm is changed in Alarm Setting Mode, operation of the alarm indicators is not reversed.
- The operation of the alarm indicators are not changed even when the P output is set in Advanced Setting Mode.
- The reference values in executing the Forced Zero and Tare Adjustment can be set to the ones other than ‘0’.
- The MAX and MIN values can be set in their addresses even while ‘S.ERR’ is indicated.

23.1 DEVICE ADDRESS

23.1.1 OPERATING PROCEDURE



NOTE

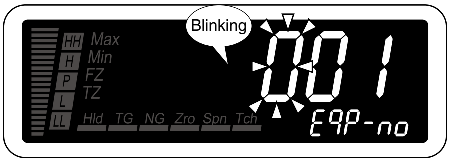
The following figures are display examples. The displays depend on the settings.

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

- The device address is indicated.
- The SD indicates ‘EQP-NO’.

2 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the device address.**

- The third digit starts blinking, to which you can apply changes.
- Set within the range of 001 to 247.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the baud rate will be indicated (‘B-RATE’ on the SD).
- Press Scale/↑ button, and the long register will be indicated (‘L-WORD’ on the SD).

4 ■ **TO GO ON TO SET THE BAUD RATE,**

Skip to Step 2 in “23.2 BAUD RATE”.

■ **TO QUIT,**

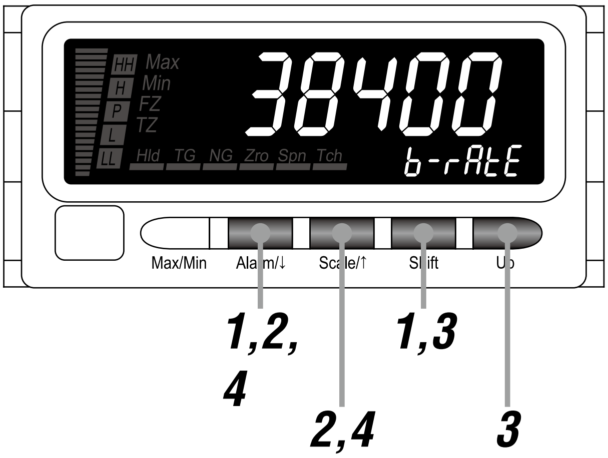
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

IMPORTANT

Modbus setting changes are enabled only after the power supply has been turned off and on.

23.2 BAUD RATE

23.2.1 OPERATING PROCEDURE



NOTE

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

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

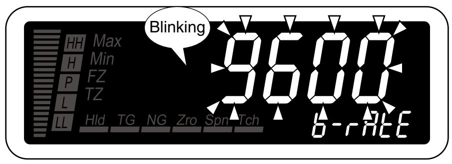
- The device address is indicated.
- The SD indicates 'EQP-NO'.

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

- The baud rate is indicated.
- The SD indicates 'B-RATE'.

3 **Press Shift and Up buttons to select the baud rate.**

- Select one among '1200', '2400', '4800', '9600', '19200' and '38400'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the parity bit will be indicated ('PARITY' on the SD).
- Press Scale/↑ button, and the device address will be indicated ('EQP-NO' on the SD).

5 ■ **TO GO ON TO SET THE PARITY BIT,**
Skip to Step 2 in “23.3 PARITY BIT”.

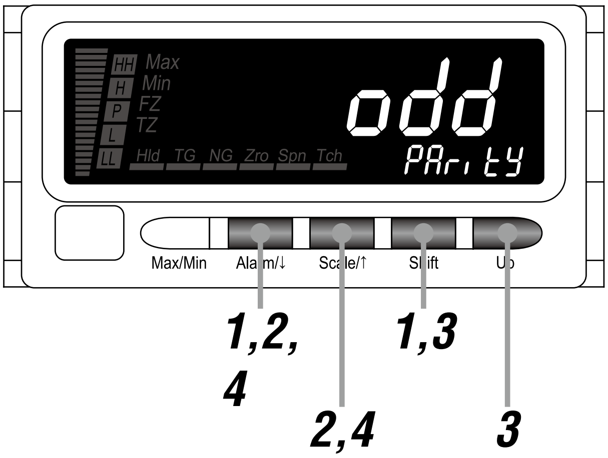
■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

IMPORTANT

Modbus setting changes are enabled only after the power supply has been turned off and on.

23.3 PARITY BIT

23.3.1 OPERATING PROCEDURE



NOTE

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

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

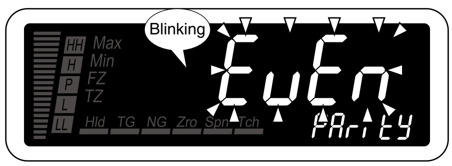
- The device address is indicated.
- The SD indicates 'EQP-NO'.

2 **Press Alarm/↓ or Scale/↑ button to go to the parity bit setting.**

- The parity bit is indicated.
- The SD indicates 'PARITY'.

3 **Press Shift and Up buttons to select the parity bit.**

- Select one among 'ODD', 'EVEN' and 'NONE'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the stop bit will be indicated ('STOPBIT' on the SD).
- Press Scale/↑ button, and the baud rate will be indicated ('B-RATE' on the SD).

5 ■ **TO GO ON TO SET THE STOP BIT,**

Skip to Step 2 in “23.4 STOP BIT”.

■ **TO QUIT,**

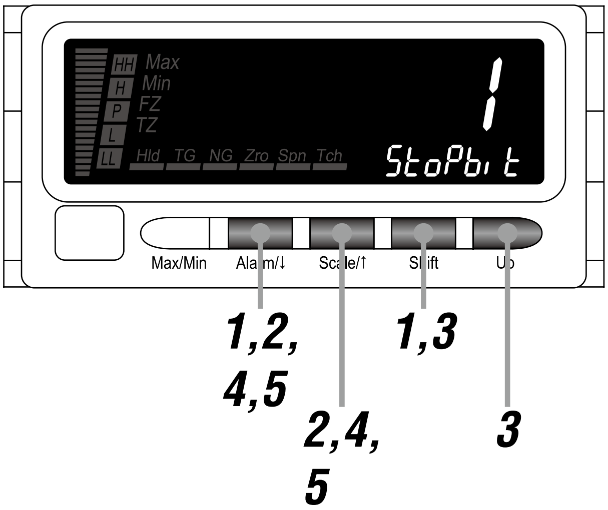
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

IMPORTANT

Modbus setting changes are enabled only after the power supply has been turned off and on.

23.4 STOP BIT

23.4.1 OPERATING PROCEDURE



NOTE

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

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

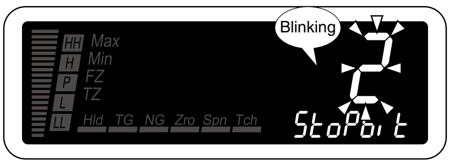
- The device address is indicated.
- The SD indicates ‘EQP-NO’.

2 **Press Alarm/↓ or Scale/↑ button to go to the stop bit setting.**

- The stop bit is indicated.
- The SD indicates ‘STOPBIT’.

3 **Press Shift and Up buttons to select the stop bit.**

- Select ‘1’ or ‘2’.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the T1.5 timer will be indicated (‘T15’ on the SD).
- Press Scale/↑ button, and the parity bit will be indicated (‘PARITY’ on the SD).

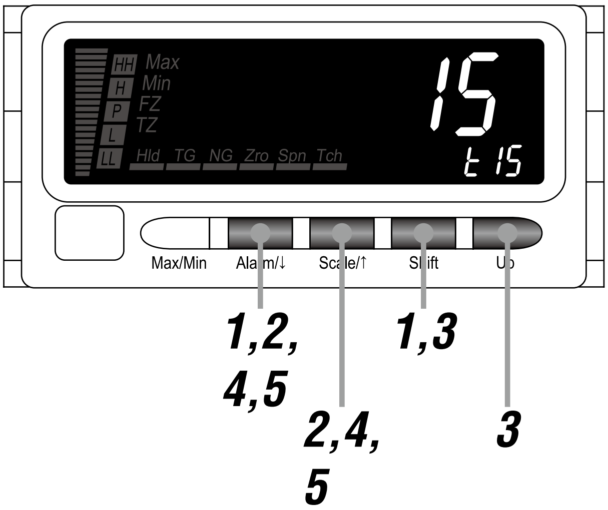
5 **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

IMPORTANT

Modbus setting changes are enabled only after the power supply has been turned off and on.

23.5 TIMER

23.5.1 OPERATING PROCEDURE



NOTE

Procedures to set the T1.5 timer are described here. To set the T3.5 timer, the procedures are same.

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

- The device address is indicated.
- The SD indicates ‘EQP-NO’.

2 **Press Alarm/↓ or Scale/↑ button to go to the T1.5 timer setting.**

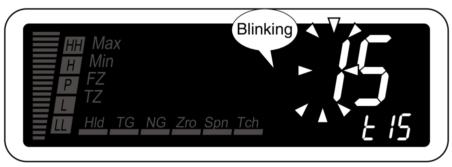
- The T1.5 timer is indicated.
- The SD indicates ‘T15’.

NOTE

The SD indicates ‘T35’ with the T3.5 timer.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the T1.5 timer.**

- The second digit starts blinking, to which you can apply changes.
- Set within the range of 01 to 60.



NOTE

The decimal point is not indicated. Set as ‘setting value × 0.1’.

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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the T3.5 timer will be indicated ('T35' on the SD).
• Press Scale/↑ button, and the stop bit will be indicated ('STOPBIT' on the SD).

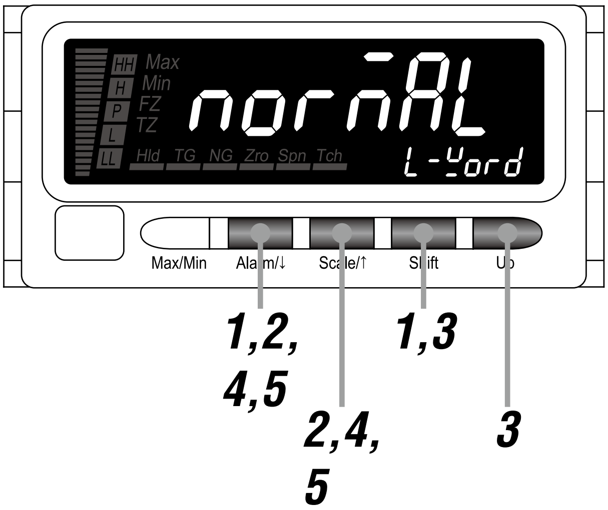
5 **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

IMPORTANT

• Modbus setting changes are enabled only after the power supply has been turned off and on.
• The T1.5 and T3.5 timers are specified as 1.5 and 3.5 characters times in Modbus standard specifications. These parameters are not necessary to be changed normally.

23.6 LONG REGISTER

23.6.1 OPERATING PROCEDURE



NOTE

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

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

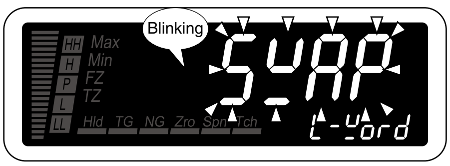
- The device address is indicated.
- The SD indicates 'EQP-NO'.

2 **Press Alarm/↓ or Scale/↑ button to go to the long register setting.**

- The long register is indicated.
- The SD indicates 'L-WORD'.

3 **Press Shift and Up buttons to select the long register.**

- Select 'NORMAL' or 'SWAP'.



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the device address will be indicated ('EQP-NO' on the SD).
- Press Scale/↑ button, and the T3.5 timer will be indicated ('T35' on the SD).

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

IMPORTANT

Modbus setting changes are enabled only after the power supply has been turned off and on.

24. LOOP TESTING

The 47DV 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 and the BCD output function according to the scaling values during the loop test.

24.1 LOOP TEST OUTPUT RANGE

-10 to +110% of the display scaling span can be set manually.

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.

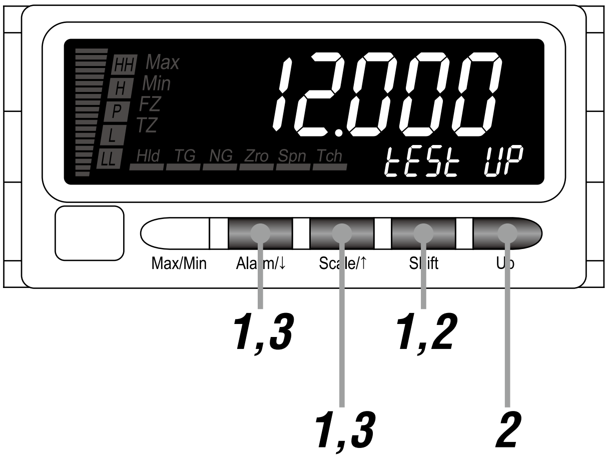
The DC output is provided within the range of -10 to +110% of the output span. The output is saturated at approximately -10% or 110%.

e.g. With the DC output 4 – 20 mA DC, the output can be provided within the range of 2.4 to 21.6 mA DC.

NOTE

- Loop Test Output Mode can be used only with the DC output option.
- Do not attempt to write via Modbus while in Loop Test Output Mode.
- With the latching alarm set to "output latched / measuring continued", when the display value reaches a setpoint in Loop Test Output Mode, the alarm output is held, and even back in Measuring Mode. Reset the latching alarm.
- With the latching alarm set to "output latched / measuring stopped", when the display value reaches a setpoint, the alarm and DC outputs are held. However the BCD output follows the display value. The outputs are still held back in Measuring Mode, and therefore the BCD output is also held with the input value. Reset the latching alarm.

24.2 OPERATING PROCEDURE

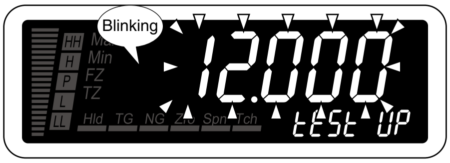


NOTE

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

1 **Hold down Alarm/↓, Scale/↑ and Shift buttons at once for 5 seconds or more to move on to Loop Test Output Mode.**

- The measuring is stopped and the last measured values or status are held for the DC, alarm and BCD outputs.
- The current indication starts blinking, to which you can apply changes.
- The SD indicates 'TEST UP'.



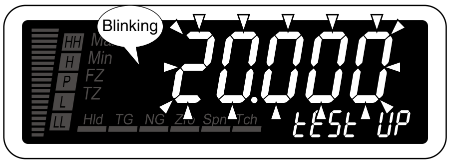
NOTE

- In moving on to Loop Test Output Mode while 'S.ERR' is indicated, -10% of the display scaling span is indicated when the SD indicates 'UNDER', and 110% of the display scaling span is indicated when the SD indicates 'OVER'.
- In moving on to Loop Test Output Mode while '-20000' blinks, -10% of the display scaling span is indicated.
- In moving on to Loop Test Output Mode while '100000' blinks, 110% of the display scaling span is indicated.
- The specified decimal point position is applied.

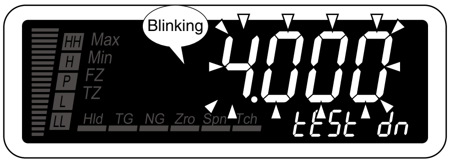
2 Press Shift and Up buttons to adjust the display value.

• Press Shift button to switch the signal to increase or decrease.
  Increase with 'TEST UP' indicated on the SD.
  Decrease with 'TEST DN' indicated on the SD.
• Press Up button to control it toward the desired output value.
• Hold down Up button to control at high speed.
• The DC and BCD outputs change according to the display value.
• When the display value reaches the desired one, check or calibrate the receiving instrument.

■ Increasing display value



■ Decreasing display value

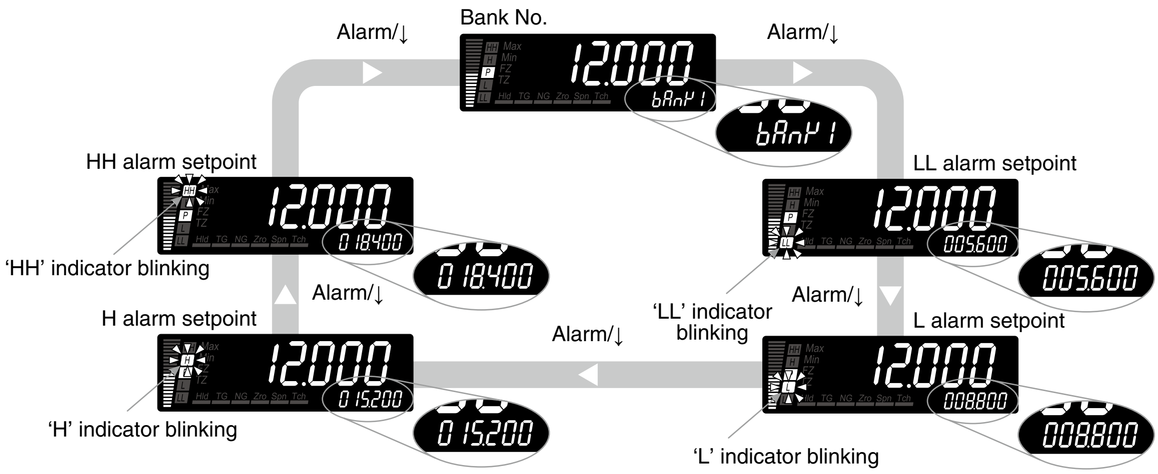


3 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

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

25. CONFIRMING AND CONFIGURING ALARM SETPOINTS

The alarm setpoints can be confirmed on the sub display 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 the original bank No. indication. The measured value is updated while in confirming the setpoints.
These setpoints can be changed in this status without moving on to Alarm Setting Mode. If the front buttons are left untouched for the specified time period while in confirming the setpoints, the sub display can be set to return to the bank No. indication.



