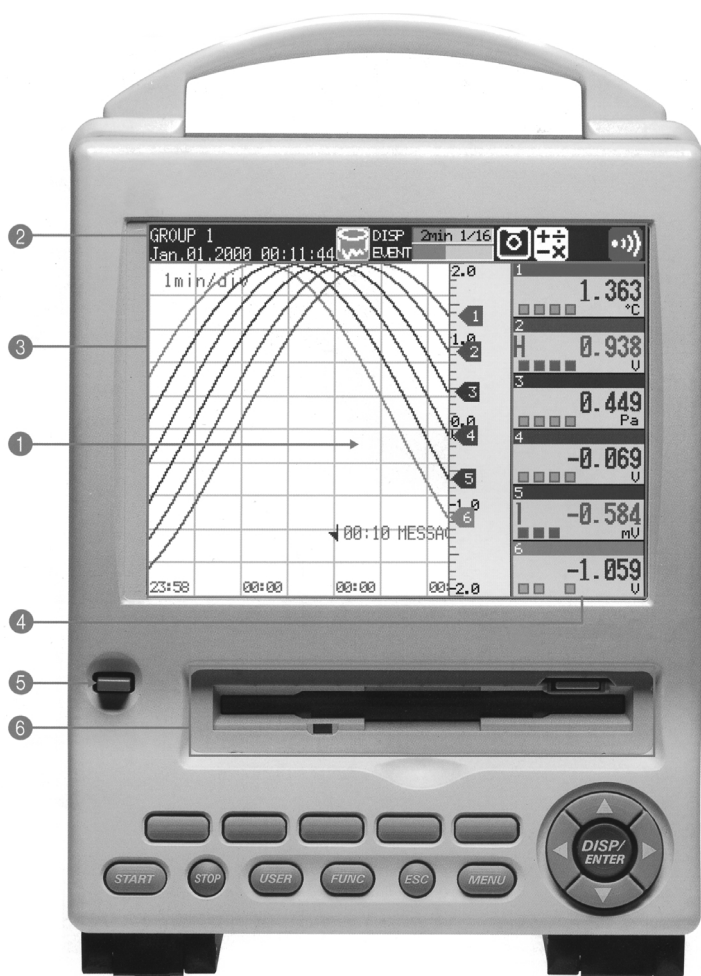


1 YEAR
WARRANTY

OMEGA CARE
Extended Warranty
Program



User's Guide



- ① 5.5-inch wide-viewing-angle color LCD display
- ② RD-MV100 status display area
- ③ Trend display area
The fastest trend display updating rate is 1 min/div (approximately 615 mm/h in terms of display speed).

- ④ Digital display area
The display updating interval is 1 second.
- ⑤ Power ON/OFF switch
- ⑥ Removable storage drive

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RD-MV100 SERIES Recorder



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United Kingdom: <u>ISO 9002 Certified</u>	One Omega Drive, River Bend Technology Centre Northbank, Irlam, Manchester M44 5EX United Kingdom TEL: +44 (0)161 777 6611 Toll Free in United Kingdom: 0800-488-488 e-mail: sales@omega.co.uk	FAX: +44 (0)161 777 6622

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

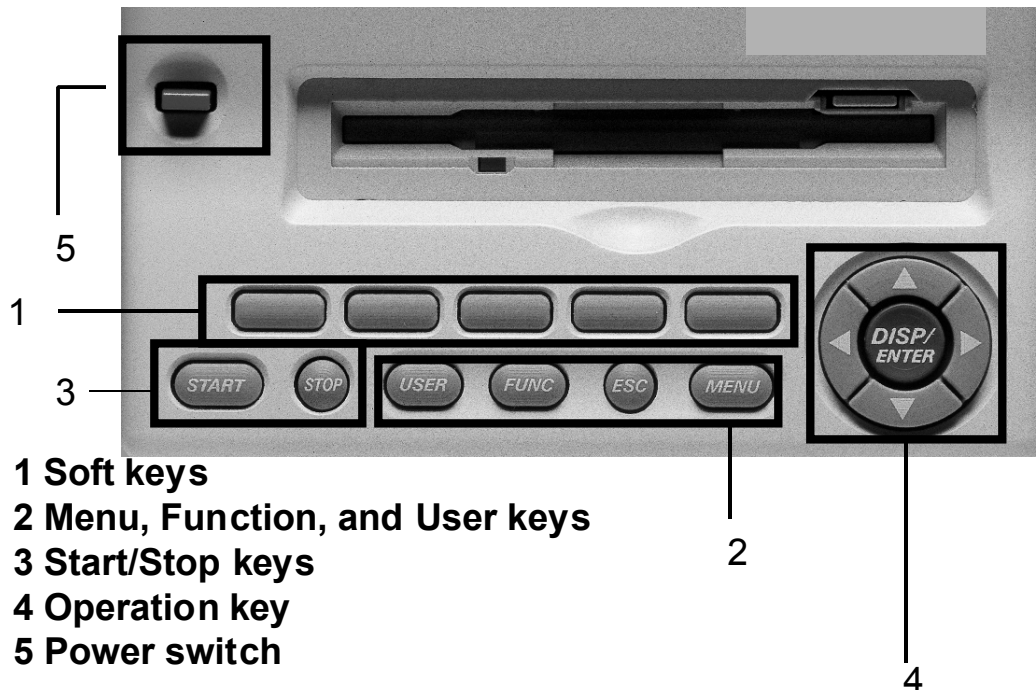
The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

MV100 Quick Reference

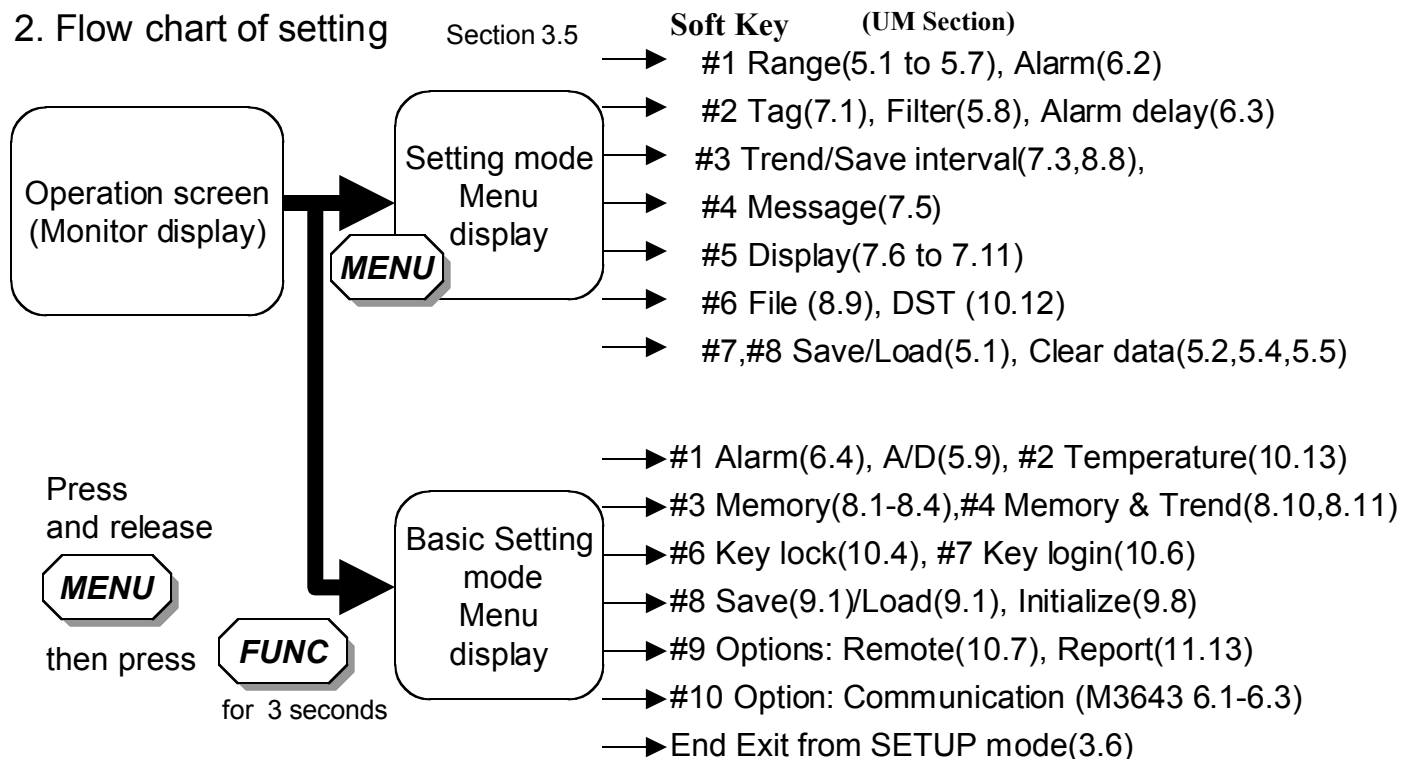
This quick reference should be used as a supplement to the User's Manual M3641.

1. Outline of key arrangement See Section 3.1 for key explanations



- 1 Soft keys
- 2 Menu, Function, and User keys
- 3 Start/Stop keys
- 4 Operation key
- 5 Power switch

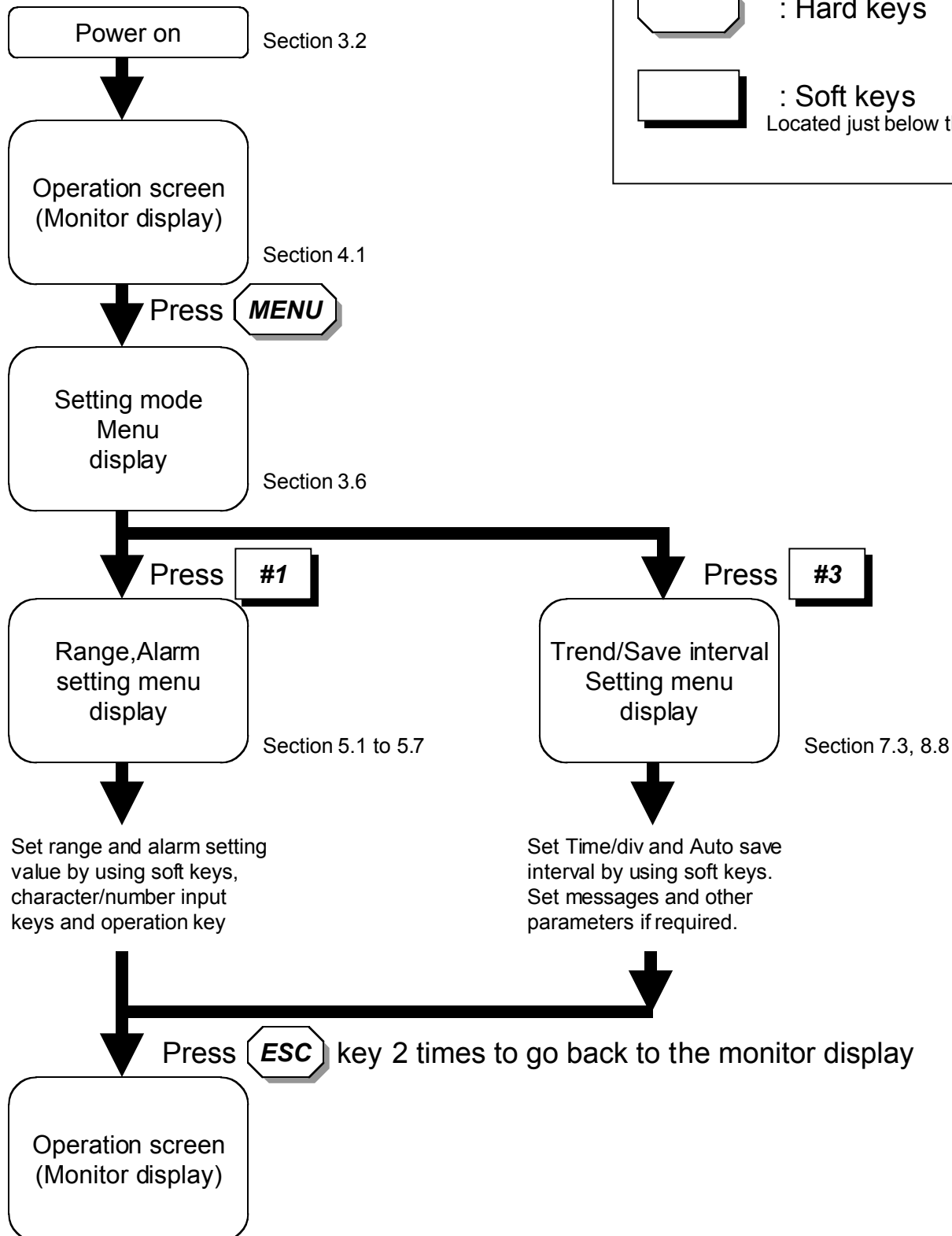
2. Flow chart of setting



MV100 Quick Reference

3. Flow chart of setting

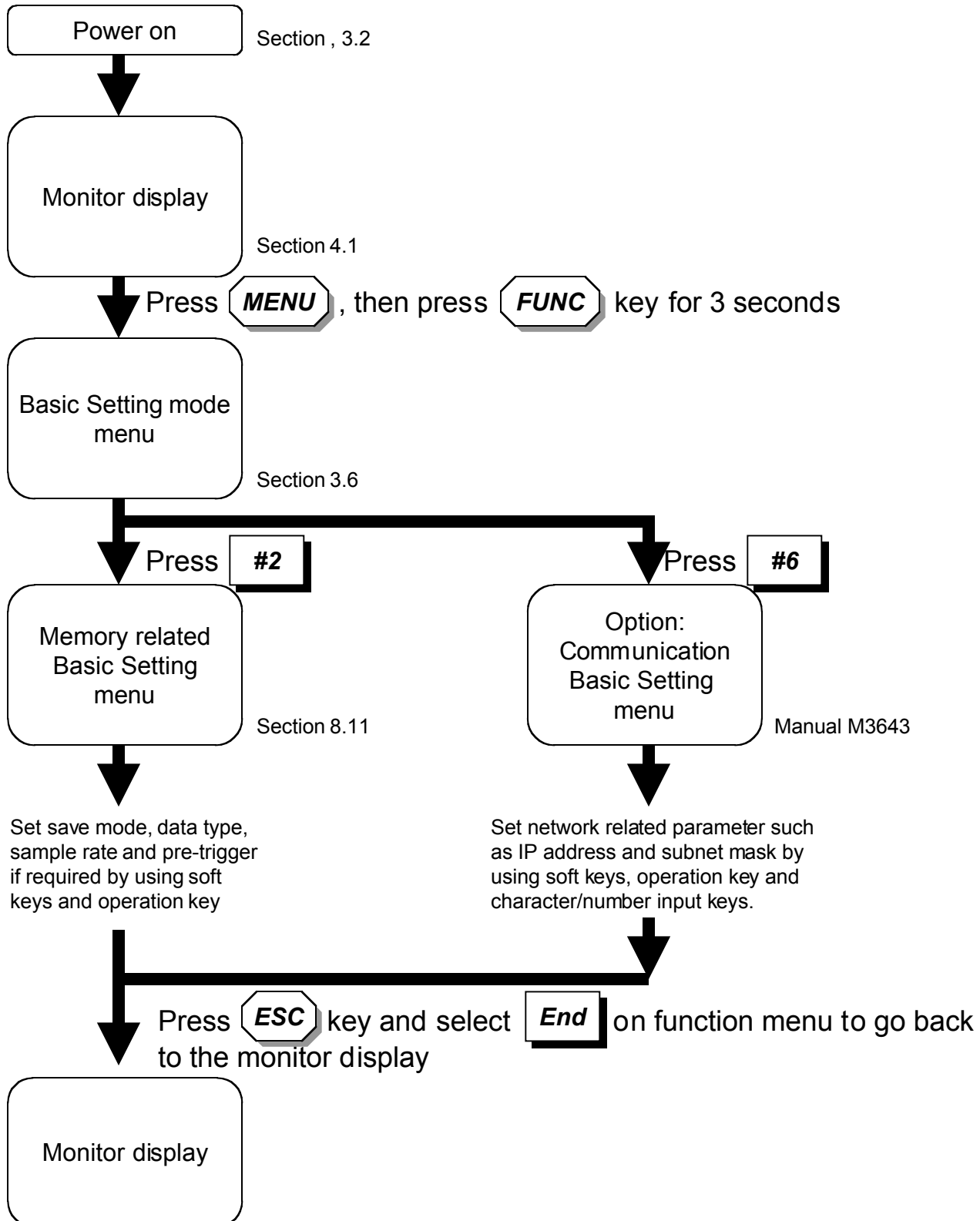
- Range, alarm and trend/save interval setting -



MV100 Quick Reference

4. Flow chart of basic setting

- Memory and communication related function setting -



MV100 Quick Reference

5. Start/stop of data acquisition into internal memory

1) Press **START** to start data storage into the internal memory.

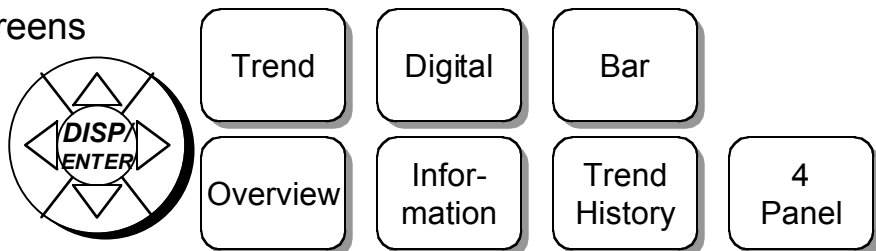
2) Press **STOP** to stop data storage.

Section 8.5, 8.6

6. Switching operation screens

1) Use *DISP/ENTER* key

Section 4.1 to 4.7



7. Data saving to external medium

7-1. While data acquisition is running

1) When **AUTO** mode is selected in save mode on memory related **SETUP** menu*

*:See previous page #2

Periodically or when you press **STOP** key, data saved into external medium

Section 8.4, 8.7

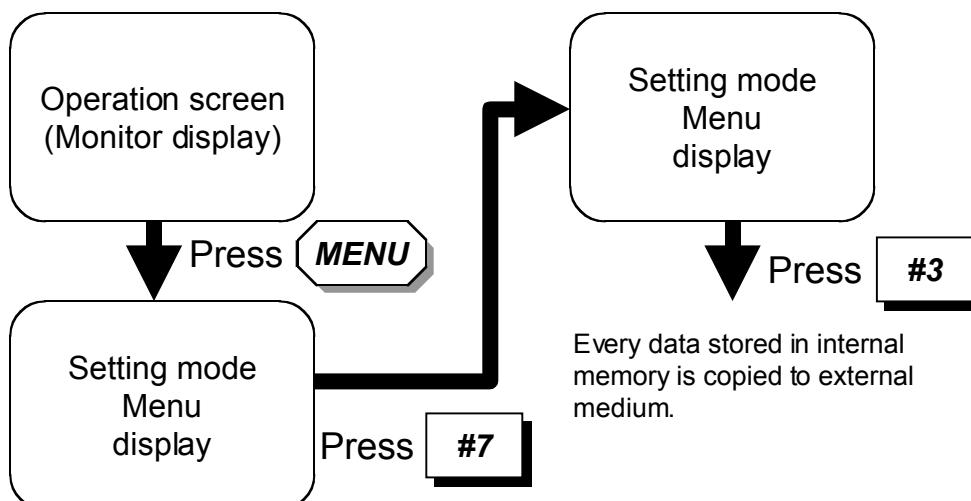
2) When **MANUAL** mode is selected in save mode on memory related **SETUP** menu*

*:See previous page #2

Press **MEDIA** key Section 8.4, 8.7

7-2. While data acquisition is stopped

Section 9.2



Foreword

Thank you for purchasing the OMEGA MobileCorder RD-MV100.

This User's Manual contains useful information about the functions, installation, wiring, operating procedures, and troubleshooting of the RD-MV100. To ensure correct use, please read these manuals thoroughly before operation.

Keep this manual in a safe place for quick reference in the event a question arises.

In addition, a quick reference is provided on the previous page. This reference briefly explains operations that are used frequently. Separate this reference from the manual for use.

The following three manuals, including this one, are provided as manuals for the RD-MV100.

Manual Name	Manual No.	Description
RD-MV100 User's Manual	M3641	This manual. Explains all functions and procedures of the RD-MV100 excluding the communication functions.
RD-MV100 Communication Interface User's Manual	M3643	Explains the communication functions of the Ethernet/serial interface.
RD-MV100 DAQstandard Software	M3645	Describes the functions and operating procedures of RD-MV Software that comes with the package.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact Omega.
- Copying or reproducing all or any part of the contents of this manual without Omega's permission is strictly prohibited.

Trademarks

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Revisions

First edition : March 2000

Safety Precautions

This instrument conforms to IEC safety class I (provided with terminal for protective grounding), Installation Category II, and EN61326-1 (EMC standard), class A (use in a commercial, industrial, or business environment).

The following general safety precautions must be observed during all phases of operation. If this recorder is used in a manner not specified in this manual, the protection provided by this recorder may be impaired. Omega assumes no liability for the customer's failure to comply with these requirements.

The following symbols are used on this instrument.



"Handle with care." To avoid injury, death of personnel or damage to the instrument, the operator must refer to the explanation in the User's Manual or Service Manual.



High temperature : To avoid injury caused by hot surface, do not touch the heat sink.



Functional ground terminal. Do not use this terminal as a protective ground terminal.



Protective ground terminal.



AC



ON (power)



OFF (power)

Make sure to comply with the following safety precautions. Failure to comply may result in injury or death (electric shock hazard).

WARNING

Power Supply

Ensure that the source voltage matches the voltage of the power supply before turning ON the power.

Power Cord and Plug (Desktop Type)

To prevent an electric shock or fire, be sure to use the power cord supplied by Omega. The main power plug must be plugged into an outlet with a protective grounding terminal. Do not invalidate protection by using an extension cord without protective grounding.

Protective Grounding

Make sure to connect the protective grounding to prevent electric shock before turning ON the power.

Necessity of Protective Grounding

Never cut off the internal or external protective grounding wire or disconnect the wiring of the protective grounding terminal. Doing so poses a potential shock hazard.

Defect of Protective Grounding

Do not operate the instrument when the protective grounding or the fuse might be defective. Also, make sure to check them before operation.

Fuse (for 12 VDC Power Model)

To prevent fire, only use a fuse that has a rating (voltage, current, and type) that is specified by the instrument. When replacing a fuse, turn OFF the power switch and unplug the power cord. Never short the fuse holder.

Do Not Operate in Explosive Atmosphere

Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Do Not Remove Covers

Some areas inside the instrument have high voltages. Do not remove the cover if the power supply is connected. The cover should be removed by Omega's qualified personnel only.

External Connection

Connect the protective grounding before connecting to the item under measurement or control unit.

Damage to the Protective Housing

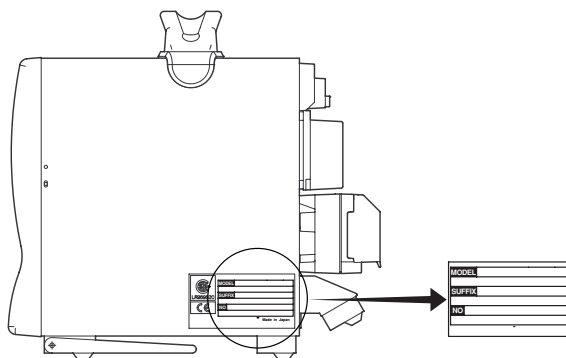
Using the instrument in a manner not specified in this manual can damage the instrument's protective housing.

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If some of the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

RD-MV100 Main Unit

There is a name plate on the back side of the key panel cover. Open the cover and check that the model name and suffix code given on the name plate match those on the order.



MODEL

Model Code	Suffix Code	Optional Code	Description
RD-MV102			RD-MV100 (2 ch)
RD-MV104			RD-MV100 (4 ch)
RD-MV106			RD-MV100 (6 ch)
RD-MV112			RD-MV100 (12 ch)
External storage medium	-1		Floppy disk
	-2		Zip disk
	-3		ATA flash memory card (PCMCIA 20MB)
Language	-2		English, deg.F/DST (English standard software included)
Power supply	-1		100 to 120 VAC/200 to 240 VAC
	-2		12 VDC ^{*1}
Power inlet, power cord		D	3-Pin power inlet with UL, CSA cable
		F	3-Pin power inlet with VDE cable
		R	3-Pin power inlet with SAA cable
		S	3-Pin power inlet with BS cable
Options		/A1	Alarm output relay (2 relays)/remote control ^{*2}
		/A2	Alarm output relay (4 relays)/remote control ^{*2}
		/A3	Alarm output relay (6 relays) ^{*2}
		/C2	RS-232 interface
		/C3	RS-422-A/485 interface
		/F1	FAIL/memory end output relay ^{*3}
		/H3	Screw terminal
		/M1	Computation function (report function included)
		/R1	Remote control

^{*1} With AC adapter

^{*2} /A1, /A2, and /A3 cannot be specified simultaneously

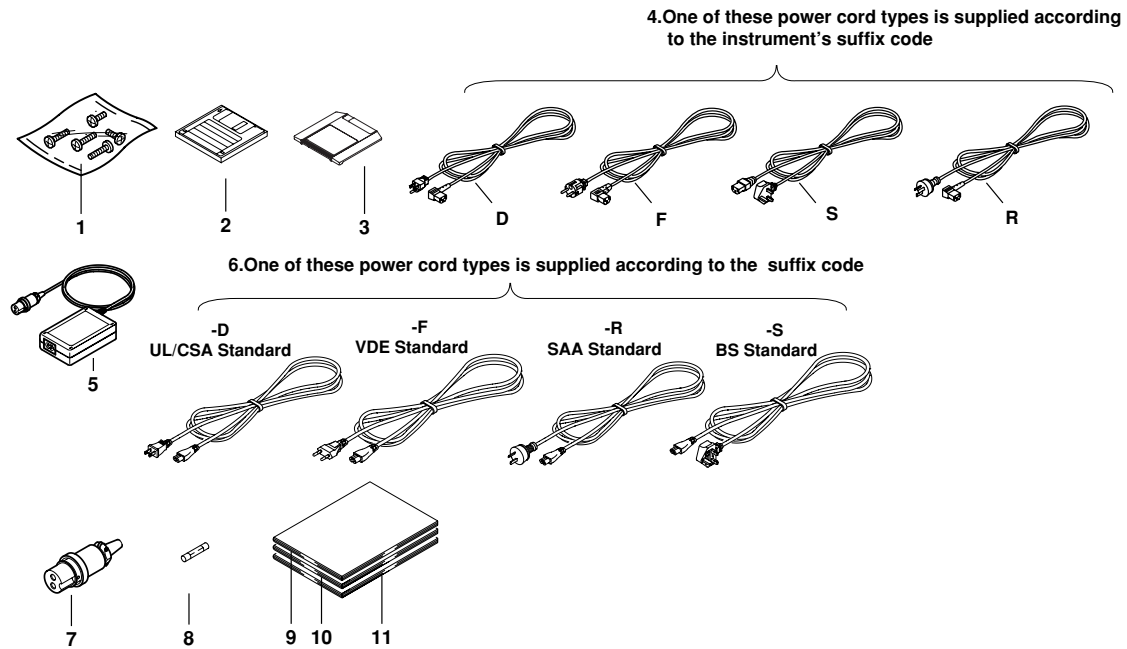
^{*3} If /F1 is specified, /A3 cannot be specified.

NO. (Instrument No.)

When contacting the dealer from which you purchased the instrument, please quote the instrument No.

Standard Accessories

The following standard accessories are supplied with the instrument. Make sure that all items are present and undamaged.



Number	Part Name	Part Number/Model	Q'ty	Notes
1	Terminal screw		5	M4
2	Application software	MV10A-02	1	Included only when the language code is "-2" For Windows 95/98/NT
3	External storage medium	A1053MP	1	Zip disk, included only when the code for external storage medium is "-2"
		A1134UN	1	ATA flash memory card, included only when the code for external storage medium is "-3"
4	Power cord	A1006WD	1	Provided only when "-1" is specified for the power supply code.
		A1009WD	1	Provided only when "-1" is specified for the power supply code.
		A1024WD	1	Provided only when "-1" is specified for the power supply code.
		A1023WD	1	Provided only when "-1" is specified for the power supply code.
5	AC adapter	B9230ZW	1	Provided only when power supply code is -2.
6	Power cord for AC adapter	—	1	
7	DC power supply terminal connector	A1105JC	1	Provided only when power supply code is -2.
8	Fuse	A1352EF	1	250 V 4 A, time lag (for 12 VDC power supply model)
9	User's Manual	M3641	1	This manual
10	User's Manual	M3643	1	Communication function
11	User's Manual	M3645	1	Application software

Checking the Contents of the Package

Optional Accessories (Sold Separately)

The following optional accessories are available for purchase separately. If you make an order, make sure that all items are present and undamaged.

For information about ordering accessories, contact the dealer from which you purchased the recorder.

Number	Part Name	Part Number/Model	Q'ty	Notes
1	3.5" floppy disk	7059 00	10	2HD
2	Zip disk	A1053MP	1	100 MB
3	ATA flash memory card	A1134UN	1	20 MB
4	Shunt resistor (for the screw terminal)	4159 20	1	250 Ω \pm 0.1%
		4159 21	1	100 Ω \pm 0.1%
		4159 22	1	10 Ω \pm 0.1%
5	Shunt resistor (for the clamp input terminal)	4389 20	1	250 Ω \pm 0.1%
		4389 21	1	100 Ω \pm 0.1%
		4389 22	1	10 Ω \pm 0.1%
6	Fuse	A1352EF	4	250 V 4 A, time lag (for 12 VDC power supply model)

How to Use this Manual

Structure of the Manual

This User's Manual consists of the following 14 chapters, an appendix, and an index. For information about the communication functions and the standard software, see the respective manuals (M3643 and M3644).

