

Please read through this User's Manual before use for correct handling. Please keep this User's Manual for future reference.

### QR code

The product may have a QR Code pasted for efficient plant maintenance work and asset information management. It enables confirming the specifications of purchased products and user's manuals. For more details, please refer to the following URL.

<https://www.yokogawa.com/qr-code>

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You can download the latest manuals from the following website:

<http://www.yokogawa.com/ns/juxta/im/>

## CAUTIONARY NOTES FOR SAFE USE OF THE PRODUCT

This User's Manual should be carefully read before installing and operating the product. Please keep this User's Manual for future reference.

The related manuals and general specifications are shown in the table below.

Doc. Name	Doc. Number
Model MVHK Limit Alarm for DC Input (User's Manual)	IM 77J04H31-01E (This manual)
Model MVHK Limit Alarm for DC Input (General Specifications)	GS 77J04H31-01E

User's manuals in the above table are essential parts of the product; keep it in a safe place for future reference.

This manual is intended for the following personnel;

- Engineers responsible for installation, wiring, and maintenance of the equipment.
- Personnel responsible for normal daily operation of the equipment.

The following symbol is used on the product and in this manual to ensure safe usage.



### WARNING

**Calls attention to actions or conditions that could cause serious or fatal injury to the user, and indicates precautions that should be taken to prevent such occurrences.**

The following symbols are used only in this manual.



### CAUTION

**Calls attention to actions or conditions that could cause injury to the user or damage to the instrument or property and indicates precautions that should be taken to prevent such occurrences.**

## CHECKING THE PRODUCT SPECIFICATIONS AND THE CONTENTS OF THE PACKAGE

### (1) Checking the Model and Product Specifications

Check that the model and specifications indicated on the nameplate attached to the side face of the main unit are as ordered. (In checking the model and suffix codes, refer to the main specifications listed on the last page of this manual.)

### (2) Packaged Items

Check that the package contains the following items.

- MVHK: 1
- Tag number label: 1 sheet
- Range label: 1 sheet
- Spacer: 1 (used for DIN rail mounting)
- Receiving resistor: 1 (supplied when the input signal code "A," optional specification code "/R100" or "/R250" is specified)
- Monitor output terminal connector: 1 (supplied when monitor output code 6, A, P is specified)
- User's manual (this manual: IM 77J04H31-01E): 1

## GENERAL

This plug-in type Limit Alarm for DC input receives DC current or DC voltage signal. It is equipped with Active color PV display (PV display color changing function).

## MODEL AND SUFFIX CODES

Model	Suffix codes	Description
MVHK	-□ □ 0 □ □ □ 0 /□□	Limit Alarm for DC Input
Type	-0	General use type
	-1	JK12 type (The terminal assignment is same as that of Yokogawa's JK12 and MHKW.)
	-2	Fail output type
Power Supply	0	Always 0
	3 6	24 V DC±10% 100-240 V AC/DC (Operating range: 85 to 264 V)
Input Signal	-6	1 to 5 V DC
	-A	4 to 20 mA DC (with 250 Ω receiving resistor)
	-U	DC voltage or DC current signal
	-Z	Custom order
Output Signal	1	Alarm output (transfer contact [1a1b]), 2 points
	2	Alarm output (NO contact), 4 points
	3	Alarm output 2points, Fail output 1point
Monitor Output	6	1 to 5 V DC
	A	4 to 20 mA DC
	P	Communication function (RS-485)
	N	No monitor output
Optional Specification	0	Always 0
	/SN	No socket (with socket if not specified)
	/R100	With 100 Ω receiving resistor
	/R250	With 250 Ω receiving resistor
	/C0	Coating
	/FB	Fuse bypass
	/F1	Alarm 1: NO, Alarm 2: NO, Fail output: NO
	/F2	Alarm 1: NC, Alarm 2: NO, Fail output: NO
	/F3	Alarm 1: NO, Alarm 2: NC, Fail output: NO
	/F4	Alarm 1: NC, Alarm 2: NC, Fail output: NO
	/F5	Alarm 1: NO, Alarm 2: NO, Fail output: NC
	/F6	Alarm 1: NC, Alarm 2: NO, Fail output: NC
	/F7	Alarm 1: NO, Alarm 2: NC, Fail output: NC
	/F8	Alarm 1: NC, Alarm 2: NC, Fail output: NC

## 1. MOUNTING METHODS

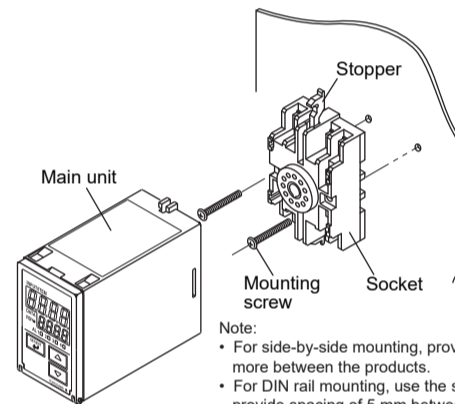


### CAUTION

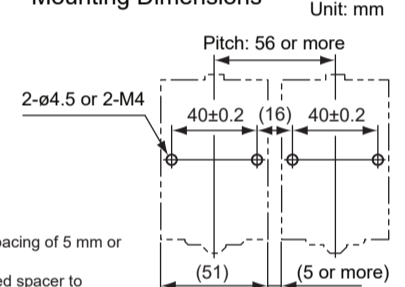
- Plug/disconnect the main unit into/from the socket vertically to the socket face. Otherwise the terminals may bend and it may cause bad contact.
- The converter shall not tilt 5 degrees or more in either direction when installed.
- When the converter is not connected to the socket, it is necessary to protect the socket against ingress of dust to the connector part.

### 1.1 Wall Mounting

Unfasten the upper and lower stoppers to disconnect the main unit from the socket. Next, anchor the socket onto the wall with two M4 screws. Then plug the main unit into the socket and secure the main unit with the upper and lower stoppers.

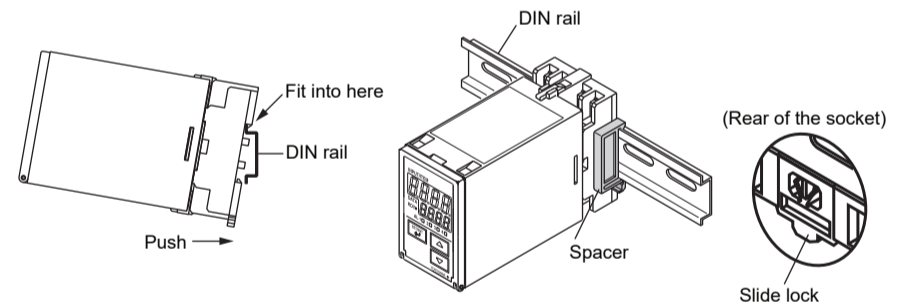


#### • Mounting Dimensions



### 1.2 DIN Rail Mounting

Locate the MVHK so that the DIN rail fits into the upper part of the DIN-rail groove at the rear of the socket, and fasten the socket using the slide lock at the lower part of the socket. For side-by-side mounting, attach the spacer supplied with the product to the DIN rail to provide spacing between the products.



### 1.3 Using a Duct

When using a wiring duct, install the duct at least 30 mm away from the top and bottom faces of the main unit.

## 2. INSTALLATION LOCATIONS

- Avoid the following environments for installation locations: Areas with vibrations, corrosive gases, dust, water, oil, solvents, direct sunlight, radiation, a strong electric field, and/or a strong magnetic field, direct radiant heat, wind, temperature fluctuation, 2000 m or more above sea level.
- If there is any risk of a surge being induced into the power line and/or signal lines due to lightning or other factors, a dedicated lightning arrester should be used as protection for both this unit and a field-installed device.
- Operating temperature/humidity range: 0 to 50°C (0 to 40 °C for multiple mounting)/5 to 90%RH (no condensation)
- Continuous vibration \*: (at 5 to 9 Hz) Half amplitude of 3 mm or less (at 9 to 150 Hz) 9.8m/s<sup>2</sup> or less, 1 oct/min for 90 minutes each in the three axis directions
- Impact \*: 98 m/s<sup>2</sup> or less, 11 ms, 3 axes, 6 directions, 3 times each
- Install in a place where rigidity is secured.

\*: Type code 2 is an environment without vibration and impact.