*1 Display depends on the settings and input.

■ PROCEDURE TO CONFIRM ALARM SETPOINTS

Each time pressing Alarm/↓ button in Measuring Mode, the sub display indication is changed from the bank No. to LL alarm setpoint to L alarm setpoint to H alarm setpoint to HH alarm setpoint and back to the bank No.

NOTE

- When the bank switching is set to "disabled", the bank No. is not indicated.
- The alarm setpoints cannot be confirmed when the alarm setting lockout is set to "lock Alarm Setting Mode".
- Switching the banks is not available in this mode.
- The alarm setpoints can be confirmed while 'S.ERR' is indicated. However the SD indicates 'OVER' or 'UNDER' instead of the bank No.

■ CONFIGURATION OF ALARM SETPOINTS

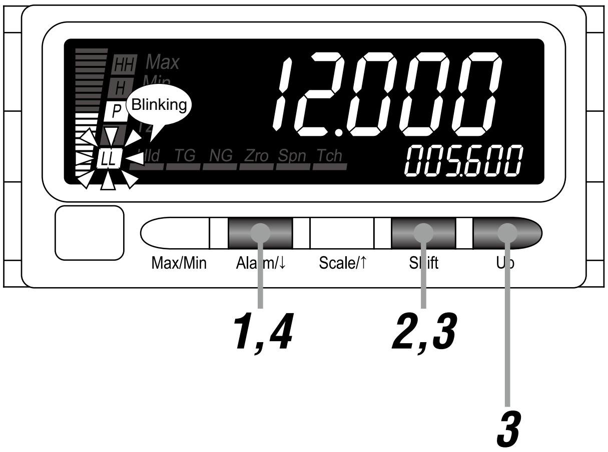
The alarm setpoints can be changed while in confirming in Measuring Mode without moving on to Alarm Setting Mode. Refer to the following OPERATING PROCEDURE.

■ MANUAL SUB DISPLAY RESET

If the front buttons are left untouched for the specified time period while in confirming the alarm setpoints, the automatic reset of the SD to the bank No. indication ('OFF') or manual reset ('ON') can be selected. The default setting is "alarm setpoint display automatically reset" ('OFF'). The automatic return time is the same as the time set with the "automatic return time to Measuring Mode".

25.1 CONFIGURATION OF ALARM SETPOINTS

25.1.1 OPERATING PROCEDURE LV1



NOTE

- Procedures to change the LL alarm setpoint are described here. To set other setpoints, the procedures are same. Indicate a setpoint to change.
- The following figures are display examples. The displays depend on the specifications and settings.

1 **Press Alarm/↓ button to indicate the LL alarm setpoint on the SD.**

- The SD indicates the LL alarm setpoint.
- ‘LL’ indicator starts blinking.

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

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

3 **Press Shift and Up buttons to set the LL alarm setpoint.**

- Set within the range of -20000 to 100000.

IMPORTANT

Specify ‘------’ to disable the alarm output.

NOTE

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

4 **Press Alarm/↓ button to apply the new setting and indicate the L alarm setpoint.**

- The LL setpoint is registered and the L setpoint is indicated.
- 'LL' indicator turns off and 'L' indicator starts blinking.

5 **■ TO GO ON TO SET OTHER ALARM SETPOINTS,**
Repeat operation from Step 2.

■ TO RETURN TO THE BANK NO. INDICATION,
Press Alarm/↓ button several times.

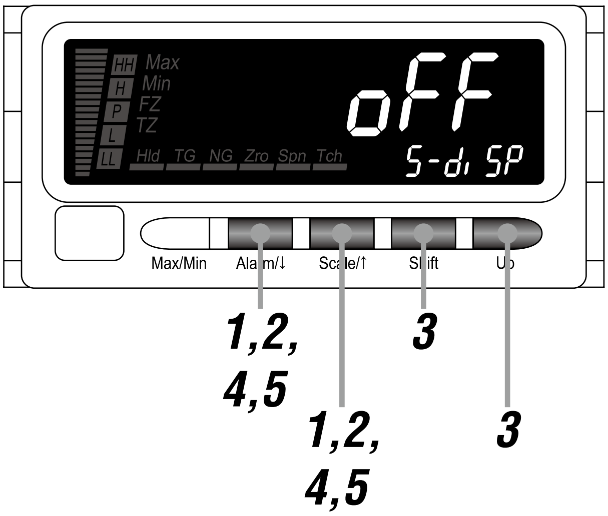
NOTE

When the manual sub display reset is set to "alarm setpoint display automatically reset", the SD returns to the bank No. indication after the set automatic return time period.

25.2 MANUAL SUB DISPLAY RESET

If the front buttons are left untouched for the specified time period while in confirming the alarm setpoints, the SD can be automatically reset to the bank No. indication (‘OFF’) or manually reset (‘ON’). The default setting is “alarm setpoint display automatically reset”. The automatic return time is the same as the time set with the automatic return time to Measuring Mode.

25.2.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates ‘AVE-TP’.

NOTE

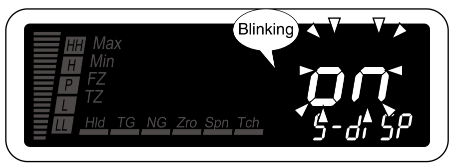
With the I/O option code ‘6’ or ‘A’, the event trigger mode is indicated (‘EVENT’ on the SD).

2 **Press Alarm/↓ or Scale/↑ button to go to the manual sub display reset setting.**

- The Manual sub display reset is indicated.
- The SD indicates ‘S-DISP’.

3 **Press Shift and Up buttons to select the manual sub display reset.**

- Select ‘OFF’ or ‘ON’.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the P output will be indicated ('PASS' on the SD).
• Press Scale/↑ button, and the display refreshing rate will be indicated ('D-REFSH' on the SD).

---

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

26. FORCING THE PRESENT DISPLAY VALUE TO ZERO

The display value can be forced to 0 while in Measuring Mode. Press Up button during Measuring Mode to shift the present display value to zero and to continue measuring in reference to this point. This operation is called Forced Zero. Press Up button during Forced Zero mode to execute the Forced Zero again, which is called Tare Adjustment. This function can be used for applications such as measuring the weight of the contents in a container by canceling the weight of the empty container, or indicating the weight of each material adding into a container one after another.
With the I/O option code '6' or 'A', the ZERO signal can execute or cancel Forced Zero and Tare Adjustment as well as the front button control. The Forced Zero and Tare Adjustment control depends on the Forced Zero control lockout setting.

■ FORCED ZERO CONTROL (UP BUTTON) LOCKOUT

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
LV0	Unlock Forced Zero and Tare Adjustment control	LV0
LV1	Unlock Forced Zero control / lock Tare Adjustment control	
LV2	Lock Forced Zero and Tare Adjustment control	

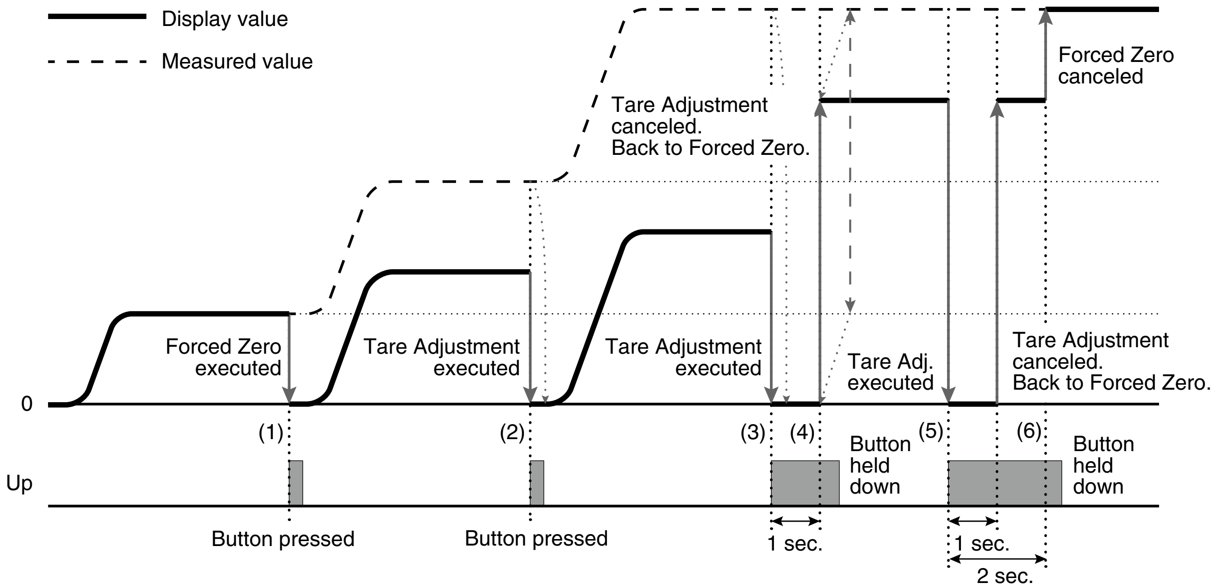
NOTE

The Forced Zero control lockout limits the Forced Zero and Tare Adjustment via the front button control, but does not limit the control with the ZERO signal.

■ DISPLAY VALUE IN EXECUTING AND CANCELING FORCED ZERO AND TARE ADJUSTMENT

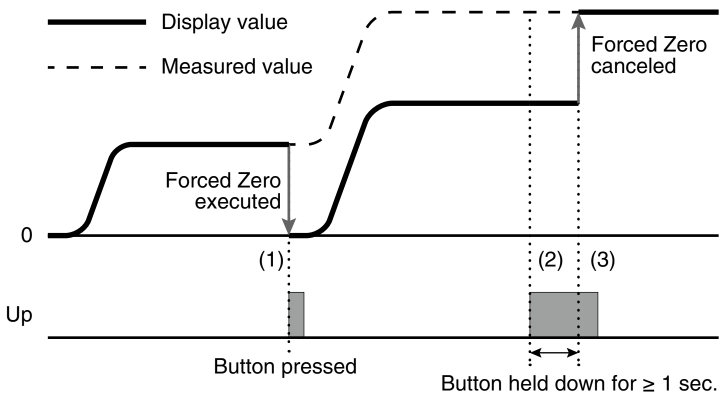
The display value changes as shown in the following figures when Forced Zero and Tare Adjustment are executed or canceled with Up button. With the ZERO signal ON, the display changes likewise. Replace "Press (hold down) Up button" with "Turn the ZERO signal ON".

• Forced Zero control lockout 'LV0' (unlock Forced Zero and Tare Adjustment control)



(1) Press Up button to shift the present display value to zero (Forced Zero).
(2) Press Up button again to shift the display value to zero (Tare Adjustment).
(3) Hold down Up button for 1 second or more to cancel the Tare Adjustment mode. The display value is forced to 0 once.
(4) The display is back to the Forced Zero mode.
(5) Hold down Up button for 2 seconds or more to cancel the Forced Zero mode. The display value is forced to 0 once (Tare Adjustment).
(6) Then the Tare Adjustment is canceled in approximately 1 second, and the Forced Zero is canceled in approximately 2 seconds.

• **Forced Zero control lockout ‘LV1’ (unlock Forced Zero control / lock Tare Adjustment control)**

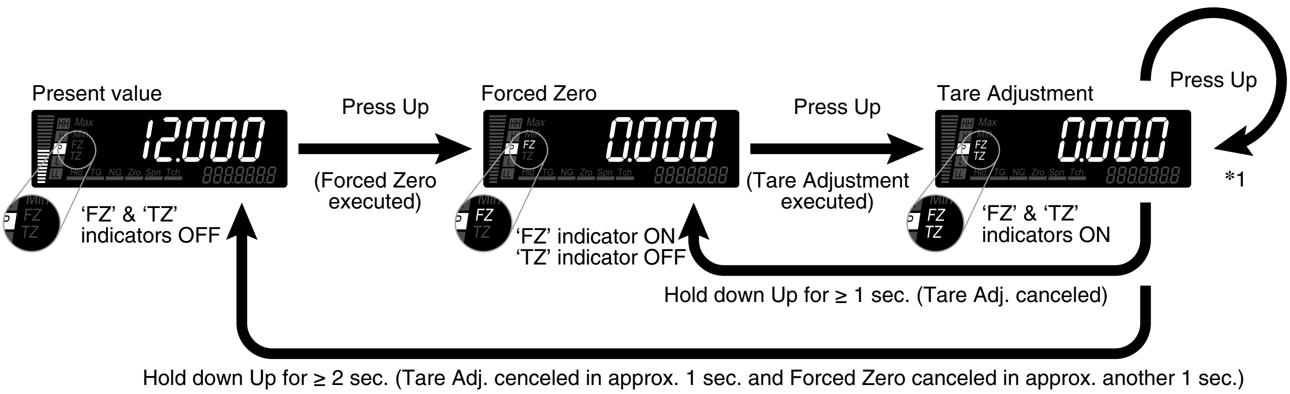


(1) Press Up button to shift the present display value to zero (Forced Zero).
(2) Hold down Up button for 1 second or more to cancel the Forced Zero mode. The Tare Adjustment is not executed.
(3) Then the display is back to indicate the measured value.

■ OPERATING PROCEDURE TO EXECUTE/CANCEL FORCED ZERO AND TARE ADJUSTMENT

The operating procedure with Up button is the same with the ZERO signal. Replace “Press (hold down) Up button” with “Turn the ZERO signal ON”.

• **Forced Zero control lockout ‘LV0’ (unlock Forced Zero and Tare Adjustment control)**
(1) Press Up button in Measuring Mode to execute the Forced Zero.
(2) Press Up button in Forced Zero mode to execute the Tare Adjustment.
(3) Hold down UP button for 1 second or more to cancel the Tare Adjustment mode.
(4) Hold down UP button for 2 seconds or more to cancel the Forced Zero mode.

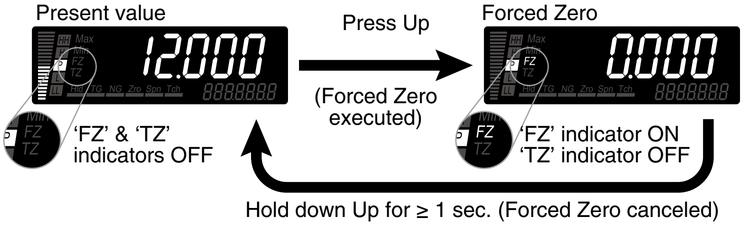


*1 After executing Tare Adjustment, another Tare Adjustment can be executed.
*2 Display depends on the settings and input.

• Forced Zero control lockout 'LV1' (unlock Forced Zero control / lock Tare Adjustment control)

(1) Press Up button in Measuring Mode to execute the Forced Zero.

(2) Hold down UP button for 1 second or more to cancel the Forced Zero mode.



*1 Display depends on the settings and input.

NOTE

- The Forced Zero and Tare Adjustment cannot be executed but can be canceled while in the MAX/MIN Value Display mode.
- The Forced Zero and Tare Adjustment can be executed or canceled while 'S.ERR' is indicated, though the values are not warranted.
- The Forced Zero and Tare Adjustment cannot be executed or canceled for no measured data (RESET signal ON).
- The reference values in executing the Forced Zero and Tare Adjustment can be set to the ones other than '0' using the 47DCFG or via Modbus communication. Refer to 47DCFG PC Configurator Software Users Manual and Modbus Protocol Reference Guide for 47Dx for details.

27. 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.
Indication or reset of the MAX and MIN values depends on the MAX/MIN display control lockout setting.