Chapter	Title and Contents
1	Overview of Functions Describes the functions of the recorder.
2	Before Using the Recorder Describes the installation and wiring procedures.
3	Names of Parts/Run Mode/Common Operations Describes the names of each part of the recorder, how to use the storage medium drive, run mode, and common key operations.
4	Switching Operation Screens Describes how to use the operation screen such as the trend display and digital display. Describes the operations that can be performed using the arrow keys and the DISP/ENTER key on the front panel.
5	Measurement Channel Settings Describes how to set input specifications such as the range, filter, moving average, scan interval, integration time of the A/D converter, burnout, and reference junction compensation.
6	Acknowledging and Setting Alarms Describes how to acknowledge alarms and how to set alarms.
7	Setting and Operating the Display Describes how to set the display specification of the operation screen, how to display messages, and other display-related operations.
8	Data acquisition and Saving to External Storage Medium Describes how to acquire the measured/computed data and how to save the data to the external storage medium.
9	Managing Files and Initializing Data Describes how to save and load the setup data, manage files on the external storage medium, save the data residing in the internal memory to the external storage medium using key operations, initialize the internal memory, and other operations.
10	Other Functions Describes how to set and operate key lock, key login/logout, and other functions.
11	Computation/Report Function (Option) Describes how to use the optional computation (report) function.
12	Troubleshooting Describes the error messages and the troubleshooting measures of the recorder.
13	Maintenance Describes fuse replacement and other information.
14	Specifications Describes the specifications of the recorder.
Appendix	Describes the initial values of the setting mode and basic setting mode, file formats of ASCII files.
Index	

Note

This manual covers information regarding RD-MV100s that have a language code “-2” (English).

Conventions Used in this Manual

Unit

K Denotes “1024.” Example : 768 KB (File capacity)

k Denotes “1000.”

M Denotes “1024K.” Example : 1.2 MB (Storage capacity of floppy disks)

B “Bytes.” Example : 1.2 MB (Storage capacity of floppy disks)

Symbols

The following symbols are used in this manual.



Affixed to the instrument. Indicates danger to personnel or instrument and the operator must refer to the User's Manual. The symbol is used in the User's Manual to indicate the reference.

WARNING

Describes precautions that should be observed to prevent injury or death to the user.

CAUTION

Describes precautions that should be observed to prevent minor or moderate injury, or damage to the instrument.

Note

Provides important information for the proper operation of the instrument.

Notation regarding procedures

On pages that describe the operating procedures in Chapter 3 through 11, the following symbols are used to distinguish the procedures from their explanations.

[] Represents contents that are displayed on the screen. Example : [Volt]

⇒ “ ” Indicates a reference item. Example : ⇒ “1.3 Display Function”

#1

 to

#12

 Denotes the soft key that is used to make a selection on the setting and basic setting menus.

Procedure

Follow the steps indicated with numbers. The procedures are given with the premise that the user is carrying out the steps for the first time

Explanation

This section describes the setting parameters and the limitations regarding the procedures. It does not give a detailed explanation of the function. For detail on the function, see chapter 1.

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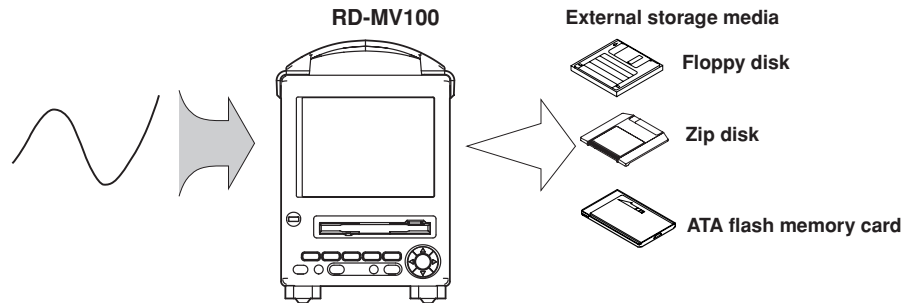
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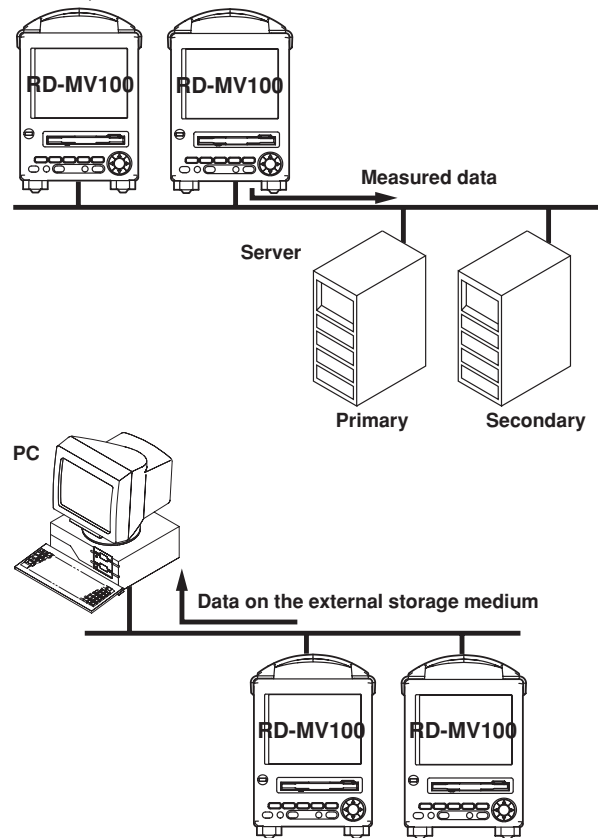
1.1 Overview of the RD-MV100

Unlike conventional recorders that record data on charts, the RD-MV100 displays the measured data acquired in the internal memory to a LCD in the form of waveforms, numerical values, and bar graphs. The measured data can also be saved to external storage media such as floppy disks, Zip disks, and ATA flash memory cards.



The data that have been saved to an external storage medium can be displayed on a PC using the standard software that comes with the package. The data can also be loaded into the RD-MV100 to be displayed.

By using the Ethernet interface that comes standard with the RD-MV100, the data can be transferred to a server on a network (client function). The data stored on the RD-MV100's external storage medium can also be read from a PC on the network (server function).



The communication functions such as the Ethernet interface are not covered in this manual. See the RD-MV100 Communication Interface User's Manual (M3643).

1.2 Functions of the Input Section

Number of Measurement Channels/Scan Interval

The number of measurement channels and scan intervals for different models are listed in the table below. For the procedure related to setting the scan interval, see section 5.9.

Model	Number of Measurement Channels	Scan Interval
RD-MV102	2 channels	125 ms or 250 ms
RD-MV104	4 channels	125 ms or 250 ms
RD-MV106	6 channels	1 s or 2 s
RD-MV112	12 channels	1 s or 2 s

Input Type and Computation

You can select the input type of a measurement channel from DC voltage, thermocouple, resistance temperature detector (RTD), and ON/OFF input (contact signal or voltage signal). You can also perform computation on the measured data such as the “difference,” “square root,” and “scaling.”

The input type and computation are configured as an “input mode” on the RD-MV100.

For the procedure related to setting the different modes, see sections 5.1 to 5.7.

Input Mode	Notation*1	Description
DC voltage	Volt	Measures a DC voltage in the range ± 20 mV to ± 20 V.
Thermocouple	TC	Measures the temperature corresponding to the appropriate range for R, S, B, K, E, J, T, N, W, L, and U.
Resistance temperature detector	RTD	Measures the temperature corresponding to the appropriate range for Pt100, JPt100, Cu10*2, and CU25*2.
ON/OFF input	DI	Displays the contact input or voltage input signals by correlating them to 0% or 100% of the display range. Contact input: Closed contact is ON (1). Open contact is OFF (0). Voltage input: Less than 2.4 V is OFF (0). Greater than or equal to 2.4 V is ON (1)
Difference	Delta	When the input type*3 is set to “DC voltage,” “thermocouple,” “RTD,” or “ON/OFF input,” the value obtained by subtracting the measured value of another channel (this channel is called a “reference channel”) from the input signal of the channel set to compute the difference is displayed as the measured value of that channel.
Square root	Sqrt	When the input type*3 is set to “DC voltage,” the square root of the input signal of the channel set to compute the square root is displayed as the measured value of that channel. The computed result can be scaled to a value in the appropriate unit and displayed.
Scaling	Scale	When the input type*3 is set to “DC voltage,” “thermocouple,” “RTD,” or “ON/OFF input,” the input signal can be converted to a value in the appropriate unit desired and displayed.
Skip	Skip	Channels that are not measured. They are not displayed.

*1 Notation used by the RD-MV100 to represent the input modes. It is used when setting the measurement channels.

*2 This is optional.

*3 This item defines the type of signals that can be connected to the input terminal when the input mode is set to “Difference,” “Square root,” or “Scaling.” The description of the input types, “DC voltage,” “Thermocouple,” “Resistive temperature detector,” and “ON/OFF input,” are the same as the descriptions given for the input modes, “DC voltage,” “Thermocouple,” “Resistive temperature detector,” and “ON/OFF input,” respectively.

If the signal to be measured is a DC current, a shunt resistance is attached to the input terminal to convert the current signal to a voltage signal. The input mode is set to "DC voltage" in this case. For the various types of shunt resistors and the procedure related to setting the current input, see section 5.1.

Input Range and Measurable Range

You can select the "Input range" that is appropriate for the input signal for "DC voltage," "Thermocouple," "RTD," and "ON/OFF input." (For example, R, S, B, K, E, J, T, N, W, L, and U are available input ranges for "Thermocouple.") For each "Input range," a measurable range is defined (for example, the measurable range for /R of "Thermocouple" is "0.0°C to 1760°C"). For details, see section 14.1.

Burnout

When measuring temperature using a thermocouple and the thermocouple burns out, you can specify the measurement result to be set to positive over range or negative over range. Burnout can be set on each measurement channel. The initial setting is set so that burnout is not indicated. For the setting procedure, see section 5.9.

*1 Positive over range is a condition in which the input signal is over the upper limit of the measurable range. The measured value is indicated as "+*****."

*2 Negative over range is a condition in which the input signal is below the lower limit of the measurable range. The measured value is indicated as "-*****."

Reference Junction Compensation (RJC)

When measuring the temperature using a thermocouple, the reference junction compensation can be used. You can select whether to use the reference junction compensation provided by the recorder or external reference junction compensation. If you are using external reference junction compensation, you will also set the reference voltage. The initial setting is set so that the reference junction compensation provided by the recorder is used. For the setting procedure, see section 5.9.

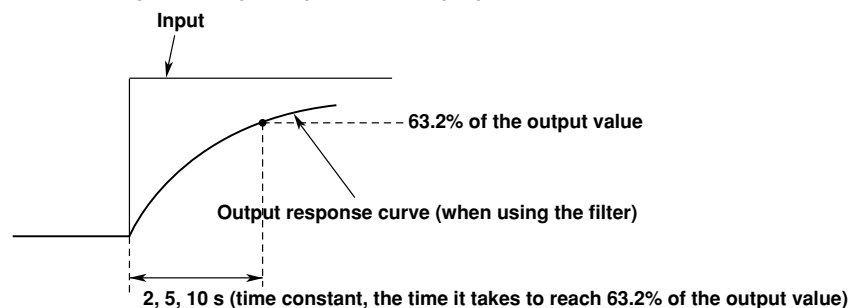
Filter and Moving Average

The filter and moving average are used to suppress the effects of noise that is riding on the signal. Filtering is provided on the RD-MV102 and RD-MV104. Moving average is provided on the RD-MV106, and RD-MV112. The filter or moving average can be set on each channel. For the setting procedure, see section 5.8.

Filter function (RD-MV102 and RD-MV104)

Suppresses the effects of noise above the frequency determined by the specified time constant. The time constant can be set to 2 s, 5 s, or 10 s. The filter is initially turned OFF.

Effects of using filter (Output response for a step input)

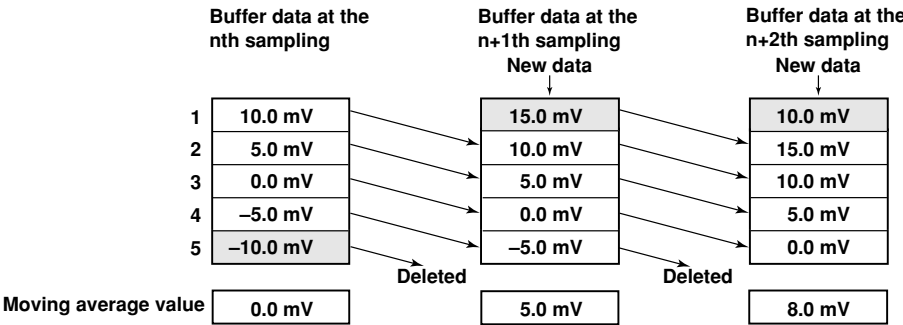


1.2 Functions of the Input Section

Moving average (RD-MV106, and RD-MV112)

The input signal of the measurement channel is set to the averaged value of the m most current data points (the number of moving-averaged data points) acquired at the scan interval. The number of moving-averaged data points can be set in the range 2 to 16. The moving average is initially turned OFF.

The figure below shows an example indicating the operation of the buffer for the moving average computation when the number of moving averaged data points is set to “5.”



Integration Time of the A/D Converter

The recorder uses an A/D converter to convert the sampled analog signal to a digital signal. By setting the integration time to match the time period corresponding to one cycle of the power supply or an integer multiple of one cycle, the power supply frequency noise can be effectively eliminated. The integration time of the A/D converter is selected according to the model from the table below. If “Auto” is selected, the recorder will automatically detect the power supply frequency and select 16.7 ms or 20 ms. Because 100 ms is an integer multiple of 16.7 ms and 20 ms, this setting can be used to eliminate the power frequency noise for either frequency, 50 Hz or 60 Hz. 100 ms is available on the RD-MV106, and RD-MV112. For the setting procedure, see section 5.9.

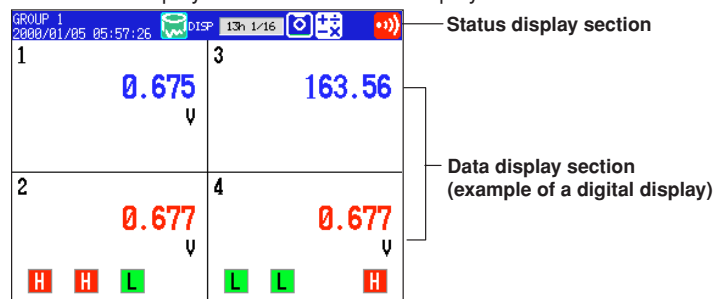
Model	Integration Time of the A/D Converter
RD-MV102/RD-MV104	Select 16.7 ms (60 Hz), 20 ms (50 Hz), or auto (automatically switches 16.7 ms/20 ms, fixed to 20 ms for 12 VDC power supply model)
RD-MV106/RD-MV112	Select 16.7 ms (60 Hz), 20 ms (50 Hz), 100 ms, or auto (automatically switches 16.7 ms/20 ms, fixed to 20 ms for 12 VDC power supply model)

1.3 Display Function

Common Items Related to the Display

5.5" TFT color LCD and the screen configuration

The recorder has a 5.5" TFT color LCD (320-by-240 dot resolution). The screen consists of the status display section and the data display section.



Status display section

Displays the displayed screen name, date and time, internal memory/external storage medium usage condition, alarm condition, key lock, user name (key login function), and computation condition (option). For details, see section 4.2.

Data display section

- Displays the operation screen such as the trend display, digital display, and bar graph display of the measured and computed data as well as alarm, message, and file information.
- Displays the setup screen for the setting and basic setting modes when the recorder is being configured. For details related to the setting and basic setting modes, see section 3.5.

Group display

The data displayed on the trend, digital, and bar graph displays are the data of measurement or computation channels that are assigned to the group. Up to 6 channels can be assigned to a single group. For the procedure used to assign channels to groups, see section 7.6, "Setting Groups." Up to four groups can be registered. The groups are common to the trend, digital, and bar graph displays.

On the trend, digital, and bar graph displays, the displayed groups can be automatically switched at 5 s, 10 s, 20 s, 30 s, or 1 min intervals.

Channel number of tag display

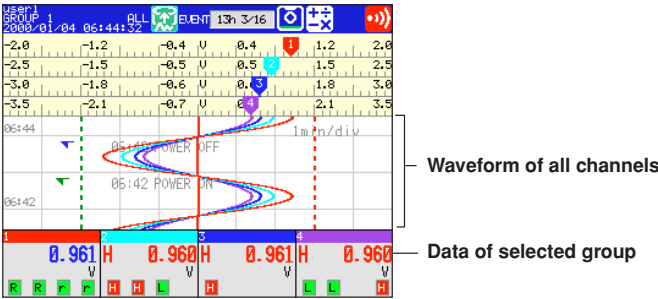
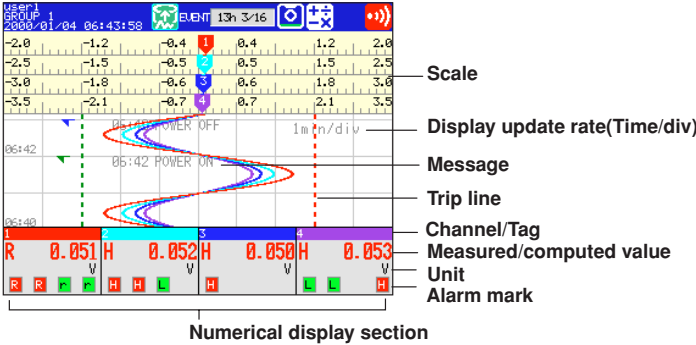
The channels can be displayed as channel number or tags. The setting applies to all channels. For the procedure related to the selecting the channel display or tag display, see section 7.2. For the procedure related to setting the tags, see section 7.1.

1.3 Display Function

Trend Screen

Displays the waveform of the measured and computed data. The direction of the waveform display can be set to horizontal or vertical. For details related to the display method, see section 4.3.

Trend display



Updating the waveform and updating the numerical display

One division on the RD-MV100 consists of 30 dots on the LCD. The displayed waveform is updated at an interval corresponding to one dot. This interval is determined by the time period corresponding to one division (referred to as the display update rate). The relationship between the display update rate and the speed of movement of waveforms is as follows:

Display Update Rate (/div)	1 min	2 min	5 min	10 min	20 min	30 min	1 h	2 h	4 h
Speed of movement (approximate value, mm/h)	594	297	119	59	30	20	10	5	2.5

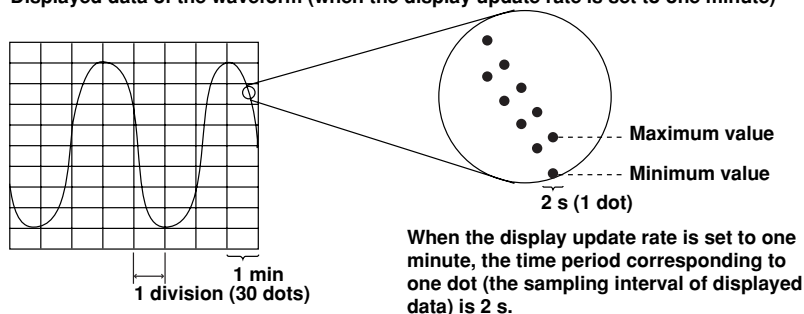
Note

The speed of movement of the trend display along the time axis is derived from the following equation given the dot pitch of the LCD (0.33 mm):
The speed of movement of the trend display along the time axis = 30 (dots) × 0.33 (mm) × 60 (min)/display update rate (min)

Measured and computed values are updated every second. However, when the scan interval on the RD-MV106/RD-MV112 is 2 s, the display update rate is also 2 s.

Displayed data

The data displayed on the screen are a maximum and minimum values of the data that are sampled at the scan interval, within the time period corresponding to one dot.

Displayed data of the waveform (when the display update rate is set to one minute)

The time period corresponding to one dot is called “the sampling interval of displayed data.” The sampling interval of displayed data is determined by the display update interval.

The relationship between the display update rate and the sampling interval of displayed data is as follows:

For the procedure related to setting the display update rate, see section 7.3.

Display Update Rate (/div)	1 min	2 min	5 min	10 min	20 min	30 min	1 h	2 h	4 h
Sampling interval of displayed data (s)	2	4	10	20	40	60	120	240	480

Displayed information

The following Information can be displayed.

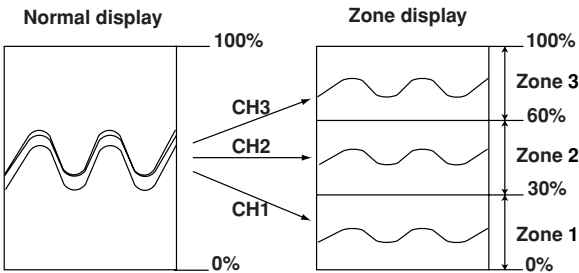
Information	Description
All channel display	All the channels that were set to display the trend are displayed on one trend screen. ⇒“Sections 4.3 and 8.10”
Message display	Messages specified by the user can be displayed at arbitrary points in time. For example, by displaying a message when a certain operation is carried out, the point at which the operation is carried out can be seen visually. Displayed messages are stored. ⇒“Sections 7.4 and 7.5”
Display direction of waveforms	The waveform can be displayed vertically or horizontally. The vertical display is in the same direction as the chart recorder and is convenient when the RD-MV100 is used with the chart recorder. ⇒“Section 7.13”
Displayed color of waveforms	The displayed color of waveforms can be specified for each channel. The color also applies to the bar graph display. ⇒“Section 7.8”
Thickness of waveform lines	You can select from three types: 1, 2, or 3 dots. The specified thickness of waveform lines applies to all channels. ⇒“Section 7.13”
Trip line display	Displays a line to indicate a particular value of interest (trip line) for each group. You can select the thickness of the displayed line from three types: 1, 2, or 3 dots. Up to four trip lines can be displayed on a single group. ⇒“Sections 7.7 and 7.13”

1.3 Display Function

Information	Description
Scale display	A scale appropriate for the measured item can be displayed for each channel. The number of divisions of the display scale created by the main scale marks can be set to a value in the range 4 to 12 div (also applies to the bar graph display). Medium and small scale marks are displayed in between the main scale marks. You can select whether or not to display the scale for each channel and the display position. ⇒“Section 7.10”
Turn ON/OFF the numerical display section	The numerical display section can be turned ON or OFF. If the numerical display section is turned OFF, the display shows only the waveform and the scale. See section 4.3.
Zone display	The waveform of each channel is displayed in its display range (zone). The waveforms are easier to view, because they do not overlap. See the explanation of the zone display below. ⇒“Section 7.9”
Partial expanded display	You can expand the important section of the display area. See the explanation of the partial expanded display below. ⇒“Sections 7.11 and 7.12”

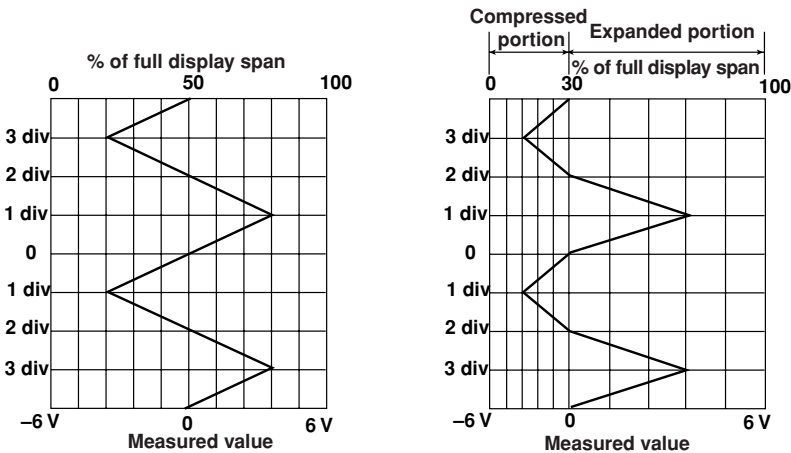
Explanation regarding the zone display

The display range of the measured/computed data is called a zone. Zones can be set for each channel. The waveforms can be set in different zones, so that they are easier to view. In the example shown in the figure below, channel 1 is displayed in the zone 0 to 30%, channel 2 in the zone 30 to 60%, and channel 3 in the zone 60 to 100%.



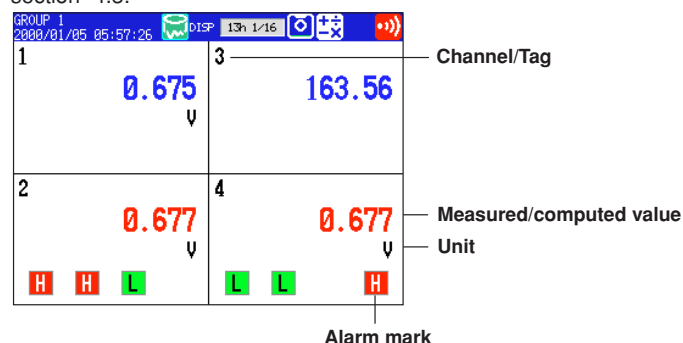
Explanation regarding the partial expansion display

By compressing a section of the display scale of the measured/computed data, the remaining section of the display is expanded. You specify a value on the display scale (boundary value) to be moved to another position on the display scale (boundary value displacement position). In the example shown in the figure below, 0 V (boundary value) is moved to the 30% position of the display scale (boundary value displacement position). The section below the boundary (accounts for 30% of the entire display) represents -6 V to 0 V and the section above the boundary (accounts for 70% of the entire display) represents 0 V to 6 V.



Digital Screen

The measured/computed data are displayed using numerical values in large size. See section “4.3.”



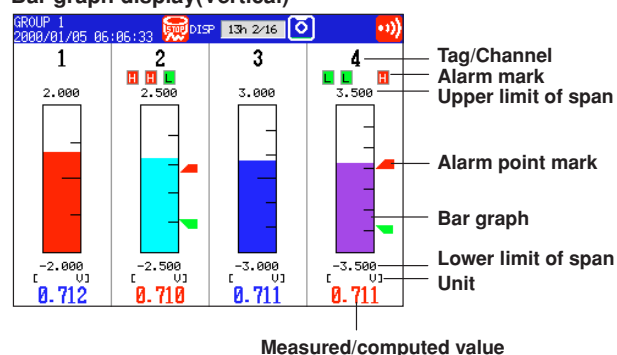
Display update rate

Measured and computed values are updated every second. However, when the scan interval on the RD-MV106/RD-MV112 is 2 s, the display update rate is also 2 s.

Bar graph Screen

The measured/computed data are displayed using bar graphs. See section 4.3.

Bar graph display(Vertical)



Display update rate

Measured and computed values are updated every second. However, when the scan interval on the RD-MV106/RD-MV112 is 2 s, the display update rate is also 2 s.

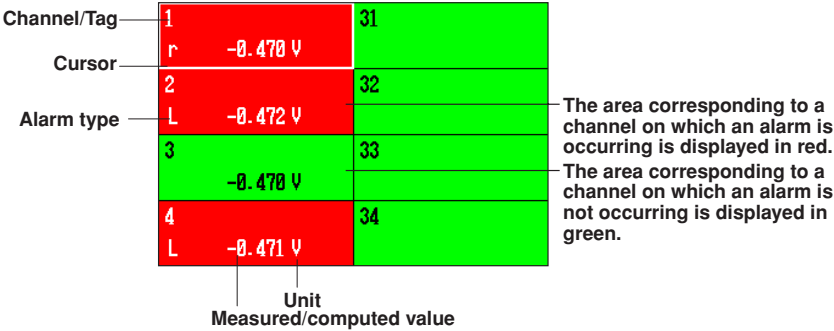
Displayed information

The following Information can be displayed.

Information	Description
Display direction	The bar graphs can be displayed horizontally or vertically. ⇒ “Section 7.13”
Base position	When the bar graph is displayed horizontally, the starting point of the bar (base position) can be set to the minimum edge of the measurement scale or to the center position. ⇒ “Section 7.10”
Displayed color	The displayed color of the channels are common with the trend display. ⇒ “Section 7.8”
Scale display	The number of divisions of the scale can be set to a value in the range 4 to 12 div. ⇒ “Section 7.10” (common with the trend display)

Overview Screen

A list of measured/computed values and alarm conditions of all measurement/computation channels is displayed. You can move the cursor to select a channel and display the trend or bar graph of the group containing the selected channel. For the procedure used to display the overview, see section 4.4.



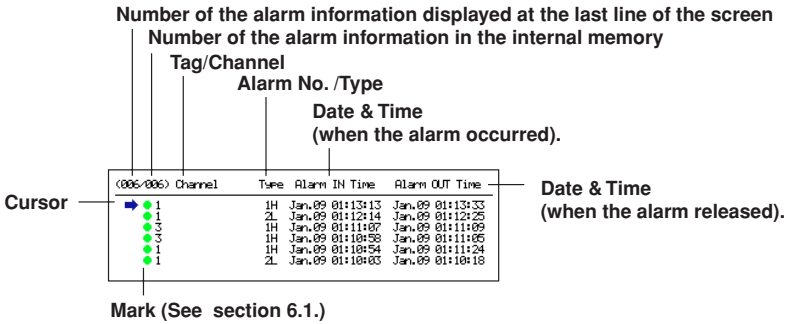
Updating of the numerical display

Measured and computed value are updated every second. However, when the scan interval on the RD-MV106/RD-MV112 is 2 s, the display update rate is also 2 s.

Alarm Summary

A list of the most recent alarms can be displayed. By scrolling the screen using a key, up to 120 incidents can be displayed.

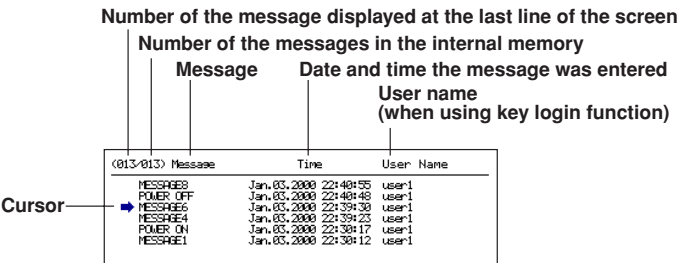
By selecting an alarm from the list using arrow keys, the historical trend of the display data or event data containing the alarm can be recalled. For a description on the historical trend display, see "Historical Trend" in this section. For the operating procedure, see section 4.5.



Message Summary

The messages that were entered in the trend display and the times when they were entered (message information) are displayed in a list. By scrolling the screen using a key, up to 100 incidents can be displayed.

By selecting a message from the list using arrow keys, the historical trend of the display data or event data containing the message can be recalled. For a description on the historical trend display, see "Historical Trend" in this section. For the operating procedure, see section 4.5.