## 3. TRANSPORT AND STORAGE CONDITIONS

- Temperature: -25 to 70°C
- Temperature change rate: 20°C per hour or less
- Humidity: 5 to 95% RH (no condensation)



### CAUTION

**Keep this product in a conductive bag when plugged out, during transport or storage.**

## 4. EXTERNAL WIRING

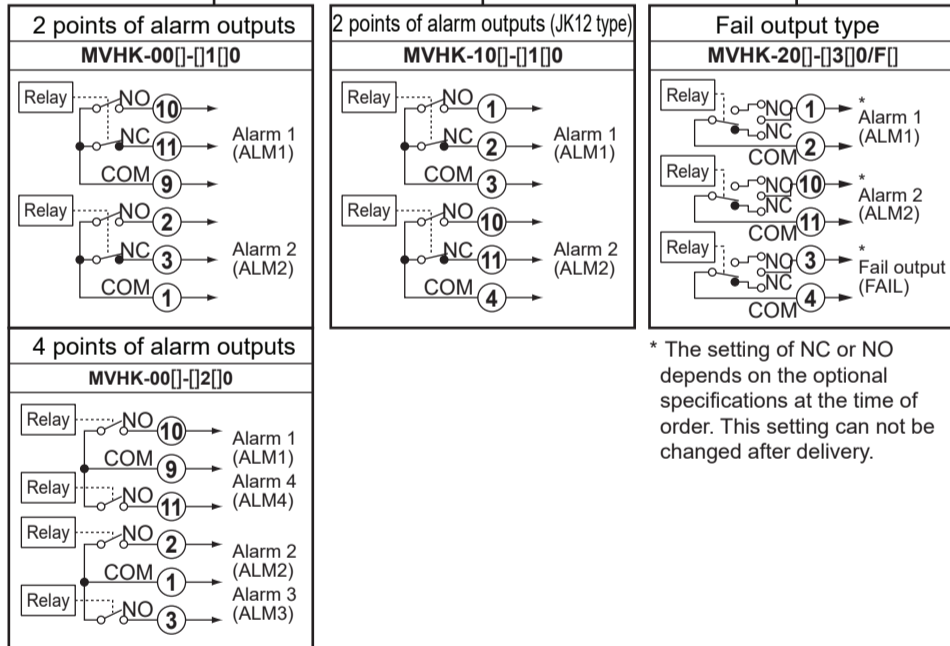
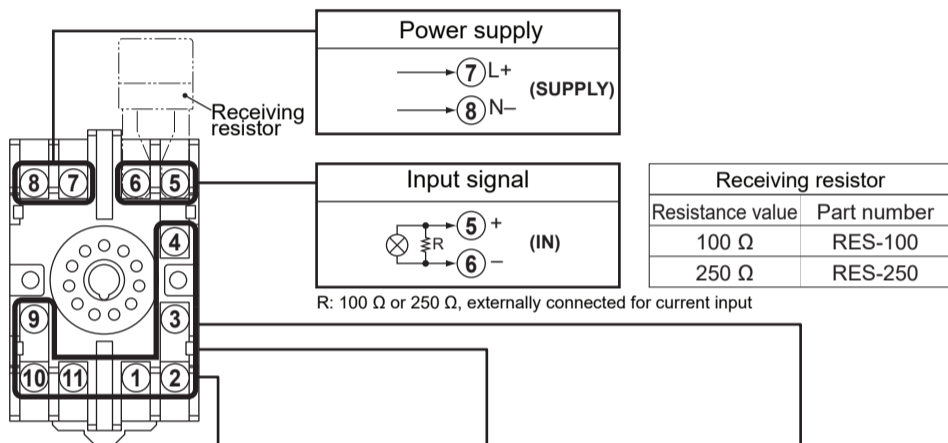
### WARNING

- To avoid the risk of an electric shock, turn off the power supply and use a tester or similar device to ensure that no power is supplied to a cable to be connected, before carrying out wiring work.
- Do not operate the product in the presence of flammable or explosive gases or vapors. To do so is highly dangerous.
- Use of the product ignoring the specifications may cause overheating or damage. Before turning on the power, ensure the following:
  - Power supply voltage and input signal value applied to the product should meet the required specifications.
  - The external wiring to the terminals and wiring to ground are as specifications.

### CAUTION

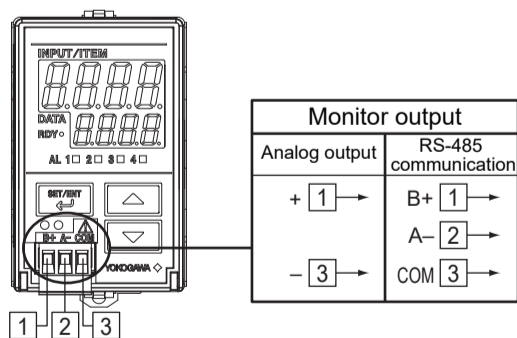
- The power line and input/output signal lines should be installed away from noise-generating sources. Otherwise accuracy cannot be guaranteed.
- The product is sensitive to static electricity; exercise care in operating it. Before you operate the product, touch a nearby metal part to discharge static electricity.
- If an inductance (L) load such as auxiliary relays or solenoid valves is used, always insert a spark killer for diminishing sparks, such as a CR filter or a diode in parallel with the inductance load. Otherwise a malfunction or relay failure may occur. Refer to the following guidelines for a capacitor and resistor:
  - Capacitor: 0.5 to 1  $\mu$ F with respect to a contact current of 1 A
  - Resistor: 0.5 to 1  $\Omega$  with respect to a contact voltage of 1 V
- Transfer contacts for 2 points of alarms consist of an NO contact and an NC contact. When using transfer contacts, consideration should be given to the risk of a short circuit due to contact MBB<sup>1</sup> resulting from non-concurrent action of the NO and NC contacts or to a short circuit caused by arcs produced when opening a contact at large current.
  - \*1 The condition where both NO and NC contacts close when the contact actuates
- Fail output of the fail output type is energized during normal operation and de-energized on FAIL (same as when the power is turned off).
  - When NO is specified: The contact opens when it is FAIL.
  - When NC is specified: The contact closes when it is FAIL.
- Do not connect anything to the terminals that are not used in the wiring diagram.

Wiring should be connected to the terminals on the socket of the MVHK. The terminals for external connections are of M3.5 screws. Use crimp-on lugs for connections to the terminals. It is recommended that signal wires have a nominal cross-sectional area of 0.5 mm<sup>2</sup> or thicker, while the power cable has a nominal cross-sectional area of 1.25 mm<sup>2</sup> or thicker.



### Wiring for Monitor Output

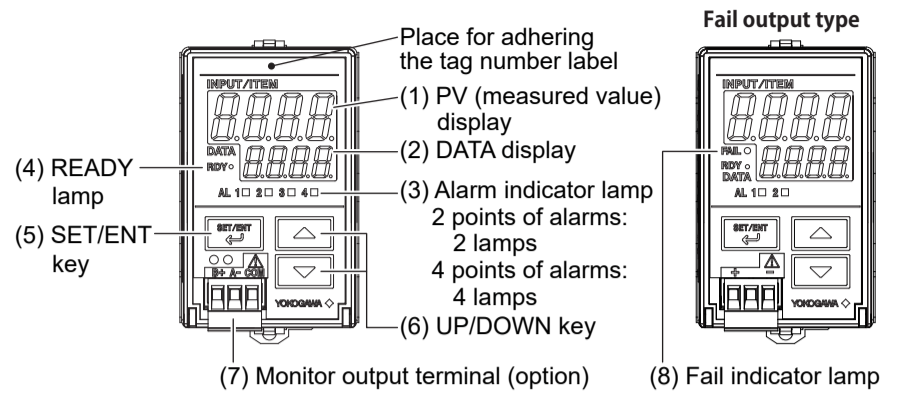
If the monitor output code (one of 6, A or P) is specified at the time of order, the following wiring is possible.