■ MAX/MIN DISPLAY CONTROL LOCKOUT

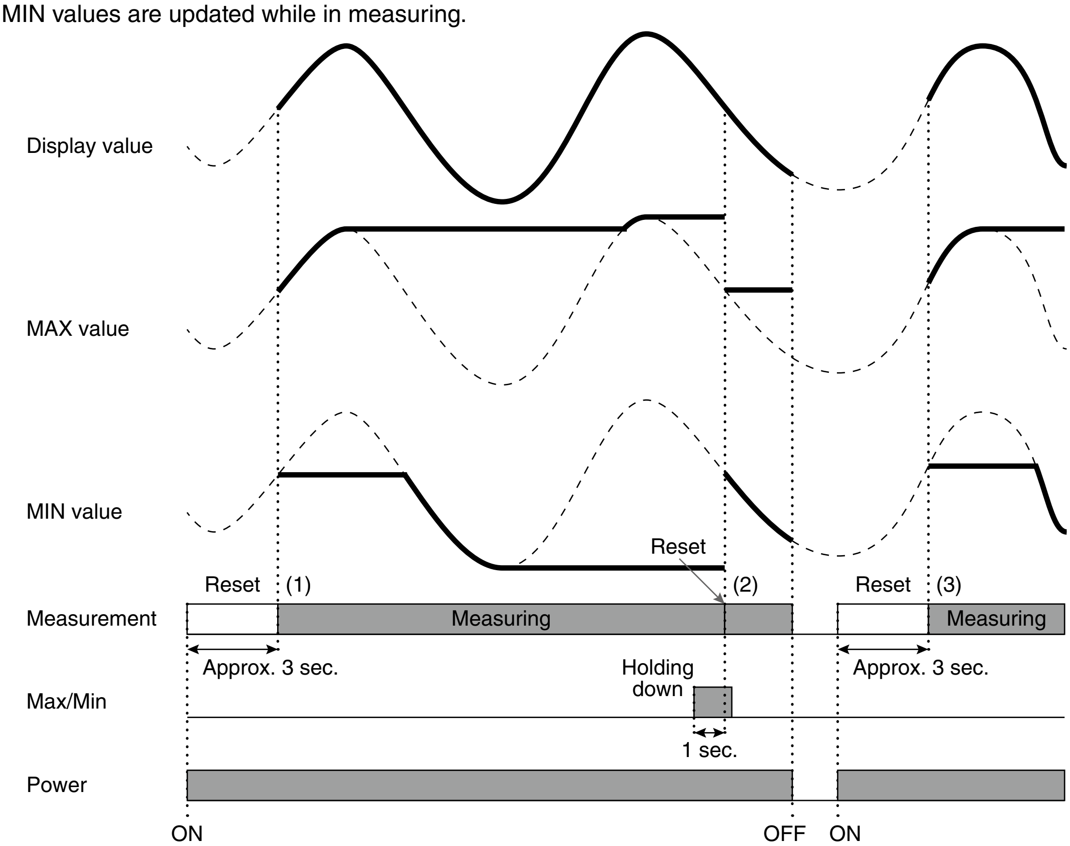
MAIN DISPLAY	FUNCTION	DEFAULT VALUE
LV0	Unlock MAX/MIN display control	LV0
LV1	Lock MAX/MIN display reset	
LV2	Lock MAX/MIN display control	

NOTE

The MAX/MIN display control lockout limits the MAX/MIN display and reset via the front button control but does not limit indication with the BCD output or via Modbus communication, and reset with the RESET signal or via Modbus communication.

■ MAX AND MIN VALUES

MAX and MIN values are updated while in measuring.



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

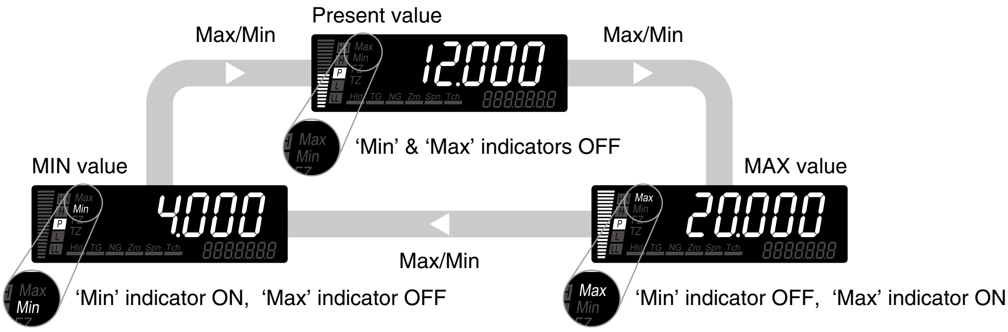
NOTE

With the MAX/MIN display control lockout set to 'LV1', resetting with Max/Min button is not available.

■ **PROCEDURE TO CONFIRM MAX OR MIN VALUE**

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

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



*1 Display depends on the settings and input.

NOTE

- The MAX and MIN values are not reset even when the Forced Zero or Tare Adjustment is executed or canceled.
- The MAX and MIN values are not indicated while 'S.ERR' is indicated though the bargraph shows the signal level. Increase or decrease the input signal within the measurable range and then press Max/Min button again.

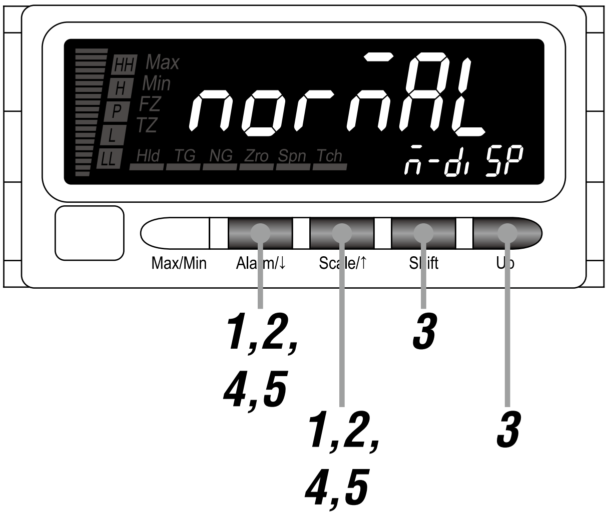
28. SETTING DISPLAY READING TYPE TO MAX OR MIN VALUE

You can specify which reading is initially displayed, the measured value, MAX value or MIN value, when the power supply is turned on or when the display returns to Measuring Mode from a Setting Mode or with the automatic return.

■ DISPLAY READING TYPE

MAIN DISPLAY	FUNCTION	DEFAULT VALUE
normAL	Measured value	normAL
mAu	MAX value	
mi n	MIN value	

28.1 OPERATING PROCEDURE LV0



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

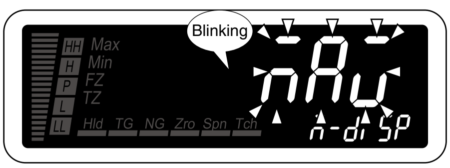
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The display reading type is indicated.
- The SD indicates 'M-DISP'.

3 **Press Shift and Up buttons to select the display reading type.**

- Select one among 'NORMAL', 'MAX' and 'MIN'.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the high-pass filter will be indicated ('HP-F' on the SD).
• Press Scale/↑ button, and the round off low-digit reading will be indicated ('STEP' on the SD).

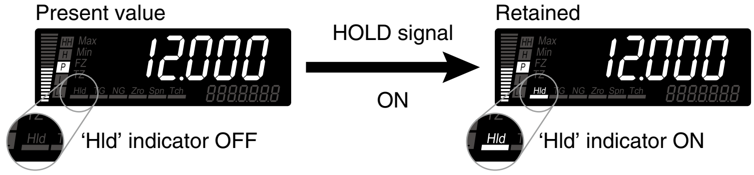
---

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

29. RETAINING MEASUREMENT STATUS

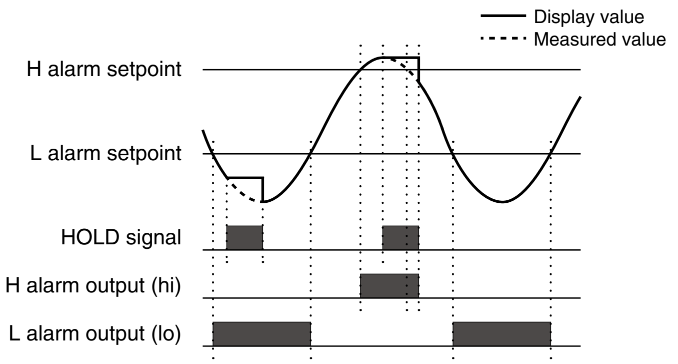
With the I/O option code ‘5’, ‘6’, ‘9’ or ‘A’, the present value, MAX/MIN values, DC/alarm/BCD outputs can be held while the HOLD signal is ON.
When the HOLD signal is OFF, each value and output corresponds to the input.

■ OPERATING PROCEDURE TO RETAIN MEASUREMENT STATUS



*1 Display depends on the settings and input.

■ RETAINING MEASUREMENT STATUS

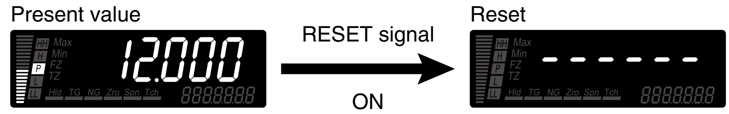


NOTE

- While the HOLD signal is ON, other signals except the RESET signal are invalid.
- The ‘S.ERR’ indication or no measured data is held with the HOLD signal ON.
- The Forced Zero and Tare Adjustment can be executed or canceled with the front button control while the HOLD signal is ON.

30. RESETTING MAX/MIN VALUES AND LATCHING ALARM

With the I/O option code ‘5’, ‘6’, ‘9’ or ‘A’, the MAX/MIN values and latching alarm can be reset with the RESET signal ON. While the signal is ON, no measuring continues. When the signal is OFF, each value and output corresponds to the measured value.



*1 Display depends on the settings and input.

NOTE

- While the RESET signal is ON, the DC output provides 0% and all alarm and BCD outputs (including the status and DAV signals) turn OFF. However some BCD outputs may be ON depending on the output logic settings.
- The Forced Zero or Tare Adjustment cannot be executed or canceled while the RESET signal is ON.
- The MAX and MIN values can be reset with the RESET signal even when the MAX/MIN display control lockout is set to “lock MAX/MIN display reset” or “lock MAX/MIN display control”.
- The RESET signal is not effective while ‘S.ERR’ is indicated. However all BCD outputs (including the status and DAV signals) turn OFF.

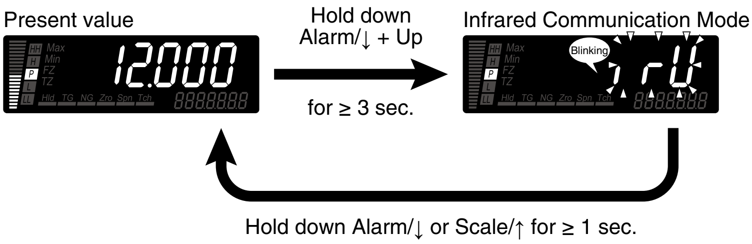
31. CONFIGURING PARAMETERS VIA INFRARED COMMUNICATION

The 47DV is equipped with the infrared communication function in order to read and write parameters with a PC. The software 47DCFG is downloadable freely at M-System's web site. Prepare the COP-IRU separately.
The infrared communication is convenient in the following cases:

- To configure the same settings to several units.
- To confirm the current settings with a PC.
- To make a backup file for failure.

■ PROCEDURE TO MOVE ON TO INFRARED COMMUNICATION MODE

(1) Hold down Alarm/↓ and Up buttons at once for 3 seconds or more to move on to Infrared Communication Mode.
(2) Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

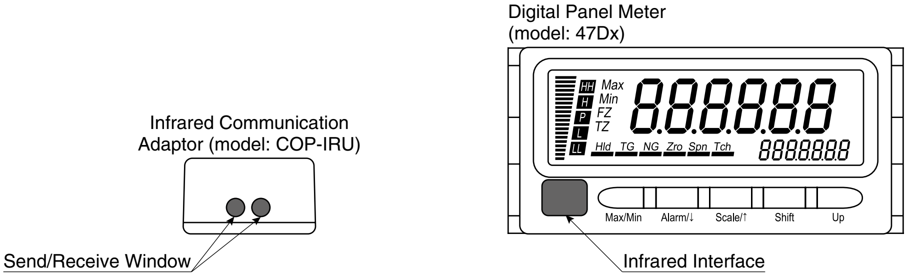


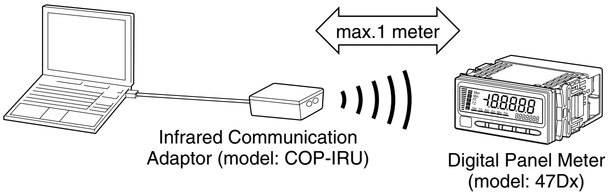
*1 Display depends on the settings and input.

■ INFRARED COMMUNICATION

Perform infrared communication in the following procedure.
Refer to 47DCFG PC Configurator Software Users Manual for details of configuration.

(1) Move on to Infrared Communication Mode.
(2) Face the infrared interface of the unit to the send/receive window of the COP-IRU connected to the PC with the 47DCFG installed within 1 meter.





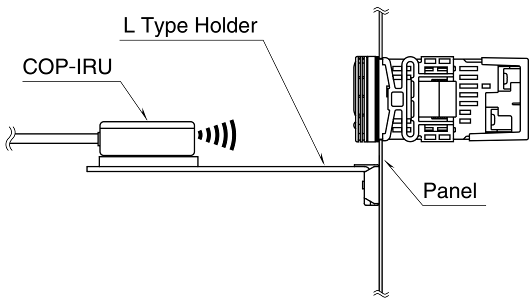
(3) Manipulate 47DCFG files. The main display blinks first and then turns on in downloading.
(4) Quit Infrared Communication Mode when the operation is finished.

IMPORTANT

- The infrared communication cannot be performed when the COM port of the COP-IRU connected to a PC is set incorrectly.
- Communication can be affected by sunlight, fluorescent lightings employing inverter technology and so forth. Try at a shorter distance if communication is not established.
- The COP-IRU can communicate with single panel meter only. Do not turn more than one panel meter on to Infrared Communication Mode.

NOTE

- PC configuration via infrared communication may take time. It is convenient to fix the COP-IRU with L Type Holder (optional).



- Reading and writing parameters using the 47DCFG are available also via Modbus communication. In downloading, the main display indicates 'MODBUS'. Refer to 47DCFG PC Configurator Software Users Manual for details.

32. LIMITING BUTTON OPERATION

Transition from Measuring Mode to each setting mode or Loop Test Output Mode can be limited. Also some parameter settings and function controls can be limited depending on the lockout level. With this setting, the transition to each mode by holding down the buttons, and the display of some parameters or function controls will be disabled. Three lockout levels are selectable for the alarm setting lockout, advanced setting lockout, MAX/MIN display control lockout and Forced Zero control (Up button) lockout. Time duration to hold down the buttons for transition to Lockout Setting Mode can be set within the range of 0 to 99 seconds.

■ LOCKOUT SETTING

Following 9 lockout settings are available.

PARAMETER	SUB DISPLAY	MAIN DISPLAY	FUNCTION	DEFAULT VALUE
Alarm setting lockout	AL Prt	Lu0	Completely unlock Alarm Setting Mode	Lu1
		Lu1	Partially unlock Alarm Setting Mode	
		Lu2	Lock Alarm Setting Mode	
Scaling setting lockout	SC Prt	oFF	Unlock Scaling Setting Mode	oFF
		on	Lock Scaling Setting Mode	
Advanced setting lockout	dtL Prt	Lu0	Completely unlock Advanced Setting Mode	Lu1
		Lu1	Partially unlock Advanced Setting Mode	
		Lu2	Lock Advanced Setting Mode	
Modbus setting lockout*1	Con Prt	oFF	Unlock Modbus Setting Mode	oFF
		on	Lock Modbus Setting Mode	
MAX/MIN display control lockout*2	nAu Prt	Lu0	Unlock MAX/MIN display control	Lu0
		Lu1	Lock MAX/MIN display reset	
		Lu2	Lock MAX/MIN display control	
Forced zero control (Up button) lockout*2	FZ Prt	Lu0	Unlock Forced Zero and Tare Adj. control	Lu0
		Lu1	Unlock Forced Zero control / lock Tare Adj. control	
		Lu2	Lock Forced Zero and Tare Adj. control	
Loop test output lockout	tSt Prt	oFF	Unlock Loop Test Output Mode	oFF
		on	Lock Loop Test Output Mode	
IR communication lockout	irU Prt	oFF	Enable IR communication	oFF
		on	Disable IR communication	
Modbus communication lockout*1	nod Prt	oFF	Enable Modbus communication	oFF
		on	Disable Modbus communication	

*1 Usable only with the I/O option code '4', '7' or '8'.
*2 Lock control by using front buttons

NOTE

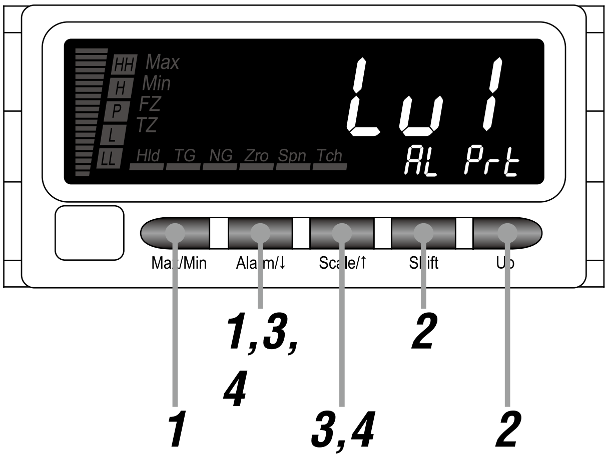
Setting is available with the 47DCFG or a upper device regardless of the lockout setting.

