

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.

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IM 77J04T31-01E
3rd Edition Oct. 2019 (YK)

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 MVTK Limit Alarm for Thermocouple Input (User's Manual)	IM 77J04T31-01E (This manual)
Model MVTK Limit Alarm for Thermocouple Input (General Specifications)	GS 77J04T31-01E

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.

- MVTK: 1
- Tag number label: 1 sheet
- Range label: 1 sheet
- Spacer: 1 (used for DIN rail mounting)
- RJC sensor (reference junction compensator): 1
- Monitor output terminal connector: 1 (supplied when monitor output code 6, A, P is specified)
- User's manual (this manual: IM 77J04T31-01E): 1

GENERAL

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

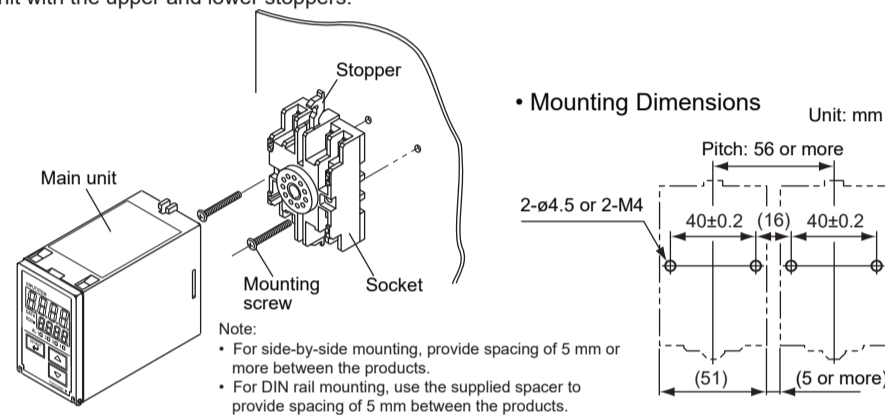
MODEL AND SUFFIX CODES

Model	Suffix codes	Description
MVTK	-0 0 □ □ □ □ □ /□□	Limit Alarm for Thermocouple Input
Type	-0 □ □ □ □ □ □	General use type
	0	Always 0
Power Supply	3	24 V DC±10%
	6	100-240 V AC/DC (Operating range: 85 to 264 V)
	-U	Thermocouple input
	-Z	Custom order
Output Signal	1	Alarm output (transfer contact [1a1b]), 2 points
	2	Alarm output (NO contact), 4 points
Monitor Output	6	1 to 5 V DC
	A	4 to 20 mA DC
	P	Communication function (RS-485)
	N	No monitor output
Burnout Function	U	UP
	D	DOWN
	N	OFF
Optional Specification	/SN	No socket (with socket if not specified)
	/CO	Coating
	/FB	Fuse bypass

1. MOUNTING METHODS

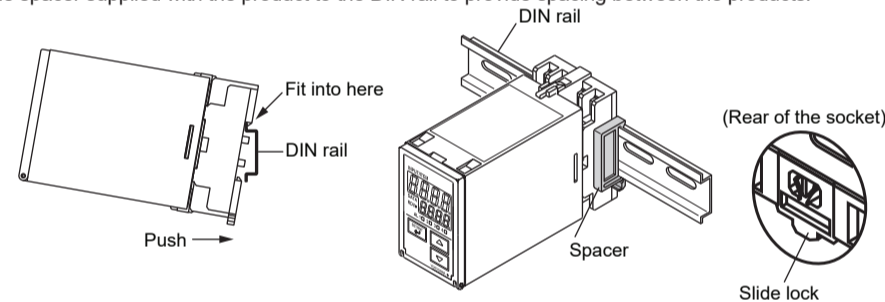
1.1 Wall Mounting

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.



1.2 DIN Rail Mounting

Locate the MVTK 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/s² or less, 1 oct/min for 90 minutes each in the three axis directions
- Impact: 98 m/s² or less, 11 ms, 3 axes, 6 directions, 3 times each
- Install in a place where rigidity is secured.