## 5. PART NAMES OF FRONT PANEL AND THEIR FUNCTIONS

### CAUTION

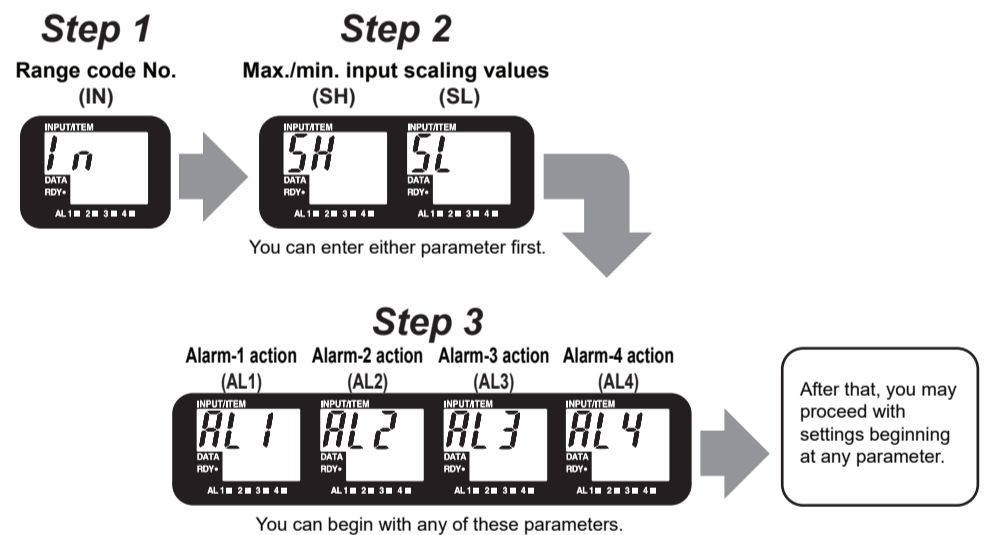
The front panel of the product is constructed to prevent opening. Forcing it open will result in breakage.



Part Name	Function										
(1) PV (measured value) display	Displays a measured value during operation. Displays a parameter symbol when a parameter is set. Displays an error code in the event of an error.										
(2) DATA display	Displays the setpoint of a variety of parameters. Displays an alarm type in the event of an alarm. (Not displayed during normal operation.) <table border="1"> <thead> <tr> <th>Alarm action</th> <th>Alarm action type</th> </tr> </thead> <tbody> <tr> <td>No alarm (normal)</td> <td>None</td> </tr> <tr> <td>PV high limit alarm</td> <td>H</td> </tr> <tr> <td>PV low limit alarm</td> <td>L</td> </tr> <tr> <td>Other alarms</td> <td>A</td> </tr> </tbody> </table> * Alarm display (when alarm 1 is the PV high-limit alarm)	Alarm action	Alarm action type	No alarm (normal)	None	PV high limit alarm	H	PV low limit alarm	L	Other alarms	A
Alarm action	Alarm action type										
No alarm (normal)	None										
PV high limit alarm	H										
PV low limit alarm	L										
Other alarms	A										
(3) Alarm indicator lamp	In the event of an alarm, AL1 to AL4 (alarm 1 to alarm 4) light up.										
(4) READY lamp	Lights up when the power is turned on.										
(5) SET/ENT key	Used to switch parameter indication or accept a setpoint. Pressing this key for more than 3 seconds allows you to select the Operation Parameter Screen and Setup Parameter Screen alternately. Used to change the setpoint of a parameter.										
(6) UP/DOWN key	Pressing the $\Delta$ key increases a numerical value. Pressing the $\nabla$ key decreases a numerical value. Holding down a key accelerates the speed of change.										
(7) Monitor output terminal (Two-piece connector)	Outputs 1 to 5 V DC, 4 to 20 mA DC or RS-485 communication signal. (To be added only when the monitor output has been specified at the time of order.)										
(8) Fail indicator lamp	Lights up in a fault condition. The self-diagnosis function detects the Fail status *. * EEP sum error, EEP error, AD error, ROM error, RAM error (When type code 2 is specified when ordering.)										

## 6. PARAMETER SETTING ORDER AND PRECAUTIONS

When setting a parameter, begin with Step 1 below and continue in sequence.



### CAUTION

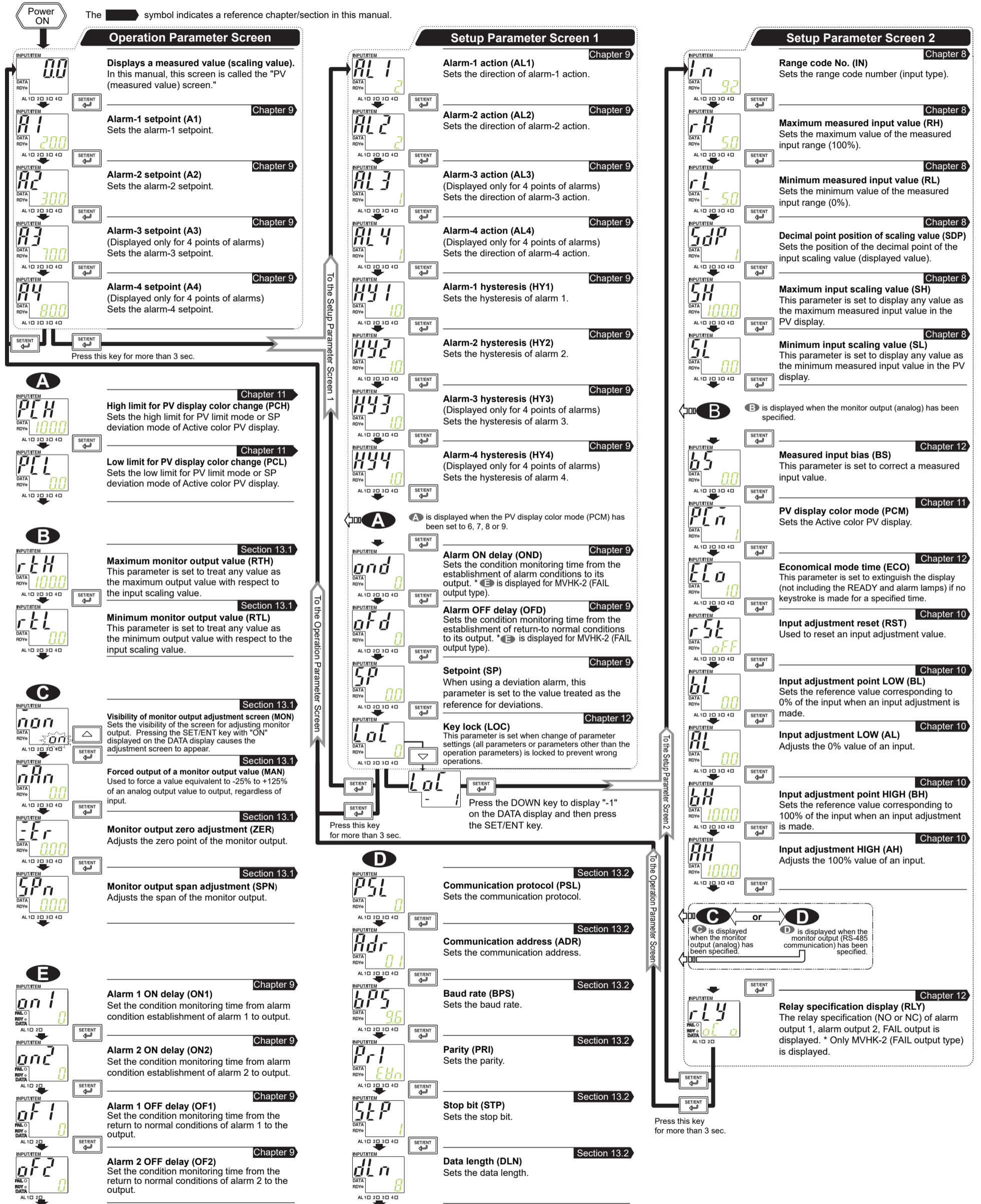
- If the settings for the range code No. (IN), maximum and minimum input scaling values (SH)/(SL) or alarm actions (AL1 to AL4) are changed, the relevant parameter setpoints shown in the table below will be initialized. To change a parameter setpoint, begin with Step 1 above and continue in sequence.
- Do not turn off the power of this product while changing the parameters of this product or adjusting this product.