■ 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.

32.1 LOCKOUT SETTING

32.1.1 OPERATING PROCEDURE



NOTE

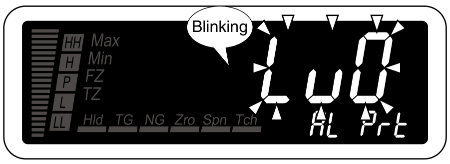
Procedures to set the alarm setting lockout are described here. The procedures of other lockout settings are same.

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.
- The SD indicates 'AL PRT'.

2 **Press Shift and Up buttons to select the alarm setting lockout.**

- Select one among 'LV1', 'LV2' and 'LV0'.



NOTE

Select 'OFF' or 'ON' depending on the parameters.

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

- And the next parameter setting is indicated.

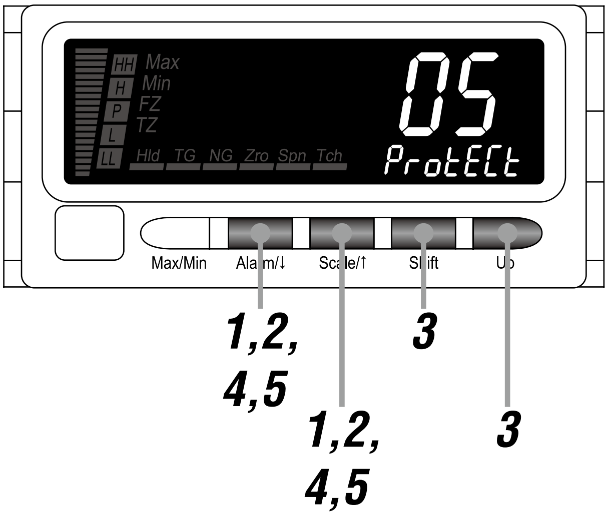
NOTE

- Press Alarm/↓ button, and the scaling setting lockout will be indicated ('SC PRT' on the SD).
- Press Scale/↑ button, and the initialization will be indicated ('INIT' on the SD).

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

32.2 TRANSITION TIME TO LOCKOUT SETTING MODE

32.2.1 OPERATING PROCEDURE LV1



NOTE

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

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

- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

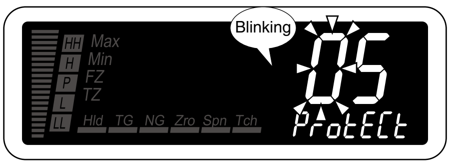
With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The transition time to Lockout Setting Mode is indicated.
- The SD indicates 'PROTECT'.

3 **Press Shift button to shift the display into the setting standby mode. Then press Shift and Up buttons to set the transition time to Lockout Setting Mode.**

- The second digit starts blinking, to which you can apply changes.
- Set within the range of 00 to 99.



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the display refreshing rate will be indicated (‘D-REFSH’ on the SD).
• Press Scale/↑ button, and the automatic return time to Measuring Mode will be indicated (‘RETURN’ on the SD).

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

33. USER CALIBRATION

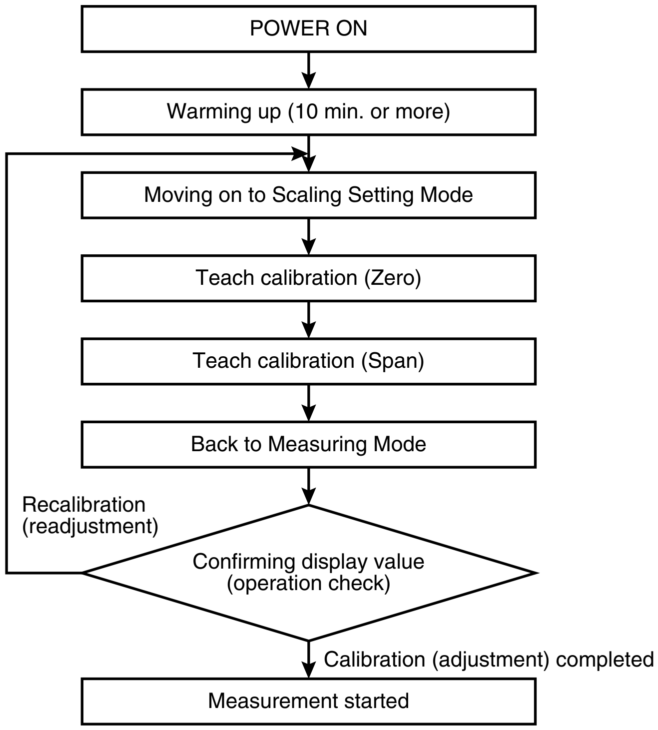
User calibration is calibration by a customer using customer's measuring instruments and standards.
To calibrate (adjust) the input signal, use "Teach Calibration" function. To compensate deviation between the DC output and a device on site, use "Analog Output Adjustment" function.
The unit is calibrated correctly at shipment and therefore there is normally no need for customers to calibrate it.

33.1 TEACH CALIBRATION

You can calibrate the input signal by the Teach Calibration function if you need calibration.
Input scaling value Zero and Span can be adjusted by applying actual input signals.
Please note that M-System does not warrant the result of your own calibration (adjustment).
The internal calibration data is overwritten every time the unit is calibrated and it is stored even if the power is turned off. However the data will be lost after an initialization.
Prepare measuring instruments and equipment for calibration by yourselves. Refer to each manual carefully for the instruments and equipment for information on handling them.

33.1.1 TEACH CALIBRATION FLOW

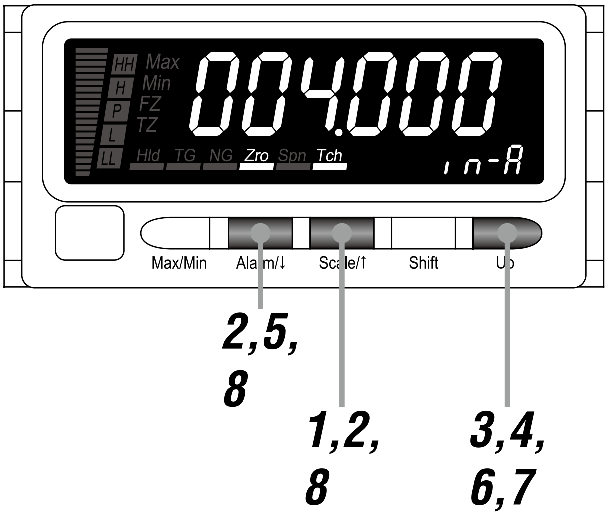
The Teach Calibration is carried out as shown in the following flowchart.



IMPORTANT

- The calibration (adjustment) in the flow above is applicable to the selected input type. To calibrate (adjustment) with other input type, set the type first in Scaling Setting Mode and then calibrate (adjust) according to the above flow.
- 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.
- In setting the input scaling values using actual inputs, carry out the Teach Calibration within the operational range per input type. Do not set 'input scaling value Zero ≥ input scaling value Span' in carrying out the Teach Calibration.

33.1.2 OPERATING PROCEDURE



NOTE

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

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

- The input type is indicated.
- The SD indicates 'INTYPE'.

IMPORTANT

Warm up the unit for 10 minutes or more before carrying out the Teach Calibration.

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

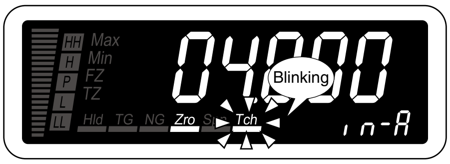
- The input scaling value Zero is indicated.
- The SD indicates 'IN-A'.
- 'Zro' and 'Tch' indicators turn on.

NOTE

Skip to Step 5 when the teach calibration (Zero) is not necessary.

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

- The present input is indicated.
- 'Tch' indicator starts blinking in red.



NOTE

The decimal point position depends on the decimal point position setting. Disregard the decimal point to calibrate.

4 Apply 0% input and press Up button to register the value.

- The teach calibration (Zero) is registered.
- 'Tch' indicator turns on in green.

IMPORTANT

Confirm that the input signal is stable before pressing Up button.

5 Press Alarm/↓ button twice to go to the input scaling value Span setting.

- The input scaling value Span is indicated.
- The SD indicates 'IN-B'.
- 'Zro' indicator turns off. 'Spn' and 'Tch' indicators turn on.

NOTE

Skip to Step 8 when the teach calibration (Span) is not necessary.

6 Press Up button to go to the teach calibration (Span) setting.

- The present input is indicated.
- 'Tch' indicator starts blinking in red.

NOTE

The decimal point position depends on the decimal point position setting. Disregard the decimal point to calibrate.

7 Apply 100% input and press Up button to register the value.

- The teach calibration (Span) is registered.
- 'Tch' indicator turns on in green.

IMPORTANT

Confirm that the input signal is stable before pressing Up button.

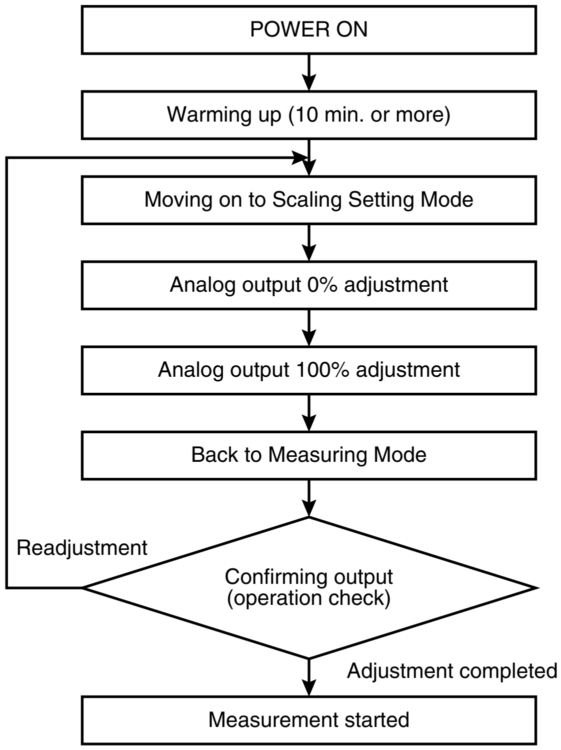
8 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

33.2 ANALOG OUTPUT ADJUSTMENT

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

33.2.1 ANALOG OUTPUT ADJUSTMENT FLOW

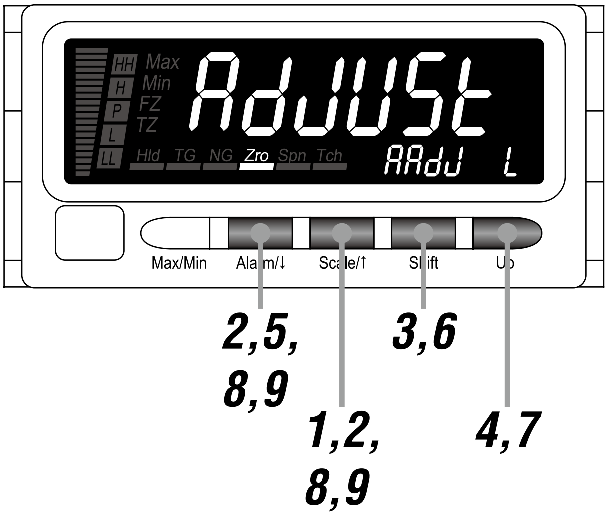
The Analog Output Adjustment is carried out as shown in the following flowchart.



IMPORTANT

- Warm up measuring instruments, equipment and other devices on site for the time specified in each manual, and operate the unit in a stable condition.
- Adjustable ranges:
  Analog output 0% adjustment -5 to +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%
- The analog output is adjustable beyond the above ranges and condition. However the accuracy is not warranted.

33.2.2 OPERATING PROCEDURE



NOTE

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

---

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

- The input type is indicated.
- The SD indicates ‘INTYPE’.

IMPORTANT

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

---

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

- The analog output 0% adjustment is indicated.
- The SD indicates ‘AADJ L’
- ‘Zro’ indicator turns on.

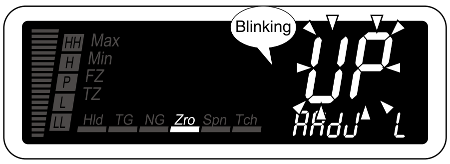
NOTE

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

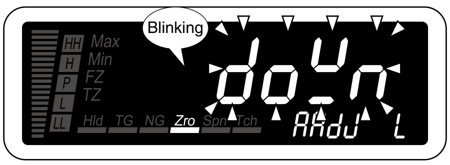
---

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.**

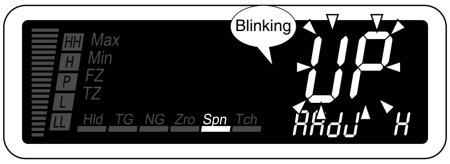
- The analog output 0% adjustment is registered.
- The analog output 100% adjustment is indicated.
- The SD indicates 'AADJ H'.
- 'Zro' indicator turns off and 'Spn' indicator turns on.

NOTE

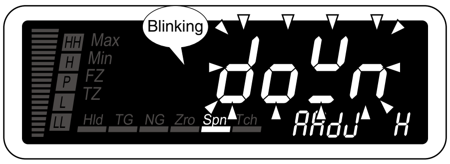
Skip to Step 9 when the analog output 100% adjustment is not necessary.

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 Scale/↑ button to register the analog output 100% adjustment.

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

NOTE

- Press Alarm/↓ button, and the input type will be indicated ('INTYPE' on the SD).
- Press Scale/↑ button, and the analog output 0% adjustment will be indicated ('AADJ L' on the SD).

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

34. 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.

35. TROUBLESHOOTING

35.1 ERROR MESSAGES

MAIN DISPLAY	ERROR MESSAGE	WHAT TO DO
S.Err	Input error, Out of the measuring range	Increase/decrease the input signal until it is back within the measuring range.
r.Err	Non-volatile memory error (reading)	While the error message is on the display, press Up button for 3 seconds or more, go to the lockout setting mode and initialize the unit to its factory default status.*1
y.Err	Non-volatile memory error (writing)	
i.Err	Internal data error	Repair is needed if the display does not recover after the power is reset.
A.Err	A/D converter error	Repair is needed if the display does not recover after the power is reset.
P.Err	Excitation supply error	Confirm that there is no abnormality (such as shortcircuit) at the external connection for the excitation supply terminal.

Note: The meter recovers normal status following its startup sequence (except the power ON delay) when it is out of an error status.

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

NOTE

- Error messages can be confirmed also via Modbus communication. Refer to Modbus Protocol Reference Guide for 47Dx for details.
- The scaling error can be recognized with the OVF signal of the BCD output. Refer to 22. SETTING BCD OUTPUT for details.

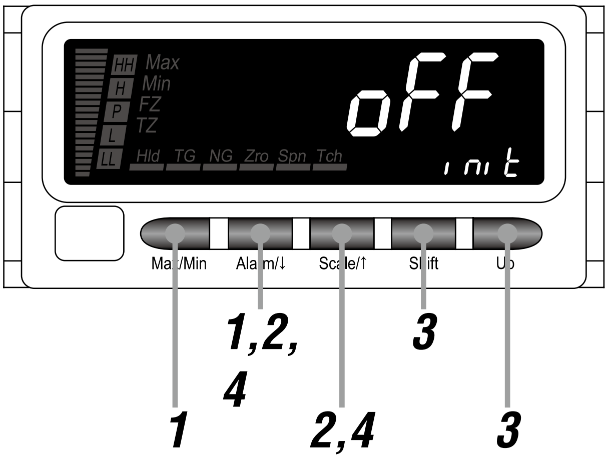
35.2 INITIALIZING SETTING VALUES

To restart setting from the default state, initialization can be used. Refer to attached 36.3 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.