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

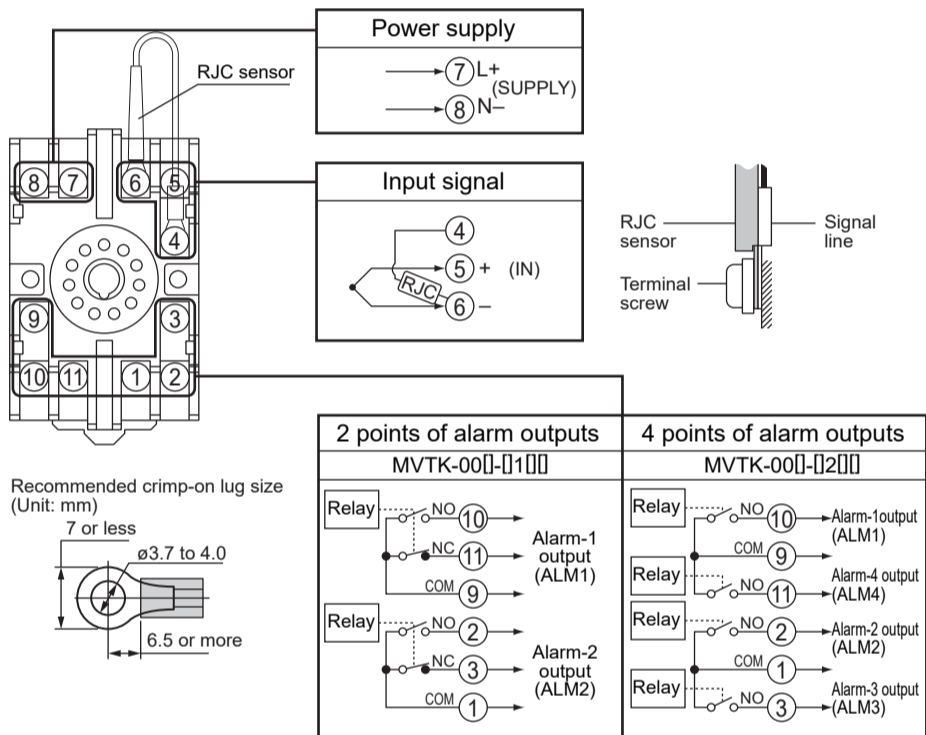
WARNING

- 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

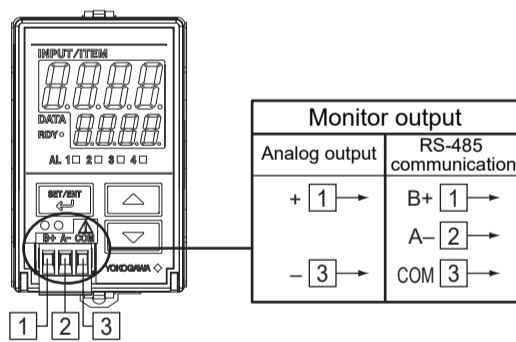
- The power line and input/output signal lines should be installed away from noise-generating sources. Otherwise accuracy cannot be guaranteed.
- The product is sensitive to static electricity; exercise care in operating it. Before you operate the product, touch a nearby metal part to discharge static 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 μ F with respect to a contact current of 1 A
 - Resistor: 0.5 to 1 Ω 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 MBB¹ 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
- Connect the RJC sensor at the correct position as shown below. Otherwise temperatures cannot be measured correctly.
- Connect the RJC sensor so that it overlaps the input signal line.
- Handle the RJC sensor lead wire care to prevent disconnection.

Wiring should be connected to the terminals on the socket of the MVTK. 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 mm² or thicker, while the power cable has a nominal cross-sectional area of 1.25 mm² or thicker.



4.1 Wiring for Monitor Output

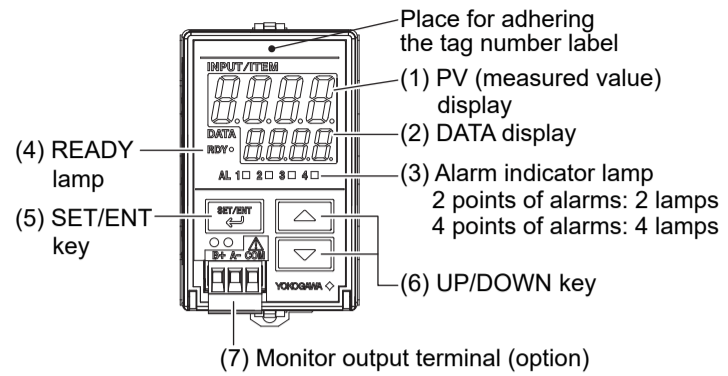
If the monitor output code (one of 6, A or P) is specified at the time of order, the following wiring is possible.