Memory Summary

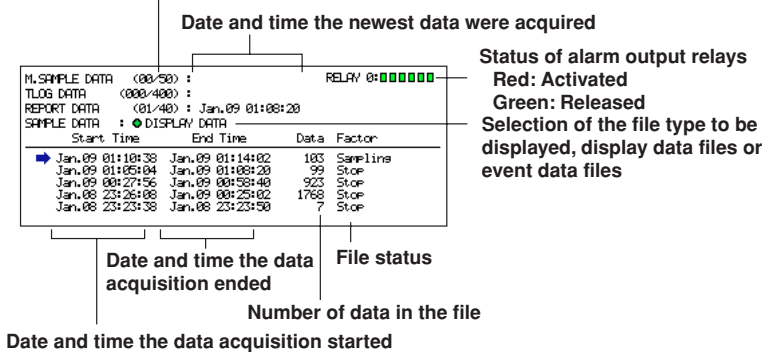
The information pertaining to the display data file and event data file in the internal memory is displayed. Display data correspond to the data on the trend display. Event data are data acquired to the internal memory according to the specified sampling interval and data collection period. The data are separate from the display data.

In addition, the number of manual sampled data, TLOG data (option), and report data (option) residing in the internal memory are displayed. For models that have the alarm output relays (option), the ON/OFF state of the relays are also listed.

For details related to the data residing in the internal memory, see section 1.4.

By selecting the display data file or event data file using the arrow keys, the historical trend display can be recalled. For a description on the historical trend display, see "Historical Trend" in this section. For the operating procedure, see section 4.5.

Number of data sets in the internal memory/The maximum number of data sets the internal memory can hold

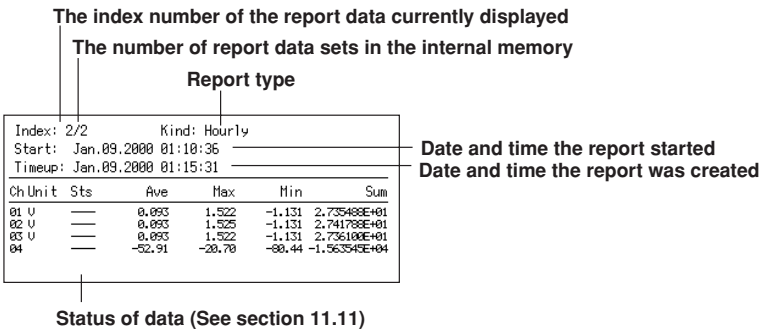


Note

For models with the batch function (/BT1 option), a batch number and lot number can be displayed in place of the date and time when the data acquisition ended.

Report Data (/M1 Option)

Report data residing in the internal memory can be displayed. The report function is used to write the average, minimum, maximum, and sum at specified intervals for the specified channels. Reports can be made hourly, daily, weekly, or monthly. For details related to the report data, see section 1.6. For the operating procedure, see section 4.5.



Historical Trend

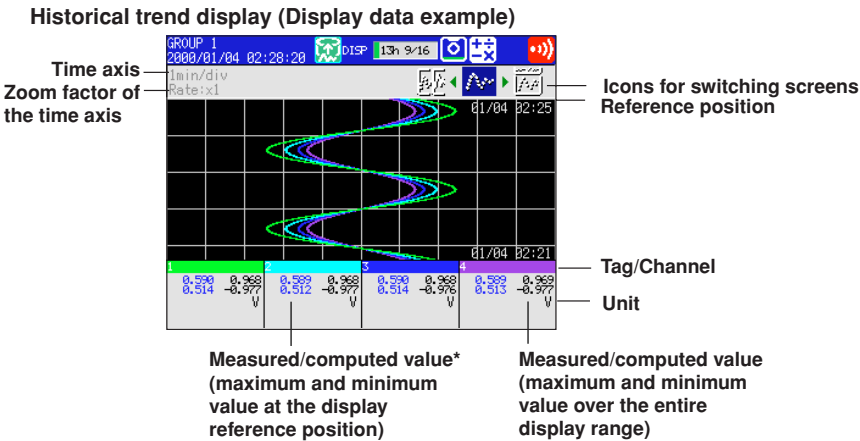
The display data and event data of the measured/computed data stored in the internal memory or external storage medium are displayed as a historical trend. For details related to the display data, see “Trend Display” in this section. For details related to the event data, see section 1.4. Alarms and scales are not displayed on the historical trend display.

Methods used to display the historical trend

- The following four methods are available in displaying the historical trend of the display data or event data in the internal memory:
 - Display from the alarm summary. For the operating procedure, see section 4.5.
 - Display from the message summary. For the operating procedure, see section 4.5.
 - Display from the memory summary. For the operating procedure, see section 4.5.
 - Recall from the screen menu. For the operating procedure, see section 4.6.
- For methods used to display the historical trend of display data or event data in the external storage medium, see section 9.3 and 9.4.

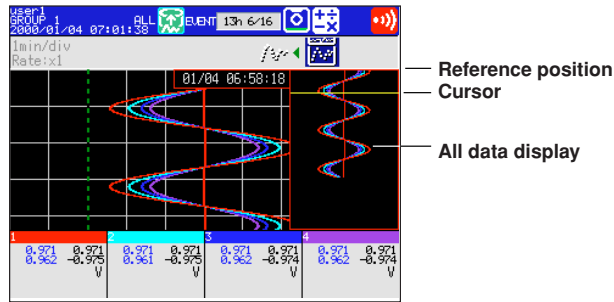
Information displayed on the historical trend

The displayed information shown below is common to the historical trend of display data and event data.



* For event data, the measured/computed value at the display reference position.

- The waveform can be scrolled along the time axis using the cursor keys.
- The time axis can be expanded or reduced.
- The entire data of the file that is being displayed on the historical trend can be displayed at the top section of the screen (right section if the trend display is vertical). You can specify the position to be displayed on the historical trend display using a cursor. The specified position becomes the display reference position.

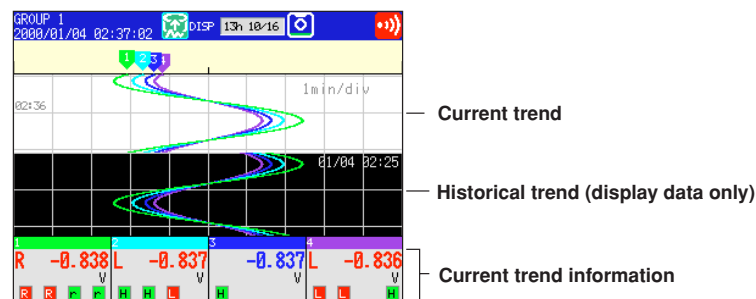


- The memory information of the file being displayed on the historical trend can be displayed.
For models with the batch function (/BT1 option), information such as the batch number and lot number are also displayed.

File Name (Data Kind): Memory (DISP)	File name and data type
Serial No. : 12V321463	Serial number of the instrument that sampled the data
Start Time : Jan.03.2000 07:55:04	Start/stop time and user name (user name is displayed only when the key login function is used)
Start User Name : user1	
End Time : Jan.03.2000 07:55:18	
End User Name : user1	

Half screen display (only when displaying the historical trend of the display data)

Displays the historical trend of the display data on the left half of the screen and the current display data on the right half of the screen.



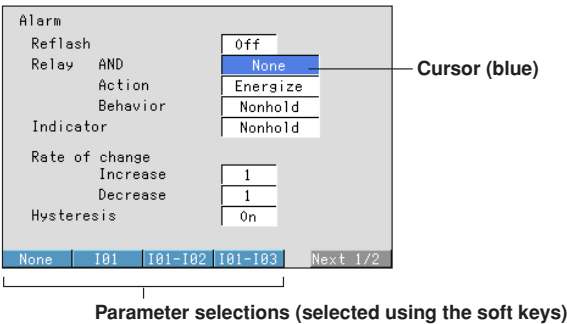
Setting Screen

The various functions of the RD-MV100 are configured using the setting mode or the basic setting mode.

Setting mode screen

This screen is used to set the input range, filter/moving average, alarm, group, channel display color, etc. For details, see section 3.5.

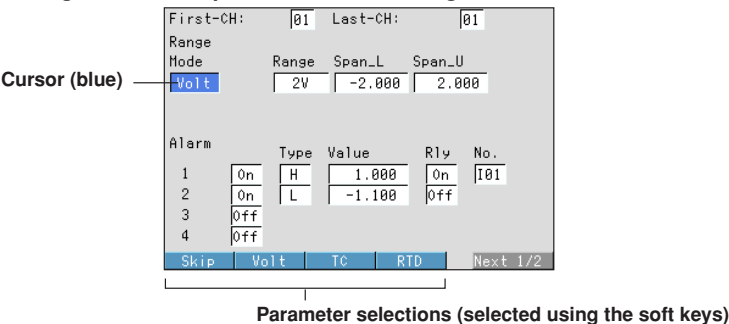
• Setting screen example for the setting mode



Basic setting mode screen

This screen is used to configure the basic specifications of the various functions such as burnout, reference junction compensation, A/D integration time, and the method used to acquire data to the internal memory. For details, see section 3.5.

• Setting screen example for the basic setting mode



Setting the Display Conditions of the LCD

The following display conditions of the LCD can be configured.

Screen Attribute	Settings
Background color operation screen	You can select white or black for the background color of the of the screen.The initial setting is "white." For the setting procedure, see section 7.13.
LCD brightness	The brightness of the LCD can be set between eight levels. The initial setting is "4." For the setting procedure, see section 7.14.
Backlight saver	The lifetime of the LCD backlight can be extended by automatically dimming the light when there is no key operation for a certain amount of time. The screen returns to the original brightness with a key operation or an alarm occurrence. The initial setting is set so that the backlight saver is disabled. For the setting procedure, see section 7.14.

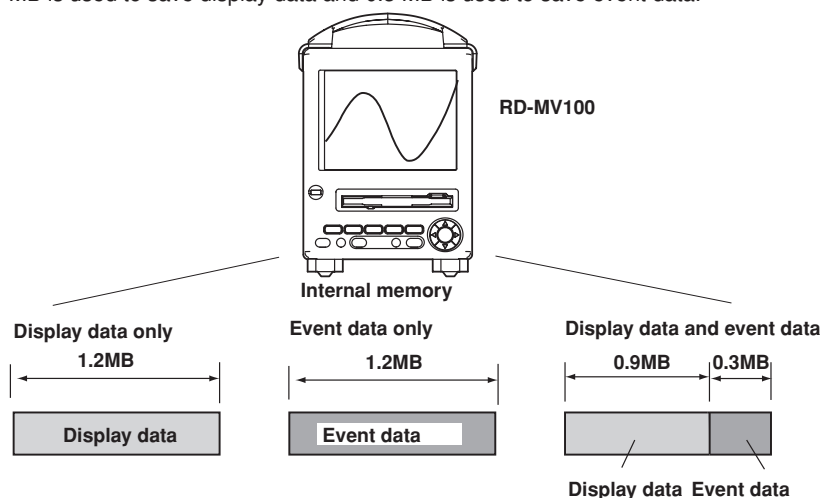
1.4 Storage Function

Acquiring Data to the Internal Memory

Display data and event data

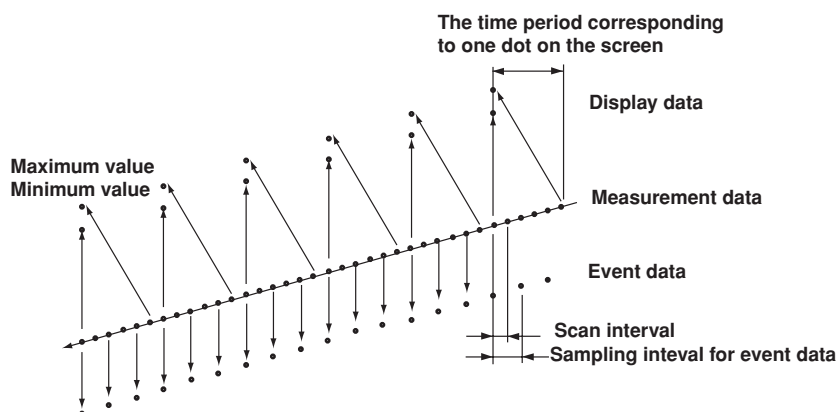
The measured/computed data are first acquired to the RD-MV100's internal memory as two types of data, display data and event data. Then, the data are saved to the external storage medium automatically or when press MEDIA key. You can select whether to save the measured/computed data as display data, event data, or as both.

The capacity of the internal memory for acquiring display data and event data is 1.2 MB. When the measured/computed data are saved as both display data and event data, 0.9 MB is used to save display data and 0.3 MB is used to save event data.



Display data are used to display waveforms on the RD-MV100's screen. Display data consists of maximum and minimum values of the measured or computed data sampled at the scan interval within the time period corresponding to one dot on the time axis on the screen. Display data can be likened to the conventional recording on the chart sheet and are useful for long-term observations.

Event data are instantaneous values of the measured/computed data at specified sampling intervals of the event data. By setting the sampling interval equal to the scan interval, all measured or computed data sampled at the scan interval can be saved. In addition, the event data generated when an event occurs (an alarm, for example) can also be saved. This is useful when you wish to observe the measured/computed data in detail.



Manual sampled data

Every time a given key operation is carried out, all measured/computed data (instantaneous values) at that point are acquired to the internal memory. However, this excludes measurement channels that are skipped and computation channels that are turned OFF.

TLOG data (only on models with the optional computation function (/M1))

The average, maximum, minimum, sum, or maximum - minimum can be computed for the specified channels at predetermined intervals and the result can be acquired to the internal memory. You can specify the interval.

Report data (only on models with the optional computation function (/M1))

The average, maximum, minimum, and sum can be computed for the specified channels at predetermined intervals and the result can be acquired to the internal memory. You can select one hour (hourly report), one day (daily report), one day/one week (daily and weekly reports), or one day/one month (daily and monthly reports) for the interval.

Saving Data to the External Storage Media

External storage media

Various data can be stored to the following storage media:

- 3.5" floppy disk (1.44 MB, 2HD)
- Zip disk (100 MB)
- ATA flash memory card (4 MB to 160 MB): The size varies depending on the memory card that you are using.

Save method

There are two methods of storing data to the external storage medium. One method stores the data when press MEDIA key (referred to as manual save). The other method stores data automatically at certain time intervals to a storage medium (referred to as auto save).

Other types of data that can be stored

In addition to the types of data described in "Acquiring Data to the Internal Memory," the following types of data can be stored on the external storage medium.

- **Setting data**

The RD-MV100 setting data, such as the setting of the functions of the input section as described in section 1.2, can also be stored to an external storage medium to the specified file name. The stored data can also be loaded and used by the RD-MV100.

- **Image data of the display screen**

The image data of the display screen can be stored to the external storage medium. The image data can be pasted to documents created on a PC.

Saving Data via Ethernet

The display data, event data, and report data, as described in "Acquiring Data to the Internal Memory," can be automatically transferred to an FTP server via Ethernet for storage. Conversely, the RD-MV100 can operate as an FTP server. The RD-MV100 can be accessed from a PC and the data in the external storage medium can be retrieved for storage. For these functions, see the "RD-MV100 Communication Interface User's Manual" (M3643).

1.5 Alarm Function

This function generates an alarm when the measured/computed data meets a certain condition. When an alarm occurs, information notifying the alarm occurrence is displayed on the screen. In addition, a signal can be output from the relay output terminals on the rear panel of the RD-MV100 (only on models with the optional alarm output relay function (/A1 through /A3)).

Alarm indication

The alarm conditions are displayed as alarm icons in the status display section and on the trend, digital, bar graph, and overview displays. The detailed information about the alarms is displayed in the alarm summary display.

Alarms are displayed when the alarm conditions are met. You can select to clear the alarm when the conditions are no longer met (non-hold alarm) or hold the alarm until it is cleared (hold alarm).

Alarm indication example (overview display and alarm summary display)

Channel/Tag	1	31
Cursor	r	-0.470 V
Alarm type	L	-0.472 V
	3	-0.470 V
	4	-0.471 V
	L	

The area corresponding to a channel on which an alarm is occurring is displayed in red.

The area corresponding to a channel on which an alarm is not occurring is displayed in green.

Unit
Measured/computed value

Number of the alarm information displayed at the last line of the screen

Number of the alarm information in the internal memory

Tag/Channel

Alarm No. /Type

Date & Time
(when the alarm occurred).

Channel	Type	Alarm IN Time	Alarm OUT Time
0005-0006	1H	Jan.09 01:13:13	Jan.09 01:13:33
1	2L	Jan.09 01:12:14	Jan.09 01:12:25
1	1H	Jan.09 01:11:07	Jan.09 01:11:09
4/0	1H	Jan.09 01:10:50	Jan.09 01:11:05
1	1H	Jan.09 01:10:54	Jan.09 01:11:24
1	2L	Jan.09 01:10:03	Jan.09 01:10:18

Date & Time
(when the alarm released).

Mark (See section 6.1.)

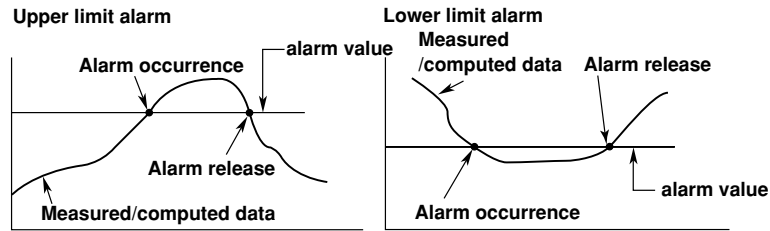
Number of alarms

You can set up to four alarms for each channel.

Alarm conditions

The following eight conditions are available:

- **Upper limit alarm**
An alarm occurs when the measured value exceeds the alarm value.
- **Lower limit alarm**
An alarm occurs when the measured value falls below the alarm value.



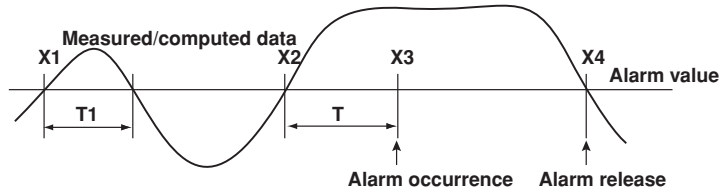
- **Alarm delay upper limit alarm**

An alarm occurs when the measured value remains above the alarm value for the specified time period (delay period).

- **Alarm delay lower limit alarm**

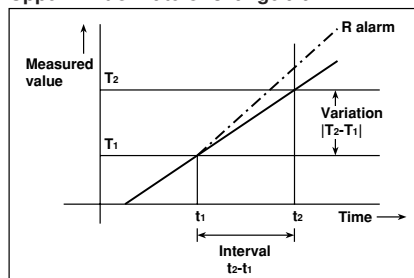
An alarm occurs when the measured value remains below the alarm value for the specified time period (delay period).

Alarm delay upper limit alarm example (T is the specified delay period)

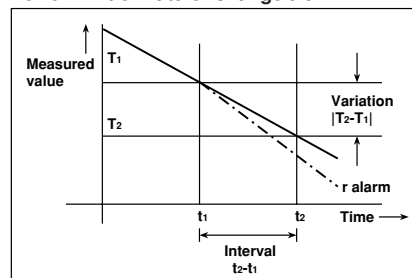


- Alarm does not occur at T1, because the time period is shorter than the specified delay period (T).
- The input exceeds the alarm value at X2, but the alarm does not occur. The alarm occurs at X3 at which the specified delay period elapses (the time when the alarm occurs is the time at X3).
- The input falls below the alarm value at X4 and the alarm is released.
- **Difference upper limit alarm**
An alarm occurs when the difference between the measured values of two channels becomes greater than or equal to the alarm value.
Can be specified only on difference computation channels.
- **Difference lower limit alarm**
An alarm occurs when the difference between the measured values of two channels becomes smaller than or equal to the alarm value.
Can be specified only on difference computation channels.
- **Upper limit on rate-of-change alarm**
The amount of change of the measured values over a certain time interval is checked.
An alarm occurs when the amount of increase becomes greater than or equal to the specified value.
Can be specified only on measurement channels.
- **Lower limit on rate-of-change alarm**
The amount of change of the measured values over a certain time interval is checked.
An alarm occurs when the amount of decrease becomes greater than or equal to the specified value.
Can be specified only on measurement channels.

Upper limit on rate-of-change alarm



Lower limit on rate-of-change alarm



The interval is defined by the following equation and is set in terms of the number of measured data points.

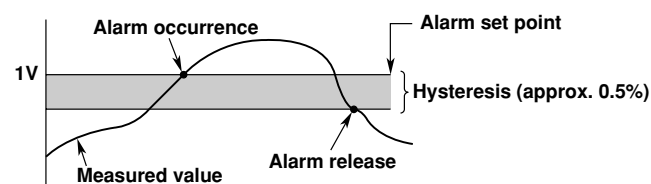
$$\text{Interval} = \text{Scan interval} \times \text{number of measurements}$$

Alarm hysteresis

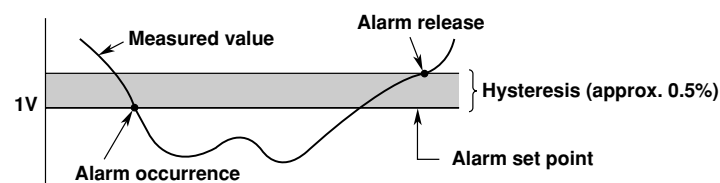
This applies to upper and lower limit alarms on measurement channels.

A width (hysteresis) can be specified on the value used to set or release the alarm. This prevents the alarm from being set or released repetitively when the measured value is fluctuating around the alarm value. The hysteresis is fixed to 0.5% of the display span (display scale if the range is set to [Scale]). The initial setting is [ON].

Upper Limit Alarm (H)



Lower Limit Alarm (L)



Alarm output relay

If you are using a model with the optional alarm output relay (/A1 through /A3), a contact signal can be generated according to the alarm conditions. For the procedure related to setting the alarm output relay, see section 6.2, "Alarm Setting."

The following functions can be specified on the alarm output relay. For details, see section 6.4.

- When multiple alarms are set to one alarm output relay, notify the succeeding alarms after the first alarm that causes the relay operation (reflash alarm function).
- When multiple alarms are set to one alarm output relay, operate the relay when all specified alarms are active (AND function)
- Energize or de-energize the alarm output relay when the alarm occurs (energize/de-energize function of the output relay).
- When the alarm changes from the ON state to the OFF state (return to normal condition), turn OFF the output relay with an alarm ACK operation (output relay hold function).

1.6 Computation Function and Report Function (/M1, Option)

Computing equations are assigned to channels that are dedicated to performing computations. Displaying computation channels and acquiring computed data can be carried out in the same manner as in the measurement channels. The computation is performed every scan interval.

Reports can be created, displayed, and stored. Report channels and report types are set in the basic setting mode.

For detail, see Chapter 11.

Computation Channels

Model	Channel
RD-MV102	Channels 31 to 34 (4 channels)
RD-MV104	Channels 31 to 34 (4 channels)
RD-MV106	Channels 31 to 42 (12 channels)
RD-MV112	Channels 31 to 42 (12 channels)

Types of Computations

The following types of computations can be performed.

Type	Description
Four arithmetical operations	Addition (+), subtraction (−), multiplication (×), and division (/)
SQR	Computes the square root.
ABS	Determines the absolute value.
LOG	Determines the common logarithm.
EXP	Determines the exponent.
Relational computation	Determines <, ≤, ≥, =, ≠ and outputs "0" or "1."
Logical computation	Determines the AND (logical product), OR (logical sum), XOR (exclusive logical sum) of two channels, NOT (negation) of an arbitrary channel and outputs "0" or "1."
Statistical computation (TLOG)	Determines the average (AVE), maximum (MAX), minimum (MIN), and maximum - minimum (P-P) at specified time intervals for the specified channels. You can specify the interval.
Rolling average	Determines the moving average of the computed result at scan intervals for the channel for which the equation is specified. The sampling interval and the number of samples are specified for each channel. The maximum sampling interval is 1 hour, the maximum number of samples is 64. The initial setting is set so that the rolling average is disabled.

The following elements can be used in the computing equations.

Element	Description
Constants (K01 to K12)	Set by the computation function.
Communication input data Communication (C01 to C12)	Set by the communication function. ⇒ "RD-MV100 Interface User's Manual"
Condition of the remote control terminals (D01 to D08)	Use ON/OFF (1 or 0) of the remote input signal.

Report Function

The report function is one of the functions provided by the optional computation function (/M1).

This function computes the average, maximum, minimum, and sum for the specified channels at specified intervals and writes the result to the internal memory.

You can select the report type from hourly reports only, daily reports only, daily and monthly reports, and weekly and monthly reports. The reports are created every hour on the hour for hourly reports, at the specified hour on the hour for daily reports (once a day), at the specified hour on the hour on the specified day for weekly reports (once a week), and at the specified hour on the hour on the specified date for monthly reports (once a week).

For example, in the case of daily reports, the average, maximum, minimum, and sum over a day for the specified channels are computed at the specified time (on the hour), and the results are acquired to the internal memory. This constitutes one report data set. The report data residing in the memory can be displayed on the RD-MV100's LCD (see section 1.3, "Display Function").

In addition, the report data residing in the internal memory can be saved to an external storage medium (section 1.4, "Storage Function"). Because the report data are saved to the external storage medium in ASCII format, spreadsheet applications can be used to view the data (see appendix 2, "Data Format of ASCII Files").

For details related to the report function, see chapter 11.

Item	Description
Report type	Select from hourly reports only, daily reports only, daily and monthly reports, and weekly and monthly reports.
Number of channels per report	Up to 12 channels
Computed data	Average, maximum, minimum, and sum
Number of reports that can be acquired to the internal memory	Up to 40
Data format	ASCII format

For a display example of report data, see section 1.3.

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1.8 Other Functions

Key Lock

Key lock is a function that locks key operations, removal of the Zip disk, and the saving of data to the external storage medium during manual save mode.

A password needs to be entered to release the key lock. For the setting and operating procedure, see section 10.2, and 10.1, respectively.

Items and behaviors of the key lock (can be set individually)

Item	Behavior during Key Lock
START key	Disabled
STOP key	Disabled
MENU key	Disabled
MEDIA key	Disabled
DISP/ENTER key	Switching operation screens is disabled.
[Alarm ACK] soft key	Disabled
Math (Computation)	
• [Math START] soft key ^{*1}	Disabled (option)
• [Math STOP] soft key ^{*1}	Disabled (option)
• [Math reset] soft key ^{*1}	Disabled (option)
Write memory	
• [Message] soft key ^{*2}	Disabled
• [Manual sample] soft key ^{*2}	Disabled
• [Trigger] soft key ^{*2}	Disabled
• [Save Display] soft key ^{*2}	Disabled
• [Save Event] soft key ^{*2}	Disabled
Media (External storage medium)	
• During manual save	Prevent Zip disk removal.

^{*1} Set together by [Math] parameter.

^{*2} Set together by [Write memory] parameter.

Key Login/Logout

This function allows only certain users to access the recorder. The users are distinguished by their name, user IDs, and passwords. You can select whether or not to use User IDs. In addition, you can set whether or not to allow operations in the basic setting mode for each user. Up to 7 users can be registered.

For the setting and operating procedure, see section 10.4, and 10.3, respectively.

Log Display

A list of phenomena that occurred can be displayed in the order of occurrence for the following items:

- Error messages (50 most recent messages)
- A log of key login and logout (50 most recent logins)
- A log of communication commands (200 most recent commands)
- A log of file transfers using the FTP client function (50 most recent transfers)

For details related to the display format, see section 10.5.

Error log example

Displays the date and time of the error occurrence, error code number, and the message.

The number of the log displayed at the last line of the screen / total number of logs

Date and time of occurrence	Error code	Error message
(005/005) Time	No.	Message
Jan.12.2000 00:36:47	201	"Not enough free space on media."
Jan.12.2000 00:36:19	210	"Media has not been inserted."
Jan.11.2000 04:15:30	005	"The input numerical value exceeds the set range.."
Jan.11.2000 04:15:28	005	"The input numerical value exceeds the set range.."
Jan.11.2000 03:23:19	601	"Measured data have been initialized."

System Screen

The total number of inputs on the RD-MV100, the capacity of the internal memory, the communication functions, the external storage drive, the options, and the MAC address (Internet address) can be displayed. For details related to the display format, see section 10.5.

Number of measurement channels*		Number of computation channels	
ANALOG: 12			
MEMORY: 1200000		MATH: 12	Internal memory capacity
OPTION:		BATCH	Optional functions
REMOTE			
RS-422		ETHERNET	Communication function
ETHERNET			
ZIP		ALARM 4	External storage medium drive
ALARM 4			
FAIL/REHEND		PRODUCT:	Optional functions
PRODUCT:			
MAC address 00:00:64:00:00:00		MAC address	

* When the cramped input terminal is equipped (/H2, option), "C" is indicated as "Analog: 12(C)" in this example.

Displayed Language

The displayed language can be set to English, Japanese, German, or French. If German or French is selected, the following information is displayed in the specified language. For all other information, the displays will be the same as those for English.

Locations where German or French is used

- Menu used to switch the screen in the operation mode.
- Function menus in the operation mode
- Error Messages
- Operation guide screens (confirmation screen that appears when the STOP key is pressed or the selection screen that appears when exiting the basic setting mode, for example.).

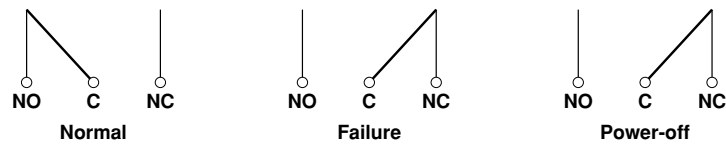
For the setting procedure, see section 10.8.

FAIL/Memory End Function (Option)

Operation at system failure

This function activates the relay output when the CPU fails. The relay is de-energized on CPU failure. The relay is de-energized if the CPU fails. This relay action cannot be reversed to “energized on failure” and thus this relay is de-energized also upon power-off (including a power failure).

• Relay behavior (de-energized on failure)



NO, C, and NC denote normally-opened, common, and normally closed, respectively.

Operation at memory end

This function activates the relay output when the remaining space (time) in the internal memory or the external storage medium becomes small. The relay is energized if the memory end is detected. The relay action cannot be reversed to “de-energized on memory end.” When the relay is energized, save the data in the internal memory to the external storage medium during manual save, or use another external storage medium during auto save.

The memory end detection operates as follows.

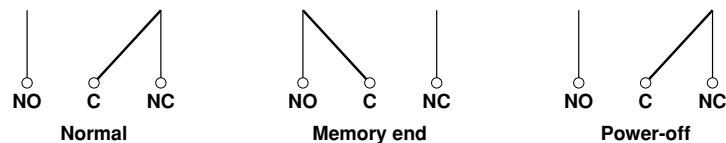
• When using auto save

When using auto save and the storage medium is inserted, the relay is energized when the remaining space on the storage medium falls to 10%. At this point, the icon of the external storage medium on the status display section on the screen turns to red from green. See section 4.2.