Parameters to be initialized if the range code No. (IN) is changed
Max. and min. measured input values (RH, RL), decimal point position of scaling value (SDP), max. and min. input scaling values (SH, SL)
Alarm setpoints (A1 to A4), hysteresis (HY1 to HY4), setpoint (SP)
Max. and min. monitor output values (RTH, RTL)
Input adjustment point LOW (BL) and HIGH (BH), input adjustment LOW (AL) and HIGH (AH)
High and low limits for PV display color change (PCH, PCL)
Parameters to be initialized if the maximum or minimum input scaling value (SH) or (SL) is changed
Alarm setpoints (A1 to A4), hysteresis (HY1 to HY4), setpoint (SP)
Max. and min. monitor output values (RTH, RTL)
Input adjustment point LOW (BL) and HIGH (BH), input adjustment LOW (AL) and HIGH (AH)
High and low limits for PV display color change (PCH, PCL)
Parameters to be initialized if the type of alarm action (AL1 to AL4) is changed
The alarm setpoint (A1 to A4) corresponding to each alarm action (AL1 to AL4) (Example: If AL1 is changed, A1 will be initialized.)
Parameters to be initialized if the type of PV display color mode (PCM) is changed
High and low limits for PV display color change (PCH, PCL)

# 7. SWITCHING PARAMETERS

## CAUTION

- If the alarm action (AL1 to AL4) is set to "OFF," the relevant alarm setpoint (A1 to A4) is not displayed.
- If no keystroke is made for more than 2 minutes, the PV screen automatically appears, regardless of the parameter displayed. In this case, if a data change is in progress (the decimal point is blinking), the data being changed becomes invalid and the PV screen appears with the previous data displayed as is. However, this action does not take place if the parameter "MAN", "ZER" or "SPN" is being displayed.

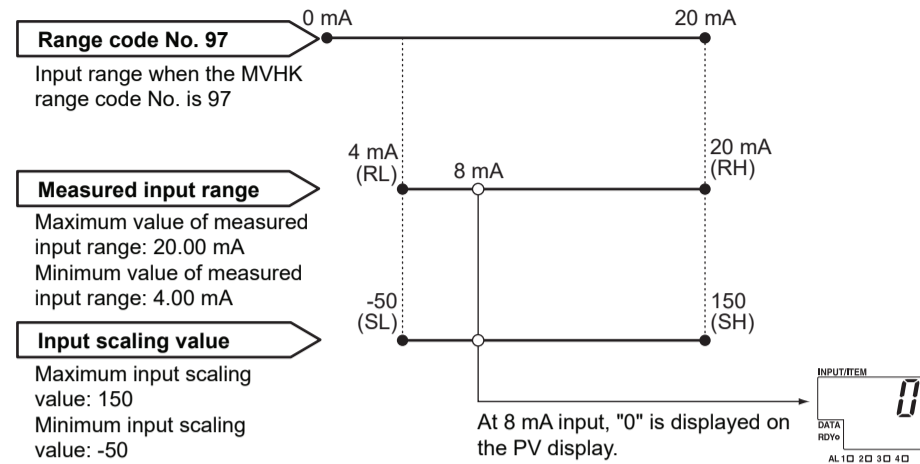


## 8. SETTING INPUT-RELATED PARAMETERS

### 8.1 Input Scaling

The MVHK allows you to set any input scaling value (displayed value) with respect to the measured input range.

For example, if the MVHK measured input range is 4 to 20 mA DC, setting the input scaling range (displayed value) to -50 to 150 causes the MVHK to display "0" in the PV display at 8 mA input (equivalent to 25% of 4 to 20 mA input) as shown in the figure below.



### 8.2 Setting Ranges and Factory-Set Values of Input-Related Parameters

#### Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range			Factory-Set Value
		Range code No.	Instrument input range	Receiving resistor	
<i>IN</i>	Range code No. (IN)	91	-10.00 to +10.00 V DC		92 *1
		92	-5.00 to +5.00 V DC		
		93	-1.000 to +1.000 V DC		
		95	0.00 to 50.00 mA DC	100 Ω	
		96	0.00 to 10.00 mA DC	100 Ω	
		97	0.00 to 20.00 mA DC	250 Ω	
		98	0.000 to 4.000 mA DC	250 Ω	
<i>RH</i>	Maximum measured input value (RH)	RL + 1 digit to the max. value of instrument input range			5.00 *1
<i>RL</i>	Minimum measured input value (RL)	Min. value of instrument input range to RH - 1 digit			-5.00 *1
<i>SDP</i>	Decimal point position of scaling value (SDP)	0 (no decimal place), 1 (one decimal place), 2 (two decimal places), 3 (three decimal places)			1
<i>SH</i>	Maximum input scaling value (SH)	SL + 1 digit to 9999 * The setting range depends on the setting of the decimal point position (SDP).			100.0
<i>SL</i>	Minimum input scaling value (SL)	-1999 to SH - 1 digit * The setting range depends on the setting of the decimal point position (SDP).			0.0

\*1 The factory-set values for the input signal code "6" are as follows:  
Range code No.: 92; maximum measured input value: 5.00; and minimum measured input value: 1.00  
The factory-set values for the input signal code "A" are as follows:  
Range code No.: 97; maximum measured input value: 20.00; and minimum measured input value: 4.00

### 8.3 Setting Input-Related Parameters

This section describes an example of setting the range code No. (IN) to "97," measured input range (RL, RH) to "4 to 20 mA DC," the decimal point position of input scaling value (SDP) to "0" (with no decimal place) and input scaling values (SL, SH) to "-50 to 150."

#### CAUTION

Note that setting the range code No. (IN) to a value other than those specified in Section 8.2 is invalid.

**Power ON**  
When the power is turned on, the PV screen of the Operation Parameter Screen appears.

**Operation Parameter Screen**  
When you press the SET/ENT key for more than 3 sec. with the Operation Parameter Screen displayed, the Setup Parameter Screen 1 appears.

**Setup Parameter Screen 1**  
Press the SET/ENT key to display parameter "LOC."  
Press the DOWN key to display "-1."  
Press the SET/ENT key to display parameter "IN" in the Setup Parameter Screen 2.

**Setup Parameter Screen 2**  
**Step 1**  
Press the UP or DOWN key to display "97" on the DATA display.  
Press the SET/ENT key to accept range code No. "97."  
Press the SET/ENT key again to display parameter "RH."

Continue to the upper right

**Step 2**

Press the SET/ENT key because the data remains the same.  
This completes the process for setting the max. measured input value.

Press the UP key to display "4.00".  
The decimal point blinks during data change.  
Press the SET/ENT key to accept this data.  
Press the SET/ENT key again to display parameter "SDP."

Press the DOWN key to display "0."  
The decimal point blinks during data change.  
Press the SET/ENT key to accept this data.  
Press the SET/ENT key again to display parameter "SH."

Press the UP key to display "150".  
The decimal point blinks during data change.  
Press the SET/ENT key to accept this data.  
Press the SET/ENT key again to display parameter "SL."

Press the DOWN key to display "-50".  
The decimal point blinks during data change.  
Press the SET/ENT key to accept this data.  
Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

To the Operation Parameter Screen

## 9. SETTING ALARM-RELATED PARAMETERS

### 9.1 Setting Ranges and Factory-Set Values of Alarm-Related Parameters

#### Operation Parameter Screen

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
<i>A1</i>	Alarm-1 setpoint (A1)	-1999 to 9999 (Within the range of set input scaling values)	20.0
<i>A2</i>	Alarm-2 setpoint (A2)	* The setting range depends on the setting of the decimal point position (SDP).	2 points of alarms: 80.0
<i>A3</i>	Alarm-3 setpoint (A3)		4 points of alarms: 30.0
<i>A4</i>	Alarm-4 setpoint (A4)	70.0	
		80.0	

#### Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
<i>AL1</i>	Alarm-1 action (AL1)	See the Alarm Action Type Codes table.	2
<i>AL2</i>	Alarm-2 action (AL2)		2 points of alarms: 1
<i>AL3</i>	Alarm-3 action (AL3)		4 points of alarms: 2
<i>AL4</i>	Alarm-4 action (AL4)		1
<i>HY1</i>	Alarm-1 hysteresis (HY1)	0 to 9999 The value resulting from adding a hysteresis value to an alarm setpoint should be within the range of set input scaling values.	1.0
<i>HY2</i>	Alarm-2 hysteresis (HY2)	* The setting range depends on the setting of the decimal point position (SDP).	1.0
<i>HY3</i>	Alarm-3 hysteresis (HY3)		1.0
<i>HY4</i>	Alarm-4 hysteresis (HY4)	Note: When parameter settings are initialized, it is set to 3% of the scaling span.	1.0
<i>OND</i>	Alarm ON delay (OND)	Setting range: 0 to 999 sec. Setting resolution: 1 sec. * For MVHK-2 (FAIL output type), ON1 and ON2 are displayed.	0
<i>OFD</i>	Alarm OFF delay (OFD)	Setting range: 0 to 999 sec. Setting resolution: 1 sec. * For MVHK-2 (FAIL output type), OF1 and OF2 are displayed.	0
<i>ON1</i>	Alarm 1 ON delay (ON1)	Setting range: 0 to 999 sec. Setting resolution: 1 sec.	0
<i>ON2</i>	Alarm 2 ON delay (ON2)	* Only MVHK-2 (FAIL output type) is displayed. Refer to OND for setting operation.	0
<i>OF1</i>	Alarm 1 OFF delay (OF1)	Setting range: 0 to 999 sec. Setting resolution: 1 sec.	0
<i>OF2</i>	Alarm 2 OFF delay (OF2)	* Only MVHK-2 (FAIL output type) is displayed. Refer to OFD for setting operation.	0
<i>SP</i>	Setpoint (SP)	-1999 to 9999 Within the range of set input scaling values * The setting range depends on the setting of the decimal point position (SDP).	0.0