5. PART NAMES OF FRONT PANEL AND THEIR FUNCTIONS

CAUTION

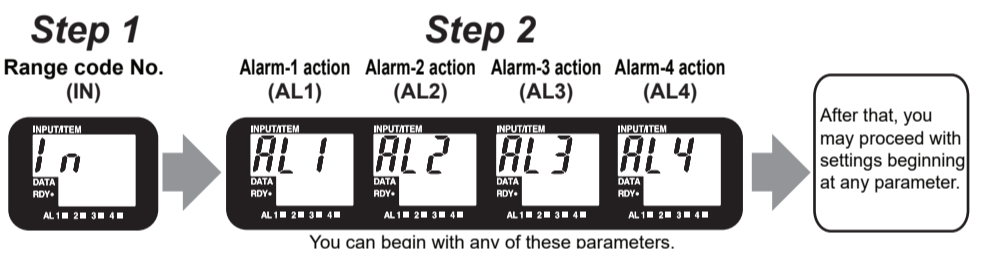
The front panel of the product is constructed to prevent opening. Forcing it open will result in breakage.



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" style="margin-top: 10px;"> <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 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.										
(6) UP/DOWN key	Used to change the setpoint of a parameter. Pressing the Δ key increases a numerical value. Pressing the ∇ 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.)										

6. PARAMETER

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



CAUTION

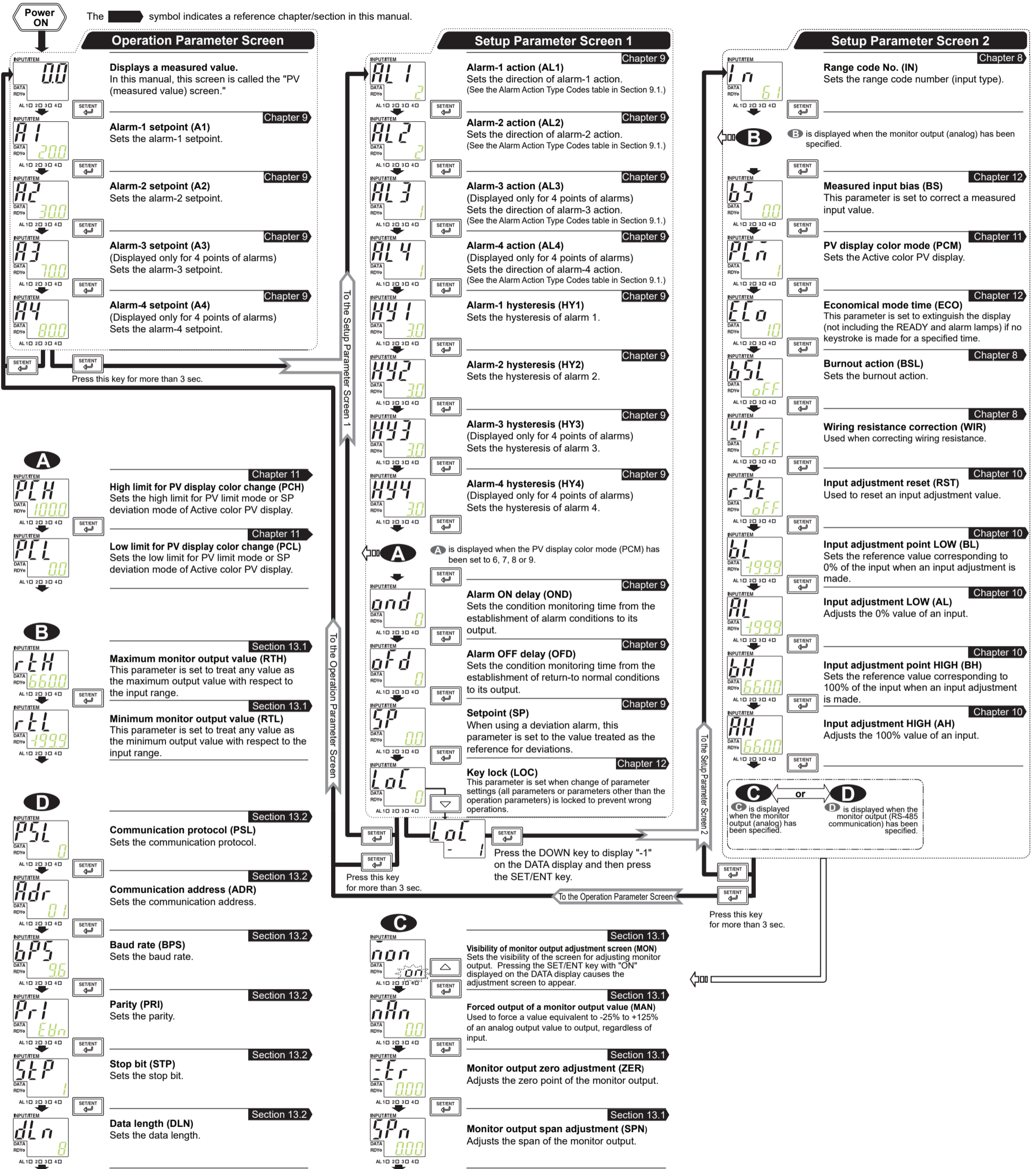
- If the settings for the range code No. (IN) or alarm actions (AL1 to AL4) are changed, the relevant parameter setpoints shown in the table below will be initialized. To change a parameter setpoint, begin with Step 1 above and continue in sequence.
- Do not turn off the power of this product while changing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