• When using manual save

- When the type of data to be acquired is display data only or display data and event data
When the remaining time for storing the display data in the internal memory falls to the specified time, the relay is energized.
- When the type of data to be acquired is event data only
In the [Free] mode, the relay is energized when the remaining time for storing the event data in the internal memory falls to the specified time.
In the [Trigger] or [Rotate] mode, the relay is not energized. (There is no alarm output.)

• Relay behavior (energized on memory end)



NO, C, and NC denote normally-opened, common, and normally closed, respectively.

For the setting procedure, see section 10.6.

Remote Control Function (/R1 Option)

When a contact or open collector signal is applied to the remote control terminal, a predetermined operation is carried out.

Arbitrary controls can be assigned to the eight remote control terminals. The available controls are listed below.

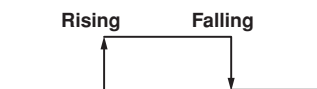
For the setting procedure, see section 10.7.

Function	Remote Signal	Operation
None	-	No operation.
Start/Stop	Edge	Start/stop acquiring data to the internal memory. ⇒ "Sections 8.4 and 8.5"
Trigger	Trigger	Trigger to start acquiring event data to the internal memory (valid only when event data are specified to be acquired to the internal memory and the trigger used to start the acquisition is set to key trigger ⇒ "Section 8.11")
Alarm ACK	Trigger	Release alarm display/relay output (valid only when the operation of the alarm display or output relay is set to "hold" ⇒ "Section 6.4").
Time adj	Trigger	Adjust the internal clock to the nearest hour.
Computation	Edge	Start/stop computation (only for models with the computation option (/M1).
Computation reset	Trigger	Reset the computed value of the computation channel (reset to 0, only on models with the computation option (/M1) while the computation is stopped).
Manual sample	Trigger	Write the instantaneous values of all channels to the internal memory once.
Load setup data 1 to 3	Trigger	Load and activate the setup data file that had been created and stored in the external storage medium.
Messages 1 to 8	Trigger	Display messages 1 to 8 on the trend display and write them to the internal memory.

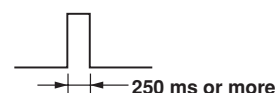
Remote signal (edge and trigger)

The above operations are carried out on the rising or falling edge of the remote signal (edge) or the ON signal lasting at least 250 ms (trigger).

Rising/Falling



Trigger



For contact inputs, the remote signal rises when the contact switches from open to close and falls when the contact switches from close to open. For open collector signals, the remote signal rises when the collector signal (voltage level of the remote terminal) goes from high to low and falls when the collector signal goes low to high.

Daylight Savings Time

- When the specified time is reached at which the daylight savings time adjustment is to be enabled, the recorder automatically sets the clock ahead by one hour.
(Example : If the time is set to 9 O'clock on June 1, the time is set ahead to 10 O'clock June 1.)
- When the specified time is reached at which the daylight savings time adjustment is to be disabled, the recorder automatically sets the clock back by one hour.
(Example : If the time is set to 9 O'clock on December 1, the time is set back to 8 O'clock December 1.)

For the setting procedure, see section 10.12.

Temperature Unit

The temperature unit can be set to Celsius (°C) or Fahrenheit (°F). This applies to all 8.4 and 8.5 channels.

For the setting procedure, see section 10.13.

2.1 Precautions on the Use of the Recorder

Read the following precautions before using the recorder and the external storage medium (floppy disk, zip disk, ATA flash memory card).

Handling Precautions

- Use care when cleaning the recorder, especially any plastic parts. When cleaning, wipe with a dry, soft cloth. Do not use chemicals such as benzene or thinner, since these may cause discoloring and deformation.
- Keep electrically charged objects away from the instrument as this may cause malfunction.
- Do not apply volatile chemicals to the LCD monitor or panel keys. Do not allow rubber and vinyl products to remain in contact with the recorder for long periods of time. This may damage the recorder.
- Do not apply shock to the recorder.
- When not in use, make sure to turn OFF the power switch.
- If there are any symptoms of trouble such as strange odors or smoke coming from the recorder, immediately turn OFF the power and unplug the power cord. Then, contact your nearest Omega.

CAUTION

Don't put any weight on the recorder while it is in reclined position with its front feet up, as it may damage the feet .

Handling Precautions of External Storage Media

- Take special care in handling external storage media as they are delicate products. For general precautions, see the instruction manual that came with the external storage medium.
- Floppy disks and Zip disks may not operate properly under high or low temperature environment. If you are using the recorder in a low-temperature environment (less than 10°C), let the recorder warm-up for at least 30 minutes beforehand.
- If you are using them in a high-temperature environment (greater than 40°C), we recommend the external storage medium be inserted into the drive when saving the data and be removed after the data have been saved (manual save, see section 8.4.)
- Remove the external storage medium from the drive when turning ON/OFF the recorder.
- Do not remove the external storage medium while the access lamp is lit. Doing so can destroy the data on the medium.

CAUTION

Don't expose the floppy disk drive or zip drive to vibration or shocks, as it may damage the drives.

2.2 Installing the Recorder

Installation Location

Install the recorder in a location that meets the following conditions. See also the normal operating conditions described in section 14.7, "General Specifications."

CAUTION

For safety reasons, don't mount the recorder with the back panel downwards.

- **Well-ventilated location**

To prevent overheating, install the recorder in a well-ventilated location. A space of 50 mm or more from the right, left and top surface of the recorder is recommended.

- **Minimum mechanical vibrations**

Choose an installation location with the minimum mechanical vibration.

- **Horizontal**

Install the recorder horizontally. (However, the recorder can be reclined up to 30 degrees when the front feet are up.)

Note

- Condensation may occur if the instrument is moved to another place where both the ambient temperature and humidity are higher, or if the temperature changes rapidly. In addition, measurement errors will result when using thermocouples. In this case, let the instrument adjust to the new environment for at least one hour before using the instrument.
 - The lifetime of the LCD may be shortened if the recorder is used in a high-temperature environment over a long period of time. When installing the recorder in a high-temperature environment (greater than 40°C), we recommend the backlight brightness of the LCD be set to a low setting. For setting the LCD brightness, see section 7.14.
-

Do not install the instrument in the following places :

- **In direct sunlight or near heat sources**

Install the recorder in a place with small temperature fluctuations near room temperature (23°C). Placing the instrument in direct sunlight or near heat sources can cause adverse effects on the internal circuitry.

- **Where an excessive amount of soot, steam, moisture, dust, or corrosive gases are present**

Soot, steam, moisture, dust, and corrosive gases will adversely affect the recorder. Avoid such locations.

- **Near strong magnetic field sources**

Do not bring magnets or instruments that produce electromagnetic fields close to the recorder. Operating the recorder in strong magnetic fields can cause errors in the measurements.

- **Bad angle for viewing the screen**

Because the recorder uses a 5.5" TFT color LCD, it is difficult to view the display from an extreme angle. Please install the recorder so that the monitor can be viewed from the front.

2.3 Input Signal Wiring



CAUTION

If a strong tension is applied to the cable wired to the recorder, the terminals of the recorder and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.

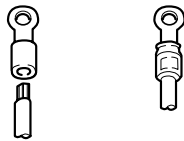
2

Before Using the Recorder

Precautions to be taken while Wiring

Take the following precautions when wiring the input signal cables.

- **It is recommended that crimp-on lugs (designed for 4 mm screws) with insulation sleeves be used on the lead wire ends for the optional screw terminals (suffix code /H3).**



Crimp-on lug

- **Take measures to prevent noise from entering the measurement circuit.**
 - Move the measurement circuit away from the power cable (power circuit) and ground cable.
 - It is desirable that the item being measured does not generate noise. However, if this is unavoidable, isolate the measurement circuit from the item. Also, ground the item being measured.
 - Shielded wires should be used to minimize noise caused by electrostatic induction. Connect the shield to the earth ground terminal of the recorder as necessary (make sure you are not grounding at two points).
 - To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.
 - Make sure to earth ground the earth ground terminal through minimum resistance (100 Ω).
- **When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal.**
 - Always use the input terminal cover.
 - Do not use thick wires which may cause large heat dissipation (cross sectional area 0.5 mm² or less recommended).
 - Make sure that the air temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns ON or OFF.
- **Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices.**

If you need to make a parallel connection, then

 - Turn the burnout function OFF. (See section 5.9)
 - Ground the instruments to the same point.
 - Do not turn ON or OFF another instrument during operation. This can have adverse effects on the other instruments.
 - RTDs cannot be wired in parallel.

2.3 Input Signal Wiring

WARNING

To prevent electric shock, ensure the main power supply is turned OFF.

CAUTION

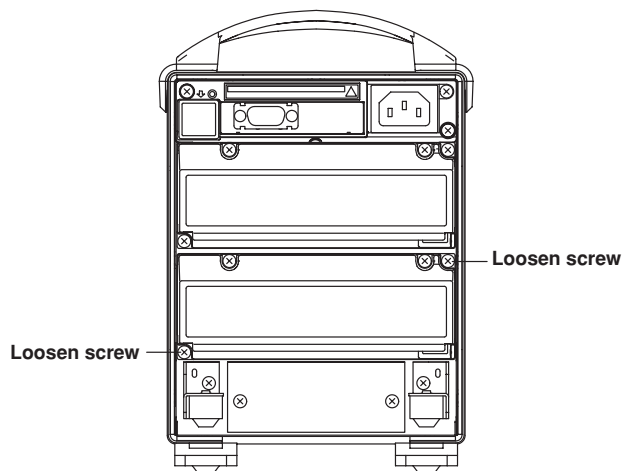
- Do not apply input signals that exceed the following values. This can damage the recorder.
 - Maximum input voltage
Voltage range of 2 VDC or less or thermocouples : ± 10 VDC
Voltage range between 6 and 20 VDC : ± 30 VDC
 - Maximum common mode noise voltage
250 VACrms (50/60 Hz)
 - This recorder is an INSTALLATION CATEGORY II product.
-

Wiring Procedure

1. Turn OFF the recorder and remove the input terminal cover.
2. Connect the input signal wires to the input terminals.
3. Replace the input terminal cover and fasten it with screws.

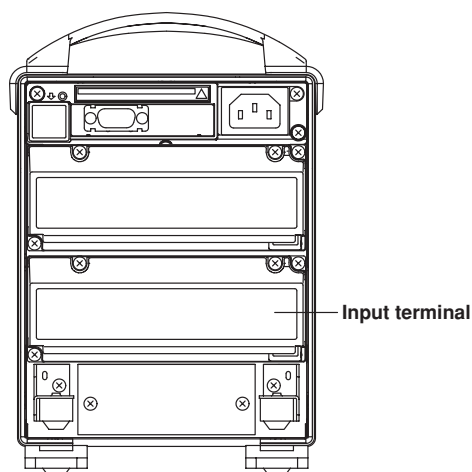
Note

The terminal block itself can be removed by loosening the two screws at the top left and bottom right of the terminal block. This makes wiring work easier. To prevent bad contacts, make sure to securely tighten the screws after wiring.



RD-MV102/RD-MV112

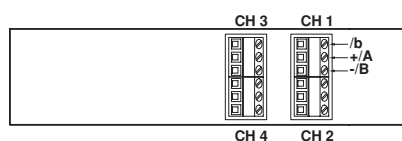
- Input terminal position



- Terminal arrangement

RD-MV102/RD-MV104

Standard input terminals

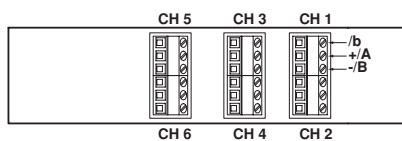


Screw terminals (/H2)

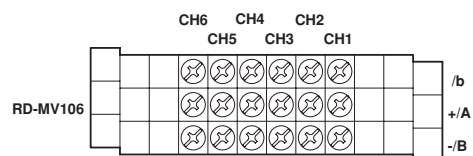


RD-MV106

Standard input terminals

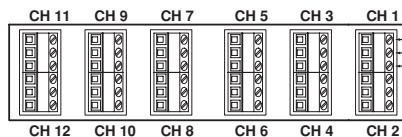


Screw terminals

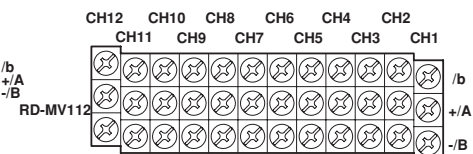


RD-MV112

Standard input terminals



Screw terminals

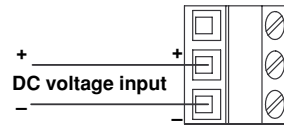
**Note**

RTD input terminals A and B are isolated on each channel. Terminal b is shorted internally across all channels. However, for options /N1 (Cu10, Cu25 RTD input, 3 terminal isolated RTD) and /N2 (3 terminal isolated RTD), input b is isolated for each channel.

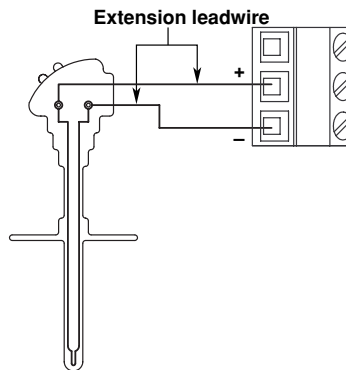
2.3 Input Signal Wiring

- Wiring diagram

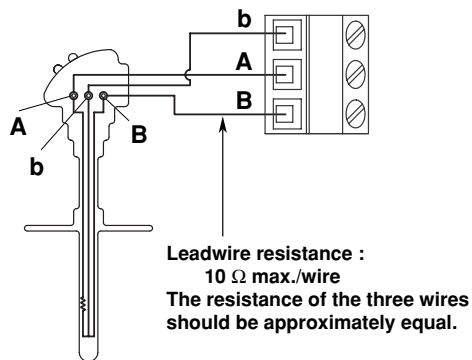
DC Voltage and DI (Contact) Input



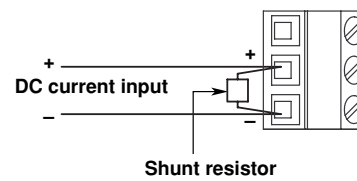
Thermocouple Input



Resistance Temperature Detector Input



DC Current Input



NOTE : For a 4 to 20 mA input, use a shunt resistor of $250 \Omega \pm 0.1\%$.

2.4 Alarm Output Wiring (/A1 to /A3, Option)



WARNING

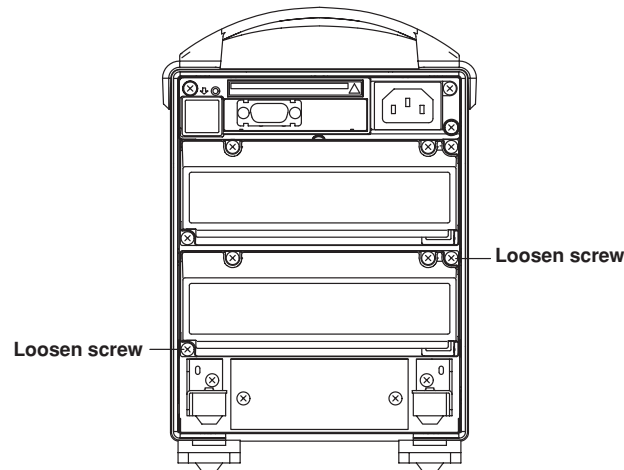
- To prevent electric shock, ensure the main power supply is turned OFF.
- If a voltage of more than 30 VAC or 60 VDC is to be applied to the alarm output terminal, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the wires from slipping out when the screws become loose. Furthermore, use double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires on which a voltage of more than 30 VAC or 60 VDC is to be applied. For all other wires, use basic insulated wires (dielectric strength of 1350 VAC). To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.

Wiring Procedure

1. Turn OFF the recorder and remove the cover for the option terminal.
2. Connect the alarm output wires to the terminal.
The terminal arrangement will be one of the figures shown below depending on the alarm output relay option (number of outputs) and the /F1 option.
3. Replace the terminal cover and fasten it with screws.

Note

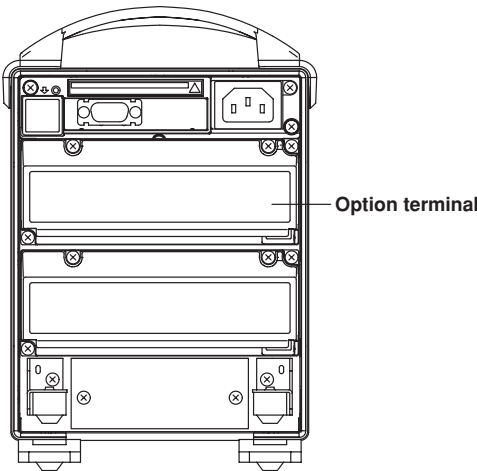
The option terminal block itself can be removed by loosening the two screws at the top left and bottom right of the terminal block. This makes wiring work easier. To prevent bad contacts, make sure to securely tighten the screws after wiring.



2.4 Alarm Output Wiring (/A1 to /A3, Option)

Alarm terminal position

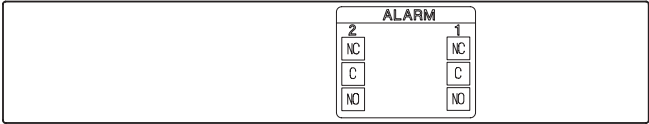
Enclosed in parentheses are the relay numbers assigned to each option terminal.



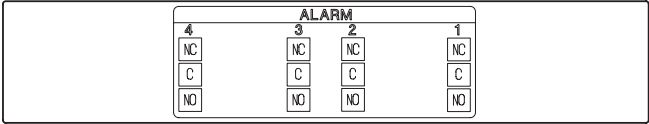
Terminal arrangement (only the position of the alarm output terminals is indicated.)

When the relay is not energized, NC is closed and NO is open. C is the common terminal.

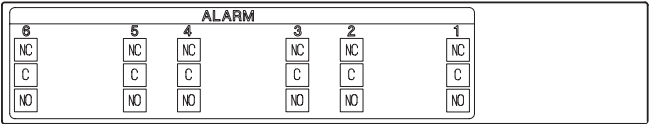
/A1, /A1/F1



/A2, /A2/F1



/A3, /A3/R1



Contact Specifications

Item	Specification
Output type	Relay transfer contact (energize/de-energize switchable)
Output capacity	250 VAC (50/60 Hz), 3 A 250 VDC, 0.1 A (resistive load)
Dielectric strength	1500 VAC (50/60 Hz) for one minute between output terminals and earth ground terminal

For details related to the switching of energized/de-energized state of the alarm relays, see section 6.4.

2.5 FAIL/Memory End Wiring (/F1, Option)

2

Before Using the Recorder



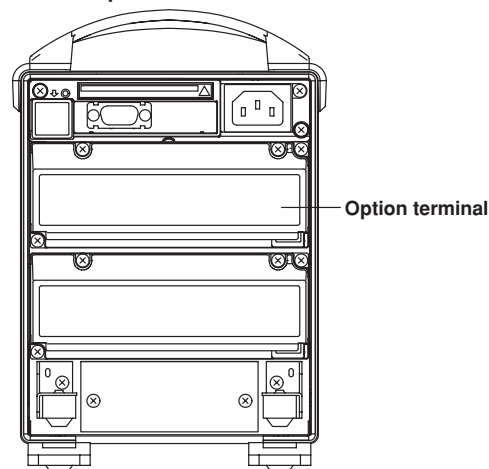
WARNING

- To prevent electric shock, ensure the main power supply is turned OFF.
- If a voltage of more than 30 VAC or 60 VDC is to be applied to the FAIL/Memory End output terminal, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the wires from slipping out when the screws become loose. Furthermore, use double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires on which a voltage of more than 30 VAC or 60 VDC is to be applied. For all other wires, use basic insulated wires (dielectric strength of 1350 VAC). To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.

Wiring Procedure

1. Turn OFF the recorder and remove the cover for the option terminal.
2. Connect the FAIL/Memory End output wires to the terminal.
The terminal arrangement for the FAIL/Memory End output option is as follows.

Terminal position



Terminal arrangement (only the position of the FAIL/Memory end output terminals is indicated.)

When the relay is not energized, NC is closed and NO is open. C is the common terminal.



3. Replace the terminal cover and fasten it with screws.

Note

- The option terminal block itself can be removed by loosening the two screws at the top left and bottom right of the terminal block. This makes wiring work easier. To prevent bad contacts, make sure to securely tighten the screws after wiring.
- FAIL output is a de-energize relay, and the Memory End output is an energize relay.

2.5 FAIL/Memory End Wiring (/F1, Option)

Contact Specifications

Item	Specification
Output type	Relay transfer contact
Output capacity	250 VAC (50/60 Hz), 3 A 250 VDC, 0.1 A (resistive load)
Dielectric strength	1500 VAC (50/60 Hz) for one minute between output terminals and earth ground terminal

For details related to the FAIL/Memory End output, see section 1.8.

2.6 Remote Control Wiring (/R1, Option)



WARNING

To prevent electric shock, ensure the main power supply is turned OFF.

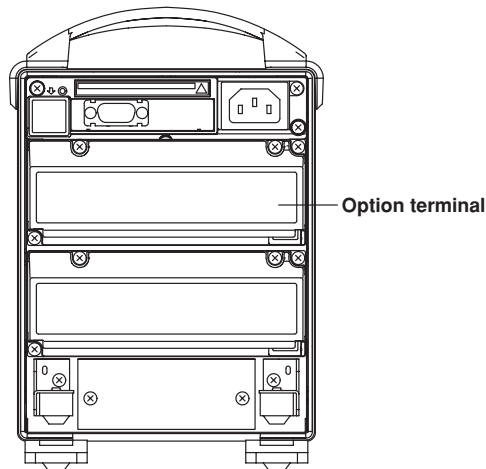
2

Before Using the Recorder

Wiring Procedure

1. Turn OFF the recorder and remove the cover for the option terminal.
2. Connect the remote control signal wires to the terminal.
The terminal arrangement for the remote control option is as follows. C is a common terminal for terminals 1 through 8.

Terminal position



Terminal arrangement (only the position of the remote control terminals is indicated.)



"C" denotes the common terminal.

3. Replace the terminal cover and fasten it with screws.

Note

- The option terminal block itself can be removed by loosening the two screws at the top left and bottom right of the terminal block. This makes wiring work easier. To prevent bad contacts, make sure to securely tighten the screws after wiring.
- Use shielded wires for the remote control wires to reduce the effects of noise. Connect the shield to the earth ground terminal of the recorder.

2.6 Remote Control Wiring (/R1, Option)

Input Specifications

Item	Specification
Input signal	Voltage-free (dry) contact, open-collector (TTL or transistor)
Input conditions	ON voltage : Less than or equal to 0.5 V (30 mA DC) Leakage current in the OFF state : No more than 0.25 mA Signal duration : 250 ms minimum
Input type	Photocoupler isolation (one side common) Internal isolated power source (5 V \pm 5%)
Dielectric strength	500 VDC for one minute between input terminals and earth ground terminal

For details related to the control and input types, see section 10.7.

2.7 Power Supply Wiring

This section describes how to connect the power supply cable. Make sure to read this section before wiring the power supply cables.

2

Before Using the Recorder

100 to 120 VAC/200 to 240 VAC Power Supply Model

Precautions to be taken when wiring the power supply

To prevent electric shock and damage to the recorder, observe the following warnings.



WARNING

- Confirm that the supply voltage meets the rated power supply voltage before connecting the cable.
- Confirm that the power is turned OFF before connecting the power cord.
- To prevent electric shock and the possibility of fire, use only the power cord that is supplied by Omega.
- Always use protective earth terminal to prevent electric shock. Connect the power cord to a three-pole power outlet that has a protective earth terminal.
- Never use an extension cord that does not have protective earth terminal, otherwise the protection function will be compromised.

Use a power supply that meets the following conditions:

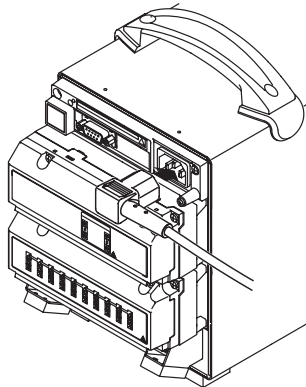
Item	Conditions
Rated power supply	100 to 240 VAC
Allowable power supply voltage range	90 to 132 or 180 to 264 VAC
Rated power supply frequency	50/60 Hz
Allowable power supply frequency range	50/60 Hz \pm 2%
Maximum power consumption	38 VA(100 V), 53 VA(240 V)

Note

Do not use a supply voltage in the range 132 to 180 VAC, as this may have adverse effects on the measurement accuracy.

• Connection procedure

1. Check that the recorder is turned OFF.
2. Connect the power cable (supplied with the recorder) to the power connector on the rear panel of the recorder.



3. Connect the other end of the power cord to a socket that meets the requirements.

12 VDC Power Supply Model

Using AC adapter

Follow the warnings below to avoid electric shock or damaging the instrument.



WARNING

- Connect the power wires after checking that the power supply is turned off to prevent electric shock.
 - To prevent electric shock or fire, always use the power cable supplied by Omega.
 - Before connecting the power cord, check that the voltage on the supply side matches with the voltage rating of this recorder.
 - When not using the instrument for a long time, unplug the power cord of the AC adapter.
 - Only use the AC adapter from Omega (Part No.: B9230ZW).
 - Do not put objects on top of the AC adapter or the power cord. Also, do not let heat generating objects come in contact with them.
 - When unplugging the power cord, do not pull on the power cord. Always hold the plug. If the power cord becomes damaged, contact your nearest representative listed on the back cover of this manual.
-

Connecting Procedure

1. Check that the power switch is turned OFF.
2. Connect the AC adapter to the AC adapter jack on RD-MV100.
Install the clamp filter (standard accessory) near RD-MV100 of power cord.
3. Connect the power cord plug that came with the AC adapter to the power supply connector of the AC adapter.
4. Connect the plug on the other end of the power cord to a power outlet meeting the following specifications.
The power outlet should be a three-pole type with a protective grounding terminal.

Rated power supply voltage:	100 to 240 VAC
Operating supply voltage range:	90 to 250 VAC
Rated supply voltage frequency:	50/60 Hz
Maximum power consumption:	90 VA
AC adapter rated output voltage:	12 VDC
AC adapter maximum rated output current:	2.6 A

Functional grounding

When using the AC adapter, noise may be reduced if the functional ground is connected to the earth GND. Use the functional ground terminal as necessary.

Using the accessory DC power terminal connector

Follow the warnings below to avoid electric shock or damaging the instrument.

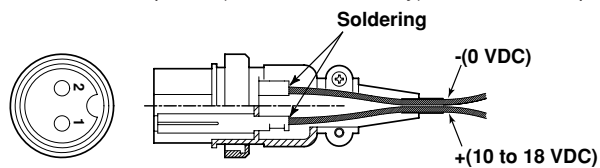
**WARNING**

- Connect the power wires after checking that the power supply is turned off to prevent electric shock.
- To prevent fire, use wires with cross sectional area of 0.3mm²(22AWG) or more.

Connecting procedure

1. Check that the power switch is turned off.
2. Connect the accessory DC power terminal connector (part No. A1105JC) to the power wire and the DC100/DS400/DS600. Use a power wire with a cross sectional area of 0.3 mm² (22AWG) or more.

Install the clamp filter (standard accessory) near DC100 of power wire.



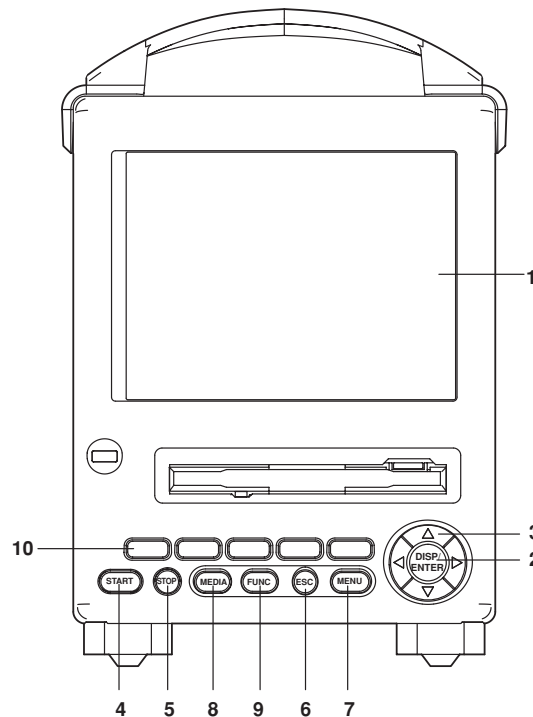
Rated supply voltage: 12 VDC

Operating supply voltage: 10 to 18 VDC

Power consumption: About 30 VA max.

3.1 Names of Parts and Functions

Front Panel



1. LCD screen

Displays various operation screens such as the trend display and the setup screen to configure the recorder.

2. DISP/ENTER key

Displays and confirms the settings for switching screens in the operation mode.

3. Arrow keys

Used to select the screen in the operation mode and to select the parameter.

4. START key

Used to start the data acquisition to the internal memory and display the waveform on the trend display. Also starts computation and the report function when the computation function (/M1) is equipped.

5. STOP key

Used to stop the data acquisition to the internal memory. It also stops the updating of the waveform on the trend display. If the model has the optional computation function (/M1), the report is stopped. For computation, you can select whether or not to stop the operation when the STOP key is pressed.

6. ESC key

Used to cancel an operation. Also used to return to the operation mode from the setting mode (This function is the same as the MENU key).

7. MENU key

Used to enter the setting mode. Also used to return to the operation mode from the setting mode (This function is the same as the ESC key).

3.1 Names of Parts and Functions

8. MEDIA key

Detects the external storage medium and saves internal memory data to the external storage medium.

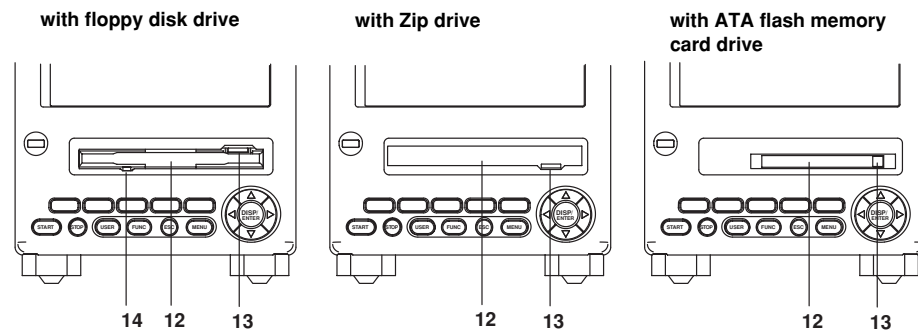
9. FUNC key

Used to execute various functions in the operation mode. Also, used to enter the basic setting mode from the setting mode.