35.2.1 OPERATING PROCEDURE



NOTE

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

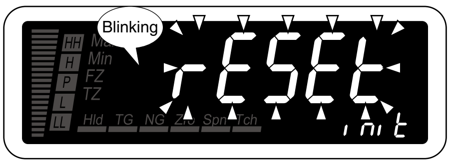
1 **Hold down Max/Min and Alarm/↓ buttons at once for a preset time duration to move on to Lockout Setting Mode.**

- The alarm setting lockout is indicated.
- The SD indicates 'AL PRT'.

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

- The initialization is indicated.
- The SD indicates 'INIT'.

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



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

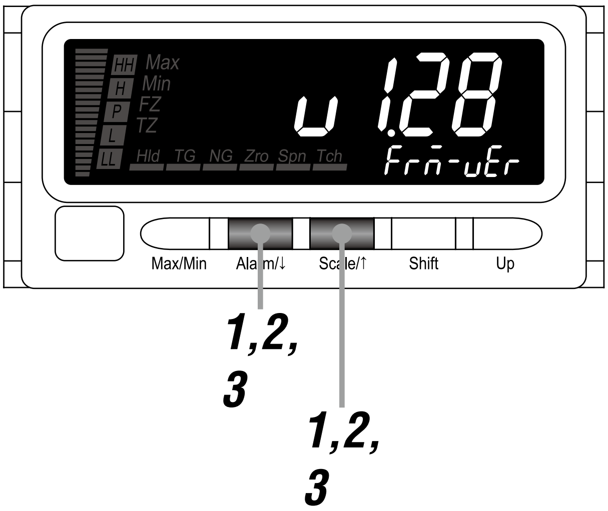
- All the settings are initialized and the display returns to Measuring Mode.

35.3 CONFIRMING FIRMWARE VERSION

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

- The display is different from the one described in the operating manual.
- Some parameters cannot be configured.

35.3.1 OPERATING PROCEDURE LV1



NOTE

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

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

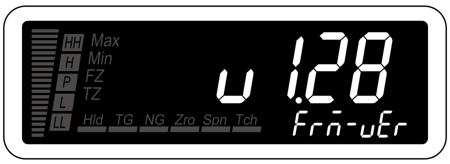
- The averaging type is indicated.
- The SD indicates 'AVE-TP'.

NOTE

With the I/O option code '6' or 'A', the event trigger mode is indicated ('EVENT' on the SD).

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

- The firmware version indication is indicated.
- The SD indicates 'FRM-VER'.



NOTE

The display depends on the specifications and firmware version number.

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

NOTE

The firmware version number can be confirmed also with the 47DCFG or via Modbus communication. Refer to 47DCFG PC Configurator Software Users Manual or Modbus Protocol Reference Guide for 47Dx for details.

36. APPENDICES

36.1 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	Input, excitation supply, DC output, relay output, network interface, power	M3 separable screw terminal (torque 0.6 N·m)
	Photo MOSFET relay, event trigger input	Euro Type Connector Terminal Applicable wire size: max. 1.3 dia., 0.5 – 1.25 mm^2, stripped length 7 to 8 mm
	BCD output	50-pin connector (Honda Tsushin Kogyo HDR-EC50LFDT1-SLE+)
Screw terminal		Nickel-plated steel (standard) or stainless steel
Housing material		Flame-resistant resin (gray)
Isolation		Input or excitation supply to DC output to HH output or H output to L output or LL output to network or BCD output or event trigger input to power
Infrared communication		Transmission distance max. 1 meter (for use with the COP-IRU)
Setting (front button)	Scaling setting mode	Input type, input scaling value Zero and Span, display scaling value Zero and Span, decimal point position, bargraph type, bargraph lower limit, bargraph upper limit, analog output type, analog output function mode, analog output 0%, analog output 100%, analog output 0% adjustment, analog output 100% adjustment
	Alarm setting mode	Bank No., alarm output pattern, HH, H, L and LL alarm setpoint, HH, H, L and LL trip action, HH, H, L and LL deadband (hysteresis), HH, H, L, LL and P ON delay time, HH, H, L, LL and P OFF delay time, HH, H, L, LL and P one-shot output, HH, H, L, LL and P coil at alarm, main display blinking at alarm, bank copy
	Advanced setting mode	Event trigger mode, ON timing delay, OFF timing delay, startup timer, averaging type, averaging time, low-end cutout, low-end cutout value, display color, automatic return time to Measuring Mode, transition time to Lockout Setting Mode, display refreshing rate, manual sub display reset, P output, latching alarm, alarm power ON delay, standby sequence, scaling error, round off low-digit reading, display reading type, high-pass filter, backlight brightness, LCD contrast, bank switching, REQ input logic, DAV output logic, DATA output logic, status output logic, firmware version indication
	Lockout setting mode	Alarm setting lockout, scaling setting lockout, advanced setting lockout, Modbus setting lockout, MAX/MIN display control lockout, forced zero control (Up button) lockout, loop test output lockout, IR communication lockout, Modbus communication lockout, initialization
	Modbus setting mode	Device address, baud rate, parity bit, stop bit, T1.5 timer, T3.5 timer, long register
	Loop test output	----
Read rate		20 times/sec. (50 msec.)
Averaging		Simple average, moving average or no averaging
Lockout setting		Prohibiting certain operations; protecting settings

■ DISPLAY

Main display		5½ digits, LCD with LED backlight, 7-segment, 14.2 mm (.56) high
	Color	Red or green changeable at alarm
	Scaling range	-20000 to 100000
	Decimal point position	10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, or none
	Zero indication	Higher-digit zeros are suppressed
Sub display		7 digits, LCD with LED backlight, 7-segment, 5.5 mm (.22) high
	Color	Green
Over-range indication		'-20000' or '100000' blinking for display values out of the scaled range (decimal point position depending upon setting). 'S.ERR' (main display) and 'UNDER' or 'OVER' (sub display) blinking when the input signal is out of the usable range.
Bargraph	No. of LED segments	20, displayed with divided by 10
	Color	Amber

Alarm status indication		All setpoints can be set and indicated regardless of alarm output options. Each is independently set either for Hi or Lo alarm trip.
	LL indicator	Turns on in red when the LL alarm is tripped
	L indicator	Turns on in red when the L alarm is tripped
	H indicator	Turns on in green when the H alarm is tripped
	HH indicator	Turns on in green when the HH alarm is tripped
	P indicator	Turns on in amber when none of the other alarms is tripped
Status indicators	Max, Min, FZ, TZ	Display MAX/MIN value, amber LED turns on at Forced Zero mode and Tare Adjustment mode
Function indicators	Hld	Turns on in green when HOLD signal is ON
	TG	Turns on in green when TIMING signal is ON
	NG	Blinking in green when a parameter is invalid
	Zro	Turns on in green at zero setting of scaling setting mode
	Spn	Turns on in green at span setting of scaling setting mode
	Tch	Turns on in green at input scaling, blinking in red at teach calibration

■ EXCITATION SUPPLY

+12 V sensor excitation	Output voltage (across the terminals 5 – 6)	12 – 16 V DC with no load 10.8 V DC minimum at 80 mA	
	Current rating	≤ 84 mA DC	
	Shortcircuit Protection	Current limited	97 mA maximum
		Protected time duration	No limit
+24 V 2-wire transmitter excitation	Output voltage (across the terminals 5 – 6)	24 – 28 V DC with no load 22 V DC minimum at 20 mA	
	Current rating	≤ 22 mA DC	
	Shortcircuit Protection	Current limited	30 mA maximum
		Protected time duration	No limit

■ INPUT SPECIFICATIONS

DC voltage	Input type: 1-5V	Measuring range	1 – 5 V
		Operational range	0.6 – 5.4 V
		Input impedance	1 MΩ minimum
	Input type: -5-5V	Measuring range	±5 V
		Operational range	-6 – +6 V
		Input impedance	1 MΩ minimum
	Input type: 20V	Measuring range	±20 V
		Operational range	-24 – +24 V
		Input impedance	1 MΩ minimum
	Input type: 200V	Measuring range	±200 V
		Operational range	-240 – +240 V
		Input impedance	1 MΩ minimum
DC current	Input type: 4-20MA	Measuring range	4 – 20 mA
		Operational range	2.4 – 21.6 mA
		Input impedance	Approx. 10 Ω
	Input type: 0-20MA	Measuring range	0 – 20 mA
		Operational range	-2 – +22 mA
		Input impedance	Approx. 10 Ω
	Input type: 20MA	Measuring range	±20 mA
		Operational range	-24 – +24 mA
		Input impedance	Approx. 10 Ω
	Input type: 200MA	Measuring range	±200 mA
		Operational range	-240 – +240 mA
		Input impedance	Approx. 1 Ω

■ DC OUTPUT SIGNAL SPECIFICATIONS

DC voltage	Analog output type: 0-5V	Output range	0 – 5 V
		Operational range	-0.5 – +5.5 V
		Load resistance	2000 Ω minimum
	Analog output type: 5V	Output range	±5 V
		Operational range	-6 – +6 V
		Load resistance	4000 Ω minimum
	Analog output type: 10V	Output range	±10 V
		Operational range	-12 – +12 V
		Load resistance	8000 Ω minimum
DC current	Analog output type: 0-20MA	Output range	0 – 20 mA
		Operational range	-2 – +22 mA
		Load resistance	400 Ω maximum
	Analog output type: 4-20MA	Output range	4 – 20 mA
		Operational range	2.4 – 21.6 mA
		Load resistance	400 Ω maximum

■ I/O OPTIONS

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.)
Alarm output (photo MOSFET relay)	Rated load	120 V AC/DC @ 80 mA (resistive load)
	ON resistance	25 Ω
	Permissible loss	250 mW
Network interface	Transmission	Half-duplex, asynchronous, no procedure
	Interface	Conforms to TIA/EIA-485-A
	Max. transmission distance	500 meters
	Baud rate	1200, 2400, 4800, 9600, 19200, 38400 bps
	Max. number of nodes	31 (except the master)
	Protocol	Modbus-RTU
	Parity	None, odd or even
	Stop bit	1 bit, 2 bits
	Node address	1 to 247
	Media	Shielded twisted-pair cable (CPEV-S 0.9 dia.)
	Terminating resistor	Built-in (Connect across T2 – T3, when the unit is the end of the line)

BCD output + control signals	Input signals	Dry contact or NPN open collector	
		Input current	≤ 3 mA
		Sensing	6 V
		Contact detecting	≤ 1.5 V at ON; ≥ 3 V at OFF
	Output signals	NPN open collector	
		Max. load voltage	24 V DC
		Max. load current	10 mA
		Saturation voltage	≤ 0.3 V
		Leakage current	≤ 500 μA
	Alarm output signals	NPN open collector	
		Max. load voltage	24 V DC
		Max. load current	50 mA
		Saturation voltage	≤ 1.1 V
		Leakage current	≤ 500 μA
Event trigger input		Dry contact or NPN open collector	
		Input current	≤ 3 mA
		Sensing	6 V
		Contact detecting	≤ 1.5 V at ON; ≥ 3 V at OFF

■ INSTALLATION

Power consumption	AC power	100 – 240 V AC	Operational voltage range 85 – 264 V AC, 50/60 Hz Max. 12 VA
	DC power	24 V DC	Operational voltage range 24 V DC ±10% Ripple 10% p-p max. 3.5 W max.
		110 V DC	Operational voltage range 85 – 150 V DC Ripple 10% p-p max. 3.5 W max.
Operating temperature		-10 to +55°C (14 to 131°F)	
Operating humidity		30 to 90% RH (non-condensing)	
Mounting		Panel flush mounting	
Weight		300 g (0.66 lb)	

■ PERFORMANCE

Accuracy	Display	Voltage input: ±0.03% ±1 digit Current input: ±0.1% ±1 digit
	Output	±0.1% (DC output = display + output)
Temp. coefficient		±0.015%/°C (±0.008%/°F)
Input resolution		Max. 19 bits
Output resolution		Max. 14 bits
Response time		≤ 0.5 sec. (alarm output: 0 – 100% at 90% setpoint) ≤ 0.5 sec. (DC output: 0 – 90%)
Line voltage effect		±0.1% over voltage range
Insulation resistance		≥ 100 MΩ with 500 V DC
Dielectric strength		2000 V AC @ 1 minute (input or excitation supply to DC output to HH output or H output to L output or LL output to network or BCD output or event trigger input to power to ground)

■ STANDARDS & APPROVALS

EU conformity	EMC Directive EN 61326-1 Low Voltage Directive EN 61010-1 Measurement Category II (input, alarm output) Installation Category II (power) Pollution degree 2 Input or excitation supply or DC output to alarm output to power: Reinforced insulation (300 V) Input or excitation supply to DC output: Basic insulation (300 V) RoHS Directive EN 50581

36.2 MODEL NUMBERING

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

[1] INPUT
- 1: DC voltage
- 2: DC current

[2] DC OUTPUT
- 0: Without
- 1: With

[3] EXCITATION SUPPLY
- 1: +12 V sensor excitation
- 2: +24 V two-wire transmitter excitation

[4] I/O OPTIONS
- 0: None
- 1: Alarm output: N.O. relay, 4 points
- 2: Alarm output: SPDT relay, 2 points
- 3: Alarm output: N.O. photo MOSFET relay, 4 points (CE not available)
- 4: Network interface: RS-485 / Modbus-RTU
- 5: BCD output
- 6: Event trigger input
- 7: Alarm output: N.O. relay, 4 points + Network interface: RS-485 / Modbus-RTU
- 8: Alarm output: SPDT relay, 2 points + Network interface: RS-485 / Modbus-RTU
- 9: Alarm output: N.O. photo MOSFET relay, 4 points + BCD output (CE not available)
- A: Event trigger input + BCD output

[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
- Blank: None
- /Q: With options (specify the specification)

■ SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to M-System's 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-9501)

36.3 PARAMETER LIST

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Measuring	Present value	-20000 – 100000	HH, H, P, L, LL	----	----	*1	User-defined
	MAX value	-20000 – 100000	*Max*	----	----	*1	User-defined
	MIN value	-20000 – 100000	*Min*	----	----	*1	User-defined
	Forced zero	-20000 – 100000	FZ	----	----	*1	User-defined
	Tare Adjustment	-20000 – 100000	TZ	----	----	*1	User-defined
	LL alarm setpoint	-20000 – 100000	-20000 to 100000 / LL	-20000 to 100000	1: 014000 2: 005600	*1	User-defined
	L alarm setpoint	-20000 – 100000	-20000 to 100000 / L	-20000 to 100000	1: 022000 2: 008800	*1	User-defined
	H alarm setpoint	-20000 – 100000	-20000 to 100000 / H	-20000 to 100000	1: 038000 2: 015200	*1	User-defined
	HH alarm setpoint	-20000 – 100000	-20000 to 100000 / HH	-20000 to 100000	1: 046000 2: 018400	*1	User-defined
Scaling setting	Input type	1: 1 – 5 V, -5 – +5 V, -20 – +20 V, -200 – +200 V	inTYPE	1-5v, -5-5v, 20v, 200v	1-5v	----	----
		2: 4 – 20 mA, 0 – 20 mA, -20 – +20 mA, -200 – +200 mA		4-20mA, 0-20mA, 20mA, 200mA	4-20mA		
	Input scaling value Zero	1: 1.0000 – 5.0000 -5.000 – 5.000 -20.000 – 20.000 -200.00 – 200.00	in-A / Zro, Tch	010000 to 050000 -05000 to 005000 -20000 to 020000 -20000 to 020000	010000	----	V DC
		2: 4.000 – 20.000 0.000 – 20.000 -20.000 – 20.000 -200.00 – 200.00		004000 to 020000 000000 to 020000 -20000 to 020000 -20000 to 020000	004000		mA DC
	Display scaling value Zero	-20000 – 100000	diSP-A / Zro	-20000 to 100000	1: 010000 2: 004000	*1	User-defined
	Input scaling value Span	1: 1.0000 – 5.0000 -5.000 – 5.000 -20.000 – 20.000 -200.00 – 200.00	in-b / Spn, Tch	010000 to 050000 -05000 to 005000 -20000 to 020000 -20000 to 020000	050000	----	V DC
		2: 4.000 – 20.000 0.000 – 20.000 -20.000 – 20.000 -200.00 – 200.00		004000 to 020000 000000 to 020000 -20000 to 020000 -20000 to 020000	020000		mA DC
	Display scaling value Span	-20000 – 100000	diSP-b / Spn	-20000 to 100000	1: 050000 2: 020000	*1	User-defined
	Decimal point position	No decimal point, or 10^{-1} to 10^{-4}	d-Point	00000, 00000, 00000, 00000, 00000	1: 50000 2: 20000	----	----

*1 Conforms to decimal point position setting.