Parameters to be initialized if the range code No. (IN) is changed
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), wiring resistance correction (WIR)
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 Setting Ranges and Factory-Set Values of Input-Related Parameters

Setup Parameter Screen 2

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value		
<i>in</i>	Range code No. (IN)	Range code No.	1 or the range code No. specified at the time of order		
		Input type			
		Instrument input range			
		1		Type K	-200 to 1200 °C
		2		Type E	-60.0 to 600.0 °C
		3			
		4		Type J	-40.0 to 350.0 °C
		5			
		6		Type T	0.0 to 750.0 °C
		7			
		8		Type R	0.0 to 450.0 °C
		9			
		10		Type S	-199.9 to 350.0 °C
		11			
		12		Type B	-70.0 to 350.0 °C
		13			
		14		Type N	0 to 1600 °C
		15			
		16		Type W3	0 to 1600 °C
		17			
		18		Type W5	600 to 1700 °C
		19			
		20		Type K	0 to 2000 °C
		21			
		22		Type E	0 to 1390 °C
		23			
		24		Type J	0 to 2000 °C
		25			
		26		Type T	0 to 1560 °C
		27			
		28		Type K	80 to 1470 K
		29			
		30		Type E	210.0 to 875.0 K
		31			
		32		Type J	80 to 1070 K
		33			
		34		Type T	230.0 to 620.0 K
35					
36	Type R	273 to 1020 K			
37					
38	Type S	273.0 to 730.0 K			
39					
40	Type B	80.0 to 620.0 K			
41					
42	Type N	210.0 to 620.0 K			
43					
44	Type W3	273 to 1870 K			
45					
46	Type W5	273 to 1870 K			
47					
48	Type K	1120 to 1970 K			
49					
50	Type E	80 to 1470 K			
51					
52	Type J	170.0 to 980.0 K			
53					
54	Type T	273 to 2270 K			
55					
56	Type R	273 to 1660 K			
57					
58	Type S	273 to 2270 K			
59					
60	Type B	273 to 1830 K			
61					
Type W3: W97Re3-W75Re25 (tungsten97% rhenium 3%- tungsten 75% rhenium 25%) The abbreviation of ASTM E988 Standard. Type W5: W95Re5-W74Re26 (tungsten95% rhenium 5%- tungsten 74% rhenium 26%) The abbreviation of ASTM E988 Standard.					
<i>bsl</i>	Burnout action (BSL)	OFF (0), UP (1), DOWN (2)	According to the suffix codes specified at the time of order		
<i>wir</i>	Wiring resistance correction (WIR)	OFF (0), ON (1)	OFF		
<i>rjc</i>	RJC sensor (RJC)	OFF (0), ON (1)	ON		

8.2 Setting Range Code No.

This section describes an example of setting the range code No. (IN) to "2" (instrument input range: -60.0 to 600.0°C).

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 "LOC."
Press the DOWN key to display "-1."
Press the SET/ENT key to display parameter "IN" for setting the range code No. in the Setup Parameter Screen 2.

Setup Parameter Screen 2
Step 1
Press the UP or DOWN key to display "2" on the DATA display.
Press the SET/ENT key to accept range code No. "2."
Press the SET/ENT key again for more than 3 sec. This causes the Operation Parameter Screen to appear.

To the Operation Parameter Screen

8.3 Setting Burnout Action

This section describes an example of setting the burnout action to "UP." 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 "BSL."
Press the UP or DOWN key to display "UP" on the DATA display.
Press the SET/ENT key to accept burnout "UP."
This completes the process for setting the burnout action.

8.4 Correcting Wiring Resistance

This section describes how to correct wiring resistance when an error occurs due to the influence of the input wiring resistance. Correct wiring resistance after completing the wiring.

Setup Parameter Screen 2
Short-circuit at the cable end.
The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.
Press the SET/ENT key to display parameter "WIR."
Press the UP or DOWN key to display "ON" on the DATA display.
Press the SET/ENT key to correct the wiring resistance.
This completes the process for correcting the wiring resistance.