<Alarm Action Type Codes>

Alarm Type	Alarm Action	Alarm Action Type Code			
		Without Stand-by Action		With Stand-by Action	
		Deenergized under Normal Condition	Energized under Normal Condition	Deenergized under Normal Condition	Energized under Normal Condition
PV high-limit alarm		1	9	11	19
PV low-limit alarm		2	10	12	20
Deviation high-limit alarm		3	5	13	15
Deviation low-limit alarm		4	6	14	16
Deviation high and low-limit alarm		7		17	
Deviation within high and low-limit alarm		8		18	
No alarm		<i>off</i> (Parameters A1 to A4 are not displayed.)			

**Setup Parameter Screen 1**

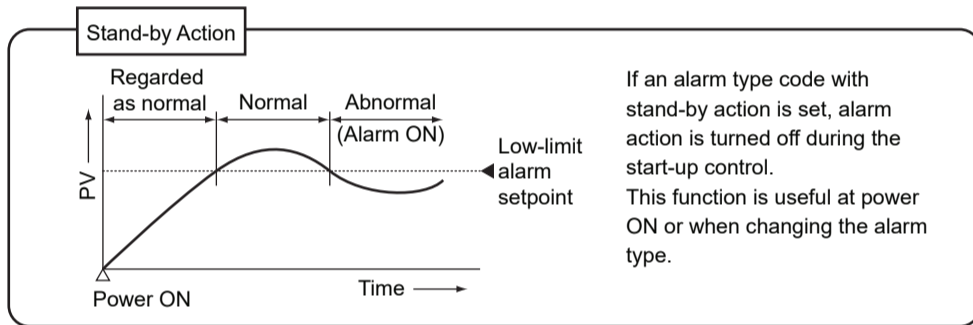
Press the UP or DOWN key to display "5" on the DATA display.  
Press the SET/ENT key to accept alarm-1 hysteresis "5."

Press the SET/ENT key to display parameter "OND."

Press the UP or DOWN key to display "5" (sec.) on the DATA display.  
Press the SET/ENT key to accept alarm ON delay "5" (sec).  
Press the SET/ENT key again to display parameter "OFD."

Press the UP or DOWN key to display "5" (sec.) on the DATA display.  
Press the SET/ENT key to accept alarm OFF delay "5" (sec).  
Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

To the Operation Parameter Screen



**9.2 Setting Alarm Output-Related Parameters**

This section describes an example of setting the alarm-1 action (AL1) to "12" (PV low-limit alarm, with stand-by action), alarm-1 setpoint (A1) to "0," alarm-1 hysteresis (HY1) to "5," alarm ON delay (OND) to "5" and alarm OFF delay (OFD) to "5" with the input scaling values (SL, SH) set to "-50 to 150." (Parameters relating to alarm 2 to alarm 4 can be set in the same way as the procedure below.) The alarm setpoints, setpoint (set when setting a deviation alarm) and hysteresis are based on the set input scaling values. For example, if the input scaling values are "-50 to 150," to set the low-limit alarm value to 25% of the measured input range, set the low-limit alarm value to "0."

**Power ON**

When the power is turned on, the PV screen of the Operation Parameter Screen appears.

When the SET/ENT key is pressed for more than 3 sec. with the Operation Parameter Screen displayed, the Setup Parameter Screen 1 appears with parameter "AL1" displayed.

**Step 3**

Press the UP or DOWN key to display "12" on the DATA display.  
Press the SET/ENT key to accept alarm-1 action "12."  
Then to set the alarm setpoint, press the SET/ENT key for more than 3 sec. to display the Operation Parameter Screen. (To set the hysteresis parameter and successive settings, press the SET/ENT key to display the next parameter.)

Press the SET/ENT key to display parameter "A1."  
Press the UP or DOWN key to display a low-limit alarm value "0" (value corresponding to 25% of the scaling value) that is set to the DATA display.  
Press the SET/ENT key to accept low-limit alarm "0."

Continue to the upper right

**10. INPUT ADJUSTMENTS**

**10.1 Setting Ranges and Factory-Set Values of Adjustment-Related Parameters**

**Setup Parameter Screen 2**

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
<i>rSt</i>	Input adjustment reset (RST)	OFF (0) or ON (1) (This parameter is used (set to ON) to reset adjusted values.)	OFF
<i>bl</i>	Input adjustment point LOW (BL)	Scaling span $\pm 10\%$ (and BL <BH)	SL
<i>al</i>	Input adjustment LOW (AL)	Scaling span $\pm 10\%$ (and AL <AH)	SL
<i>bh</i>	Input adjustment point HIGH (BH)	Scaling span $\pm 10\%$ (and BL <BH)	SH
<i>ah</i>	Input adjustment HIGH (AH)	Scaling span $\pm 10\%$ (and AL <AH)	SH

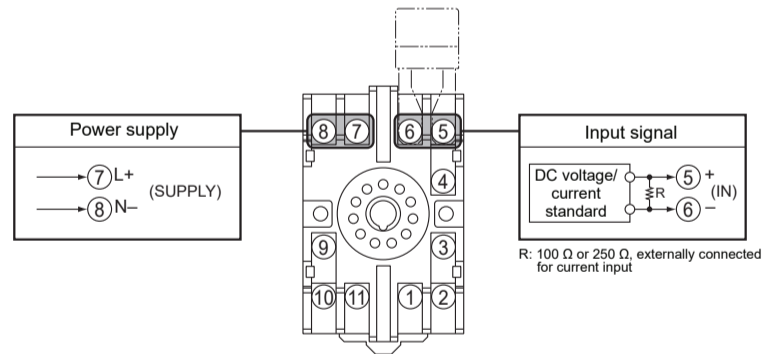
**10.2 Instrument for Adjustments**

- DC voltage/current standard (YOKOGAWA GS200 or equivalent): 1

**10.3 Input Adjustment**

**10.3.1 Connecting the Adjustment Instrument**

Connect the input and supply voltage as shown in the figure below.



**10.3.2 Adjusting Inputs**

Carry out input adjustments between two points, or the low limit (BL: input adjustment point LOW) and high limit (BH: input adjustment point HIGH) that have been set within the adjustment range (see Section 10.1). This subsection describes an example of making an input adjustment between two points, or input scaling values "0" and "100" applied at 8 mA input (25% of measured input range) and 16 mA input (75% of measured input range) with the MVHK range code No. set to "97," the measured input range set to "4 to 20 mA DC" and the input scaling value (displayed value) set to "-50 to 150."

The MVHK enters the operable status as soon as the power is turned on, but requires 10 to 15 minutes of warm-up to meet the performance requirements.

**Power ON**

When the power is turned on, the PV screen of the Operation Parameter Screen appears.

When you press the SET/ENT key for more than 3 sec. with the Operation Parameter Screen displayed, the Setup Parameter Screen 1 appears.

Press the SET/ENT key to display parameter "LOC."  
Press the DOWN key to display "-1" on the DATA display.  
Press the SET/ENT key to display the Setup Parameter Screen 2.

Continue to the next page

Setup Parameter Screen 2

Press the SET/ENT key to display parameter "BL." In this case, the DATA display shows the set minimum input scaling value "-50."

Press the UP key to display "0" on the DATA display.

The decimal point blinks during data change.

Press the SET/ENT key to accept this data.

Press the SET/ENT key to display the next parameter.

Using the voltage/current standard, apply 8 mA input to the MVHK.

This causes parameter "AL" and the scaling value corresponding to the measured value (8 mA) to appear alternately.

Press the UP or DOWN key.

The decimal point blinks.

Press the SET/ENT key.

The value before adjustment "2" appears on the DATA display.

Press the SET/ENT key to display the next parameter "BH."

In this case, the DATA display shows the set maximum input scaling value "150."

Press the DOWN key to display "100" on the DATA display.

Press the SET/ENT key to accept this data.