10. Soft keys

When the FUNC key is pressed, the functions are assigned to the soft keys and displayed at the bottom of the screen.

During the setting/basic setting modes, the parameters are assigned to the soft keys and displayed at the bottom of the screen.



11. Power switch

Used to turn the power ON/OFF.

12. Storage medium drive

Floppy disk drive, Zip drive, or ATA flash memory card drive depending on the specification.

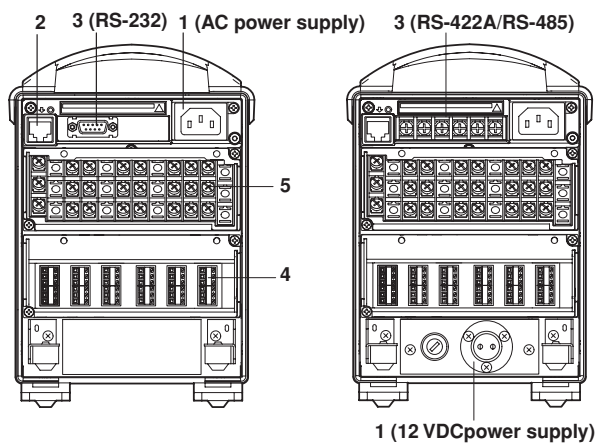
13. Eject button (access lamp for Zip drive)

Used when ejecting the storage medium. Also is the access lamp for the Zip drive. The access lamp is lit while the Zip disk is being accessed.

14. Access lamp for the floppy disk drive

The access lamp is lit while the floppy disk is being accessed.

Rear Panel



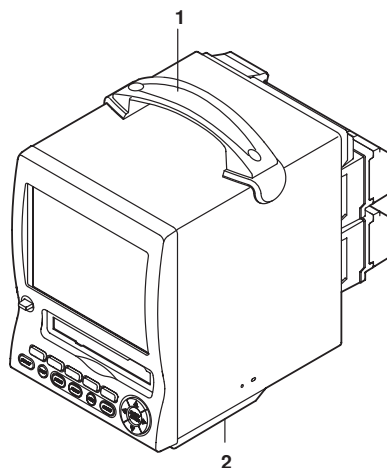
1. **Power terminals**
Connect the power cord.
2. **Ethernet port**
Connect the Ethernet cable (10Base-T).
3. **Serial interface port**
RS-232 port or RS-422-A/485 port depending on the specification. Connect the serial interface cable.
4. **Input terminals**
Connect the input signal cable of the item being measured.
5. **Option terminals**
Connect optional input/output signal cables.

Note

See "RD-MV100 Communication interface user's manual" to use Ethernet port and the serial interface port.

Desktop Type

1. **Carrying handle**
2. **Foot**



3.2 Turning ON/OFF the Power Switch

This section describes the procedures to turn ON/OFF the power switch.

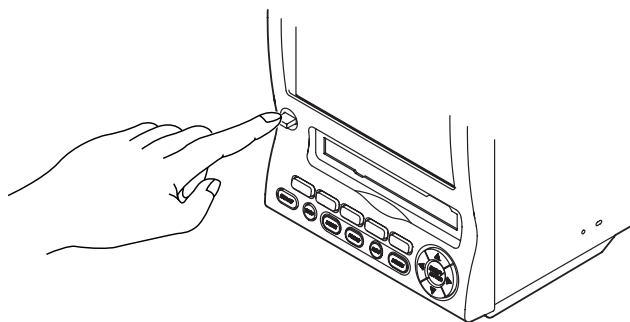
Procedure

1. Check the following points before turning ON the power switch.
 - The power cord/wires are connected correctly to the recorder.
 - The recorder is connected to the correct power supply. (See section 14.7)
 - The proper fuse is set.

CAUTION

If the input wires are connected in parallel with another instrument, avoid turning ON/OFF the recorder or the other instrument when either one is in operation. This may affect the reading.

2. Turn the power switch ON.
After performing a self-diagnosis for a few seconds, a screen in the operation mode appears.



Note

- If nothing is displayed when the power switch is turned ON, turn OFF the power switch and check the points listed in step 1. After checking the points, turn ON the power switch again. If the unit still does not work, it is probably malfunctioning. Contact Omega for repairs.
 - If an error message is displayed on the screen, take measures according to the description in chapter 12, "Troubleshooting."
 - Turn ON the power switch, let the RD-MV100 warm up for at least 30 minutes, and then start the measurements.
-

3.3 Inserting/Removing the External Storage Medium

This section describes the procedures to insert and remove the external storage medium. Three types of media can be used depending on the specification.

- Model RD-MV1**-1: Floppy disk
- Model RD-MV1**-2: Zip disk
- Model RD-MV1**-3: ATA flash memory card

For the handling procedure of the storage medium, see section 2.1.

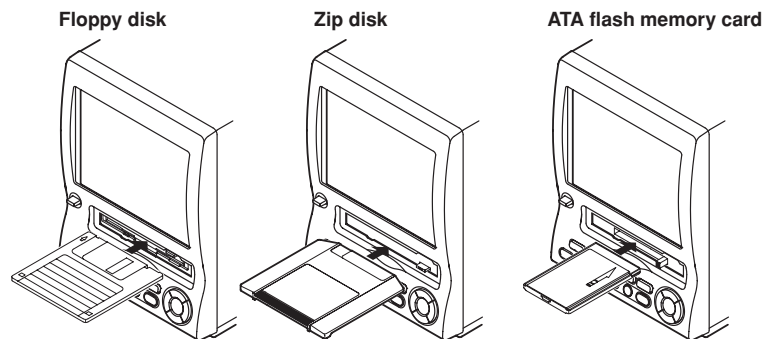
Procedure

Inserting the storage medium

1. Insert the medium into the drive until a click is heard.
2. When the power switch is turned ON, closing the front cover causes the RD-MV100 to detect the existence of an external storage medium in the drive. If the storage medium is detected, an external storage medium icon is displayed in the status display section of the screen.

Note

The external storage medium can't be detected when the MEDIA key is locked. First release the MEDIA key and then press it. (See 10.2 Using key lock.)



Removing the storage medium

Floppy disks and ATA flash memory cards can be removed from the drive regardless of whether the RD-MV100 is turned ON or OFF. Zip disks cannot be removed when the RD-MV100 is turned OFF.

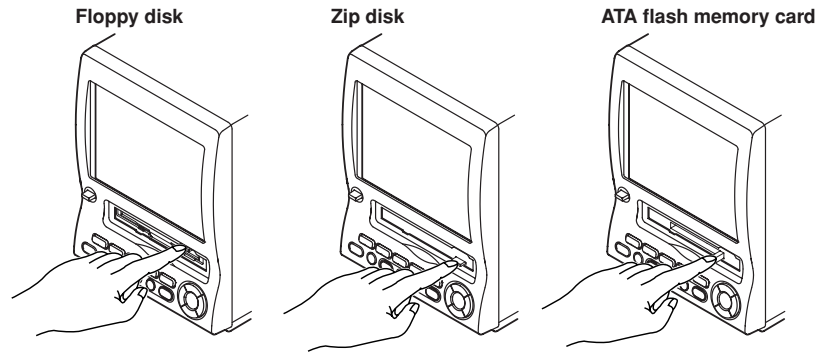
1. If the RD-MV100 is turned ON, check that the storage medium is not being accessed.

Note

- The access lamp is lit while the storage medium is being accessed.
- A message "Data are being saved to the medium." is displayed while measured/computed data are being saved to the medium.

3.3 Inserting/Removing the External Storage Medium

2. Open the front cover by pressing down on the knob that is located in the center of the upper section of the cover and pulling forward. Push the eject button to remove the storage medium.
3. Close the front cover. If the RD-MV100 is turned ON, the external storage medium icon in the status display section disappears (see the figure of the icon on the previous page).



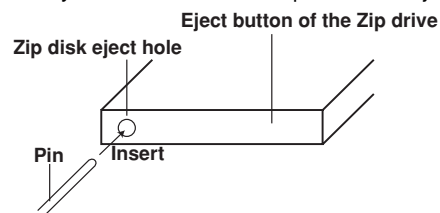
Note

If the key lock function for the storage medium is engaged, the Zip disk cannot be ejected even if the eject button is pressed. Release the key lock before attempting to eject the Zip disk.

Procedure when the Zip disk cannot be ejected

If the Zip disk cannot be removed by performing the steps given in the “Removing the storage medium” section, carry out the following steps to remove it.

1. Open the front cover by pressing down on the knob that is located in the center of the upper section of the cover and pulling forward.
2. Insert a pin of approx. 1 mm in diameter into the eject button hole and press slowly. This will cause the Zip disk to be ejected.



Explanation

Formatting external storage media

Format the external storage medium before use.

The external storage medium is formatted to the following types using the recorder.

Format type

Floppy disk : 2 HD, 1.44 MB

Zip disk : FDISK 1 partition (hard disk format)

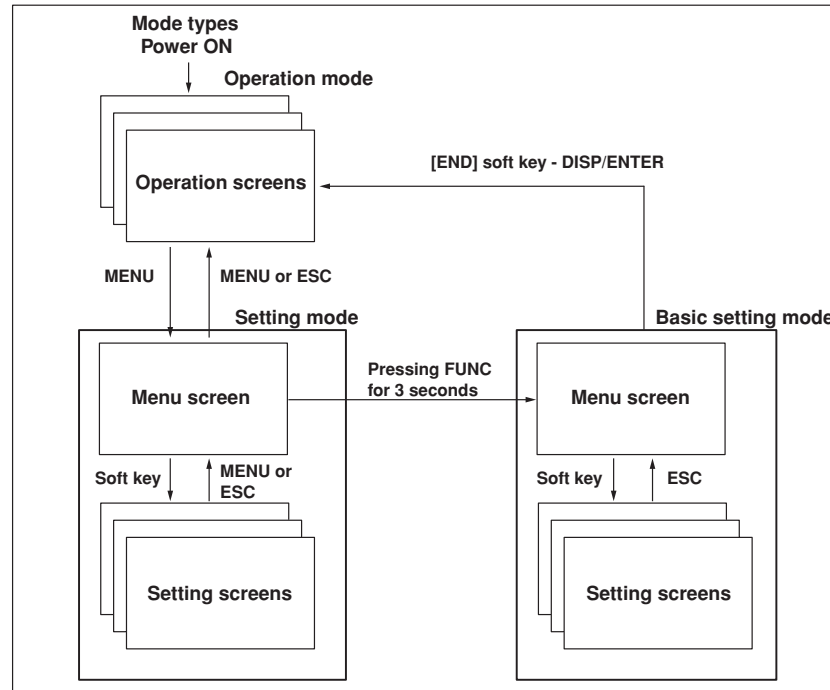
ATA flash memory card : FDISK 1 partition (hard disk format)

External storage media formatted on other devices can be used as long as the format type is the same as those indicated above.

3.4 Run Mode

There are three run modes on the recorder : operation, setting, and basic setting. This section describes the functions and relationships of the three modes.

Mode Types



Mode Type	Description	Possible Operations
Operation mode	This mode is used for daily operation. This mode is entered when the power is turned ON.	Monitoring operation Data acquisition
Setting mode	This mode is used to configure the recorder operation such as input range and alarms. This mode is entered by pressing the MENU key in the operation mode. Measured data cannot be displayed in this mode. Operations such as measurements, alarm detection, and data acquisition are continued.	Setting the operation Operation related to the file on the external storage medium
Basic setting mode (Setup mode)	This mode is used to configure the basic environment of the recorder such as the input format and the data storage format. This mode is entered by pressing the FUNC key for three seconds at the setting mode menu. This mode cannot be entered while data acquisition or computation is in progress. Operations such as measurements, alarm detection, and data acquisition are stopped.	Basic settings of the functions Operation related to the file on the external storage medium

Functions and Operations in the Operation Mode

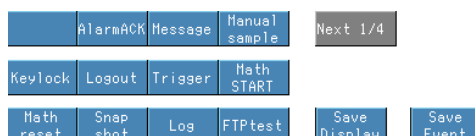
Operation screen

Displays various operation screens such as trend, digital, bar graph, alarm summary, message summary, memory summary, historical trend, and report display (option). Screens are switched by the arrow keys and the DISP/ENTER key. See chapter 4.

Operations using the FUNC key

Pressing the FUNC key displays a menu that is assigned to the soft keys at the bottom of the screen. The menu varies depending on the setup information and options. Press the [Next] soft key to display the soft key menu in the next line.

The function is executed by pressing the soft key. Press the FUNC or ESC key to erase the menu without executing the assigned function.



FUNC key menu

Menu	Ref. Section	Description
Alarm ACK	6.1, 6.4	Release alarm indication and relay output (when alarm display and alarm output relay action is set to "hold.")
Message	7.4	Displays messages and stores them to the internal memory.
Manual sample	8.12	Stores instantaneous values of all channels to the internal memory.
Key lock	10.1	Enables or disables key lock. (when key lock is in use)
Logout	10.3	Logout (when being logged in while key login is in use)
Trigger	8.6, 8.11	Starts acquiring event data (when [Key Trigger] is set as a trigger to start acquiring event data)
Math START/STOP	11.3	Starts/stops computation. (when the computation function(/M1) is equipped)
Math reset	11.3	Clears computed results. (when the computation function(/M1) is equipped and the computation is suspended)
Math ACK	11.3	Clears the computation dropout display. (when the computation function(/M1) is equipped and the computation dropout occurs)
Snapshot	9.6	Saves the screen image data to the external medium.
Log	10.5	Displays log screens or the system information screen.
FTP test*		Execute FTP test.
Save Display/Save Event	8.7	Stores the display data or event data to the external storage medium. (only when the display data or event data (free mode) are being acquired to the internal memory).

* See RD-MV100 Communication Interface User's Manual.

Other key operations**• START/STOP**

Start/stop acquiring measured/computed data. For the operating procedure, see sections 8.5 and 8.6.

The waveform on the trend display also starts/stops.

When the computation function (/M1) is equipped, computation and the report function also start/stop. For the operating procedure, see sections 11.3 and 11.12.

• MEDIA

Detects the external storage medium and saves the data in the internal memory to the external storage medium in the manual save mode.

Functions of the Setting and Basic Setting Modes

Configure recorder functions using the arrow keys, the DISP/ENTER key, the soft keys, and the character/number input keys. See “3.5 Configuring the functions” and chapters 5 through 11 for detail. Also see section 9.1 to save the setup data.

3.5 Configuring the Functions

Setting Mode and Basic Setting Mode

Basic setting mode

The basic setting mode is used to change the basic configuration of various functions. Basic setting mode cannot be entered while data acquisition or computation is in progress.

Setting mode

The setting mode is used to change the functions for each channel and the display specifications. All items except the ones listed below can be changed while data acquisition or computation is in operation. Items that cannot be changed are grayed and the cursor cannot be moved on them.

- **Items that cannot be changed while data acquisition is in progress**
 - Input range
 - The trend's display update rate
 - Auto save interval
 - Computing equation
 - Constants for computation
- **Items that cannot be changed while computation is in progress**
 - Range setting
 - Computing equation
 - Constants for computation
 - TLOG timer number and computing unit

Configuration Details

The configuration details of the setting mode and the basic setting mode are shown below. Enclosed in parentheses are reference sections.

Settings related to the input

Item	Setting Mode	Basic Setting Mode
Scan interval		• Scan interval
Input specifications (5.1 to 5.7)	<ul style="list-style-type: none"> • Input type • Measurement range • Upper and lower limit of span • Reference channel for differential computation • Upper and lower limits of scale • Unit 	
Burnout (5.9)		• Burn out Off/Up/Down
Reference junction compensation		<ul style="list-style-type: none"> • Switch between [Internal] and [External] • Compensation voltage when set to [External]
Noise elimination	<ul style="list-style-type: none"> • Filter time constant/Off (RD-MV102/ RD-MV104) (5.8) • Number of samples for the moving average/Off (RD-MV106/RD-MV112) (5.8) 	• Integration time of the A/D converter (5.9)

Settings related to the alarm

Item	Setting Mode	Basic Setting Mode
Alarm	<ul style="list-style-type: none"> • Alarm type (6.2) • Alarm value (6.2) • Output relay On/Off (6.2) • Output relay number (6.2) • Alarm delay time (6.3) 	<ul style="list-style-type: none"> • Display hold/non-hold (6.4) • The time interval for the rate-of-change alarm (for measurement channels only) (6.4) • Hysteresis (for measurement channels only) (6.4)
Alarm output relay operation (option) (6.4)		<ul style="list-style-type: none"> • Reflash alarm • AND operation • Relay energize/de-energize • Relay hold/non-hold

3.5 Configuring the Functions

Settings related to the display

Item	Setting Mode	Basic Setting Mode
Display group (7.6)	<ul style="list-style-type: none"> Group name (7.6) Channel assignment (7.6) Group display switching interval (7.13) 	
Tag/Channel display	<ul style="list-style-type: none"> Tag name (7.1) 	<ul style="list-style-type: none"> Switch between tag display and channel display (7.2)
Trend	<ul style="list-style-type: none"> Display rate (7.3) Message (7.5) Trip line position, display color (7.7) Trip line width (7.13) Channel display color (7.8) (applies also to bar graphs) Display direction (vertical/horizontal) (7.13) Trend line width (7.13) Grid (7.13) Number of scale divisions (7.10) (applies also to bar graphs) Scale position (7.10) Zone upper and lower limits (7.9) Partial expansion display (7.11) 	<ul style="list-style-type: none"> Measurement channels to display the trend (applies also to measurement channels that data are to be acquired) (8.10) Use/not use the partial expansion display (7.12)
Bar graph	<ul style="list-style-type: none"> Channel display color (applies also to trends) (7.8) Bar graph direction (vertical/horizontal) (7.13) Number of display scale divisions (applies also to trends) (7.10) Bar graph base position (7.10) 	
LCD	<ul style="list-style-type: none"> Background color (white or black) (7.13) Brightness (7.14) Backlight saver specifications (7.14) 	

Settings related to data storage

Item	Setting Mode	Basic Setting Mode
Data acquisition (8.11)		<ul style="list-style-type: none"> Types of data to be acquired Event data <ul style="list-style-type: none"> Sampling interval Mode (Free/Trigger/Rotate) Number of blocks (number of memory divisions) Data length (file size) Pre-trigger position Type of trigger to use
Channel selections for data acquisition (8.10)		<ul style="list-style-type: none"> Measurement channels that data are to be acquired (applies also to measurement channels for which to display the trend) Computation channels that data are to be acquired (applies also to computation channels for which to display the trend)
Storage media	<ul style="list-style-type: none"> Name of the directory to which data are saved (8.9) File header string (8.9) Range of data to be saved during manual save (8.9) Auto save interval (during auto save) (8.8) 	<ul style="list-style-type: none"> Save method to the to be storage media, auto save or manual save (8.11)
Memory end alarm (option)		<ul style="list-style-type: none"> Minimum remaining amount of internal memory at which to generate the alarm (10.6)

Settings related only to the computation channels (configured on a screen dedicated to computation channels, option)

Item	Setting Mode	Basic Setting Mode
Computation specifications (11.4)	<ul style="list-style-type: none"> Computing equation Unit 	<ul style="list-style-type: none"> Display span
Constants (11.6)	<ul style="list-style-type: none"> Constants (K01 to K12) 	
Alarm	<ul style="list-style-type: none"> Alarm type (11.5) Alarm value (11.5) Output relay ON/OFF (11.5) Output relay number (11.5) Alarm delay time (6.3) 	
Tag/Channel display	<ul style="list-style-type: none"> Tag name (7.1) 	
Trent	<ul style="list-style-type: none"> Channel display color (7.8) Number of display scale divisions (7.10) Scale position (7.10) Zone display (7.9) Partial expansion display (7.11) 	<ul style="list-style-type: none"> Computation channels to display the trend (applies also to computation channels that data are to be acquired) (8.10)
Bar graph	<ul style="list-style-type: none"> Channel display color (Applies also to trends) (7.8) Number of scale divisions (7.10) Bar graph base position (7.10) 	
TLOG computation	<ul style="list-style-type: none"> Timer number to use, sum unit (11.8) 	<ul style="list-style-type: none"> Timer mode (absolute time/relative time) (11.9) Interval time (11.9) Reference time for the absolute timer (11.9) Turn ON/OFF reset at each interval (11.9) Turn ON/OFF data saving to the storage medium (11.9)
Rolling average (11.10)	<ul style="list-style-type: none"> On/Off Sampling interval Number of samples 	

Other settings

Item	Setting Mode	Basic Setting Mode
Time	<ul style="list-style-type: none"> Date/time(3.7) 	
Key lock (10.2)		<ul style="list-style-type: none"> Use/Not use key lock Password Keys to lock, enable/disable the key lock
Key login (10.4)		<ul style="list-style-type: none"> Use/Not use key login Auto logout On/Off Use/Not use user ID User name User ID Password Allow/Prohibit basic setting mode
Remote control (Option) (10.7)		<ul style="list-style-type: none"> Action assignment on remote terminals
Report (Option) (11.13)		<ul style="list-style-type: none"> Report types Date/Time of creation Report channel assignments Sum unit
Display language (10.8)		<ul style="list-style-type: none"> Select the display language
Daylight savings (10.12)		<ul style="list-style-type: none"> Date/Time to switch
Temperature (10.13)		<ul style="list-style-type: none"> Temperature unit

3.5 Configuring the Functions

File Management and Data Clearing

Operations related to the internal memory

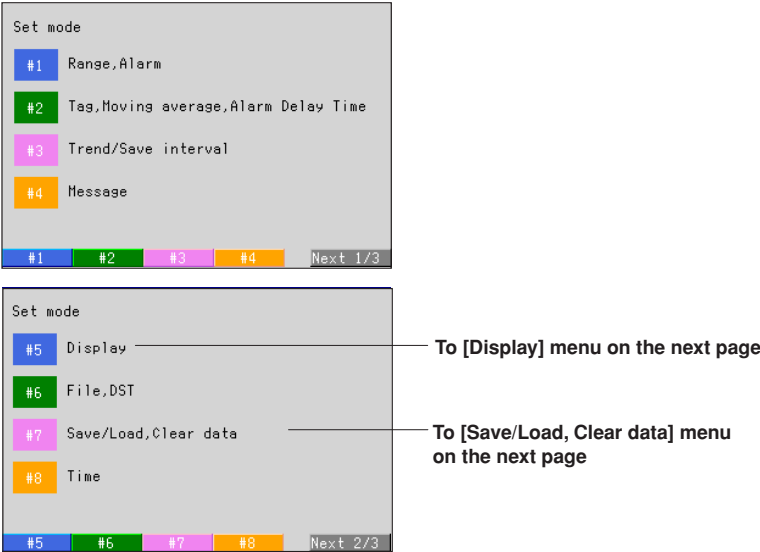
Item	Setting Mode	Basic Setting Mode
Initialization of settings/data clearing	<ul style="list-style-type: none">Clear measured/computed data	<ul style="list-style-type: none">Initialize settings (basic in the internal memory (9.7) mode/setting mode) and clear measured/computed data in the internal memory (9.8)

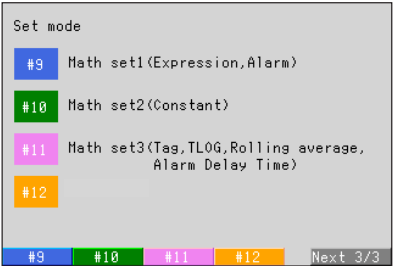
Management of files on the external storage media

Item	Setting Mode	Basic Setting Mode
File management	<ul style="list-style-type: none">Save setup data (9.1)Load setup data (9.1)Save measured data with key operation (9.2)Load/display display data (9.3)Load/display event data (9.4)List filesz (9.5)Delete files (9.5)Format external storage media (9.5)	<ul style="list-style-type: none">Save setup data (9.1)Load setup data (9.1)Delete files (9.5)Format external storage media (9.5)

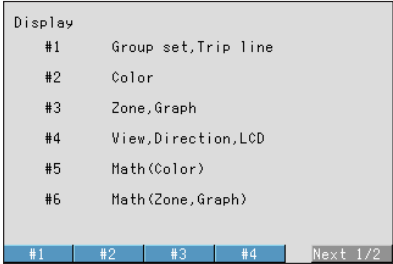
The Menu Screen and Items of the Setting Mode

The menu screen and items of the setting mode are as follows. Enclosed in parentheses are reference sections. [Math set1], [Math set2], [Math set3] are displayed when the computational function(/M1) is equipped.

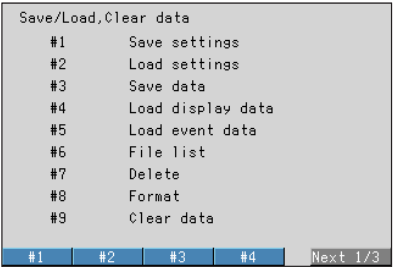




[Display] menu



[Save/Load, Clear data] menu



Soft key	Settings in the Setting Mode	
	Title	Item
#1	Range (5.1 to 5.7)	Input type Measurement range Upper and lower limits of span Reference channel for difference computation Upper and lower limits of scale Unit
	Alarm (6.2)	Alarm type Alarm value Output relay On/Off Output relay number
#2	Tag (7.1)	Tag name
	Filter (5.8)	Filter time constant/Off (RD-MV102/RD-MV104)
	Moving avarage (5.8)	Number of samples for the moving average/Off (RD-MV106/RD-MV112)
	Alarm delay time (6.3)	
#3	Trend/Save interval	Trend display rate (7.3) Auto save interval (8.8)
#4	Message (7.5)	Message string
#5	Display	
#5 - #1	Group set/Trip line	Group name (7.6) Assign channels to groups (7.6) Trip line position, display color (7.7)
#5 - #2	Color (7.8)	Measurement channel display color

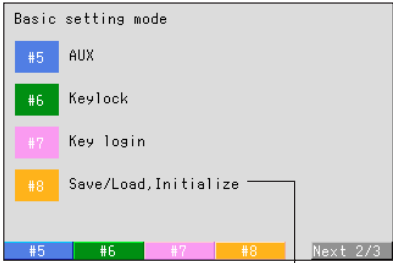
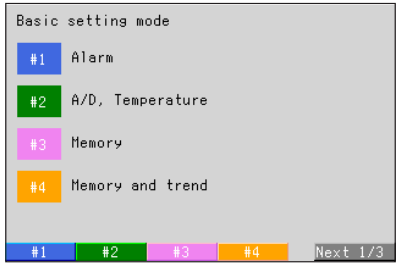
3.5 Configuring the Functions

Soft key	Settings in the Setting Mode	
	Title	Item
#5 - #3	Zone (7.9) Graph (7.10)	Zone upper and lower limits Number of scale divisions for the trend and bar graph Bar graph base position Specify the the scale display positon for trends.
	Partial (7.11)	Turn On/Off partial expansion display Position and boundary for the partial expansion display
#5 - #4	View (7.13)	Trend display direction Bar graph display direction Background color (white or black) Trend line width Trip line width Grid for the trend display Group display switching interva (Scroll time)
	LCD (7.14)	LCD brightness Turn On/Off the LCD backlight saver Transition time for the LCD backlight saver and conditions that restore the backlight
#5 - #5	Math (Color) (7.8)	Computation channel display color
#5 - #6	Zone (7.9)	Zone upper and lower limits for the computation channels
	Graph (7.10)	Number of scale divisions for the trend and bar graph displays for the computation channels Bar graph base positions for the computation channels
	Partial (7.11)	Specify the the scale display positon for trends for the computation channels. Turn On/Off partial expansion display for the computation channels Position and boundary for the partial expansion display for the computation channels
#6	File (8.9)	Header string to be written to file Name of directory to which data are to be saved Range of data to be saved during manual save
	Daylight savings time (10.12)	Daylight savings time switch time
#7	Save/Load, Clear data	
#7 - #1	Save settings	Save setup data to the external storage medium (9.1)
#7 - #2	Load settings	Load setup data from the external storage medium (9.1)
#7 - #3	Save data	Store measured data using key operation (9.2)
#7 - #4	Load display data	Load/Display the diaplay data on the external storage medium (9.3)
#7 - #5	Load event data	Load/Display the event data on the external storage medium (9.4)
#7 - #6	File list	List the files on the external storage medium (9.5)
#7 - #7	Delete	Delete files on the external storage medium (9.5)
#7 - #8	Format	Format the external storage medium (9.5)
#7 - #9	Clear data	Clear the measure/computed data in the internal memory (9.7)
#8	Time set (3.7)	Date/time
#9	Math range (11.4)	Computing equations, display span, and unit for computation channels
	Math alarm (11.5)	Alarm type for the computation channel Alarm value for the computation channel Output relay On/Off for the computation channel Output relay number for the computation channel
#10	Constant (11.6)	Constants (K01 to K12)

Soft key	Settings in the Setting Mode Title	Item
#11	Tag (7.1)	Tag names of the computation channels
	TLOG (11.8)	Timer number used in TLOG, sum unit
	Rolling average (11.10)	Turn ON/OFF the rolling average
		Sampling interval and the number of samples for the rolling average
	Alarm delay time (6.3)	

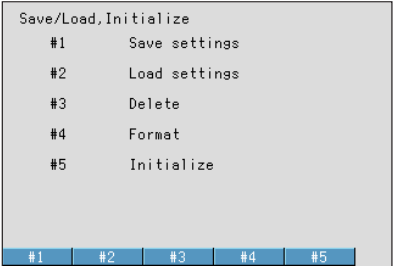
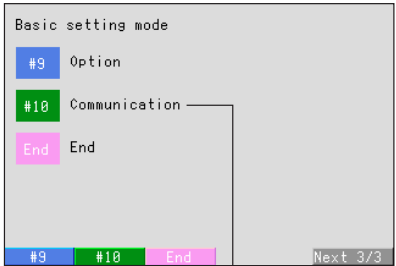
The Menu Screen and Items of the Basic Setting Mode

The menu screen and items of the basic setting mode are as follows. Enclosed in parentheses are reference sections.