CAUTION

If the burnout action setting is changed, the wiring resistance correction is automatically set to OFF (0). Correct the wiring resistance again after changing the burnout action setting.

8.5 Setting On/Off of RJC

This section describes an example of setting ON/OFF of the RJC.

Setup Parameter Screen 2
Press the SET/ENT key to display parameter "RJC."
Press the UP or DOWN key to display "OFF" on the DATA display.
Press the SET/ENT key to accept RJC "OFF."
This completes the process for setting OFF for the RJC sensor.

9. SETTING ALARM-RELATED PARAMETERS

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

The followings are the factory-set values for the range code No. 1. They may differ depending on the range code No. specified at the time of order.

Operation Parameter Screen

Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
<i>A1</i>	Alarm-1 setpoint (A1)	Within the instrument input range.	20
<i>A2</i>	Alarm-2 setpoint (A2)		2 points of alarms: 80 4 points of alarms: 30
<i>A3</i>	Alarm-3 setpoint (A3)		70
<i>A4</i>	Alarm-4 setpoint (A4)		80

Setup Parameter Screen 1

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 4 points of alarms: 2
<i>AL3</i>	Alarm-3 action (AL3)		1
<i>AL4</i>	Alarm-4 action (AL4)		1
<i>HY1</i>	Alarm-1 hysteresis (HY1)	The value resulting from adding a hysteresis value to an alarm setpoint should be within the instrument input range.	3
<i>HY2</i>	Alarm-2 hysteresis (HY2)		3
<i>HY3</i>	Alarm-3 hysteresis (HY3)		3
<i>HY4</i>	Alarm-4 hysteresis (HY4)		3
<i>OND</i>	Alarm ON delay (OND)	Setting range: 0 to 999 sec. Setting resolution: 1 sec.	0
<i>OFD</i>	Alarm OFF delay (OFD)	Setting range: 0 to 999 sec. Setting resolution: 1 sec.	0
<i>SP</i>	Setpoint (SP)	Within the instrument input range.	Minimum value of the instrument input range

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 "5.0" (°C) on the DATA display.

Press the SET/ENT key to accept alarm-1 hysteresis "5.0" (°C).

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).

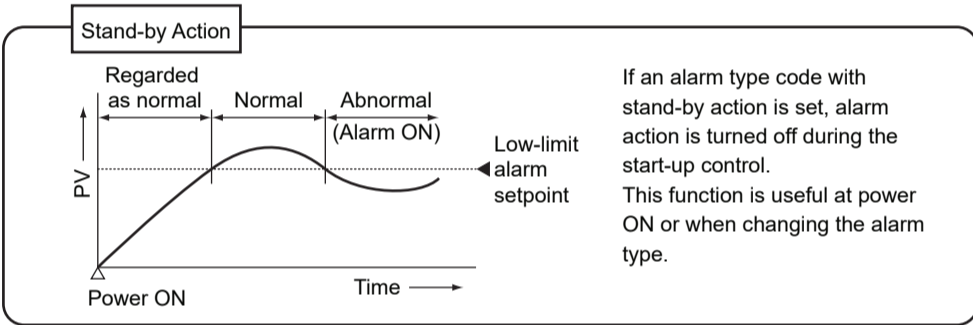
Press the SET/ENT key again to display parameter "OFD."

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" (°C), alarm-1 hysteresis (HY1) to "5" (°C), alarm ON delay (OND) to "5" (sec.) and alarm OFF delay (OFD) to "5" (sec.) with the range code No. (IN) set to "2" (-60.0 to 600.0°C). (Parameters relating to alarm 2 to alarm 4 can be set in the same way as the procedure below.)

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 2

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 "0.0" (°C) that is set to the DATA display.

Press the SET/ENT key to accept low-limit alarm "0.0" (°C).

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)	±10% of the instrument input range span (and BL < BH)	Minimum value of the instrument input range
<i>al</i>	Input adjustment LOW (AL)	±10% of the instrument input range span (and AL < AH)	Minimum value of the instrument input range
<i>bh</i>	Input adjustment point HIGH (BH)	±10% of the instrument input range span (and BL < BH)	Maximum value of the instrument input range
<i>ah</i>	Input adjustment HIGH (AH)	±10% of the instrument input range span (and AL < AH)	Maximum value of the instrument input range