NOTE 1: Indicators with the present value in Measuring Mode depend on the set alarm trip action. A scaling error or bank No. is indicated on the sub display.
NOTE 2: SUB DISPLAY/INDICATOR: ▭ = ON, ⬚ = Blinking
NOTE 3: 1 and 2 in the columns of SETTING RANGE and DEFAULT VALUE in Measuring and Scaling Setting Modes show input codes.

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Scaling setting	Bargraph type	No bargraph, unidirectional bar, unidirectional bar (reverse LCD), bidirectional bar, bidirectional bar (reverse LCD)	bAr-GrH	oFF, inC, inCr, dEv, dEvr	inC	----	----
	Bargraph lower limit	-20000 – 100000	bAr-L / Zro	-20000 to 100000	1: 010000 2: 004000	*1	User-defined
	Bargraph upper limit	-20000 – 100000	bAr-H / Spn	-20000 to 100000	1: 050000 2: 020000	*1	User-defined
	Analog output type	1 – 5 V, -5 – +5 V, -5 – +5 V, 0 – 20 mA, 4 – 20 mA	AnG tYP	0-5v, 5v, 10v, 0-20mA, 4-20mA	4-20mA	----	----
	Analog output function mode	Proportional to the display value, proportional to the scaling value	AnG vAL	diSPLY, SCALE	diSPLY	----	----
	Analog output 0%	-20000 – 100000	AnG L / Zro	-20000 to 100000	1: 010000 2: 004000	*1	User-defined
	Analog output 100%	-20000 – 100000	AnG H / Spn	-20000 to 100000	1: 050000 2: 020000	*1	User-defined
	Analog output 0% adjustment	Adjustable range -5 to +100%	AAdJ L / Zro	AdJUSt : UP (increasing) doWn (decreasing)	0% output	----	----
	Analog output 100% adjustment	Adjustable range 0 to 105%	AAdJ H / Spn	AdJUSt : UP (increasing) doWn (decreasing)	100% output	----	----
	Teach calibration (Zero)	----	in-A / Zro, Tch	----	----	----	----
	Teach calibration (Span)	----	in-b / Spn, Tch	----	----	----	----
Alarm setting	Bank No.	1 to 8	ALm bnK	1 to 8	1	----	----
	Alarm output pattern	Normal, zone	ALm Ptn	normAL, ZonE	normAL	----	----
	LL alarm setpoint	-20000 – 100000	ALArmLL / LL	-20000 to 100000	1: 014000 2: 005600	*1	User-defined
	LL trip action	High trip, low trip	LimtLL / LL	HiGH, LoW	LoW	----	----
	LL deadband (hysteresis)	0000 – 9999	HYSt HH / LL	0000 to 9999	0001	----	User-defined
	LL ON delay time	000 – 999	ondLYLL / LL	000 to 999	000	----	100 ms
	LL OFF delay time	000 – 999	oFdLYLL / LL	000 to 999	000	----	100 ms
	LL one-shot output	0000 – 9999	SHot LL / LL	0000 to 9999	0000	----	100 ms
	LL coil at alarm	Coil energized at alarm, de-energized at alarm	rELAYLL / LL	En, dE	En	----	----

*1 Conforms to decimal point position setting.

NOTE 2: SUB DISPLAY/INDICATOR: ▭ = ON, ⬚ = Blinking
NOTE 3: 1 and 2 in the columns of SETTING RANGE and DEFAULT VALUE in Measuring and Scaling Setting Modes show input codes.
NOTE 4: 'Tch' indicator in the columns of the Teach calibration (Zero) and (Span) in Scaling Setting Mode blinks in red.
NOTE 5: 1 and 2 in the columns of LL, L, H and HH alarm setpoints in Alarm Setting Mode show input codes.

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Alarm setting	L alarm setpoint	-20000 – 100000	ALArm L / L	-20000 to 100000	1: 022000 2: 008800	*1	User-defined
	L trip action	High trip, low trip	Limt L / L	HiGH, LoW	LoW	----	----
	L deadband (hysteresis)	0000 – 9999	HYSt L / L	0000 to 9999	0001	----	User-defined
	L ON delay time	000 – 999	ondLY L / L	000 to 999	000	----	100 ms
	L OFF delay time	000 – 999	oFdLY L / L	000 to 999	000	----	100 ms
	L one-shot output	0000 – 9999	SHot L / L	0000 to 9999	0000	----	100 ms
	L coil at alarm	Coil energized at alarm, de-energized at alarm	rELAY L / L	En, dE	En	----	----
	H alarm setpoint	-20000 – 100000	ALArm H / H	-20000 to 100000	1: 038000 2: 015200	*1	User-defined
	H trip action	High trip, low trip	Limt H / H	HiGH, LoW	HiGH	----	----
	H deadband (hysteresis)	0000 – 9999	HYSt H / H	0000 to 9999	0001	----	User-defined
	H ON delay time	000 – 999	ondLY H / H	000 to 999	000	----	100 ms
	H OFF delay time	000 – 999	oFdLY H / H	000 to 999	000	----	100 ms
	H one-shot output	0000 – 9999	SHot H / H	0000 to 9999	0000	----	100 ms
	H coil at alarm	Coil energized at alarm, de-energized at alarm	rELAY H / H	En, dE	En	----	----
	HH alarm setpoint	-20000 – 100000	ALArmHH / HH	-20000 to 100000	1: 046000 2: 018400	*1	User-defined
	HH trip action	High trip, low trip	Limt HH / HH	HiGH, LoW	HiGH	----	----
	HH deadband (hysteresis)	0000 – 9999	HYSt HH / HH	0000 to 9999	0001	----	User-defined
	HH ON delay time	000 – 999	ondLYHH / HH	000 to 999	000	----	100 ms
	HH OFF delay time	000 – 999	oFdLYHH / HH	000 to 999	000	----	100 ms
	HH one-shot output	0000 – 9999	SHot HH / HH	0000 to 9999	0000	----	100 ms
	HH coil at alarm	Coil energized at alarm, de-energized at alarm	rELAYHH / HH	En, dE	En	----	----
	P ON delay time	000 – 999	ondLY P / P	000 to 999	000	----	100 ms
	P OFF delay time	000 – 999	oFdLY P / P	000 to 999	000	----	100 ms
	P one-shot output	0000 – 9999	SHot P / P	0000 to 9999	0000	----	100 ms
	P coil at alarm	Coil energized at alarm, de-energized at alarm	rELAY P / P	En, dE	En	----	----
	Main display blinking at alarm	No blinking, blinking in 1.0, 0.5, 0.3 sec. intervals	ALmbLnK	0, 1, 2, 3	0	----	Second
	Bank copy	No copying, copy current bank value to all banks	bnK CPY	oFF, on	oFF	----	----

*1 Conforms to decimal point position setting.

NOTE 2: SUB DISPLAY/INDICATOR: ▭ = ON, ⬚ = Blinking

NOTE 5: 1 and 2 in the columns of LL, L, H and HH alarm setpoints in Alarm Setting Mode show input codes.

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Advanced setting	Event trigger mode	Normal, sampling hold, peak hold, valley (bottom) hold, peak-to-peak hold	EuEnt	norMAL, S-HLd, P-HLd, b-HLd, PP-HLd	norMAL	----	----
	ON timing delay	000.0 – 999.9	on-tdLY	000.0 to 999.9	000.0	----	Second
	OFF timing delay	000.0 – 999.9	oF-tdLY	000.0 to 999.9	000.0	----	Second
	Startup timer	00.0 – 99.9	Str-tMr	00.0 to 99.9	00.0	----	Second
	Averaging type	Moving average, simple average	AuE-tP	MouinG, SiMPLE	MouinG	----	----
	Averaging time	None, 2, 4, 8, 16, 32, 64, 128, 256, 512	AuE-n	oFF, 2, 4, 8, 16, 32, 64, 128, 256, 512	oFF	----	Sample
	Low-end cutout	OFF, ON, absolute value ON	ZEroLMt	oFF, on, AbS	oFF	----	----
	Low-end cutout value	000 – 999	ZLMtn	000 to 999	000	----	User-defined
	Display color	Green (normal) to red (alarm), green, red (normal) to green (alarm), red	CoLor	Grn-r, Grn, rEd-G, rEd	Grn-r	----	----
	Automatic return time to Measuring Mode	00 (automatic return disabled) 01 – 99	rEtUrn	00 to 99	15	----	Second
	Transition time to Lockout Setting Mode	00 – 99	ProtECt	00 to 99	05	----	Second
	Display refreshing rate	00.0 – 99.9	d-rEFSH	00.0 to 99.9	00.0	----	Second
	Manual sub display reset	Alarm setpoint display automatically reset, alarm setpoint display manually reset	S-diSP	oFF, on	oFF	----	----
	P output	No P output, alarm setpoint LL, alarm setpoint L, alarm setpoint H, alarm setpoint HH	PASS / LL, L, H, HH	oFF, LL, L, H, HH	oFF	----	----
	Latching alarm	No latching, output latched / measuring continued, output latched / measuring stopped	oUt-StP	oFF, oUt, ALL	oFF	----	----
	Alarm power ON delay	000.0 – 999.9	PWr-dLY	000.0 to 999.9	000.0	----	Second
	Standby sequence	Output immediately at the startup, output standing by until the input enters P zone	Stdby	oFF, on	oFF	----	----
	Scaling error	Alarm trip action valid at over-range, no alarm trip action at over-range	SE-ALM	on, oFF	on	----	----
	Round off low-digit reading	No round-off (1), 2, 5, 10	StEP	oFF, 2, 5, 10	oFF	----	----
	Display reading type	Measured value, MAX value, MIN value	M-diSP	norMAL, MAX, Min	norMAL	----	----
	High-pass filter	High-pass filter OFF, high-pass filter ON	HP-F	oFF, on	oFF	----	----
	Backlight brightness	1 (dark) to 3 (bright)	briGHt	1 to 3	2	----	----

NOTE 2: SUB DISPLAY/INDICATOR: ▭ = ON, ⬚ = Blinking

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Advanced setting	LCD Contrast	1 (low) to 10 (high)	CntrASt	1 to 10	5	----	----
	Bank switching	Disabled, enabled via the front button control, enabled via Modbus communication	bnK-CHG	oFF, KEY, Com	oFF	----	----
	REQ input logic	Request valid at ON, request valid at OFF	bCd-rEq	on, oFF	on	----	----
	DAV output logic	Data valid at ON, data valid at OFF	bCd-dAu	on, oFF	on	----	----
	DATA output logic	Negative logic open collector, positive logic open collector	bCd-dAt	on, oFF	on	----	----
	Status output logic	Valid at ON, valid at OFF	bCd-StA	on, oFF	on	----	----
	Version indication	----	Frm-uEr	----	----	----	----
Modbus setting	Device address	001 to 247	EqP-no	001 to 247	001	----	----
	Baud rate	1200, 2400, 4800, 9600, 19200, 38400	b-rAtE	1200, 2400, 4800, 9600, 19200, 38400	38400	----	bps
	Parity bit	None, odd, even	PAritY	nonE, odd, EuEn	odd	----	----
	Stop bit	1 or 2	StoPbit	1, 2	1	----	bit(s)
	T1.5 timer	01 to 60	t15	01 to 60	15	----	× 0.1
	T3.5 timer	01 to 60	t35	01 to 60	35	----	× 0.1
	Long register	Low-digit word at lower address, high-digit word at lower address	L-Word	normAL, SWAP	normAL	----	----
Lockout setting	Alarm setting lockout	Completely unlock, partially unlock, lock	AL Prt	Lu0, Lu1, Lu2	Lu1	----	----
	Scaling setting lockout	Unlock, lock	SC Prt	oFF, on	oFF	----	----
	Advanced setting lockout	Completely unlock, partially unlock, lock	dtL Prt	Lu0, Lu1, Lu2	Lu1	----	----
	Modbus setting lockout	Unlock, lock	Com Prt	oFF, on	oFF	----	----
	MAX/MIN display control lockout	Unlock MAX/MIN display control, lock MAX/MIN display reset, lock MAX/MIN display control	mAu Prt	Lu0, Lu1, Lu2	Lu0	----	----
	Forced zero control (Up button) lockout	Unlock Forced Zero and Tare Adj. control, lock Forced Zero and Tare Adj. control, unlock Forced Zero control / lock Tare Adj. control	FZ Prt	Lu0, Lu1, Lu2	Lu0	----	----
	Loop test output lockout	Unlock, lock	tSt Prt	oFF, on	oFF	----	----
	IR communication lockout	Enable, disable	irU Prt	oFF, on	oFF	----	----
	Modbus communication lockout	Enable, disable	mod Prt	oFF, on	oFF	----	----
	Initialization	OFF, initialization	init	oFF, rESEt	oFF	----	----

MODE	PARAMETER	SETTING RANGE	SUB DISPLAY / INDICATOR	MAIN DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Infrared communi-cation	IR communication	----	----	irU (display blinking)	----	----	----
Loop test output	Loop test output	-20000 – 100000	tESt UP tESt dn	-20000 to 100000 (display blinking)	----	*1	User-defined

*1 Conforms to decimal point position setting.

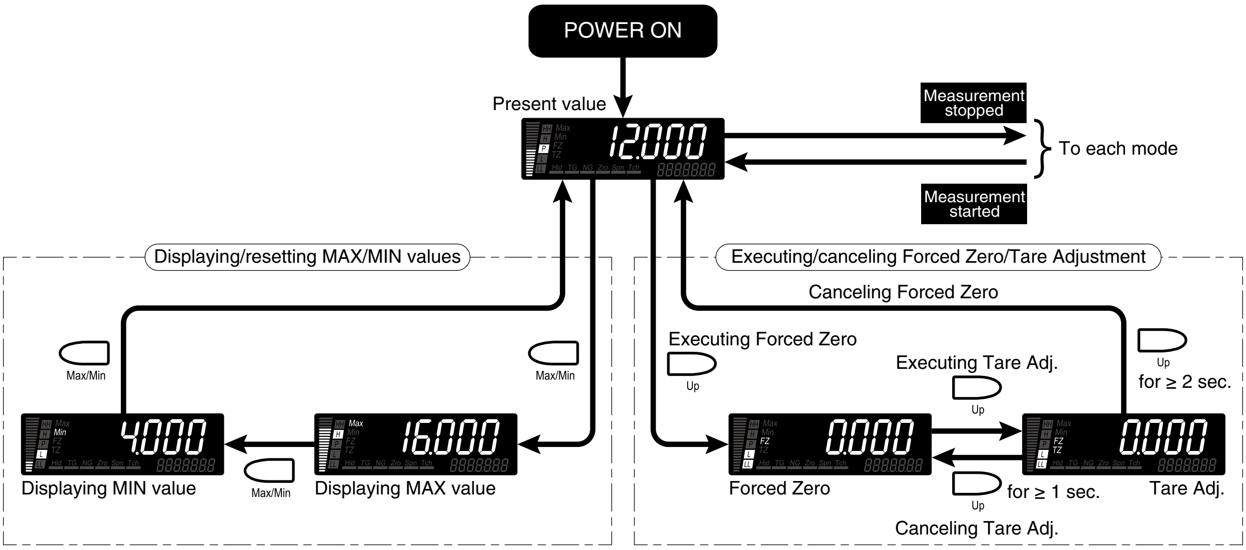
36.4 PARAMETER MAP

Parameters, their settings and display order in each mode are as shown in the following figures.
The displays show default values, and depend on the specifications, input and settings.