Press the SET/ENT key to display the next parameter.

Using the voltage/current standard, apply 16 mA input to the MVHK.

This causes parameter "AH" and the scaling value corresponding to the measured value (16 mA) to appear alternately.

Press the UP or DOWN key.

The decimal point blinks.

Press the SET/ENT key.

The value before adjustment "99" appears on the DATA display.

This completes the input adjustment for the MVHK.

If additional re-adjustment must be made, take the following steps and then perform the procedure above.

Setup Parameter Screen 2

Press the SET/ENT key to display parameter "RST."

Press the UP key to display "ON" on the DATA display.

The decimal point blinks during data change.

Press the SET/ENT key.

The previously adjusted value will be reset.

This resets the previously adjusted value.

## 11. SETTING ACTIVE COLOR PV DISPLAY (PV DISPLAY COLOR CHANGING FUNCTION)

### 11.1 Setting Ranges and Factory-Set Values

Setup Parameter Screen 1

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
PCH	High limit for PV display color change (PCH)	When PV display color mode (PCM) is 6 or 7: PCL+1digit to 9999 When PV display color mode (PCM) is 8 or 9: -100.0 to 100.0% of the measured input range * The setting range depends on the setting of the decimal point position (SDP).	-
PCL	Low limit for PV display color change (PCL)	When PV display color mode (PCM) is 6 or 7: -1999 to PCH-1digit When PV display color mode (PCM) is 8 or 9: -100.0 to 100.0% of the measured input range * The setting range depends on the setting of the decimal point position (SDP).	-

Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
PCn	PV display color mode (PCM)	0: Fixed in green 1: Fixed in red 2: Link to alarm 1 (under normal condition: green; at alarm status: red) 3: Link to alarm 1 (under normal condition: red; at alarm status: green) 4: Link to alarm 1 and alarm 2 (under normal condition: green; at alarm status: red) 5: Link to alarm 1 and alarm 2 (under normal condition: red; at alarm status: green) 6: PV limit* (when more than PCL, less than PCH: green; when PCL or less, PCH or more: red) 7: PV limit* (when more than PCL, less than PCH:red; when PCL or less, PCH or more: green) 8: SP deviation* (when more than SP-PCL, less than SP+PCH: green; when SP-PCL or less, SP+PCH or more: red) 9: SP deviation* (when more than SP-PCL, less than SP+PCH: red; when SP-PCL or less, SP+PCH or more: green) 10: Link to alarm 1 to alarm 4 (under normal condition: green; at alarm status: red) 11: Link to alarm 1 to alarm 4 (under normal condition: red; at alarm status: green)	1

\*: PV display color is changed linking to the setting range of high limit (PCH) and low limit (PCL) for PV display color change.

### 11.2 Setting Active Color PV Display

This section describes an example of setting the PV display color mode (PCM) to "6," high limit for PV display color change (PCH) to "70" and low limit (PCL) to "20."

The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.

Setup Parameter Screen 2

Press the SET/ENT key to display parameter "PCM."

Press the UP or DOWN key to display "6" on the DATA display.

The decimal point blinks during data change.

Press the SET/ENT key to accept PV display color mode "6."

This completes the process for setting the PV display color mode.

Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

Operation Parameter Screen

When you press the SET/ENT key for more than 3 sec. with the Operation Parameter Screen displayed, the Setup Parameter Screen 1 appears.

Setup Parameter Screen 1

Press the SET/ENT key to display parameter "PCH."

Press the UP or DOWN key to display "70" on the DATA display.

The decimal point blinks during data change.

Press the SET/ENT key to accept the high limit for PV display color change "70."

This completes the process for setting the high limit for PV display color change.

Press the SET/ENT key to display parameter "PCL."

Press the UP or DOWN key to display "20" on the DATA display.

The decimal point blinks during data change.

Press the SET/ENT key to accept the low limit for PV display color change "20."

This completes the process for setting the low limit for PV display color change.

Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

To the Operation Parameter Screen

## 12. OTHER PARAMETERS

### 12.1 Setting Ranges and Factory-Set Values

Setup Parameter Screen 1

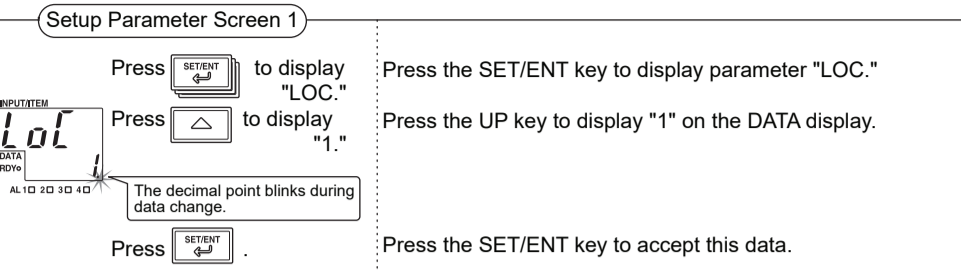
Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
LoL	Key lock (LOC)	0: Without lock. All parameters can be set. 1: Parameters other than the operation parameters cannot be changed. 2: All parameters cannot be changed. -1: This moves to the Setup Parameter Screen 2.	0

Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
b5	Measured input bias (BS)	-1999 to 9999	0
ECo	Economical mode time (ECO)	0 (Continuous: no display OFF function), 1 to 60 (minutes)	10
rLy	Relay specification display (RLY)	You can check the relay specifications for alarm output 1, alarm output 2, and FAIL output. The setting cannot be changed only by checking.	----

## 12.2 Setting Key Lock

This section describes an example of locking keys so that parameter settings other than the operation parameters cannot be changed. The procedure below begins with the condition in which the Setup Parameter Screen 1 is displayed.

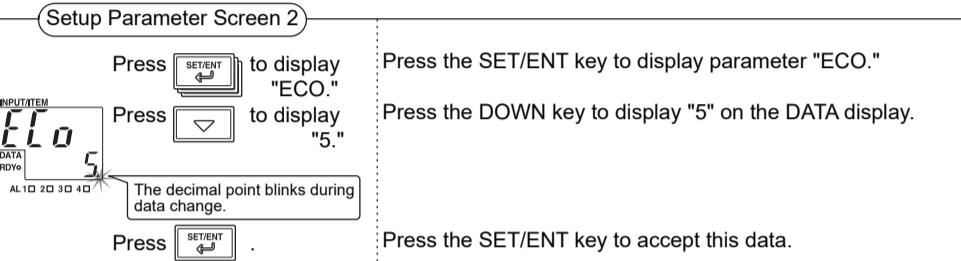


## 12.3 Setting Economical Mode Time

Setting economical mode time allows indications on the PV display to be extinguished if no keystroke is made within the set time.

The MVHK's power consumption in the OFF mode is approximately 0.5 W or 1 VA during normal operations (non-alarm status). This section describes an example of setting the economical mode time to "5 minutes" (factory-set value: 10 minutes).

The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.

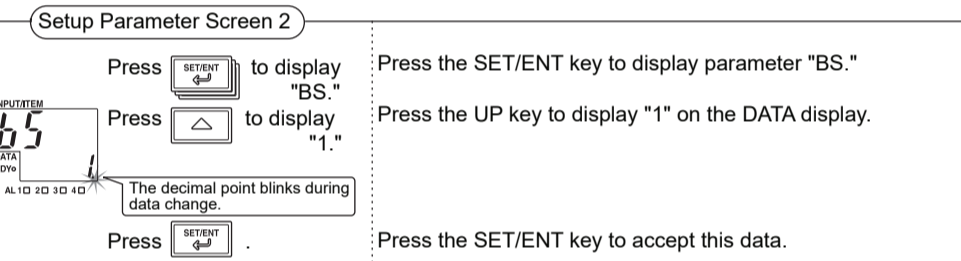


### CAUTION

The economical mode is temporarily released at the time of PV display color change and the PV display lights up. After the set economical mode time elapsed from the time of returning to normal operation, the economical mode operation begins again.

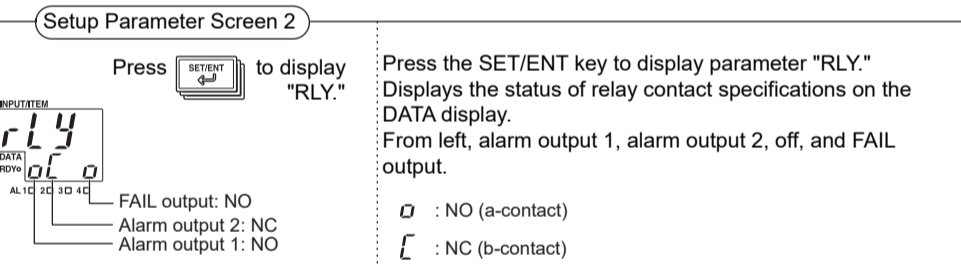
## 12.4 Setting Input Bias

This section describes an example of correcting an error by setting input bias if there is an error of "-1" in the MVHK scaling value (displayed value) with respect to the measured value. The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.