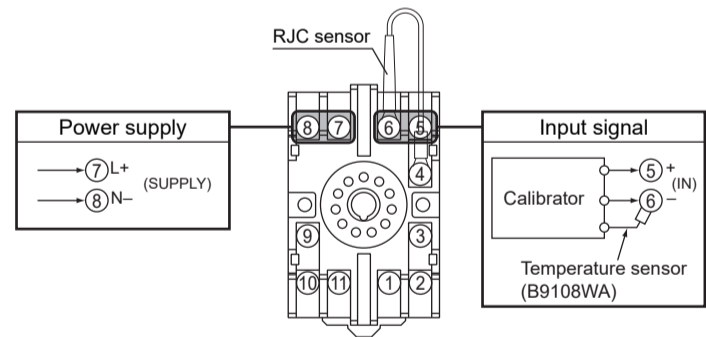
10.2 Instrument for Adjustments

- Calibrator (YOKOGAWA CA150 or equivalent): 1
- Temperature sensor : 1 (YOKOGAWA B9108WA 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 minimum value (BL: input adjustment point LOW) and maximum value (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 within the range of -50.0 to 150.0°C with the MVTK range code No. set to "2" (thermocouple Type K, instrument input range: -60.0 to 600.0°C).

The MVTK 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.

Operation Parameter Screen
Press this 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 "LOC."
Press the DOWN key to display "-1."
Press the SET/ENT key to display the Setup Parameter Screen 2.

Setup Parameter Screen 2
Press the SET/ENT key to display parameter "BL."
In this case, the DATA display shows "-60.0," the minimum value of instrument input range of the set range code No.
Press the UP key to display "-50.0."
Press the SET/ENT key to accept this data.
Press the SET/ENT key to display the next parameter.

Using the calibrator, apply the input -50°C to the MVTK.
This causes parameter "AL" and the measured value to appear alternately.
Press the UP or DOWN key. The decimal point blinks.
Press the SET/ENT key.
The value before adjustment (-52.2) appears on the DATA display.
Press the SET/ENT key to display the next parameter "BH."

In this case, the DATA display shows "600.0," the maximum value of instrument input range of the set range code No.
Press the DOWN key to display "150.0" 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 calibrator, apply the input 150°C to the MVTK.
This causes parameter "AH" and the measured value to appear alternately.
Press the UP or DOWN key. The decimal point blinks.
Press the SET/ENT key.
The value before adjustment (153.9) appears on the DATA display.
This completes the input adjustment for the MVTK.

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.
Press the SET/ENT key.
This resets the previously adjusted value.

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 "70.0" and low limit (PCL) to "20.0." 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.
Press the SET/ENT key to accept PV display color mode "6."
Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

Operation Parameter Screen
Press this 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 "70.0" on the DATA display.
Press the SET/ENT key to accept the high limit for PV display color change "70.0."
Press the SET/ENT key to display parameter "PCL."

Press the UP or DOWN key to display "20.0" on the DATA display.
Press the SET/ENT key to accept the low limit for PV display color change "20.0."
Press the SET/ENT key for more than 3 sec. This causes the Operation Parameter Screen to appear.

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
ELo	Economical mode time (ECO)	0 (Continuous: no display OFF function), 1 to 60 (minutes)	10

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

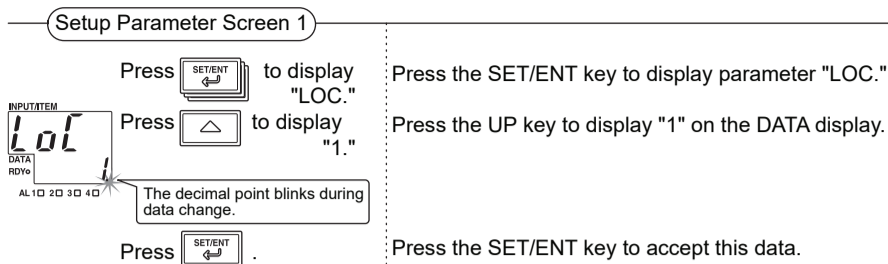
11.1 Setting Ranges and Factory-Set Values

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	-
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	-

12.2 Setting Key Lock

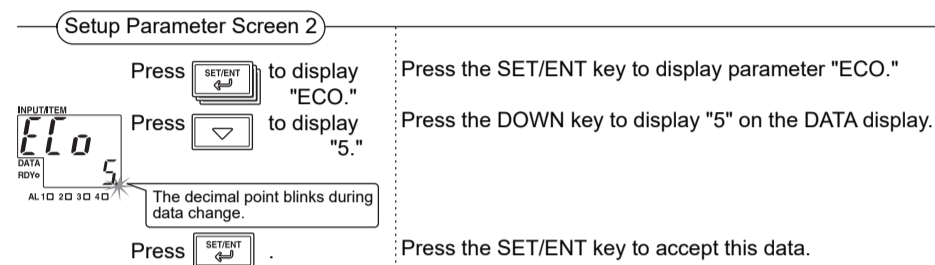
This section describes an example of locking keys so that parameter settings other than the operation parameters cannot be changed. The procedure below begins with the condition in which the Setup Parameter Screen 1 is displayed.