36.4.1 OPERATION IN MEASURING MODE

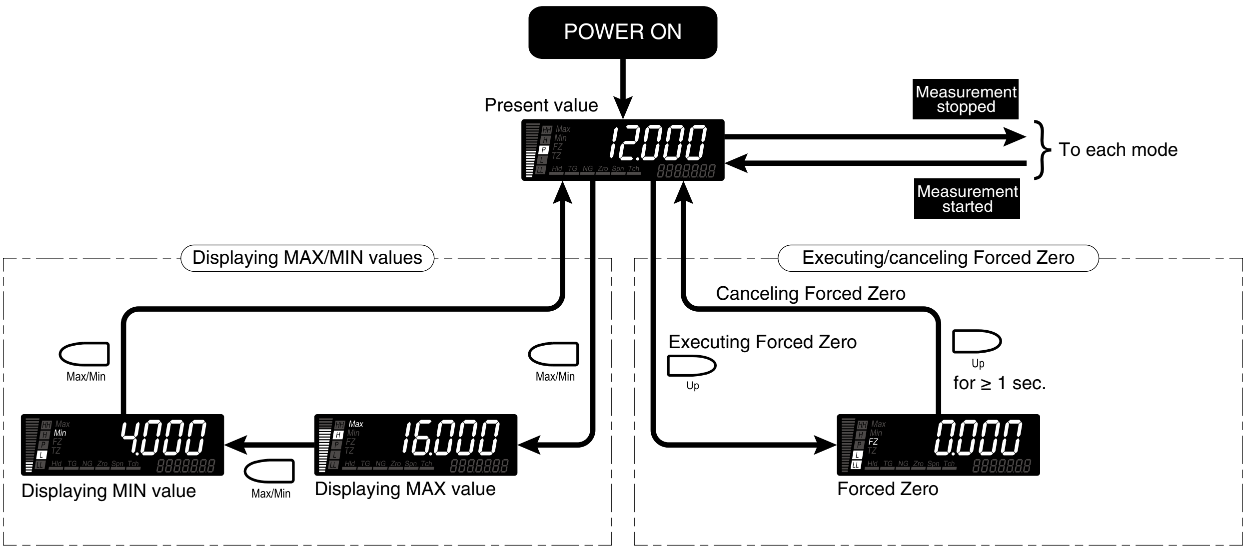
■ DISPLAY AND RESET OF MAX/MIN VALUES, EXECUTION AND CANCEL OF FORCED ZERO/TARE ADJUSTMENT

• Lockout 'LV0' (unlock MAX/MIN display control, unlock Forced Zero and Tare Adjustment control)



* Hold down Max/Min for ≥ 1 sec. to reset MAX/MIN values.

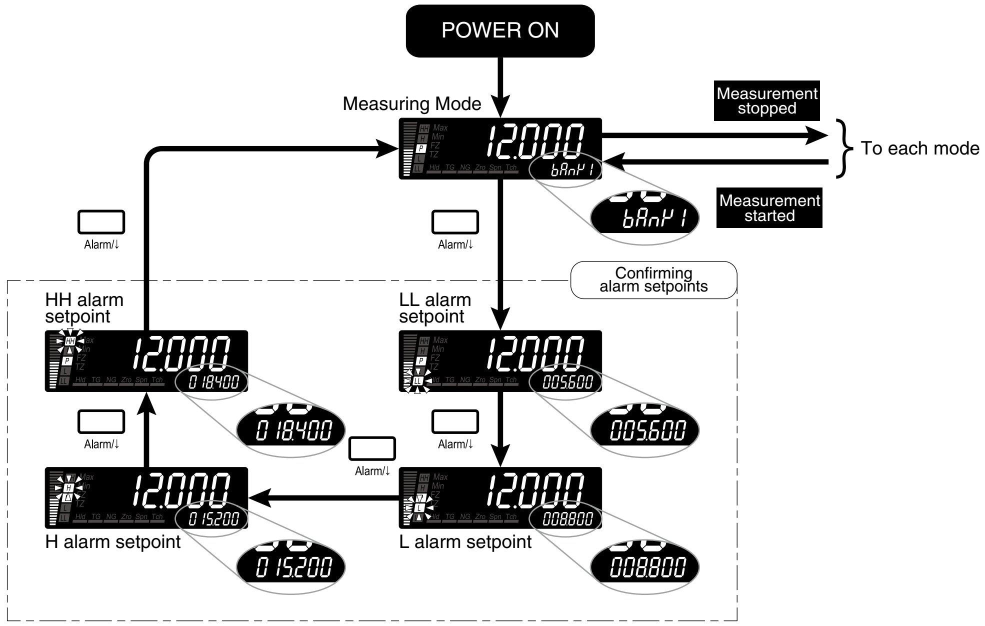
• Lockout 'LV1' (lock MAX/MIN display reset, unlock Forced Zero control / lock Tare Adjustment control)



NOTE

The display reading type after power on can be changed to "MAX value" or "MIN value" with the display reading type setting.

■ **CONFIRMATION AND CONFIGURATION OF ALARM SETPOINTS**

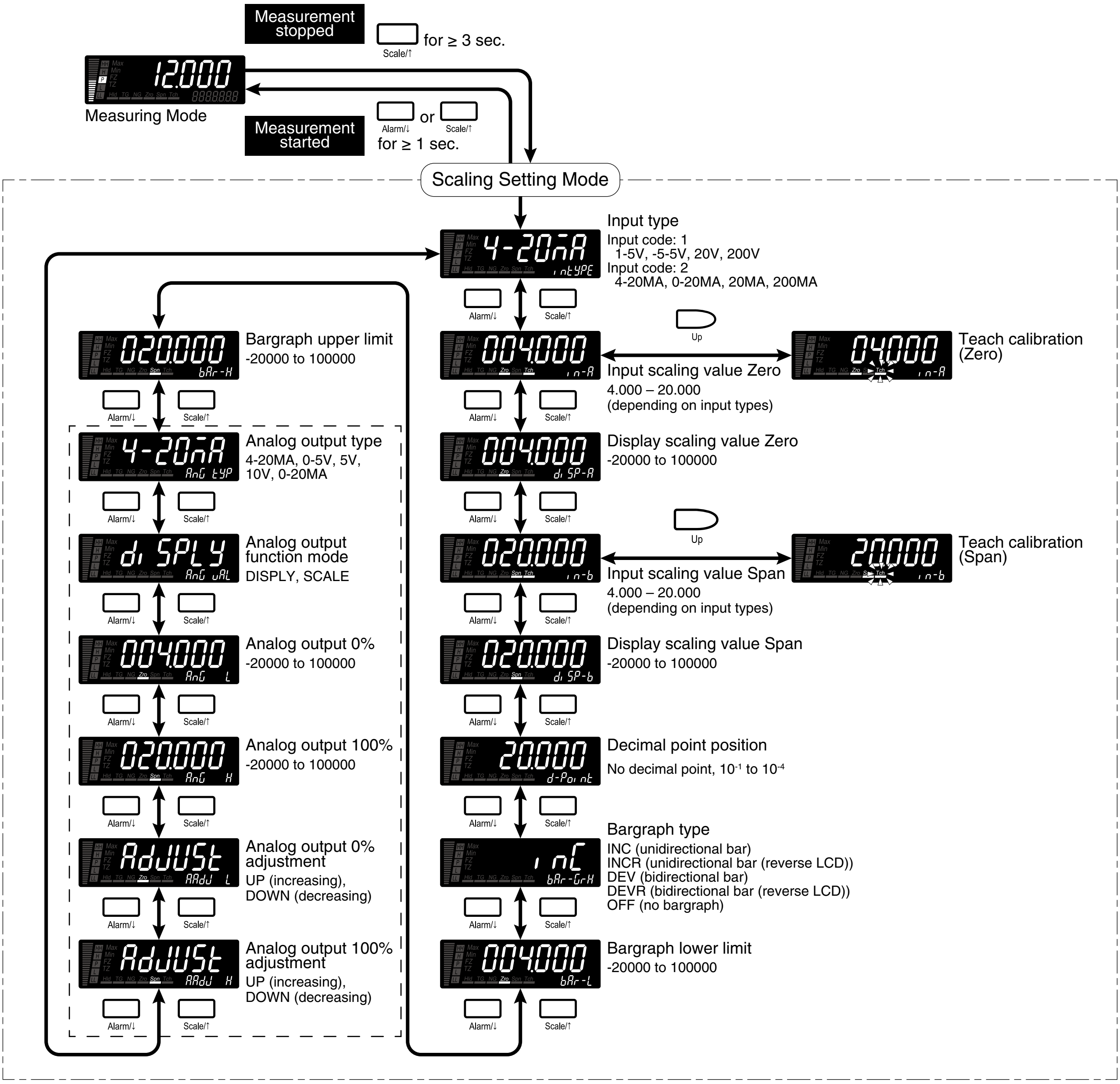


* Press [Shift] to shift the SD into the setting standby mode.

NOTE

- The alarm setpoints cannot be confirmed and configured with the alarm setting lockout set to ‘LV2’.
- Alarm setpoints can be confirmed whenever in Measuring Mode except in error indication (excluding ‘S.ERR’).

36.4.2 SCALING SETTING MODE



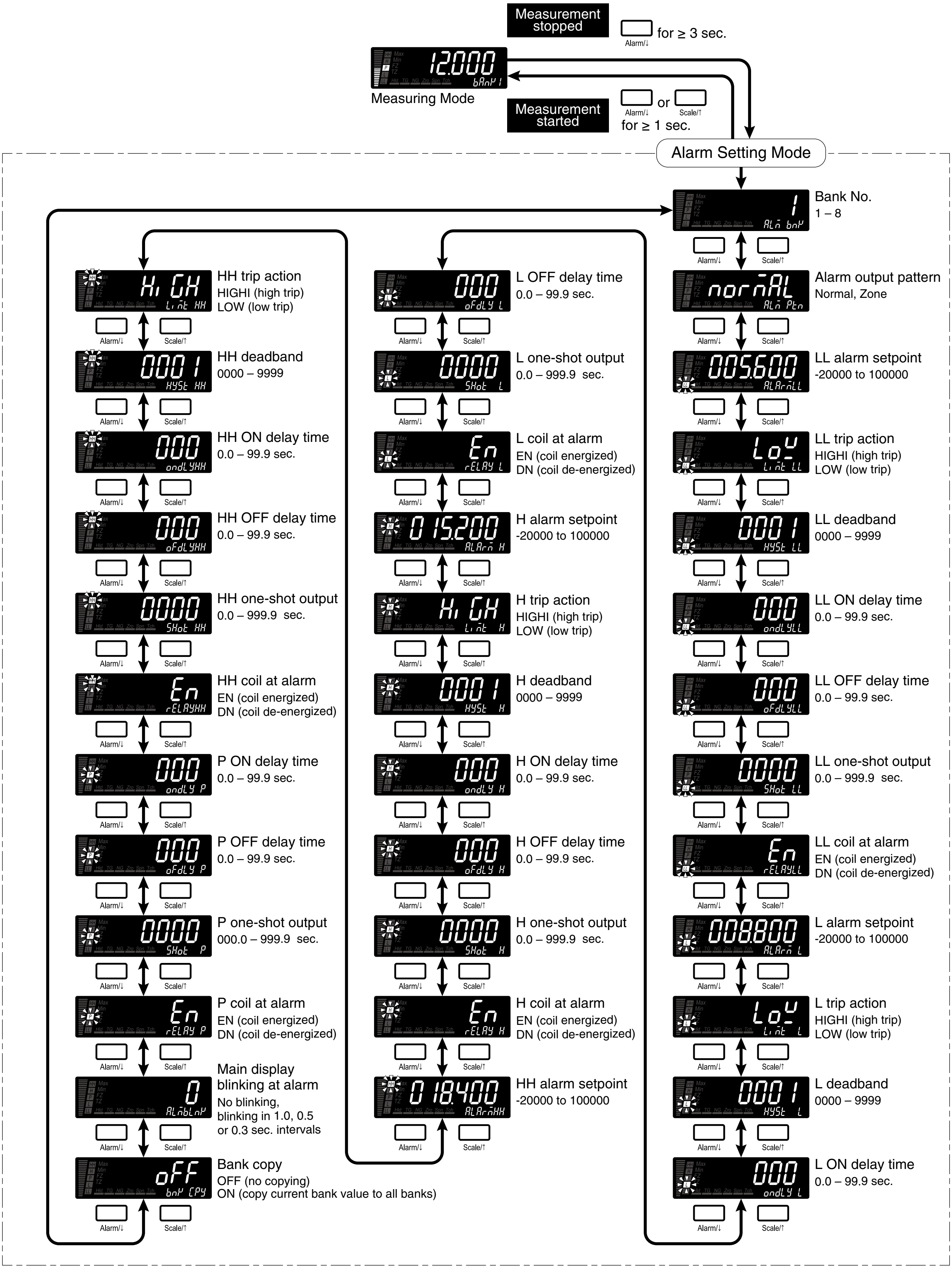
* Selectable only with the DC output code ‘1’.

NOTE

The bargraph lower and upper limits are disabled with “no bargraph” selected for the bargraph type parameter.

36.4.3 ALARM SETTING MODE

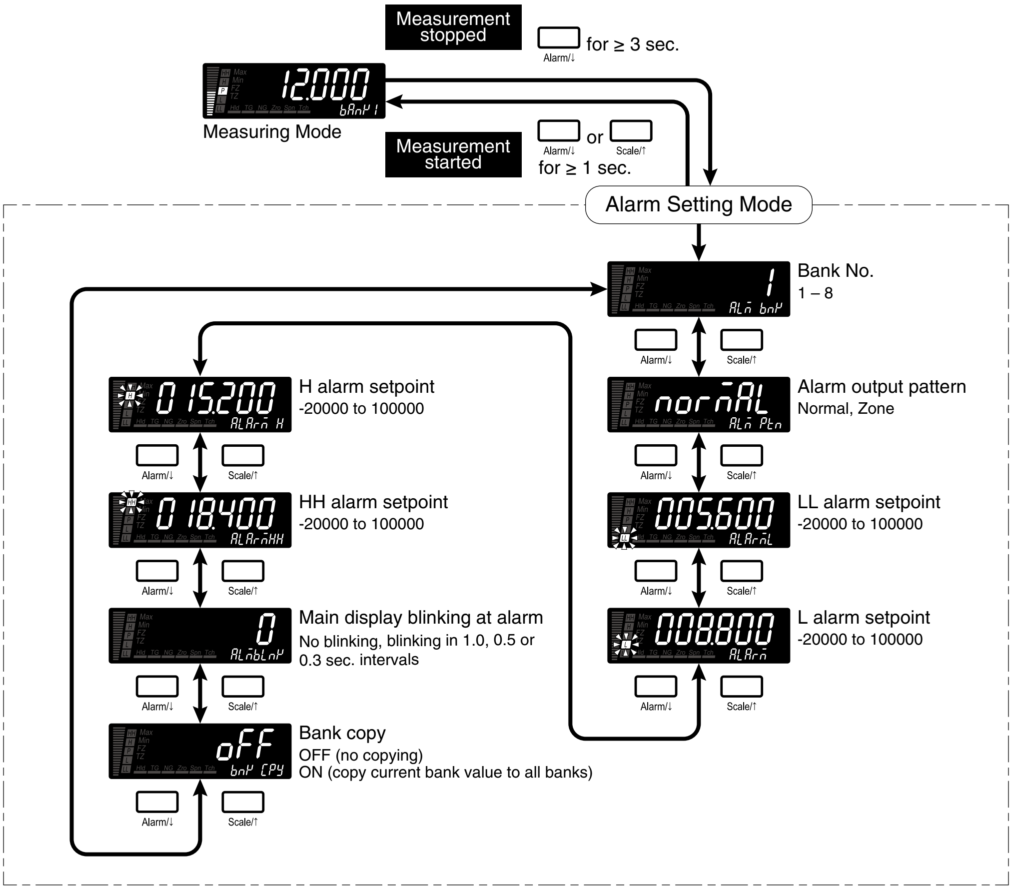
■ **LOCKOUT 'LV0' (COMPLETELY UNLOCK ALARM SETTING MODE)**



NOTE

The bank No. and bank copy are enabled with "enabled via the front button control" selected for the bank switching parameter.