To [Save/Load, Initialize] menu below

[Save/Load, Initialize] menu



See RD-MV100 communication
Interface User's Manual

Soft key	Settings in the Basic Setting Mode Title	Item
#1	Alarm (6.4)	Reflash alarm
		AND operation of alarm output relays
		Energize/de-energize alarm output relays
		Hold/non-hold alarm output relays
		Hold/non-hold alarm displays
		Rate-of-change alarm interval
		Alarm hysteresis
#2	A/D (5.9)	Integration time of the A/D converter
		Scan interval
		Burn out Off/Up/Down
		Reference junction compensation (select internal/external, compensation voltage when using external)
	Temperature (10.13)	Temperature unit

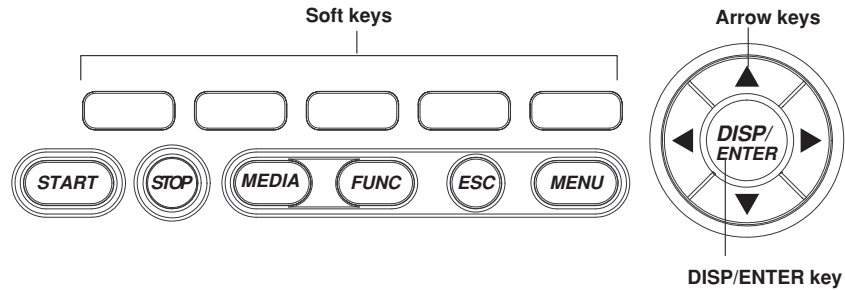
3.5 Configuring the Functions

Soft key	Settings in the Basic Setting Mode	Item
#3	Memory (8.11)	Save method to the external storage medium Type of data to be acquired Event data <ul style="list-style-type: none"> • Sampling interval • Mode (Free/Trigger/Rotate) • Number of blocks (number of memory divisions) • Data length (file size) • Pre-trigger position • Type of trigger to use
#4	Memory & trend (8.10)	Measurement channels to acquire data/display the trend Computation channels to acquire data/display the trend
#5	Aux	Switch between tag display and channel display (7.2) Minimum remaining amount of internal memory at which to generate the alarm (10.6) Set the displayed language (10.8) Use/Not use partial expansion display (7.12) Use/Not use batch function (for models with /BT1) (10.11)
#6	Key lock (10.2)	Use/Not use key lock Password Keys to lock, enable/disable the key lock
#7	Key login (10.4)	Use/Not use key login Auto logout On/Off Use/Not use user ID User name User ID Password Allow/Prohibit basic setting mode
#8	Save/Load, Initialize	
#8 - #1	Save settings	Save setup data to the external storage medium (9.1)
#8 - #2	Load settings	Load setup data from the external storage medium (9.1)
#8 - #3	Delete	Delete files on the external storage medium (9.5)
#8 - #4	Format	Format the external storage medium (9.5)
#8 - #5	Initialize	Initialize the setup data in the internal memory and clear measured/computed data (9.8)
#9	Option	
#9 - #1	Remote (10.7)	Action assignment on remote terminals
#9 - #2	Report (11.13)	Report types Date/Time of creation Report channel assignments Sum unit
#9 - #3	Timer (TLOG) (11.9)	Timer mode (absolute time/relative time) Interval Reference time for the absolute timer Turn ON/OFF reset at each interval Turn ON/OFF data saving to the storage medium
#10	Communications	
#10 - #1		Ethernet (IP_Address)*
#10 - #2		Ethernet (DNS)*
#10 - #3		FTP transfer file*
#10 - #4		FTP connection*
#10 - #5		Control (login, timeout)*
#10 - #6		Serial/Memory out*
End	End (3.6)	Terminate operations in the basic setting mode

* See RD-MV100 Communication Interface User's Manual.

3.6 Common Key Operations

This section describes common key operations that are used often.



Key Operations in the Basic Setting Mode

Procedure

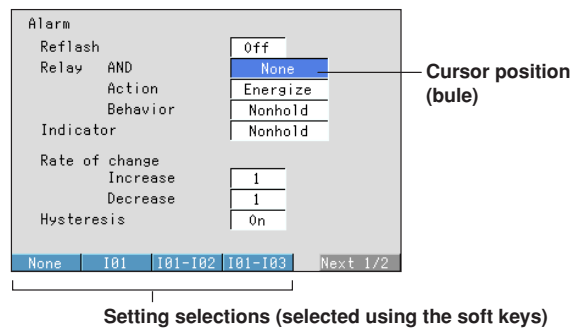
Entering the basic setting mode

1. Press the MENU key to enter the setting mode.
2. Hold the FUNC key down for three seconds to enter the basic setting mode.
3. Press the soft key to enter individual setting screens.

Note

- Basic setting mode cannot be entered while data acquisition or computation is in progress. Stop data acquisition and computation first before entering the basic setting mode.
- Changing and storing the data acquiring method in the basic setting mode ([#3 Memory] and [#4 Memory and trend]) clears the measured/computed data in the internal memory. Make sure to save the data to the external storage medium before entering the basic setting mode.

Common key operations in the basic setting mode are described.



3.6 Common Key Operations

Selecting the parameter

- 1. Use the arrow keys to move the cursor (blue) to the appropriate parameter. The available selections are displayed at the bottom of the screen above the soft keys.
 - 2. Select the parameter with the soft key. The box containing the parameter that was changed turns yellow. The cursor moves the next parameter.
- To cancel the settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] and press the DISP/ENTER key.

Confirming the settings

- 1. Pressing the DISP/ENTER key confirms the new settings. The parameter boxes return to a white color. The cursor moves to the first parameter on the page.

Returning to the menu screen of the basic setting mode

- 1. Press the ESC key to return to the menu screen of the basic setting mode.

Exiting the basic setting mode

Carry out the following steps when the basic setting menu is displayed.

- 1. Press the [END] soft key. A confirmation window with a message [Do you want to store and make the new settings take effect?] appears.
 - 2. Selecting [Yes] with the arrow key and pressing the DISP/ENTER key saves the new settings and returns to the operation mode.
- If you do not wish to save the new settings, select [No] with the arrow key and press the DISP/ENTER key to return to the operation mode.
- Selecting [Cancel] with the arrow key and pressing the DISP/ENTER key cancels the “operation to exit the basic setting mode” and returns to the basic setting mode menu. In this case, the setting changes made up to that point are held.

Key Operations in the Setting Mode

Procedure

Entering the setting mode

- 1. Press the MENU key to enter the setting mode.
- 2. Press the soft key to enter individual setting screens.

Common key operations in the setting mode are described.

Cursor position
(blue)

First-CH: 01Last-CH: 01

Range

Mode

Volt

2V

Span_L

-2.000

Span_U

2.000

Alarm

	Type	Value	Rly	No.
1	On	H	1.000	On
2	On	L	-1.100	Off
3	Off			
4	Off			

SkipVoltTCRTDNext 1/2

Setting selections (selected using the soft keys)

Selecting the parameter

1. Use the arrow keys to move the cursor (blue) to the appropriate parameter. The available selections are displayed at the bottom of the screen above the soft keys.
2. Select the parameter with the soft key. The box containing the parameter that was changed turns yellow. The cursor moves to the next parameter.
To cancel the settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] and press the DISP/ENTER key.

Confirming the settings

1. Pressing the DISP/ENTER key confirms the new settings. The parameter boxes return to a white color. The cursor moves to the first parameter on the page.

Returning to the menu screen of the setting mode

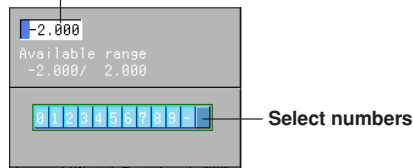
1. Press the Menu or ESC key to return to the menu screen of the setting mode.

Exiting the setting mode

1. Press the MENU or the ESC key to save the settings and return to the operation mode.

Entering Numbers

The operation to enter numbers is used such as when setting the date, time, or the display span of the input range.

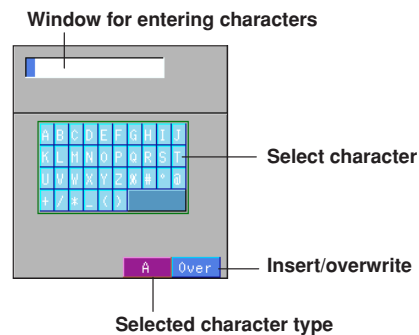
Window for entering numbers**Procedure**

When the window used to enter the numbers appears, enter the value according to the following key operations.

- Left and right arrow keys : Selects the input position
- Up and down arrow keys : Enters the number

Entering Characters

Used to set tag names, set message strings, set or enter passwords.



Procedure

When the window used to enter the string appear, enter the characters according to the following key operations.

- **Left and right arrow keys** : Selects the input position
- **Up and down arrow key** : Enters the character
- **[A/a/1] soft key** : Select upper-case alphabet (A), lower-case alphabet (a), or numbers (1).

The character type is switched in the following order each time the [1/a/A] soft key is pressed. The selected character type is displayed to the right down of the input window.

Upper-case alphabet (A) → lower-case alphabet (a) → numbers (1)

- **[DEL] soft key** : Deletes the character at the cursor position.
- **[BS] soft key** : Deletes the character to the left of the cursor position.
- **[INS] soft key** : Selects insert or overwrite

Insert and overwrite modes switch each time the [INS] soft key is pressed. The selected mode is displayed to the right down of the input window.

Copying a Character String

Procedure

To copy a character string to another box, follow the procedures below.

1. Move the cursor to the copy source string and press the [Copy] soft key.
2. Move the cursor to the copy destination box and press the [Paste] soft key. The character string is copied.



Clearing the character string

1. To clear the character string, press the [Clear] soft key.


3.7 Setting the Date and Time

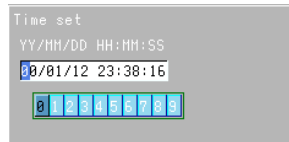
Set the date and time. The set date and time can be specified whether it belong to the summer time or the winter time. The summer time and the winter time are defined by the daylight savings time adjustment function. For detail, see section 10.12, "Using the Daylight Savings Time Adjustment Function."

Procedure

Press .

Press the soft key .

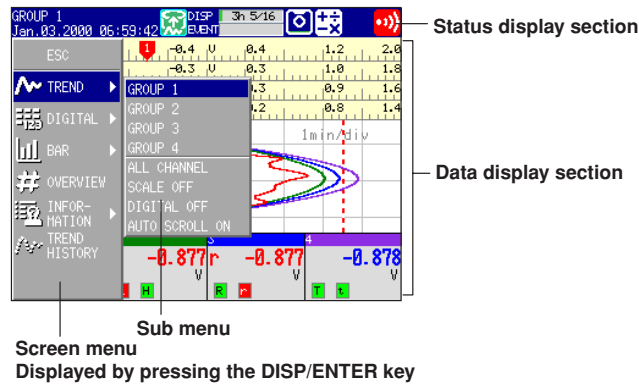
To display the window for the date and time setting, press the soft key .



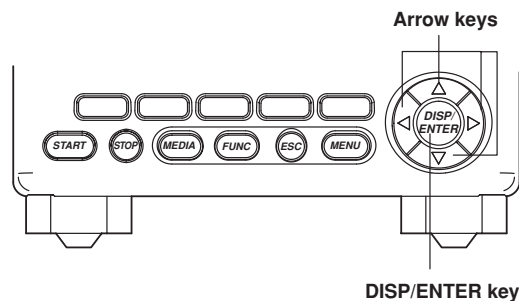
1. YY/MM/DD HH:MM:SS
Enter the date and time.
Pressing the [Input] soft key displays a window used to enter the date and time. Enter the date and time and press the [DISP/ENTER] key. For the procedures related to entering numbers, see "Entering Numbers" on page 3-21. Pressing the DISP/ENTER key closes the window without setting the [DST] box. To cancel the setting and close the window, press the ESC key.
2. DST (Daylight savings time adjustment function)
[Summer] or [Winter] is displayed in the [DST] box corresponding to the date and time indicated in the [YY/MM/DD HH:MM:SS] box when the window is opened.
Operate as follows to set [Summer] or [Winter] for the date and time entered. Pressing the right arrow key shifts the cursor to the [DST] box. Select [Summer] or [Winter] by the soft key and press the DISP/ENTER key. The window closes. To cancel the setting and close the window, press the ESC key before pressing the DISP/ENTER key.

4.1 Operation Screens

This chapter describes the screen (operation screen) used to display the measured/ computed data.

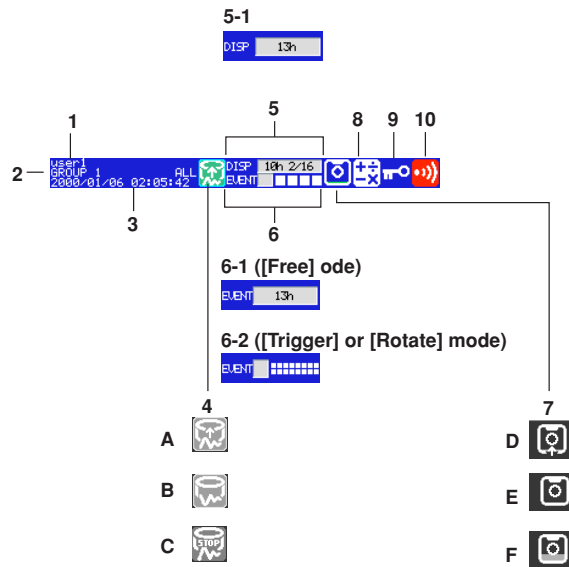


- The screen consists of the status display section and the data display section.
- The operation screen includes trend, digital, bar graph, alarm summary, message summary, memory summary, report (option), and historical trend.
- The arrow keys and the DISP/ENTER key are used to switch the screen.
 Screen menu : Displayed when the DISP/ENTER key is pressed.
 Sub menu : Displayed when the right arrow key is pressed while the screen menu is displayed.
- The following operations are possible.
 - For trend, digital, and bar graph displays, the displayed group can be automatically switched.
 - Recalling the historical trend at the time the alarm selected in the Alarm Summary occurred or the message selected in the Message Summary is written. Also displaying the historical trend selected in the Memory Summary.
 - Switching to the trend or bar graph screen that contains the channel data pointed on the overview screen.



4.2 Explanation of the Status Display Section

The following information is displayed in the status display section during the operation mode and the setting mode. (The information is not displayed in the basic setting mode. [Setup Mode] is displayed instead).



1. User name

The user name is displayed when a user is logged in using the key login function.

2. Group name or screen name

The name of the group or screen that is displayed in the data display section. [ALL] is displayed only during all channel display (see section 4.3).

3. Current date and time

The current date and time are displayed.

4. ON/OFF state of the measured/computed data acquisition.

A and B are displayed alternately : Data acquisition in progress or waiting for the event data trigger.

C : Data acquisition is suspended.

Note

For event data that starts acquiring data upon receiving a trigger, the indicator indicates that the data acquisition is in progress even when it is in the trigger wait state. The trigger wait state can be identified using the bar graph described in item 6.

5. The usage condition of the display data storage area in the internal memory

This is displayed when display data acquisition is enabled.

- Bar graph
Displays the used space of the display data storage area.
- Time period
The remaining time for acquiring the display data. When the remaining time is less than one hour, the time is displayed in units of minutes.

Remaining memory	Unit
Greater than or equal to 100 days	: %
(Percentage of the remaining area with respect to the display data acquisition area)	
Greater than or equal to 100 hours, less than 100 days	: days
(unit less than one day is rounded off)	
Greater than or equal to 60 minutes, less than 100 hours	: hours
(unit less than one hour is rounded off)	
Less than 60 minutes	: minutes
(unit less than one minute is rounded off)	
- n/16
The maximum number of display data files* that can be written to the internal memory is 16. "16" represents this value. "n" represents the number of files in the internal memory.
 * One file contains data that are acquired between start and stop operations.

Note

The display data are overwritten for the following cases. Be aware of these cases, because data that are overwritten are lost.

- When the display data storage area in the internal memory becomes full.
In such case, [Overwrite] is displayed in the status display section.
- When the number of files that remains to be saved to the external medium exceeds 16.

6. The usage condition of the event data storage area in the internal memory

This is displayed when event data acquisition is enabled.

- When the trigger mode is set to [Free]
 - Bar graph
Displays the used space of the event data storage area.
 - Time period
The remaining time for acquiring the event data. When the remaining time is less than one hour, the time is displayed in units of minutes.

Remaining memory	Unit (refer to item 5)
Greater than or equal to 100 days	: %
Greater than or equal to 100 hours, less than 100 days	: days
Greater than or equal to 60 minutes, less than 100 hours	: hours
Less than 60 minutes	: minutes
 - n/16
The maximum number of event data files* that can be written to the internal memory is 16. "16" represents this value. "n" represents the number of files in the internal memory.
 * One file contains data that are acquired between start and stop operations.

Note

The event data are overwritten for the following cases. Be aware of these cases, because data that are overwritten are lost.

- When the event data storage area in the internal memory becomes full.
In such case, [Overwrite] is displayed in the status display section.
- When the number of files that remains to be saved to the external medium exceeds 16.

4.2 Explanation of the Status Display Section

- **When the trigger mode is set to [Trigger] or [Rotate]**

- Bar graph

Displays the used space with respect to the specified memory length (data length, see section 8.11).

When pretrigger is specified and the START key is pressed causing the RD-MV100 to enter the trigger wait state, data of size equal to the pretrigger amount are acquired to the internal memory. The bar is displayed in orange. After acquiring data of size equal to the pretrigger, the length of the bar stays fixed. However, the relevant data are updated until the trigger is activated. When the trigger is activated, the bar turns green. Data are acquired to the internal memory after the pretrigger data.

During the [Trigger] mode (see section 8.2), [Full] is displayed when data acquisition to all blocks is complete. When [Full] is displayed, event data are no longer acquired even if the trigger condition is met. In this case, save the data in the internal memory to the external storage medium.

- Block display

When the event data storage area is divided into multiple blocks, the usage condition of the blocks are displayed.

White block : No data

Green block : Block containing data that were acquired to the internal memory after starting the current acquisition of event data.

Gray block : Block containing data that were acquired before the current start operation.

7. The external storage medium condition

No display : No storage medium inserted.

D and E displayed in order : Accessing the storage medium.

E : Storage medium is idle (no access)

F : The used space of the storage medium is indicated by the green level indicator in the icon. The colored section indicating the level turns red when the amount of free space on the storage medium falls below 10%.

8. Computation icon (option)

Computation icon not displayed : No computation option or computation is suspended

White computation icon : Computation in progress

Yellow computation icon : Computation data dropout occurred

Note

Computation data dropout occurs when the computation is not completed within the scan interval. The computation icon returns to the green icon by pressing FUNC → [MathACK] soft key (see section 11.3). If a computation dropout occurs, make the scan interval longer (see section 5.9) or reduce the number of computation channels that are turned On (see section 11.4).

9. Key lock icon

Key icon : Key lock ON

No display : Key lock OFF

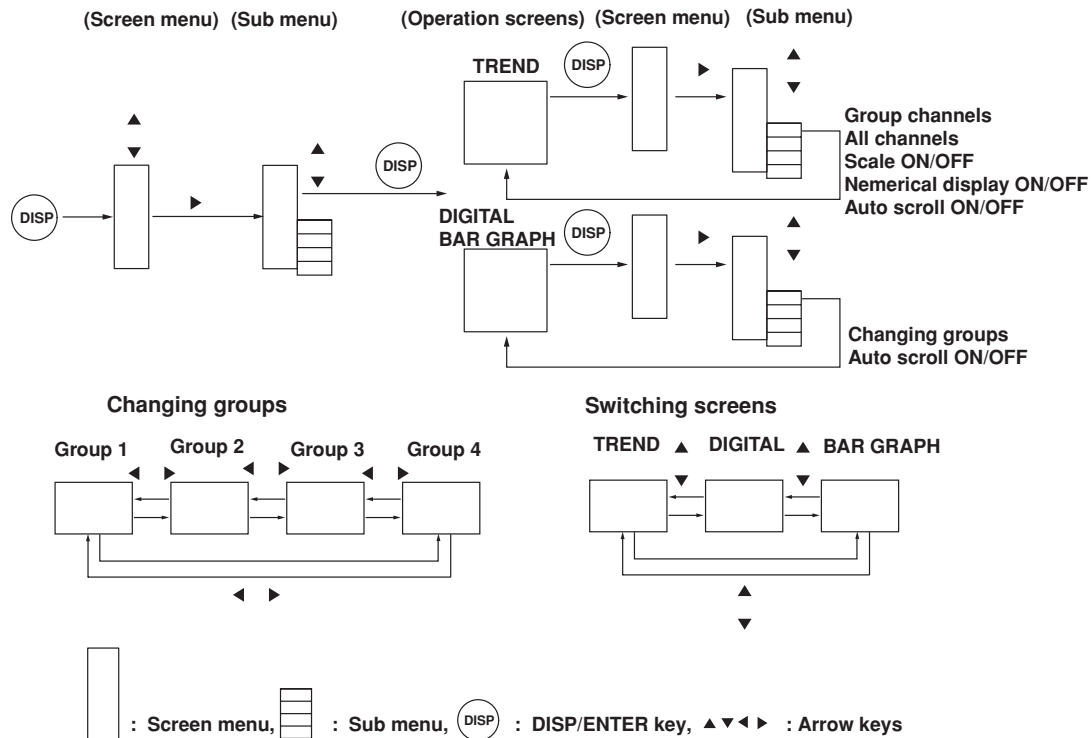
10. Alarm icon

Displayed when any one of the alarms is occurring. For details, see chapter 6.

4.3 Using the Trend, Digital, and Bar Graph Screens

Operation Flow Diagram

TREND, DIGITAL, BAR GRAPH

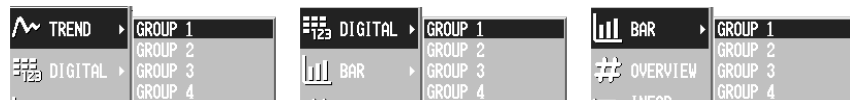


Procedure

Displaying the screen

Follow the procedures below when a different operation screen is being displayed.

1. Pressing the DISP/ENTER key displays the screen menu.
2. Select [Trend], [Digital], or [Bar Graph] using the up and down arrow keys.
3. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.



4. Select the group using the up and down arrow keys.
5. Pressing the DISP/ENTER displays the screen.
To close the menu without switching the screen, press the ESC key.

4.3 Using the Trend, Digital, and Bar Graph Screens

Displaying or clearing the scale on the trend screen

This operation is carried out on the Trend screen.

1. Pressing the DISP/ENTER displays the screen menu. ([Trend] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [SCALE ON]* or [SCALE OFF].*

* The one that is selectable is displayed in the sub menu.



4. Pressing the DISP/ENTER key displays the scale.
To close the menu without displaying/clearing the scale, press the ESC key.

Displaying all channel trend/Return to group channel trend

This operation is carried out on the Trend screen.

All channel trend displays waveforms of all channels set for Trend screen. See section 8.10 to set channels for Trend screen.

1. Pressing the DISP/ENTER key displays the screen menu. ([Trend] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [ALL CHANNEL]* or [GROUP CHANNEL] using the up and down arrow keys.

* The one that is selectable is displayed in the sub menu.



4. Pressing the DISP/ENTER key displays the screen.
To close the menu without switching the screen, press the ESC key.

Displaying or clearing the numerical section on the trend screen

This operation is carried out on the Trend screen.

1. Pressing the DISP/ENTER displays the screen menu. ([Trend] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [DIGITAL ON]* or [DIGITAL OFF]* using the up and down keys.

* The one that is selectable is displayed in the sub menu.



4. Pressing the DISP/ENTER key displays/clears the numerical section.
To close the menu without displaying/clearing the numerical section, press the ESC key.

Changing the group on the display screen

The following three methods are available. If all channel display is selected, waveforms for all channels that are registered to display the trend (see section 8.10) are displayed even when the group is changed.

- **Changing the group on the display screen from the screen menu**

1. Pressing the DISP/ENTER key displays the screen menu.
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select the group using the up and down arrow keys.
4. Pressing the DISP/ENTER displays the selected group.
To close the menu without switching the screen, press the ESC key.

- **Changing the group on the display screen using the arrow keys**

1. The displayed group changes in the order Group 1, Group 2, Group 3, Group 4, Group 1, and so on by pressing the right arrow key on the trend, digital, and bar graph screens.
2. By pressing the left arrow key, the displayed group changes in the reverse order.

- **Automatically switch the displayed groups/stop the automatic switching**

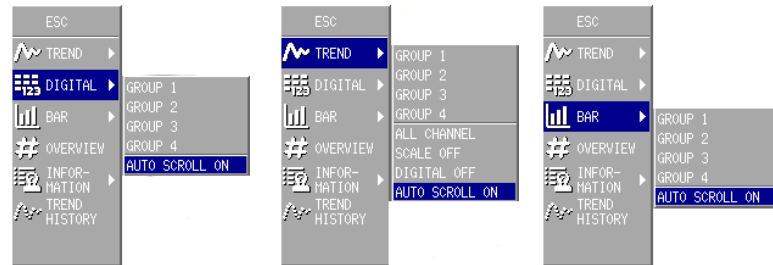
The displayed group on the trend, digital, and bar graph displays can be automatically switched at the specified interval. In each display, the displayed group rotates from group 1 to group 4. You can select 5 s, 10 s, 20 s, 30 s, and 1 min for the switch interval. For the procedure related to setting the switch interval, see section 7.13.

1. On the trend, digital, and bar graph displays, press the DISP/ENTER key to display the screen menu.
2. Press the right arrow key to display the sub menu. To close the sub menu that you opened, press the left arrow.

4.3 Using the Trend, Digital, and Bar Graph Screens

3. To enable automatic switching, select [AUTO SCROLL ON]* using the up and down arrow keys. To disable automatic switching, select [AUTO SCROLL OFF]* using the up and down arrow keys.

* The one that is selectable is displayed in the sub menu.



4. Press the DISP/ENTER key to enable or disable the automatic switching of the displayed groups.

Switching the trend, digital, and bar graph screens

The following two methods are available:

- **Switch between trend, digital, and bar graph from the screen menu**
The operating procedure is the same as "Displaying the screen" on page 4-5.
- **Switching the trend, digital, and bar graph screens using the arrow keys**
 1. The displayed screen changes in the order trend, digital, bar graph, trend, and so on by pressing the down arrow key on the trend, digital, and bar graph screens.
 2. By pressing the up arrow key, the displayed screen changes in the reverse order.

Starting the waveform display of the trend display/stopping the waveform update

The operation procedure used to start the waveform display of the trend display and the procedure used to stop the waveform update are the same as the operation used to start/stop the data acquisition to the internal memory. When the data are being acquired to the internal memory, the waveform is displayed. When it is stopped, the waveform is not updated. For the operating procedure, see sections 8.4 and 8.6.

Explanation**About group display and all channel display**

The group display of trend, digital, and bar graph and the all channel display of the trend are displayed in the following fashion (see table below). They depend on whether channels are assigned to the groups and whether the channels are set to display the trend and set to store the data.

Assigned to Groups	Trend Display/Data Storage Specification	Numerical Display* ¹ Bar Graph	Trend's Waveform Display Group	All Channels	Data Acquisition to the Internal Memory
Yes	Yes	Display	Display	Display	Yes
Yes	No	Display	Don't display	Don't display	No
No	Yes	Don't display	Don't display	Display	Yes
No	No	Don't display	Don't display	Don't display	No

*1 Numerical display refers to the numerical display of trend, digital, and bar graph displays.

- The numerical display of trend, digital, and bar graph displays and the bar graph display are updated at all times when they are displayed. It is not affected by whether or not the waveform of the trend display is shown.
- The waveform of the trend display is updated at the display update rate. For the procedure related to setting the display update rate, see section 7.3, "Setting the Display Update Rate (Trend)."
- For the procedure related to setting the channel to display the trend and to store the data, see section 8.10.
- For the procedure used to assign channels to groups, see section 7.6.

Alarm indication

Alarms are checked at all times and displayed on the relevant displays regardless of whether or not the waveform of the trend display is shown.

Alarms are displayed using alarm type symbols. For details related to the alarms, see section 6.2.

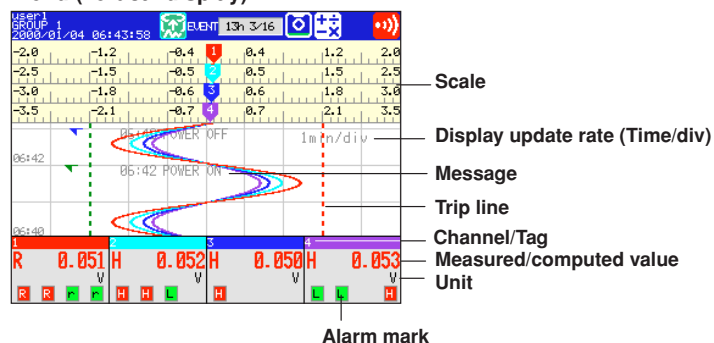
Name	Symbol
Upper limit alarm	H
Lower limit alarm	L
Difference upper limit alarm	h
Difference lower limit alarm	l
Upper limit on rate-of-change alarm	R
Lower limit on rate-of-change alarm	r
Delay upper limit alarm	T
Delay lower limit alarm	t

The display direction of the trend and the bar graph

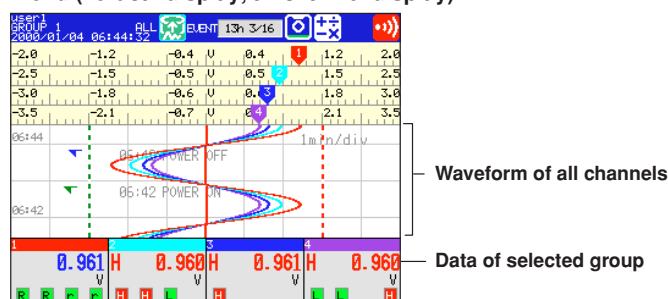
For the setting procedure of the display direction of the trend and the bar graph, see section 7.13.