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 MVTK'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.

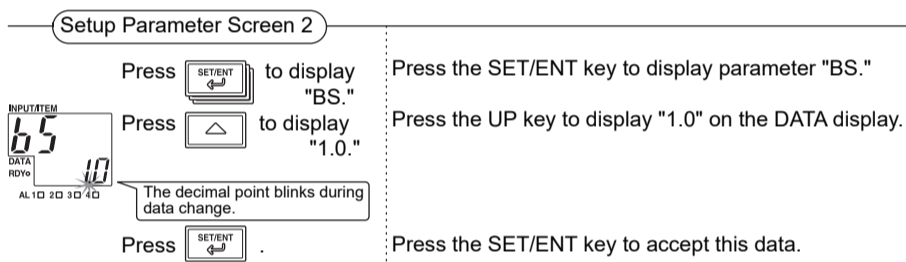


CAUTION

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 (°C)" in the MVTK displayed value with respect to the measured value. The procedure below begins with the condition in which the Setup Parameter Screen 2 is displayed.



13. MONITOR OUTPUT

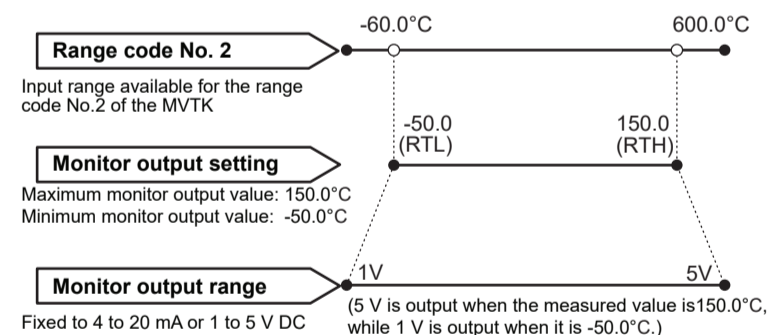
13.1 Monitor Output (Analog)

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 instrument input range of the set range code No. (IN) that have been set for the MVTK.

For example, to set the monitor output corresponding to the measured input range "-50.0 to 150.0°C" to "1 to 5 V DC" when the MVTK range code No. (IN) is "2" (instrument input range: -60.0 to 600.0°C), set the maximum monitor output value (RTH) to "150.0" and the minimum monitor output value (RTL) to "-50.0". This causes monitor output to be "1 V" when input to the MVTK is 50.0°C as shown below.