## 12.5 Confirmation of relay contact specifications (FAIL output type only)

For the FAIL output type (type code 2), you can check the relay contact specifications of alarm output 1, alarm output 2, and FAIL output specified at the time of order. The setting cannot be changed only by checking. This section describes the case of MVHK option specification code "/ F3". The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.



## 13. MONITOR OUTPUT

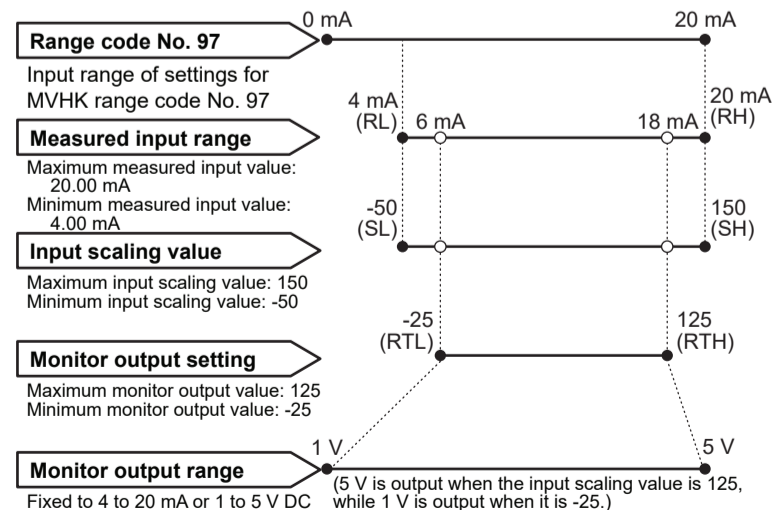
### 13.1 Monitor Output (Analog)

Monitor output (analog) is added only when monitor output code "6" or "A" is specified at the time of order.

#### 13.1.1 Setting Monitor Output

In setting monitor output, the maximum monitor output value (RTH) and minimum monitor output value (RTL) can be freely set within the range of the maximum input scaling value (SH) and minimum input scaling value (SL) that have been set for the MVHK.

For example, when the MVHK range code No. (IN) is "97," the measured input range (RL, RH) is "4 to 20 mA DC," the input scaling values (displayed values) (SL, SH) are "-50 to 150" and monitor output is "1 to 5 V DC," setting the maximum monitor output value (RTH) to "125" and the minimum monitor output value (RTL) to "-25" causes monitor output to be "1 V" when input to the MVHK is 6 mA (scaling value -25) as shown below.



### 13.1.2 Setting Ranges and Factory-Set Values of Monitor Output (Analog)-Related Parameters

#### Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
rth	Maximum monitor output value (RTH)	RTL + 1 digit to 9999 Within the instrument input range	SH
rtl	Minimum monitor output value (RTL)	-1999 to RTH - 1 digit Within the instrument input range	SL
non	Visibility of monitor output adjustment screen (MON)	OFF (invisible) or ON (visible) Set this parameter to "ON" for adjustments of monitor output.	OFF (invisible)
man	Forced output of a monitor output value (MAN)	-25.0 to +125.0 (%) Note that the assured range is -6.0 to +106 (%).	0.0
zer	Monitor output zero adjustment (ZER)	-19.99 to 20.00 (%)	0.00
spn	Monitor output span adjustment (SPN)	-19.99 to 20.00 (%)	0.00

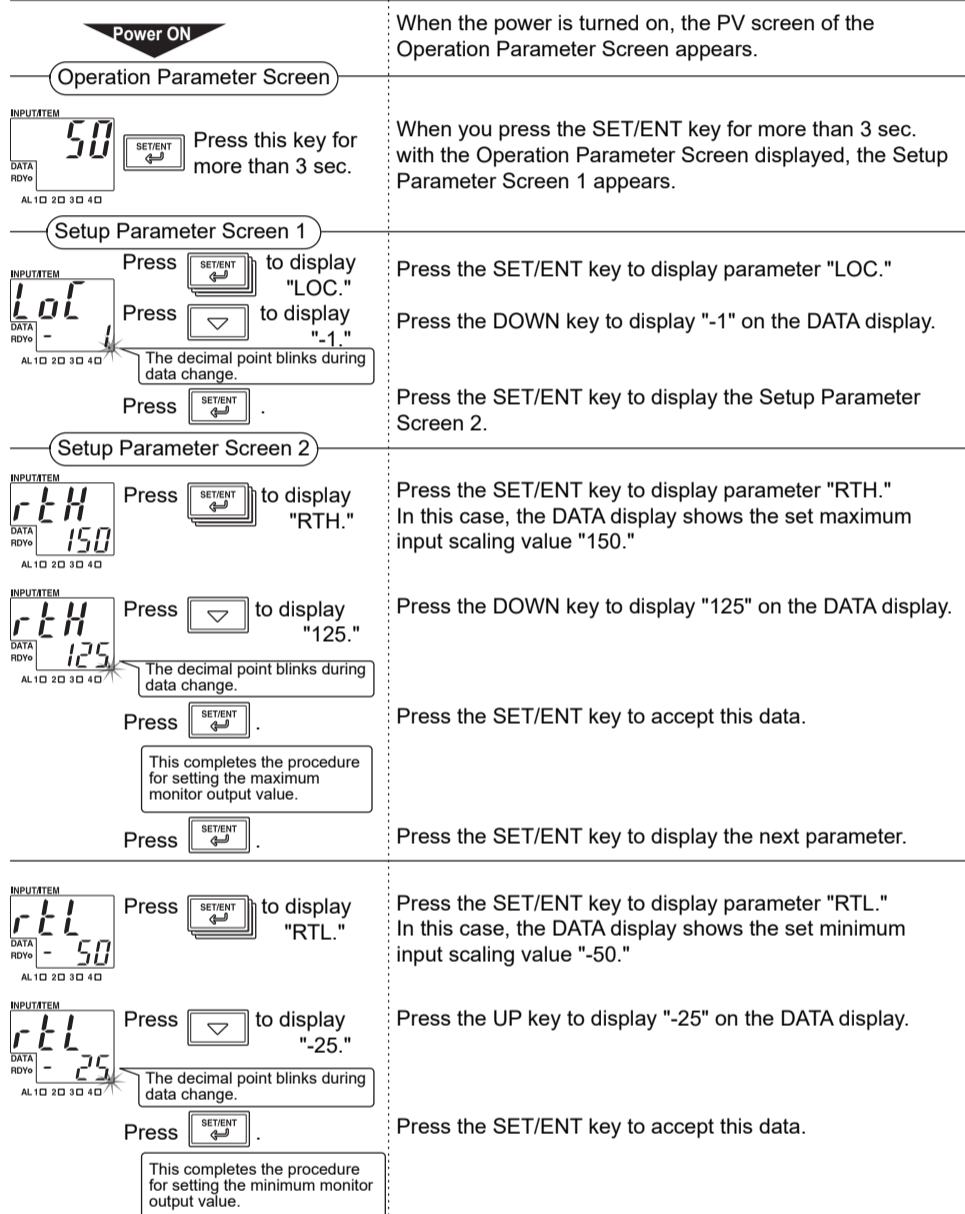
#### 13.1.3 Setting Monitor Output



### CAUTION

Accuracy ( $\pm 0.1\%$  of output span) is limited depending on the settings for input scaling and maximum and minimum monitor output values. For more information on accuracy limitations, refer to the general specifications (GS 77J04H31-01E).

This subsection describes an example of setting the maximum monitor output value (RTH) to "125" and minimum monitor output value (RTL) to "-25" when the MVHK input scaling values (displayed values) (SL, SH) are "-50 to 150."