4.3 Using the Trend, Digital, and Bar Graph Screens

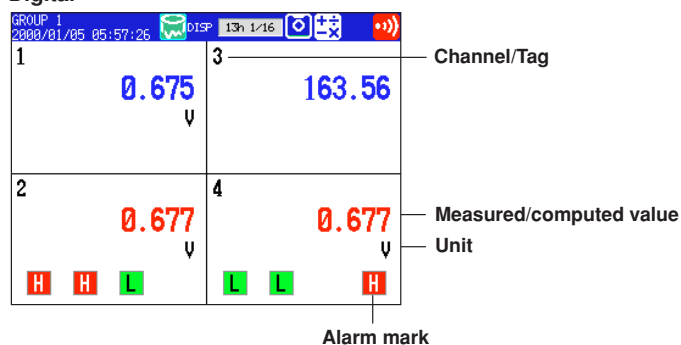
Trend (vertical display)



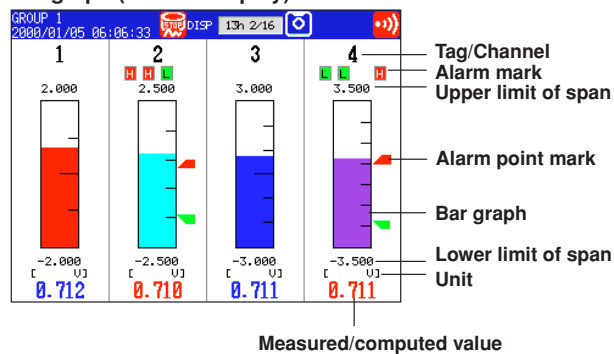
Trend (vertical display, all channel display)



Digital

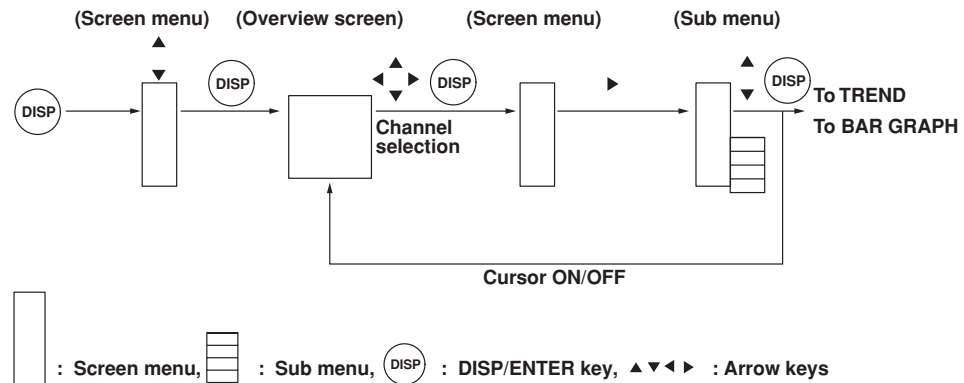


Bar graph (vertical display)



4.4 Using the Overview Screen

Operation Flow Diagram



Procedure

Displaying the screen

1. Pressing the DISP/ENTER key displays the screen menu.
2. Select [Trend], [Digital], or [Bar Graph] using the up and down arrow keys.
Select [Overview] using the up and down arrow keys.
3. Pressing the DISP/ENTER displays the screen.
To close the menu without switching the screen, press the ESC key.

Displaying or clearing the cursor

1. Pressing the DISP/ENTER key displays the screen menu.
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [CURSOR ON]* or [CURSOR OFF].*



4. Pressing the DISP/ENTER key displays or clears the cursor.
To close the menu without displaying/clearing the cursor, press the ESC key.

Switching to the trend or bar graph screen of the channel selected with the cursor

1. Move the cursor to select the channel using the arrow key.
2. Pressing the DISP/ENTER key displays the screen menu.
3. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
4. Select [JUMP TO TREND] or [JUMP TO BAR] using up and down arrow keys.



5. Pressing the DISP/ENTER key displays the screen.
To close the menu without displaying the screen, press the ESC key.

4.4 Using the Overview Screen

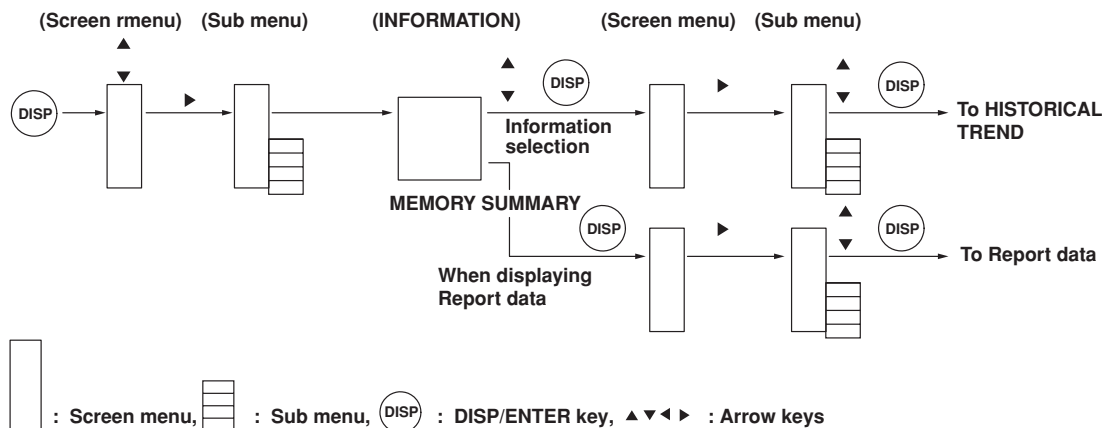
Explanation

Overview screen

Channel/Tag	1		31
Cursor	r	-0.470 V	
Alarm type	2		32
	L	-0.472 V	
	3		33
		-0.470 V	
	4		34
	L	-0.471 V	
		Unit	
		Measured/computed value	

4.5 Using the Information Screen (Alarm Summary, Message Summary, and Memory Summary)

Operation Flow Diagram



Procedure

Displaying the alarm summary, message summary, or memory summary

- Pressing the DISP/ENTER displays the screen menu.
- Select [INFORMATION] using the up and down arrow keys.
- Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
- Select [ALARM SUMMARY], [MESSAGE SUMMARY], or [MEMORY SUMMARY] using the up and down arrow keys.



- Pressing the DISP/ENTER key displays the screen.
To close the menu without displaying the screen, press the ESC key.

Recalling the historical trend at the time the alarm occurred

This operation is carried out on the Alarm Summary screen.

- Select the alarm of which to display the trend using the up and down arrow keys.

Selected alarm

(006/006) Channel	Tune	Alarm IN Time	Alarm OUT Time
1	1H	Jan.09 01:13:13	Jan.09 01:13:33
1	2L	Jan.09 01:12:14	Jan.09 01:12:25
3	1H	Jan.09 01:11:07	Jan.09 01:11:09
3	1H	Jan.09 01:10:58	Jan.09 01:11:05
1	1H	Jan.09 01:10:54	Jan.09 01:11:24
1	2L	Jan.09 01:10:03	Jan.09 01:10:18

- Pressing the DISP/ENTER displays the screen menu.
- Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
- Select [JUMP TO HISTORY] using the up and down arrow keys.



4.5 Using the Information Screen (Alarm Summary, Message Summary, and Memory Summary)

- Pressing the DISP/ENTER key displays the historical trend.
The displayed data are as follows:
 - When configured to acquire only the display data to the internal memory
: Display data.
 - When configured to acquire only the event data to the internal memory
: Event data.
 - When configured to acquire the display data and the event data to the internal memory
: Data selected in the memory summary.

To close the menu without switching the screen, press the ESC key.

Recalling the historical trend at the time the message was written

This operation is carried out on the Message Summary screen.

- Select the message of which to display the trend using the up and down arrow keys.

(004/004) Message		Time
Selected message	POWER OFF	Jan. 09, 2000 01:07:34
	STOP	Jan. 09, 2000 01:07:09
	INPUT	Jan. 09, 2000 01:05:41
	POWER ON	Jan. 09, 2000 01:05:10

- Pressing the DISP/ENTER displays the screen menu.
- Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
- Select [JUMP TO HISTORY] using the up and down arrow keys.



- Pressing the DISP/ENTER key displays the historical trend.
The displayed data are as follows:
 - When configured to acquire only the display data to the internal memory
: Display data.
 - When configured to acquire only the event data to the internal memory
: Event data.
 - When configured to acquire the display data and the event data to the internal memory
: Data selected in the memory summary.

To close the menu without switching the screen, press the ESC key.

Selecting the type of file (display data or event data) to display in the memory summary

This operation is carried out on the Memory Summary screen.

- Select display data or event data using the left and right arrow keys.
The selected file type is indicated by a green circle to the left of [DISPLAY DATA] or [EVENT DATA]. Information about the selected file is displayed.

4.5 Using the Information Screen (Alarm Summary, Message Summary, and Memory Summary)

Opening the display data file from memory summary (recalling the historical trend).

This operation is carried out when displaying the information about the display data in Memory Summary.

1. Select the file using the up and down arrow keys.

Selected file

H.SAMPLE DATA (00-50) :		RELAY 0:■■■■■
TLOG DATA (000-400) :		
REPORT DATA (01-40) : Jan.09 01:08:20		
SAMPLE DATA : ● DISPLAY DATA		
Start Time	End Time	Data Factor
Jan.09 01:10:38	Jan.09 01:14:02	103 Sampling
Jan.09 01:05:04	Jan.09 01:08:20	99 Stop
Jan.09 00:27:56	Jan.09 00:30:40	923 Stop
Jan.08 23:26:08	Jan.09 00:25:02	1768 Stop
Jan.08 23:23:38	Jan.08 23:23:50	7 Stop

2. Pressing the DISP/ENTER displays the screen menu.
3. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.



4. Select [JUMP TO HISTORY] using the up and down arrow keys.
5. Pressing the DISP/ENTER key displays the historical trend.
To close the menu without switching the screen, press the ESC key.

Displaying the report data (option)

This operation is carried out on the Message Summary screen. For detail of the report data, see section 11.11.

1. Pressing the DISP/ENTER displays the screen menu.
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [REPORT DATA] using the up and down arrow keys.



4. Pressing the DISP/ENTER key displays the report data.
To close the menu without displaying the report data, press the ESC key.

Changing the report data to be displayed

“The index number of the report data currently displayed/the number of report data sets in the internal memory” is displayed in the [Index] column of the report data display. The most recent report data set is the one with the largest report data index number.

When the report data are being displayed, the arrow keys can be pressed to switch the report being displayed. The operation when the four arrow keys are pressed are as follows :

Up arrow key : Displays next report data.

Down arrow key : Displays the previous report data.

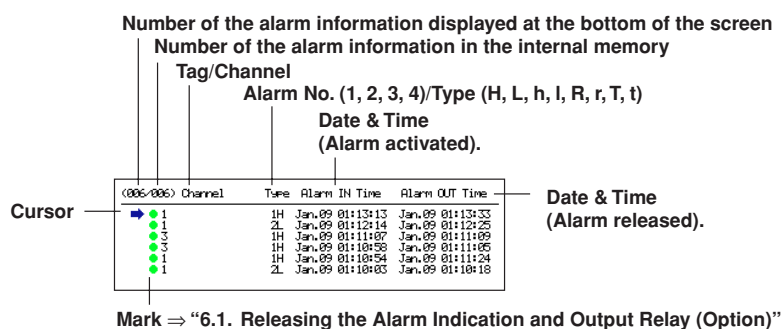
Right arrow key : Displays the report data that is 10 data sets after the report data being displayed. However, if there are less than 10 data sets, the most recent report data (with the maximum report data number) are displayed.

Left arrow key : Displays the report data that is 10 data sets before the report data being displayed. However, if there are less than 10 data sets, the oldest report data (report data number 1) are displayed.

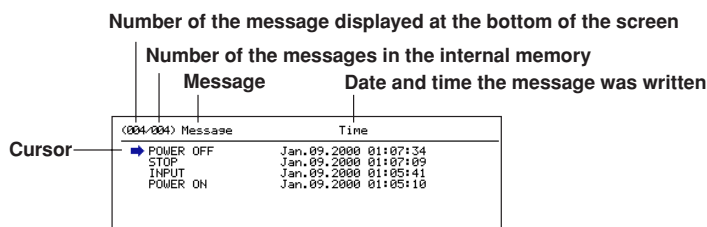
4.5 Using the Information Screen (Alarm Summary, Message Summary, and Memory Summary)

Explanation

Alarm summary



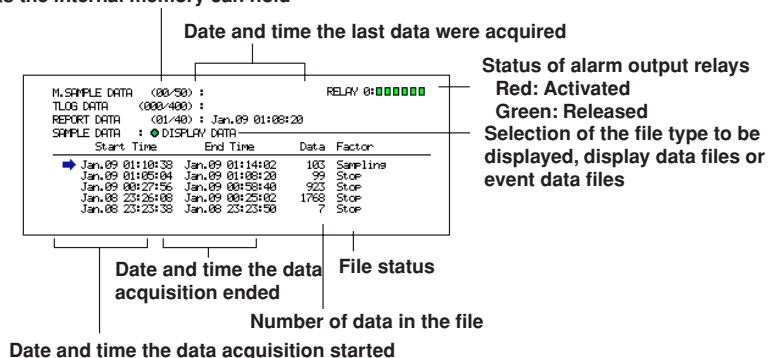
Message summary



The date and time when the message was entered and the user name (when using key login function) are displayed.

Memory summary

Number of data sets in the internal memory/The maximum number of data sets the internal memory can hold



4.5 Using the Information Screen (Alarm Summary, Message Summary, and Memory Summary)

Report data (option)

The index number of the report data currently displayed

The number of report data sets in the internal memory

Report type

Index:	2/2	Kind:	Hourly			
Start:	Jan.09.2000 01:10:36					
Timeup:	Jan.09.2000 01:15:31					
Ch	Unit	Sts	Ave	Max	Min	Sum
01	V	—	0.093	1.522	-1.131	2.735488E+01
02	V	—	0.093	1.525	-1.131	2.741788E+01
03	V	—	0.093	1.522	-1.131	2.736100E+01
04		—	-32.91	-28.78	-88.44	-1.563545E+04

Date and time the report started

Date and time the report was created

Status of data

Note

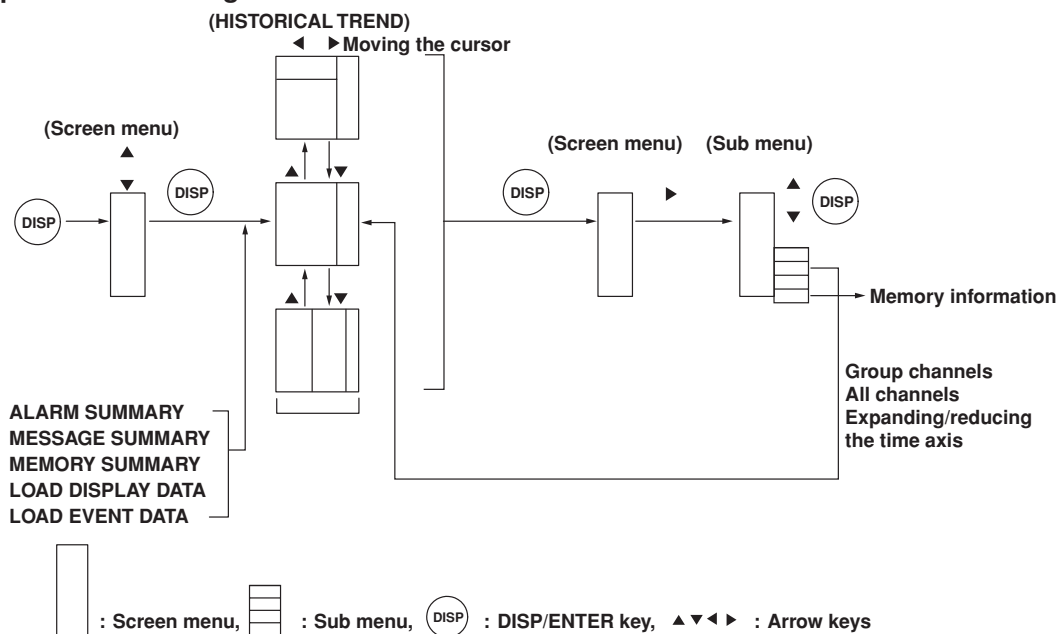
When new report data are created while displaying the report data, the screen is not updated.

The most recent report data can be displayed by carrying out the following operations.

- Press the DISP/ENTER key and display the report data again from the menu.
- Press the right arrow key.

4.6 Using the Historical Trend

Operation Flow Diagram



Procedure

There are 6 methods in displaying the historical trend screen.

- From the alarm summary. See section 4.5.
- From the message summary. See section 4.5.
- From the memory summary. See section 4.5.
- From [Load display data]. See section 9.3.
- From [Load event data]. See section 9.4.
- Recall from the screen menu. Described in this section.

Displaying the historical trend screen (from the screen menu)

Of the data being sampled, the display data existing before the execution of this operation are displayed as a historical trend.

1. Pressing the DISP/ENTER displays the screen menu.
2. Select [TREND HISTORY] using the up and down arrow keys.
3. Pressing the DISP/ENTER key displays the screen.

To close the menu without switching the screen, press the ESC key.

Note

Even if the display data are not configured to be acquired to the internal memory (see section 8.11), the display data existing before the execution of this operation are displayed as a historical trend.

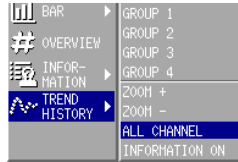
Showing the all channel display/returning to the group display

On the group display, the channels that are assigned to the group are displayed (see section 7.6.) On the all channel display, the waveform of all channels that are set to display the trend (see section 8.10) are displayed over the current group display. See the explanation in section 4.3.

This operation is carried out on the Historical Trend screen.

1. Pressing the DISP/ENTER displays the screen menu. ([TREND HISTORY] is selected.)

2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [ALL CHANNEL] or [GROUP CHANNEL] using the up and down arrow keys.



4. Pressing the DISP/ENTER key displays the screen.
To close the menu without switching the screen, press the ESC key.

Changing the group on the display screen

If all channel display is selected, waveforms for all channels that are registered to display the trend (see section 8.10) are displayed even when the group is changed.

1. Pressing the DISP/ENTER key displays the screen menu. ([TREND HISTORY] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select the group using the up and down arrow keys.
4. Pressing the DISP/ENTER displays the selected group.
To close the menu without switching the screen, press the ESC key.

Expanding/ reducing the time axis

The time axis can be expanded or reduced with respect to the display reference position.

Display data : The time axis can be expanded to twice the trend display. It can also be reduced down to 1/60th of the trend display.

Event data : The time axis can be reduced down to 1/60th.

The factor by which the display can be expanded or reduced at one time by carrying out the procedures below varies depending on the display update rate for the display data, and the sampling interval for the event data being displayed. To expand or reduce the display further, repeat the procedures below

1. Pressing the DISP/ENTER key displays the screen menu. ([TREND HISTORY] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [ZOOM +] or [ZOOM -] using the up and down arrow keys.



4. Pressing the DISP/ENTER expand or reduce the time axis.
To close the menu without switching the screen, press the ESC key.

Scrolling the waveform

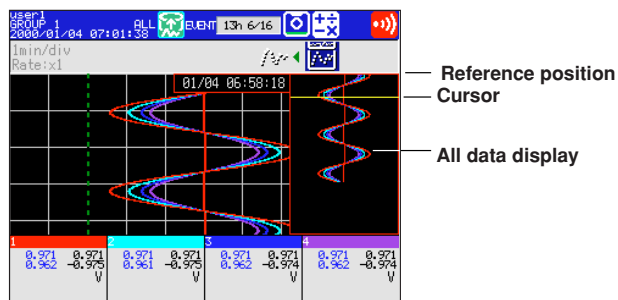
Pressing the up or down arrow key (vertical display) or the left or right arrow key (horizontal display) while displaying the historical trend scrolls the waveform along the time axis.

4.6 Using the Historical Trend

Specifying the displayed position with the cursor

The cursor position on the all data display locates the reference position. Enclosed in parentheses are for the horizontal trend display.

1. Pressing the right (up) arrow key displays the all data display in the right (upper) section of the screen.



2. Move the cursor to select the displayed position using the up and down (left and right) arrow keys.
3. Pressing the left (down) arrow key switches to the historical trend screen with shifted waveforms.

Display the current trend data and the historical trend data

Displays the current display data on the upper (right) half of the screen and the historical trend on the lower (left) half of the screen.

1. Pressing the left (down) arrow key displays the current trend and the historical trend.
To return to the previous screen, press the up arrow key.

Displaying the memory information

1. Pressing the DISP/ENTER key displays the screen menu. ([TREND HISTORY] is selected.)
2. Pressing the right arrow key displays the sub menu.
To close the sub menu, press the left arrow key.
3. Select [INFORMATION ON] using the up and down arrow keys.



4. Pressing the DISP/ENTER displays the window with the memory information.
For models with the batch function, batch number and lot number information of the display/event data (displayed as a historical trend) is also displayed.

```
File Name (Data Kind): Memory (DISP)
Serial No.           : 12V821463
Application Name     : AP
Supervisor Name      : SUPERVISOR
Manager Name         : MANAGER
Batch Name           : SAMPLE-0010
Start Time           : Jan.03.2000 07:07:52
Start User Name      : user1
End Time             : Jan.03.2000 07:08:46
End User Name        : user1
```

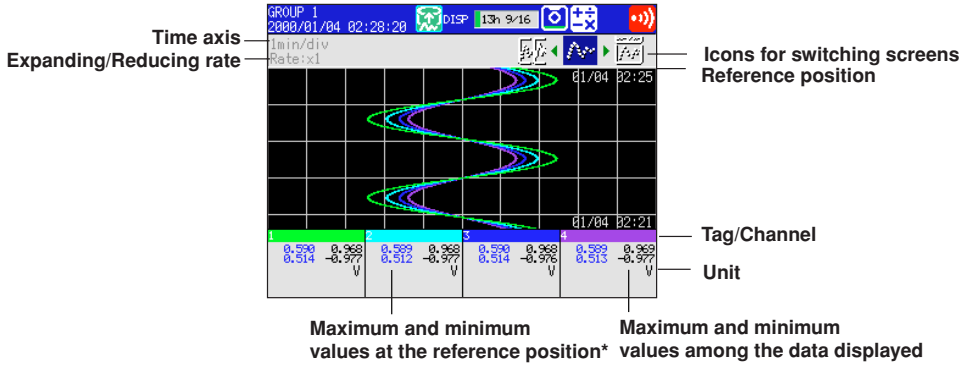
5. To clear the window, press the DISP/ENTER key or one of the arrow keys.

Explanation

Background color of the historical trend

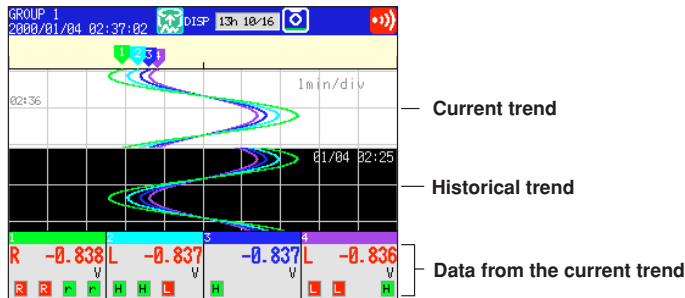
The background color of the historical trend is either black or white, opposite of the background color displayed for the current trend.

Historical trend



* For event data, the measured/computed value at the display reference position.

Historical trend (displaying the current trend and the historical trend).



Note

It is possible that not all of the digits of the maximum and minimum values of the computation channel data will be displayed.

5.1 Voltage Input Setting

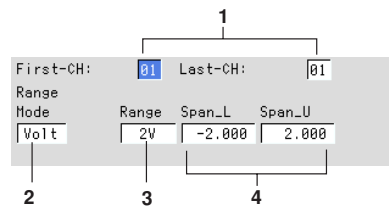
To measure the DC voltage input or the DC current input using an external shunt resistor, follow the procedures below to set the voltage input. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [Volt].
3. Range
Set the input range.
4. Upper and lower limits of span
Set the upper and lower limits of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Note

Span lower limit and span upper limit cannot be set to the same value.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

5.1 Voltage Input Setting

Explanation

The following table shows the mode, range, and measurable range.

Mode	Range	Measurable Range
Volt	20 mV	–20.00 to 20.00 mV
	60 mV	–60.00 to 60.00 mV
	200 mV	–200.0 to 200.0 mV
	2 V	–2.000 to 2.000 V
	6 V	–6.000 to 6.000 V
	20 V	–20.00 to 20.00 V

DC current input

An external shunt resistor is connected to the input terminal to convert a current signal to a voltage signal. The shunt resistors in the following table can be provided. A 250 Ω shunt resistor, for example, is used to convert a 4 to 20 mA to a 1 to 5 V.

Name	Model (Part) Number	Specification
Shunt resistors (for screw terminals)	415920	250 $\Omega \pm 0.1\%$
	415921	100 $\Omega \pm 0.1\%$
	415922	10 $\Omega \pm 0.1\%$
Shunt resistors (for clamped terminals)	438920	250 $\Omega \pm 0.1\%$
	438921	100 $\Omega \pm 0.1\%$
	438922	10 $\Omega \pm 0.1\%$

5.2 Thermocouple (TC)/Resistance Temperature Detector (RTD) Setting

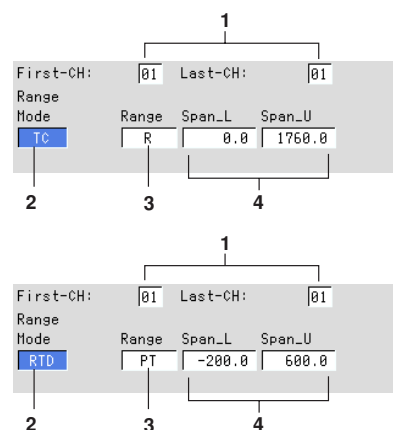
To measure TC and RTD signals, follow the procedures below to set the input range. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [TC] (thermocouple) or [RTD] (resistance temperature detector).
3. Range
Set the type of thermocouple or RTD.
4. Upper and lower limits of span
Set the upper and lower limits of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Note

Span lower limit and span upper limit cannot be set to the same value.

5.2 Thermocouple (TC)/Resistance Temperature Detector (RTD) Setting

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The following table shows the mode, range, and measurable range.

Mode	Range	Measurable Range	Note
TC	R	0.0 to 1760.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	S	0.0 to 1760.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	B	0.0 to 1820.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	K	−200.0 to 1370.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	E	−200.0 to 800.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	J	−200.0 to 1100.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	.T	−200.0 to 400.0°C	ANSI, IEC584, DIN IEC584, JIS C1602-1981
	N	0.0 to 1300.0°C	Nicrosil-Nisil, IEC584, DIN IEC584
	W	0.0 to 2315.0°C	W-5% Re/W-26% Re (Hoskins Mfg.Co.)
	L	−200.0 to 900.0°C	Fe-CuNi, DIN 43710
	U	−200.0 to 400.0°C	Cu-CuNi, DIN 43710
RTD	Pt100	−200.0 to 600.0°C	JIS C1604-1989, JIS C1606-1989, IEC751, DIN IEC751
	JPt100	−200.0 to 550.0°C	JIS C1604-1981, JIS C1606-1989
	CU1	−200.0 to 300.0°C	CU10 Ω GE (Cuid based on a particular manufacturer)
	CU2	−200.0 to 300.0°C	CU10 Ω L&N (Cuid based on a particular manufacturer)
	CU3	−200.0 to 300.0°C	CU10 Ω WEED (Cuid based on a particular manufacturer)
	CU4	−200.0 to 300.0°C	CU10 Ω BAILAY (Cuid based on a particular manufacturer)
	CU5	−200.0 to 300.0°C	CU10 Ω $\alpha = 0.00392$ at 20°C
	CU6	−200.0 to 300.0°C	CU10 Ω $\alpha = 0.00393$ at 20°C
	CU25	−200.0 to 300.0°C	CU25 Ω $\alpha = 0.00425$ at 0°C

Cu1 to 6, and Cu25 are options.

For the setting procedure of the reference junction compensation and the burnout for the thermocouple input, see section 5.9.

5.3 Digital Input (DI) Setting

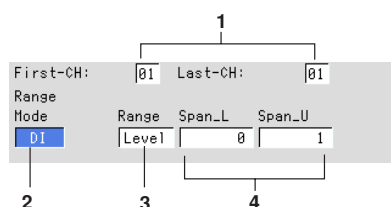
To measure the digital input (ON/OFF input), follow the procedures below to set the input range. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [DI].
3. Range
Select [Level] or [Cont] (Contact).
4. Upper and lower limits of span
Set the upper and lower limits of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter 0 or 1 and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Note

Span lower limit and span upper limit cannot be set to the same value.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

5.3 Digital Input (DI) Setting

Explanation

The following table shows the mode, range, and measurable range.

Mode	Range	Measurable Range
DI	Level	0 : Less than 2.4 V 1 : Greater than or equal to 2.4 V
	Contact	0 : Opened 1 : Closed

5.4 Difference Computation (Delta) Setting

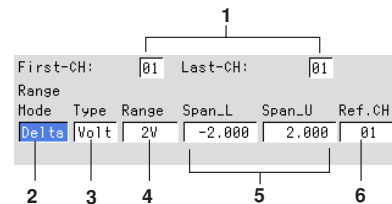
To measure the difference between the inputs of two channels, follow the procedures below to set the input range. The difference computation channel displays the computed result of “(the measured value of the difference computation channel) - (the measured value of the reference channel).” Select the input type for the difference computation channel from DC voltage, thermocouple, RTD, and ON/OFF input. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Set the channels that will measure the difference.
2. Mode
Set the mode to [Delta].
3. Type
Select the input type from [Volt], [TC], [RTD], and [DI].
4. Range
If the type is [Volt] enter the input range. If it is [TC] or [RTD] enter the type of TC or RTD. If it is [DI] enter [Level] or [Cont].
5. Upper and lower limits of span
Set the upper and lower limits of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key.
For the procedures related to entering numerical values, see “Entering Numbers” on page 3-21.

Note

- For TC or RTD input, the display span cannot exceed the difference between the maximum and the minimum of the input range.
Example : For TC type L, the input range is -200.0 to 900.0°C.
The allowed range of display span: -1100.0 to 1100.0°C.
- For DC voltage input, the display span cannot exceed the input range.
- The upper limit and the lower limit cannot be set to the same value.

5.4 Difference Computation (Delta) Setting.

6. Ref. CH
Set the reference channel (See the explanation).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The following table shows the mode, type, range, and measurable range.

Mode	Type	Range	Measurable Range
Delta	Volt	20 mV	–20.00 to 20.00 mV
		60 mV	–60.00 to 60.00 mV
		200 mV	–200.0 to 200.0 mV
		2 V	–2.000 to 2.000 V
		6 V	–6.000 to 6.000 V
		20 V	–20.00 to 20.00 V
Delta	TC	R	–1760.0 to 1760.0°C
		S	–1760.0 to 1760.0°C
		B	–1820.0 to 1820.0°C
		K	–1570.0 to 1570.0°C
		E	–1000.0 to 1000.0°C
		J	–1300.0 to 1300.0°C
		T	–600.0 to 600.0°C
		N	–1300.0 to 1300.0°C
		W	–2315.0 to 2315.0°C
		L	–1100.0 to 1100.0°C
Delta	RTD	U	–600.0 to 600.0°C
		Pt100	–800.0 to 800.0°C
		JPt100	–750.0 to 750.0°C
		CU1 to 6 (CU10)	–500.0 to 500.0°C (option)
Delta	DI	CU25	–500.0 to 500.0°C (option)
		Level	–1 to 1
Delta	DI	Contact	–1 to 1

The relationship with the reference channel

Even if the input type or the measurement range of the difference computation channel and the reference channel is not the same, the difference computation is performed according to the following rules.