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

Setup Parameter Screen 2

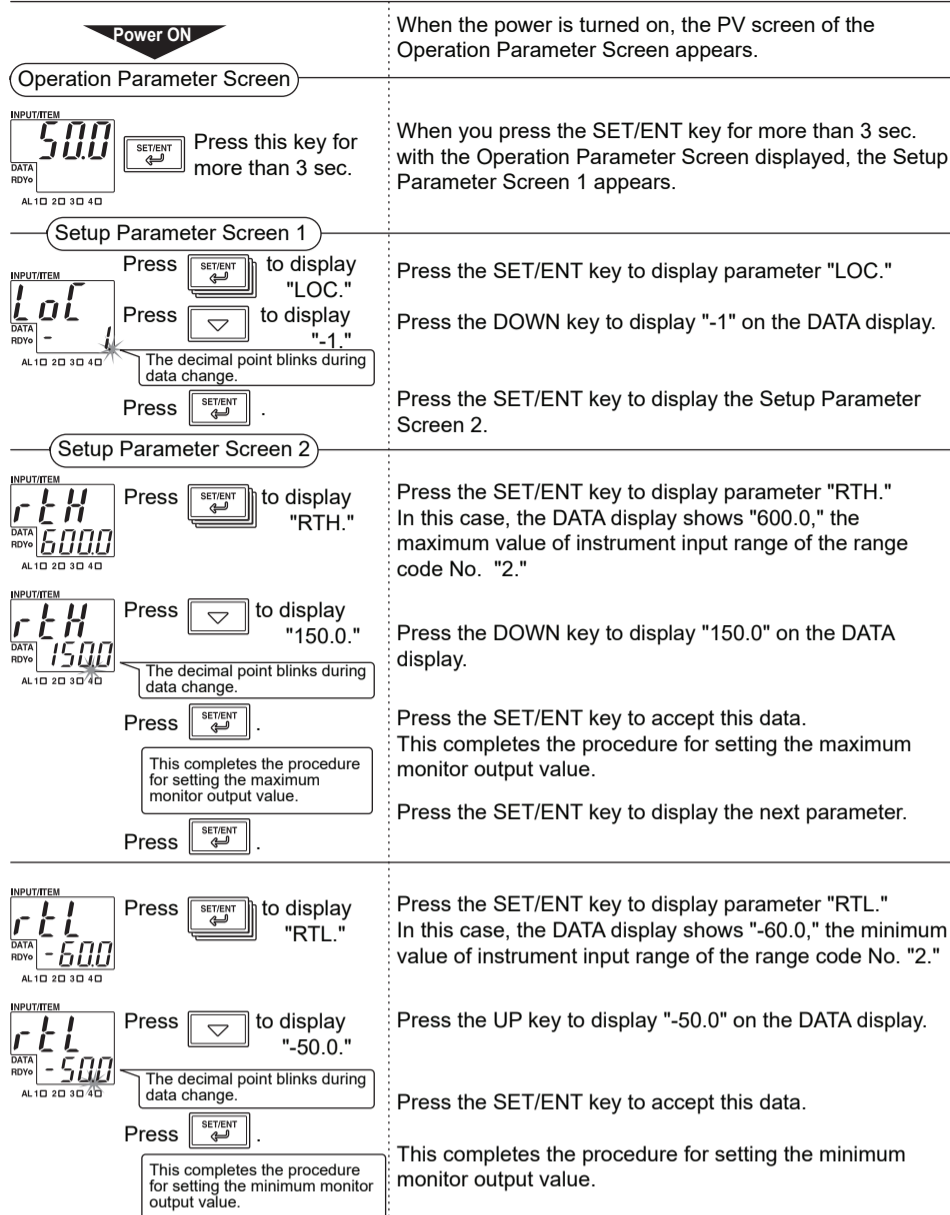
Parameter Symbol	Parameter Name	Setting Range	Factory-Set Value
rTH	Maximum monitor output value (RTH)	RTL + 1 digit to 9999 Within the instrument input range	Maximum value of the instrument input range
rTL	Minimum monitor output value (RTL)	-1999 to RTH - 1 digit Within the instrument input range	Minimum value of the instrument input range
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 maximum and minimum monitor output values. For more information on accuracy limitations, refer to the general specifications (GS 77J04T31-01E).

This subsection describes an example of setting the maximum monitor output value (RTH) to "150.0" and minimum monitor output value (RTL) to "-50.0" when the MVTK range code No. is set to "2."



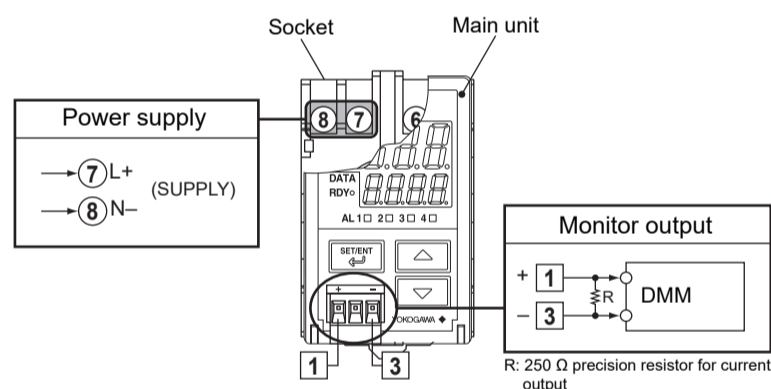
13.1.4 Adjusting Monitor Output

(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 MVTK 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 MVTK 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 MVTK forcibly outputs the minimum monitor output value (0%), regardless of input.

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

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

Press to display "-0.20."

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

Press or to make fine adjustments.

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

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

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 MVTK. 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 MVTK 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.

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

Pressing causes the output value to increase.

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

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

3 V is output forcibly. The MVTK 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 the SET/ENT key to display parameter "LOC."

Press to display "-1."

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

The decimal point blinks during data change.

Press .

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

Setup Parameter Screen 2

Press to display "PSL."

Press the SET/ENT key to display parameter "PSL" for setting the communication protocol.

Press or to display the communication protocol number to use.

Press the UP or DOWN key to display the communication protocol number on the DATA display.

Press .

This completes the process for setting the communication protocol.

Press the SET/ENT key to accept this data.

Press .

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

Possible Errors Occurring during Operations

The following describes errors that may occur during operations.

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