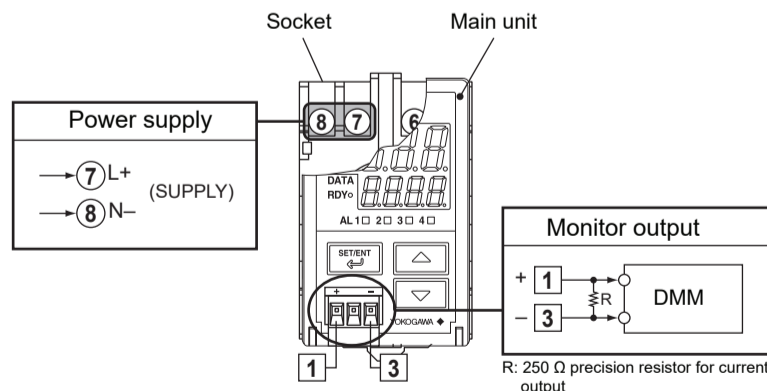
#### 13.1.4 Adjusting Monitor Output

##### (1) Instruments for adjustment

- Digital multimeter (DMM) (YOKOGAWA DM7560 or the equivalent): 1
- Precision resistor of  $250 \Omega \pm 0.01\%$ , 0.25 W or more: 1

##### (2) Output adjustments

Connect each instrument as shown below.



##### (3) Adjusting monitor output

The following describes an example of adjusting an error when the minimum monitor output value (measured value) is 1.008 V (an error of 0.008 V) with the MVHK monitor output set to "1 to 5 V DC." The basic adjusting procedure for the maximum monitor output value is the same as that of the minimum monitor output value; perform it by referring to the procedure below.

The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.

The MVHK enters the operable status as soon as the power is turned on, but requires 10 to 15 minutes of warm-up to meet the performance requirements.

### Setup Parameter Screen 2

Press to display "MON."

Press the SET/ENT key to display parameter "MON."

Press to display "ON."

Press the UP key to display "ON" on the DATA display.

Press .

Press the SET/ENT key to accept the data.

This establishes the setting in which the monitor output adjustment screen becomes visible.

Press to display "ZER."

Press the SET/ENT key twice to display parameter "ZER."

The minimum output value (1 V) is output forcibly.

**When this parameter (ZER) is displayed, the MVHK forcibly outputs the minimum monitor output value (0%), regardless of input.**

$$\text{Error} = \frac{(\text{Measured value [1.008 V]} - (\text{Reference value [1 V]}))}{\text{Output span [4 V]}} \times 100 (\%)$$

(Displays a correction value corresponding to the error.)

Press to display "-0.20."

Press or to make fine adjustments.

This completes the process for adjusting the minimum monitor output value.

The monitor output is corrected by -0.2% because the error is +0.008 V (+0.2%).

Press the DOWN key to display "-0.20" on the DATA display.

Then press the UP or DOWN key to make fine adjustments.

Follow the same procedure as above to adjust the maximum monitor output value.

The maximum output value (5 V) is output forcibly.

Make adjustments to the maximum monitor output value by displaying parameter "SPN".

After adjusting the monitor output, set the MON parameter to "OFF" (making the adjustment screen invisible).

Press to display "OFF."

Display parameter "MON" and press the DOWN key to display "OFF" on the DATA display.

Press .

Press the SET/ENT key to accept the data.

This establishes the setting in which the monitor output adjustment screen becomes invisible.

### 13.1.5 Using the Forced Output Function

The use of the forced output function allows you to conduct operation tests for a device connected to the monitor output terminals of the MVHK. This subsection describes an example of forcing a value equivalent to 50% of the output range (3 V) to output when the monitor output of the MVHK is "1 to 5 V DC." The procedure below begins with the condition in which parameter "MAN" is displayed with the MON parameter set to "ON" in the Setup Parameter Screen 2.

### Setup Parameter Screen 2

The minimum output value (1 V) is output forcibly.

Pressing causes the output value to increase.

Press the UP key to display "50.0" on the DATA display.

When this parameter (MAN) is displayed, the MVHK forces the monitor output value to be output, regardless of input.

The value equivalent to 50% of the output range (3 V) is output forcibly.

3 V is output forcibly. The MVHK continues to output while this parameter is displayed on the screen.

After completion of the forced output, return the MON parameter setting to "OFF" (making the adjustment screen invisible).

### CAUTION

After performing monitor output adjustments or forced output, always set the MON parameter to "OFF" (making the adjustment screen invisible). If the Setup Parameter Screen 2 is switched while the MON parameter is set to "ON," displaying parameter "MAN," "ZER" or "SPN" causes a value corresponding to the set value to be output forcibly. Furthermore, if the power is turned off while parameter "MAN" is displayed, the set values will be initialized.

## 13.2 Monitor Output (Communication)

Monitor output (communication) is added only when the monitor output code "P" is specified at the time of order.

### 13.2.1 Setting Ranges and Factory-Set Values of Monitor Output (Communication)-Related Parameters

#### Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
PSL	Communication protocol (PSL)	0: PC link 1: PC link with SUM 2: Ladder communication 3: MODBUS ASCII 4: MODBUS RTU	0 (PC link)
Adr	Communication address (ADR)	1 to 99	1
bPS	Baud rate (BPS)	1.2 (0: 1200 bps) 2.4 (1: 2400 bps) 4.8 (2: 4800 bps) 9.6 (3: 9600 bps) 19.2 (4: 19200 bps) 38.4 (5: 38400 bps)	9.6 (9600 bps)
Pri	Parity (PRI)	NON (0: None) EVN (1: Even) ODD (2: Odd)	EVN (Even)
STP	Stop bit (STP)	1 or 2 (bits)	1
DLn	Data length (DLN)	7 or 8 (bits)	8

## 13.2.2 Setting the Communication-Related Parameters

**Power ON**

When the power is turned on, the PV screen of the Operation Parameter Screen appears.

**Operation Parameter Screen**

Press this key for more than 3 sec.

When you press the SET/ENT key for more than 3 sec. with the Operation Parameter Screen displayed, the Setup Parameter Screen 1 appears.

**Setup Parameter Screen 1**

Press to display "LOC."

Press to display "-1."

The decimal point blinks during data change.

Press .

Press the SET/ENT key to display parameter "LOC."

Press the DOWN key to display "-1" on the DATA display.

Press the SET/ENT key to display the Setup Parameter Screen 2.

**Setup Parameter Screen 2**

Press to display "PSL."

Press or to display the communication protocol number to use.

Press .

This completes the process for setting the communication protocol.

Press the SET/ENT key to accept this data.

Press the SET/ENT key to display the next parameter.

Follow the same procedure to set the following parameters:

**Parameter "ADR" for setting the communication address**

**Parameter "BPS" for setting the baud rate**

**Parameter "PRI" for setting the parity**

**Parameter "STP" for setting the stop bit**

**Parameter "DLN" for setting the data length**

### See Also

For more information on the communication functions, refer to the M Series Digital Limit Alarms Communication Functions User's Manual (IM 77J04J11-01E) sold separately.

## 14. TROUBLESHOOTING

### Possible Errors Occurring at Power ON

The following describes possible errors occurring at power ON.

Error Indication				Status					Remedy
PV Display	Alarm Indicator Lamps	READY Lamp	Description of Error	PV	Alarm Output	Fail output	Monitor Output		
							RS-485	Analog	
Undefined	Undefined	Undefined	CPU failure	Undefined	Undefined	Undefined	Undefined	Undefined	Failure. Submit request for us to repair.
OFF	OFF	OFF	Power failure	None (0%)	OFF	De-energized	Invalid	0% or less	
Err	OFF	Normal	EEP sum error	None (0%)	OFF	De-energized	Invalid	0% or less	
Err blinks	OFF	Blinks	RAM error	None (0%)	OFF	De-energized	Invalid	0% or less	
	AL2 blinks		ROM error	None (0%)	OFF	De-energized	Invalid	0% or less	

### Possible Errors Occurring during Operations

The following describes errors that may occur during operations.

Error Indication				Status					Remedy
PV Display	Alarm Indicator Lamps	READY Lamp	Description of Error	PV	Alarm Output	Fail output	Monitor Output		
							RS-485	Analog	
Err blinks	AL1 lights	Normal	EEPROM error	None (0%)	OFF	De-energized	Invalid	0% or less	Failure. Submit request for us to repair.
	AL2 lights								
000	Normal	Normal	Input exceeding high limit	110% of the measured range	Normal	Energized	Normal	106% or more of the output range	Check input.
000	Normal	Normal	Input falling below low limit	-10% of the measured range	Normal	Energized	Normal	-6% or less of the output range	Check input.
Decimal point blinks	Normal	Normal	Communication error	Normal	Normal	Energized	Normal	Normal	Press any key, or if normal communication is made, a communication error will be cleared.