■ **LOCKOUT 'LV1' (PARTIALLY UNLOCK ALARM SETTING MODE)**

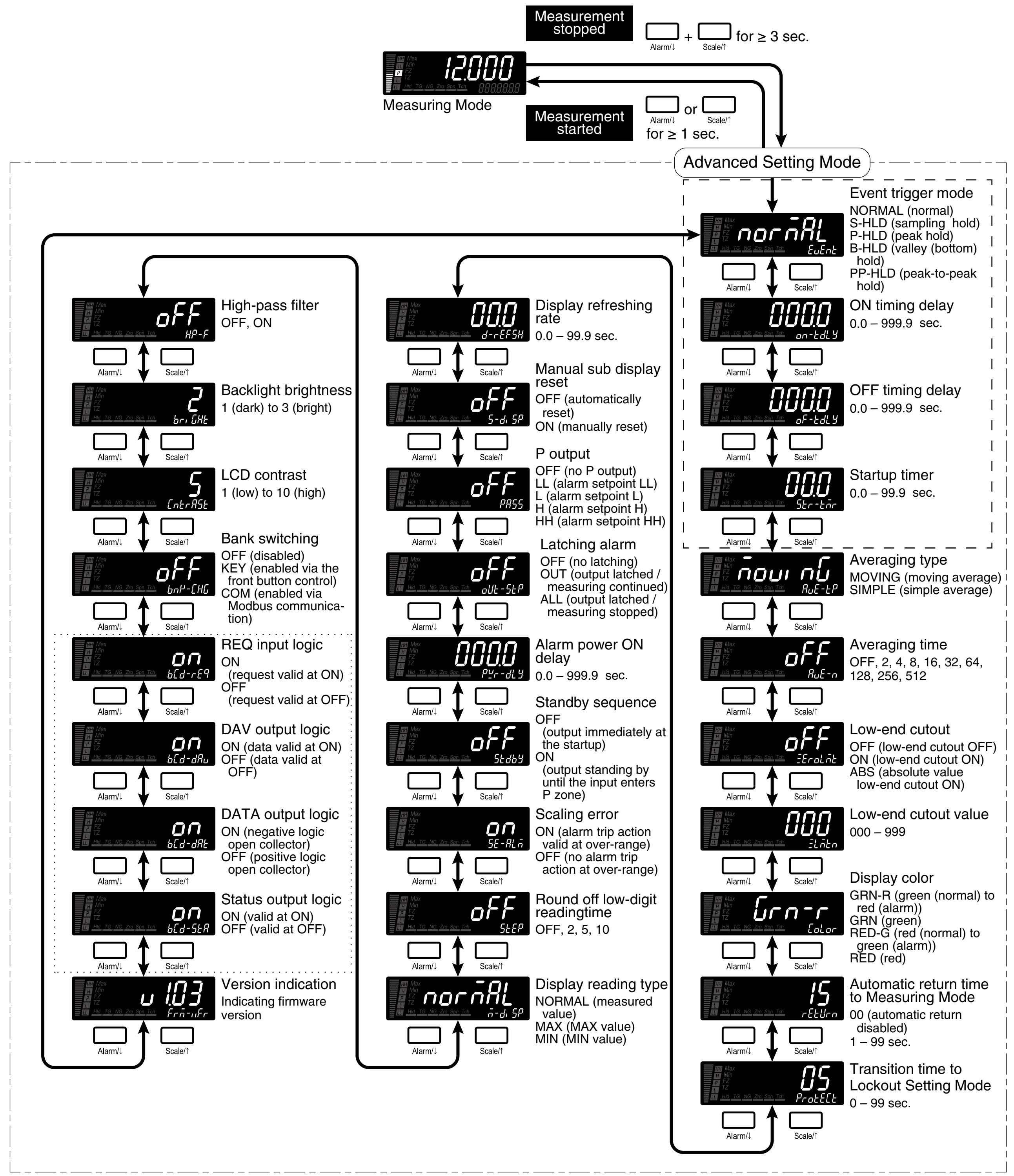


NOTE

The bank No. and bank copy are enabled with "enabled via the front button control" selected for the bank switching parameter.

36.4.4 ADVANCED SETTING MODE

■ LOCKOUT ‘LV0’ (COMPLETELY UNLOCK ADVANCED SETTING MODE)



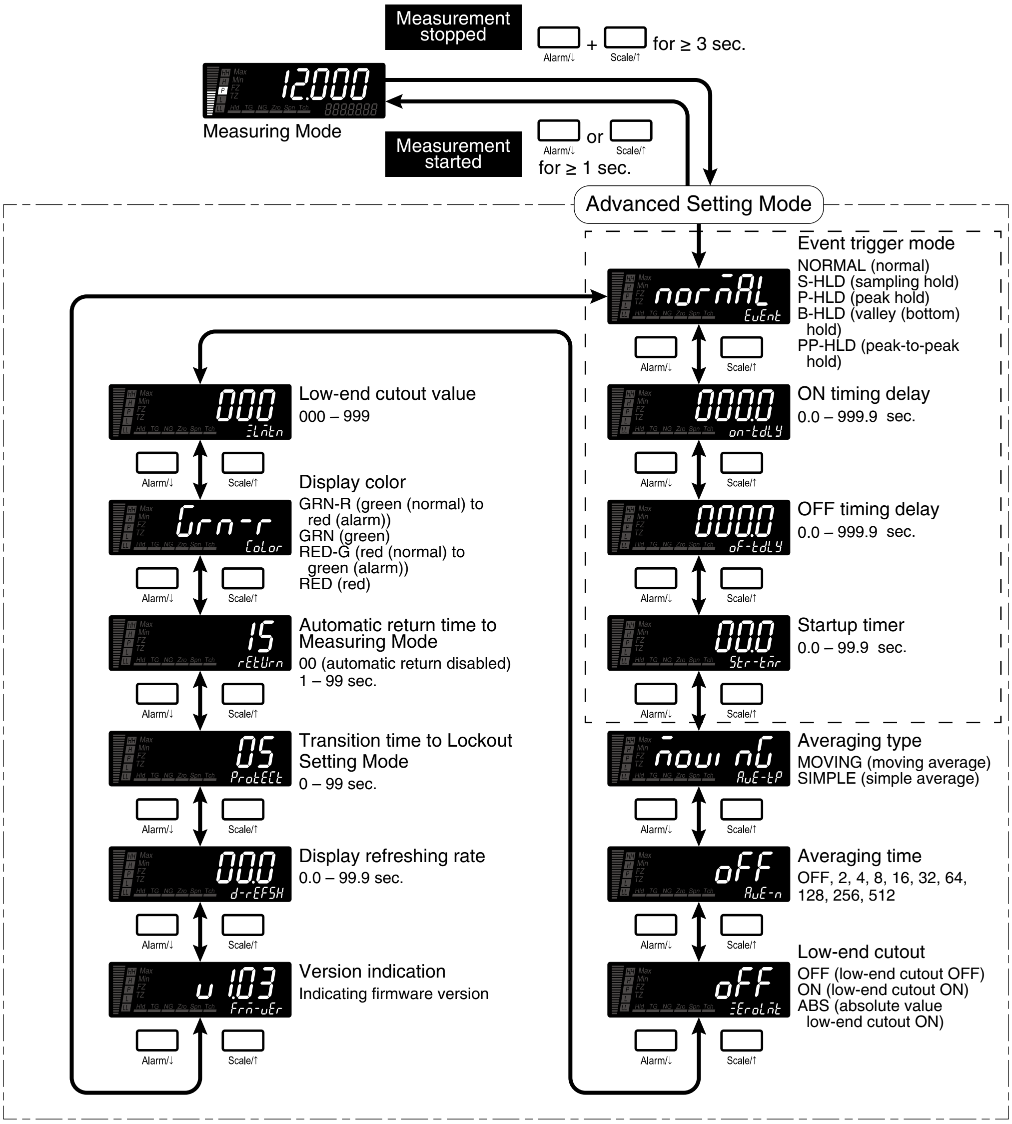
*1 Selectable only with the I/O option code ‘6’ or ‘A’ (event trigger input).

*2 Selectable only with the I/O option code ‘5’ , ‘9’ or ‘A’ (BCD output).

NOTE

- With the event trigger mode set to “normal”, the ON timing delay and OFF timing delay are disabled.
- With the event trigger mode set to “sampling hold”, the OFF timing delay is disabled.
- With the low-end cutout set to OFF, the low-end cutout value setting is locked.

■ LOCKOUT 'LV1' (PARTIALLY UNLOCK ADVANCED SETTING MODE)

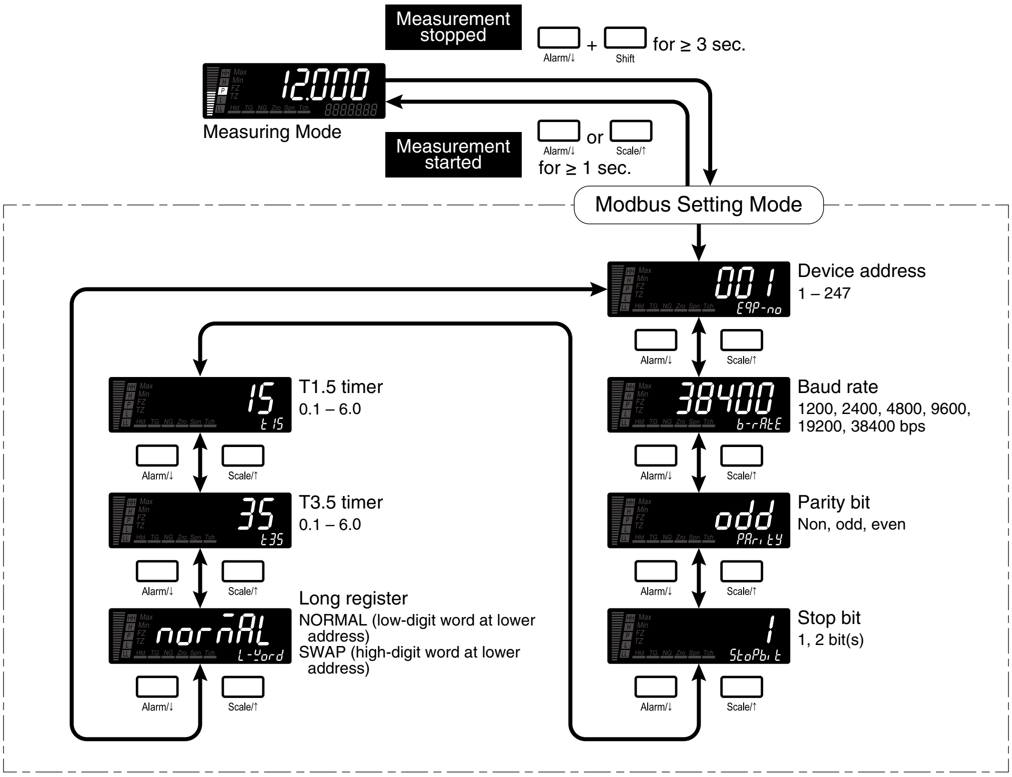


* Selectable only with the I/O option code '6' or 'A' (event trigger input).

NOTE

- With the event trigger mode set to "normal", the ON timing delay and OFF timing delay are disabled.
- With the event trigger mode set to "sampling hold", the OFF timing delay is disabled.
- With the low-end cutout set to OFF, the low-end cutout value setting is locked.

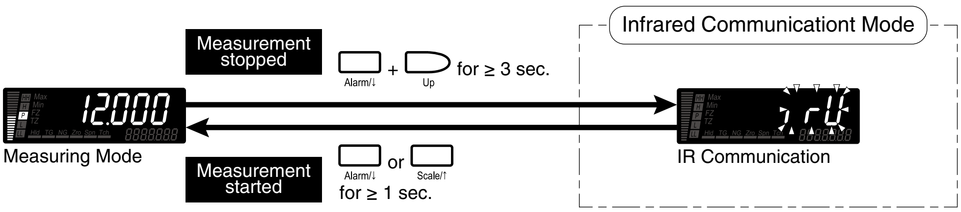
36.4.5 MODBUS SETTING MODE



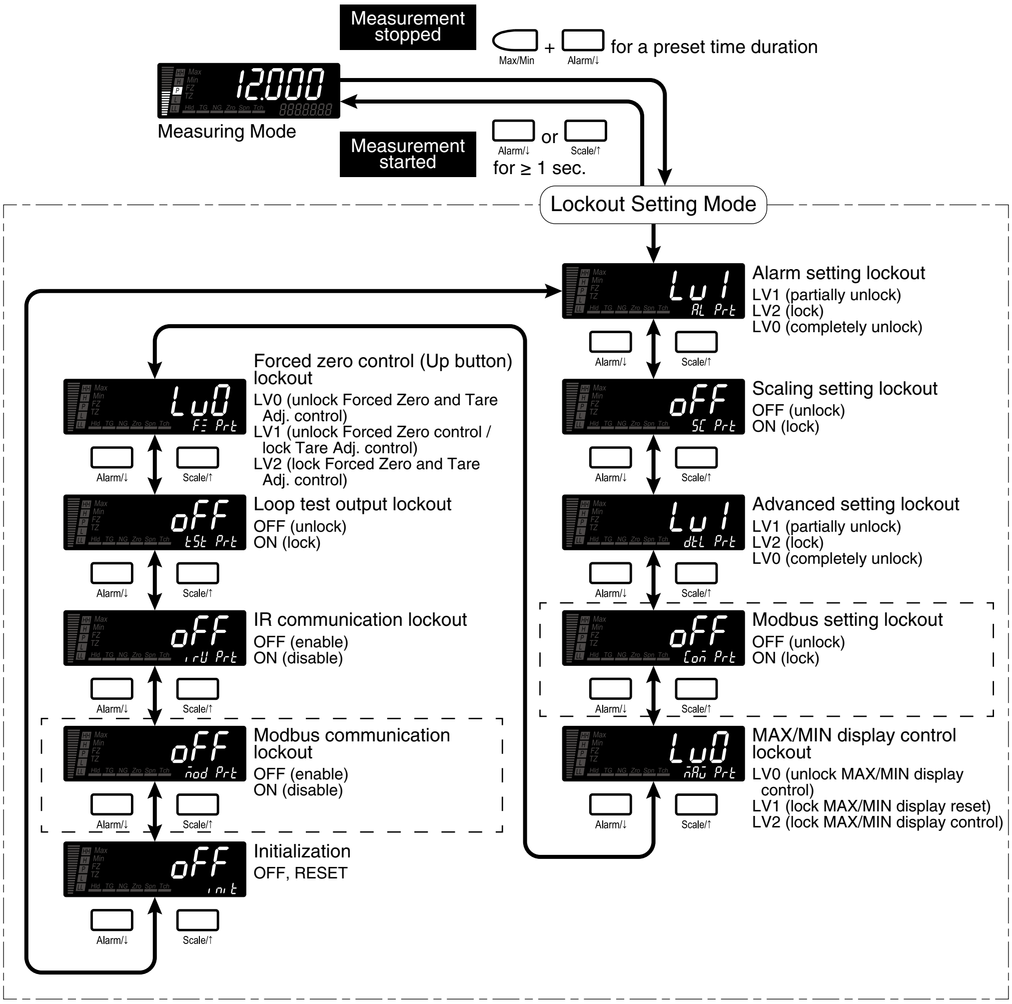
NOTE

Transition to Modbus Setting Mode is available only with the I/O option code '4', '7' or '8' (network interface).

36.4.6 INFRARED COMMUNICATION MODE

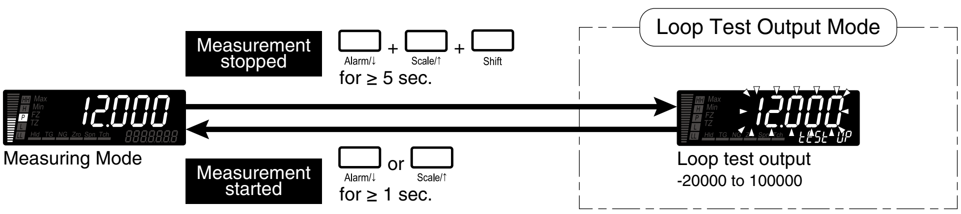


36.4.7 LOCKOUT SETTING MODE



* Selectable only with the I/O option code ‘4’ , ‘7’ or ‘8’ (network interface).

36.4.8 LOOP TEST OUTPUT MODE

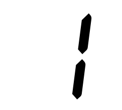
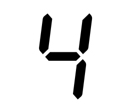
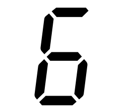
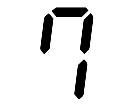
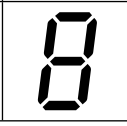
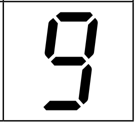


NOTE

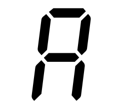
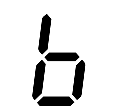
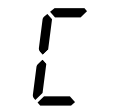
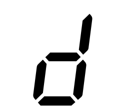
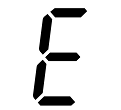
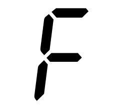
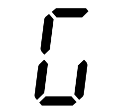
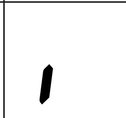
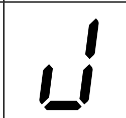
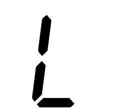
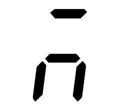
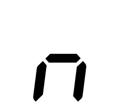
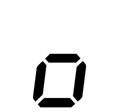
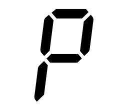
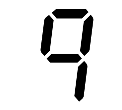
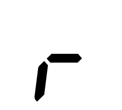
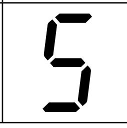
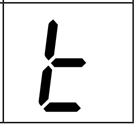
Transition to Loop Test Output Mode is available only with the DC output code ‘1’.

36.5 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