- When the decimal position between the reference channel and the difference computation channel is different, the measured value of the reference channel is adjusted to the decimal position of the measured value of the difference computation channel to make the computation.
Example : When the measured value of the difference computation channel is 10.00 and the measured value of the reference channel is 100.0, the computation result becomes $10.00 - 100.0 = -90.00$.
- When the units for the reference channel and the difference computation channel are different, the measured value is not adjusted.
Example : When the measured value of the difference computation channel is 10.00 V and the measured value of the reference channel is 5.00 mV, the computation result becomes $10.00 \text{ V} - 5.00 \text{ mV} = 5.00 \text{ V}$.
- When the reference channel is set to [Scale] or [Sqrt], the computation uses the scaled values.

5.5 Scaling Setting

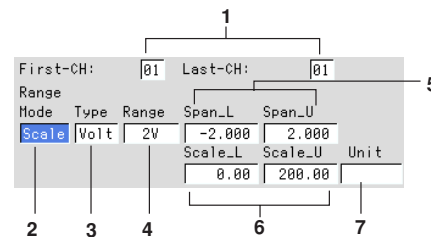
For DC voltage, thermocouple, RTD and ON/OFF input, the measured values can be scaled to a value in the appropriate unit and displayed. Set the upper and lower limits of the input's display span, the upper and lower limits after scaling, and the unit. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [Scale].
3. Type
Select the input type from [Volt], [TC], [RTD], and [DI].
4. Range
Select the input range using the soft keys according to the input type.
5. Upper and lower limits of span
Set the upper and lower limits of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Note

Span lower limit and span upper limit cannot be set to the same value.

5.5 Scaling Setting

6. Upper and lower limits of span

Set the upper and lower limits of the display span.

Pressing the [Input] soft key displays a window used to enter a numerical value.

Enter a value in the allowed range and press the DISP/ENTER key. For the procedures related to entering numerical values, see “Entering Numbers” on page 3-21.

- Allowed range : –30000 to 30000

- Decimal position :

The decimal can be set in the following positions : “□.□□□□”

“□□.□□□” “□□□.□□” “□□□□.□” “□□□□□”

- The decimal position is determined by the scale lower limit setting.

Note

- Scale lower limit and scale upper limit cannot be set to the same value.
- The recorder converts the measured data within a value span derived by removing the decimal from the scaling upper and lower limits. In other words, conversion is performed by using a span of 10 if the scale setting is –5 to 5, and 100 if the scale setting is –5.0 to 5.0. The resolution of the value derived by using a span of 10 is coarser than the value derived using a span of 100. Because the display becomes rough, set this value so that it is greater than 100.

7. Unit

Set the unit.

Pressing the [Input] soft key displays a window used to enter a character string.

Enter the unit (up to 6 alphanumeric characters) and press the DISP/ENTER key.

For the procedures related to entering character strings, see “Entering Characters” on page 3-22.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Mode	Type	Range/Measurable Range
Scale	Volt	See section 5.1, “Voltage Input Setting.”
	TC	See section 5.2, “Thermocouple (TC)/Resistance Temperature Detector (RTD) Setting.”
	RTD	See section 5.2, “Thermocouple (TC)/Resistance Temperature Detector (RTD) Setting.”
	DI	See section 5.3, “Digital Input (DI) Setting.”

5.6 Square Root Computation Setting

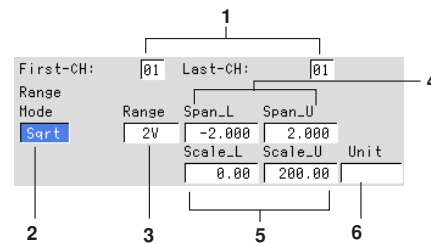
Computes the square root of the DC voltage input. The result can be scaled to a value in the appropriate unit and displayed. Set the upper and lower limits of the input's display span, the upper and lower limits after scaling, and the unit. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [Sqrt].
3. Range
Select the input range from [20 mV], [60 mV], [200 mV], [2 V], [6 V], and [20 V].
4. Upper and lower limits of span
Set the upper and lower limits of the measurement span.
Pressing the [Input] soft key displays a window used to enter a numerical value. Enter a value in the allowed range and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Note

Span lower limit and span upper limit cannot be set to the same value.

5.6 Square Root Computation Setting

5. Upper and lower limits of scale

Set the upper and lower limits of the scale.

Pressing the [Input] soft key displays a window used to enter a numerical value.

Enter a value in the allowed range and press the DISP/ENTER key. For the procedures related to entering numerical values, see “Entering Numbers” on page 3-21.

- Allowed range : –30000 to 30000

- Decimal position :

The decimal can be set in the following positions : “□.□□□□”

“□□.□□□” “□□□.□□” “□□□□.□” “□□□□□”

- The decimal position is determined by the scale lower limit setting.

Note

- Scale lower limit and scale upper limit cannot be set to the same value.
- The recorder converts the measured data within a value span derived by removing the decimal from the scaling upper and lower limits. In other words, conversion is performed by using a span of 10 if the scale setting is –5 to 5, and 100 if the scale setting is –5.0 to 5.0. The resolution of the value derived by using a span of 10 is coarser than the value derived using a span of 100. Because the display becomes rough, set this value so that it is greater than 100.

6. Unit

Set the unit.

Pressing the [Input] soft key displays a window used to enter a character string.

Enter the unit (up to 6 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see “Entering Characters” on page 3-22.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select “YES” using the arrow keys and press the DISP/ENTER key.

Explanation

For the range, and measurable range, see section 5.1, “Voltage Input Setting.”

Computing equation

The RD-MV100 uses the following square-root computation :

Using the following definitions :

- V_{min} : Lower limit of span
- V_{max} : Upper limit of span
- F_{min} : Lower limit of scale
- F_{max} : Upper limit of scale
- V_x : Input voltage
- F_x : Scaling value

$$F_x = (F_{max} - F_{min}) \sqrt{\frac{V_x - V_{min}}{V_{max} - V_{min}}} + F_{min}$$

When the value inside the square root is negative,

when $F_{min} < F_{max}$, F_x = negative overflow “-*****”

when $F_{min} > F_{max}$, F_x = positive overflow “+*****”


5.7 Skip Setting

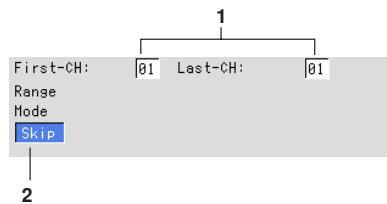
These channels will not be measured or displayed. The range cannot be changed while data acquisition or computation is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Mode
Set the mode to [Skip].

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

5.8 Input Filter and Moving Average Setting

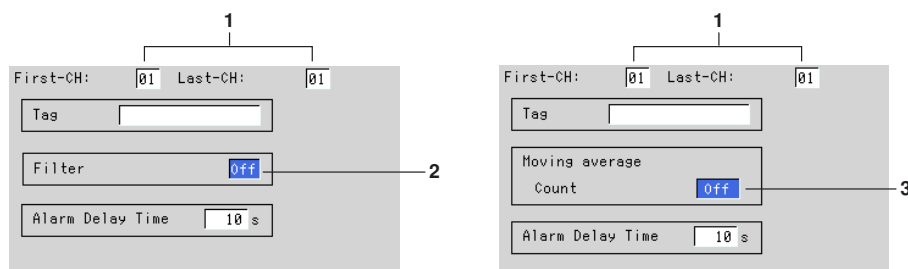
Set the input filter (for RD-MV102/RD-MV104, low pass filters) or the moving average of the input (for RD-MV106/RD-MV112).

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Tag] and [Alarm Delay Time] are also simultaneously set.)

Input filter setting (for RD-MV102/RD-MV104)

2. Filter - Filter
Select [Off] or set the time constant of the filter.

Moving average setting (for RD-MV106/RD-MV112)

3. Moving Average - Count
Select [Off] or set the number of data points for the moving average.

Note

Regardless of this setting, filter and moving average operations are not performed for the digital inputs (DI).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The following table shows the values.

Filter/Moving Average	Value	Description
Filter	Off	Do not use the filter
	2 s	Filter time constant 2 s
	5 s	Filter time constant 5 s
	10 s	Filter time constant 10 s
Moving Average	Off	Do not use moving average.
	2 to 16	Number of data samples for the moving average


5.9 Setting the A/D Integration Time, Scan Interval, Burnout, and Reference Junction Compensation (Basic Setting Mode)

Set the integration time of the input A/D converter, scan interval, thermocouple input burnout, and reference junction compensation (RJC).

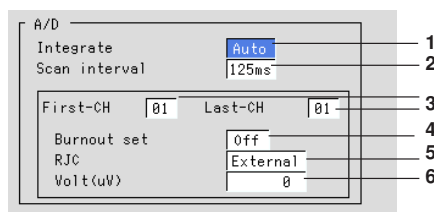
Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Setting the integration time of the input A/D converter

1. A/D Integration time
Select from [Auto], [50 Hz], [60 Hz], and [100 ms] using soft keys.
RD-MV102/RD-MV104 : Auto/50 Hz/60 Hz
RD-MV106/RD-MV112 : Auto/50 Hz/60 Hz/100 ms
AUTO : automatically switches 20/16.7 ms
50 Hz : fixed to 20 ms
60 Hz : fixed to 16.7 ms
100 ms : fixed to 100 ms (the scan interval is 2 s)

Setting the scan interval

2. Scan interval
Input signals are scanned at every scan interval. For the models with computation function (/M1), the computation carried out at every scan interval.
RD-MV102/RD-MV104 : 125 ms/250 ms
RD-MV106/RD-MV112 : 1 s/2 s (when the A/D integration time is 100 ms, 2 s only)

Setting the thermocouple input burnout and setting the reference junction compensation

This setting is void for all ranges other than the TC.

3. First channel and last channel
Select the desired channels.

5.9 Setting the A/D Integration Time, Scan Interval, Burnout, and Reference Junction Compensation (Basic Setting Mode)

4. Burnout
Select from [Off], [Up], and [Down].
Off : Disable the burnout function.
Up : When the thermocouple burns out, the measured result is set to positive over range "+*****."
Down : When the thermocouple burns out, the measured result is set to negative over range "-*****".
5. RJC
Set [External] or [Internal].
External : Use the external RJC.
Internal : Use the RJC of the recorder.
6. Volt (μV)
If [External] is selected, set the reference junction compensation voltage to add to the input.
Pressing the [Input] soft key displays a window used to enter the voltage. Enter a value ($-20000 \mu\text{V}$ to $20000 \mu\text{V}$, initial value is $0 \mu\text{V}$) and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The integration time of the input A/D converter

The recorder uses an A/D converter to convert the input signal to a digital signal. The A/D converter operates at an integral time of 16.7 ms (60 Hz), 20 ms (50 Hz), or 100 ms. By setting the integration time to match the frequency of the power supply being used, power supply frequency noise can be minimized.

Burnout of thermocouple input

When the alarm is set to detect positive or negative over range, the occurrence of burnout of thermocouple can be displayed as an alarm.

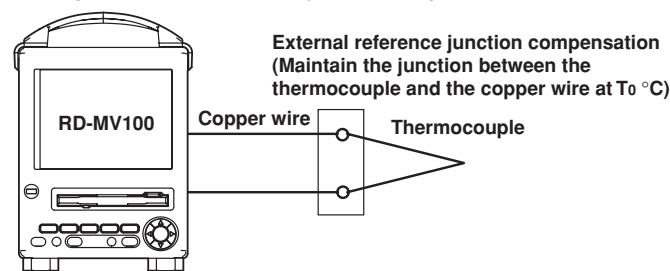
Turn the burnout function OFF when connecting the input wires in parallel with other devices.

Reference junction compensation of thermocouple input

When using the reference junction compensation of the RD-MV100, see "Precautions to be taken while wiring" in section 2.3, "Input Signal Wiring."

When using the external reference junction compensation, set an appropriate reference junction compensation voltage. As in the example in the following figure, if the reference junction temperature for the external reference junction compensation is T_0 °C, set the thermoelectromotive force of the 0 °C reference for T_0 °C as the reference junction compensation voltage.

An example of External reference junction compensation



6.1 Releasing the Alarm Indication and Output Relay (Option)

This section describes the procedures to release the alarm indication and the output relay when the behavior of the indicator or the output relay is set to [hold]. The indicator or output relay condition varies depending on the timing at which the alarm release operation is carried out.

Procedure

This operation is carried out in the operation mode.

1. Press the FUNC key to display the soft key menu.
2. To release the alarm indication and the output relay, press the [Alarm ACK] soft key.



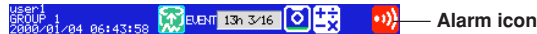
Explanation

- The indications and output relays generated by all alarms are released.
- The release operation is void if the behavior of the indicator or the output relay is set to [non-hold].
- The release operation can be executed via remote control (option) or via communications.

Alarm indication

The alarm condition can be confirmed with the alarm icon in the status display section and the alarm indication on the operation screen such as the trend display. The indicator pattern varies depending on the hold/non-hold setting.

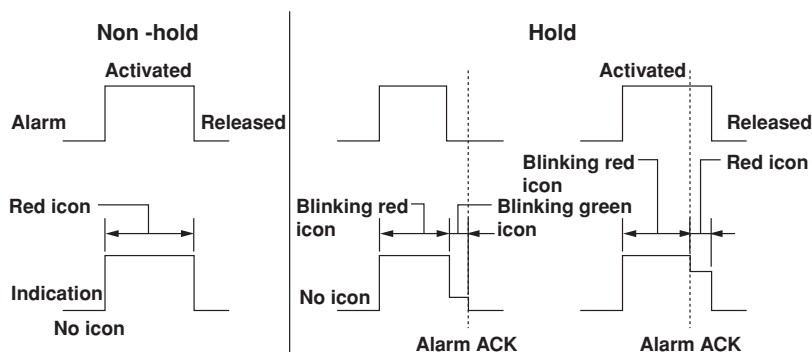
- **The alarm icon in the status display section**



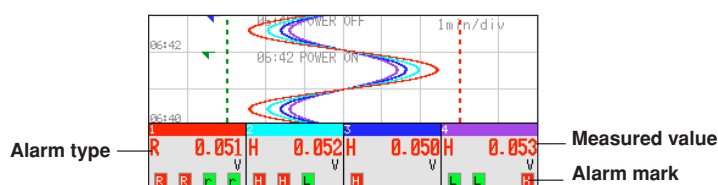
Indicator Hold/Non-hold	Alarm	Alarm Indication
Non-hold*	Activated	Red icon
	Released	No icon displayed
Hold	Activated	Blinking red icon (Stops blinking with alarm ACK)
	Released	Blinking green icon (icon disappears with alarm ACK)

* When the alarm indication is set to non-hold, alarm ACK does not work.

6.1 Releasing the Alarm Indication and Output Relay (Option)



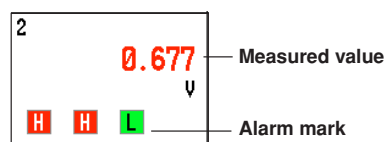
• Alarm indication in the trend display



Indicator Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Alarm mark, alarm type, measured values : All red
	Released	Alarm mark : Green color Alarm type : Not displayed Measured value : Blue color
Hold	Activated	Alarm mark : Blinks in red (Stops blinking with alarm ACK) Alarm type, measured value : Displayed in red
	Released	Alarm mark : Blinks in green (Stops blinking with alarm ACK) Alarm type : Not displayed Measured value : Blue

* When the alarm indication is set to non-hold, alarm ACK does not work.

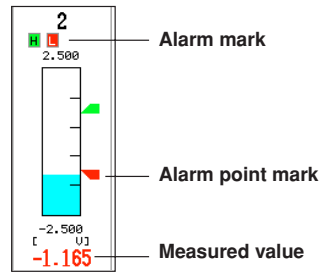
• Alarm indication in the digital display



Indicator Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Alarm mark, measured values : All red
	Released	Alarm mark : Green Measured value : Blue
Hold	Activated	Alarm mark : Blinks in red (Stops blinking with alarm ACK) Measured value : Red
	Released	Alarm mark : Blinks in green (Stops blinking with alarm ACK) Measured value : Blue

* When the alarm indication is set to non-hold, alarm ACK does not work.

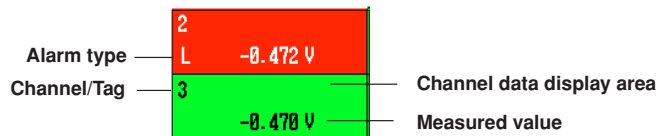
• Alarm indication in the bar graph display



Indicator Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Alarm mark, alarm point mark, and measured values : All red
	Released	Alarm mark : Green Alarm point mark : Green Measured value : Blue
Hold	Activated	Alarm mark : Blinks in red (Stops blinking with alarm ACK) Alarm point, measured values : Red
	Released	Alarm mark : Blinks in green (Stops blinking with alarm ACK) Alarm point mark : Green Measured value : Blue

* When the alarm indication is set to non-hold, alarm ACK does not work.

Alarm indication in the overview display



Indicator Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Channel display area : Red Channel (tag), alarm type, and measured values : All white
	Released	Channel display area : Green Channel (tag) and measured value : Black Alarm type : Not displayed
Hold	Activated	Channel display area : Red Channel (tag) : Blinks in white (Stops blinking with alarm ACK) Alarm type and measured value : White
	Released	Channel display area : Green Channel (tag) : Blinks in black (Stops blinking with alarm ACK) Alarm type : Not displayed Measured value : Black

* When the alarm indication is set to non- hold, alarm ACK does not work.

6.1 Releasing the Alarm Indication and Output Relay (Option)

• Alarm summary display

(005-006) Channel	Type	Alarm IN Time	Alarm OUT Time
1	1H	Jan.09 01:13:13	Jan.09 01:13:33
1	2L	Jan.09 01:12:14	Jan.09 01:12:25
3	1H	Jan.09 01:11:07	Jan.09 01:11:09
3	1H	Jan.09 01:10:58	Jan.09 01:11:05
1	1H	Jan.09 01:10:54	Jan.09 01:11:24
1	2L	Jan.09 01:10:03	Jan.09 01:10:18

Mark

Alarm Information

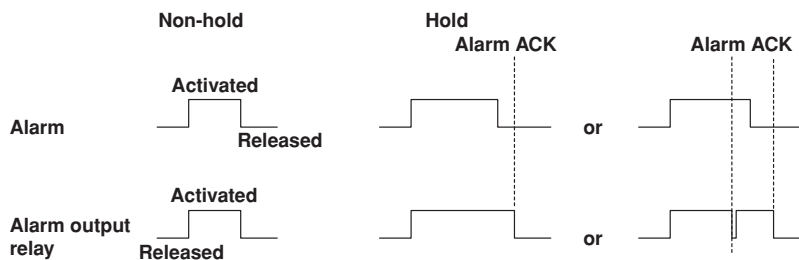
Indicator Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Displays alarm information Mark : Red
	Released	Mark : Green
Hold	Activated	Displays alarm information Mark : Blinks in red (Stops blinking with alarm ACK)
	Released	Mark : Blinks in green (Stops blinking with alarm ACK)

* When the alarm indication is set to non-hold, alarm ACK does not work.

Alarm output relay

Relay Hold/Non-Hold	Alarm	Alarm Indication
Non-hold*	Activated	Active
	Released	Idle
Hold	Activated	Active (temporarily suspend with alarm ACK)
	Released	Idle with alarm ACK

* When the alarm output relay is set to non-hold, alarm ACK does not work.



6.2 Alarm Setting

This section describes the procedures related to setting the alarm specification on each channel. The auxiliary alarm function are set in the basic setting mode. (See section 6.4)

Note

- Set the measurement range before setting the alarm.
- All of the alarm settings of a channel are canceled in the following cases :
 - When the input type is changed (Volt, TC, etc.).
 - When the input range is changed.
 - When displaying the scale or computing the square root and the measurement span or scaling value is changed (includes decimal position change).
- If the range setting is set to [Skip], alarm setting is not possible. (The alarm setting boxes are grayed in this case.)

Procedure

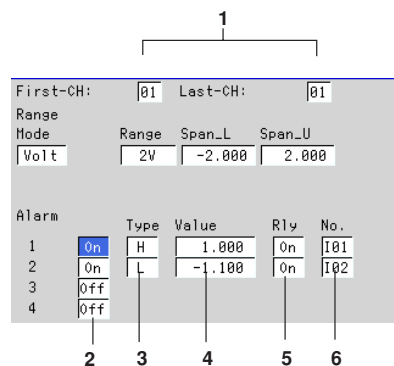
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. Once new settings are confirmed, they change back to white.

Press



To display the setting screen press the soft key

#1



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Range] is also simultaneously set.)
2. On/Off
When the alarm is turned on, [Type], [Value], and [Relay On/Off] are displayed.
3. Type
Set the alarm type. For the alarm types, see "Explanation."

Note

If you select delay alarm (T or t) for the alarm type, you must set the alarm delay period. See section 6.3.

4. Value
Enter the value at which the alarm is activated.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
- 5.* Relay On/Off
Set whether or not to activate the output relay (On/Off). When turned ON, the output relay number box appears.
- 6.* Number
Set the output relay number. For the correspondence between the output relay number and the output relay position, see section 2.4, "Alarm Output Wiring (Option)."

* When the alarm output relay option is not installed, these settings are void.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Alarm type

The following eight types of alarm type are available.

Name	Symbol	Description
Upper limit alarm	H	An alarm occurs when the measured value becomes greater than or equal to the alarm value.
Lower limit alarm	L	An alarm occurs when the measured value becomes smaller than or equal to below the alarm value.
Difference upper limit alarm ^{*1}	h	An alarm occurs when the difference between the measured values of two channels becomes greater than or equal to the alarm value.
Difference lower limit alarm ^{*1}	l	An alarm occurs when the difference between the measured values of two channels becomes smaller than or equal to the alarm value.
Upper limit on rate-of-change alarm ^{*2}	R	The amount of change of the measured values over a certain time interval is checked. An alarm occurs when the amount of increase becomes greater than or equal to the specified value (see section 6.4). The time interval is specified using a number of measurements.

Name	Symbol	Description
Lower limit on rate-of-change alarm*2	r	The amount of change of the measured values over a certain time interval is checked. An alarm occurs when the amount of decrease becomes greater than or equal to the specified value (see section 6.4). The time interval is specified using a number of measurements.
Delay upper limit alarm	T	An alarm occurs when the measured value remains above or equal to the alarm value for the specified time period (delay period, see section 6.3, "Setting the Alarm Delay Period.").
Delay lower limit alarm	t	An alarm occurs when the measured value remains below or equal to the alarm value for the specified time period (delay period, see section 6.3, "Setting the Alarm Delay Period.").

*1 Can be specified only on difference computation channels.

*2 Can be specified only on measurement channels.

6.3 Setting the Alarm Delay Period

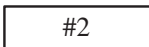
Set the alarm delay period for delayupper/lower limit alarm.

Procedure

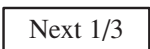
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. Once new settings are confirmed, they change back to white.

Press .

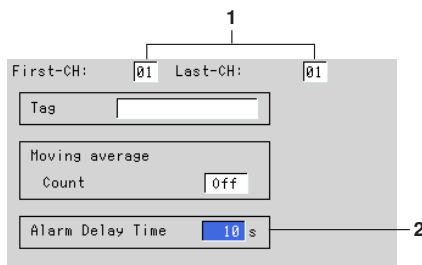
Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Tag], [Moving Average] or [Filter] for measurement channels, and [Tag], [TLOG] or [Rolling Average] for computation channels are also simultaneously set.)
2. Alarm delay period
Pressing the [Input] soft key displays a window used to enter the alarm delay period. Enter an integer value in the range 1 to 3600 s and press the DISP/ENTER key. Procedures related to entering numerical values, see “Entering Numbers” on page 3-21.
If the scan interval is 2 s and you set an odd value for the alarm delay period, it will operate at the specified period + 1 s.
Example : If the alarm delay period is set to 5 s, it will operate at 6 s.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

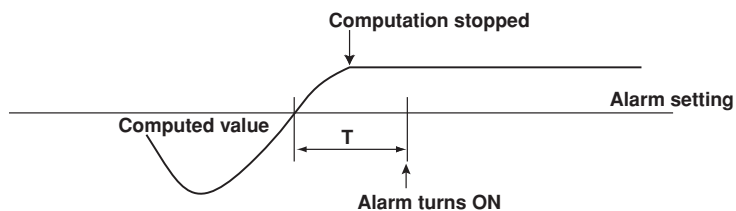
To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Operation of the delay upper/lower limit alarm**

For the operation of the delay upper/lower limit alarm, see section 1.5, "Alarm Function." This section will describe special cases of its operation.

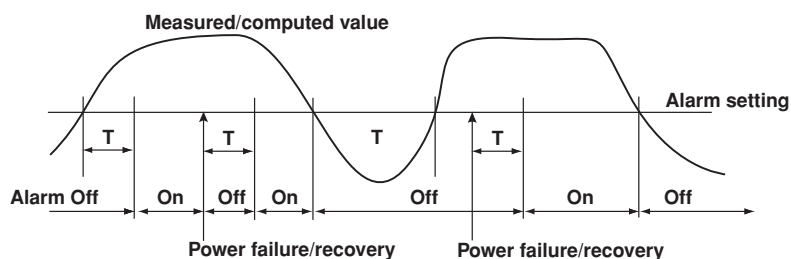
- **When delay alarm is set on a computation channel and the computation is stopped**

If the computation is stopped in a condition in which the computed value is exceeding the alarm setting, the alarm is turned ON after the specified period (delay period) elapses.



- **Delay alarm when a power failure occurs**

Alarm detection is reset upon a power failure. It restarts the operation after the power recovers.



- **Operation when the alarm setting is changed**

If a new delay alarm is set, the alarm detection starts at that time. It is unaffected by the conditions existing before the alarm is set.

If the alarm setting of a preexisting delay alarm is changed

- If an alarm is not occurring at the time of the change, alarm detection starts at the new setting.
- If an alarm is occurring at the time of the change and the alarm type is set to delay upper limit alarm, the alarm continues as long as the input is above or equal to the new setting. If the input is below the new setting, the alarm turns OFF. If the alarm type is set to delay lower limit alarm, the alarm continues as long as the input is below or equal to the new setting. If the input is above the new setting, the alarm turns OFF.


6.4 Setting the Auxiliary Alarm Function (Basic Setting Mode)

Set the auxiliary alarm function.

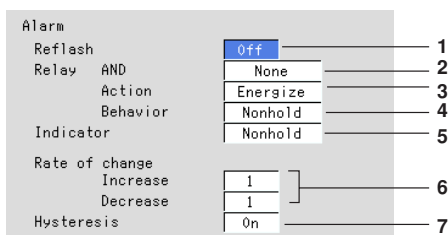
Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. Once new settings are confirmed, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Setting reflash

- 1.* Reflash
Select [On] or [Off].
On : Use reflash function
Off : Not use reflash function

Setting the AND/OR logic of output relays

- 2.* Relay - AND
Select the relays that are to use the AND logic. Set the last relay that is to use the AND logic. The relays beyond this relay will use the OR logic.
Select from [None], [I01] (I01 only), [I01 - I02] (I01 and I02), ... , and [I01 - I06] (I01 to I06). The setting is valid for relays specified by options.

Setting the output relay operation (energized/de-energized)

- 3.* Relay - Action
Select energize or de-energize using the soft key.

Setting the output relay operation (hold/non-hold)

- 4.* Relay - Behavior
Select hold or non-hold using the soft key.

* When the alarm output relay option is not installed, these settings are void.

Setting the alarm indication operation (hold/non-hold)

5. Indicator
Select hold or non-hold using the soft key.

Setting the interval for the rate-of-change alarm

- 6. Rate of change - Increase, Rate of change - Decrease
The time interval is specified using a number of sampling times.
Select the limit from 1 to 15 using the soft key.

Setting the alarm hysteresis

- 7. Hysteresis
Select [On] or [Off] using the soft key.
On : The hysteresis is 0.5% of the display span or scale.
Off : no hysteresis

Confirming operation

To confirm the new settings, press the DISP/ENTER key.
To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

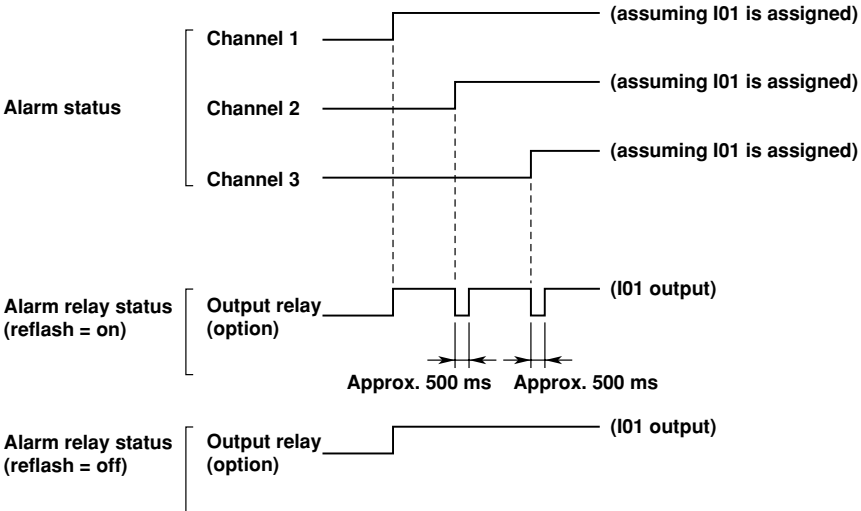
Explanation

Alarm output relay (option)

A contact signal is generated when an alarm occurs. The number of output relays is 2 to 6 points (depends on the specification).

Reflash

When multiple alarms are set to one alarm output relay, this function notifies the succeeding alarms after the first alarm that causes the relay operation. When a succeeding alarm occurs, the output relay temporarily turns OFF. The reflash alarm function is set only to output relays I01, I02, and I03. The initial setting is [Off] (Not use "Reflash").



Note

If the reflash alarm is specified, relays I01 to I03 are used as reflash relays regardless of the number of alarm output relays. Therefore, relays I01 to I03 operate as OR logic (see "AND/OR of alarm output relays") and non-hold (see "Hold/Non-hold operation of the alarm output relay") regardless of the settings made in "AND/OR of alarm output relays" and "Hold/Non-hold operation of the alarm output relay."

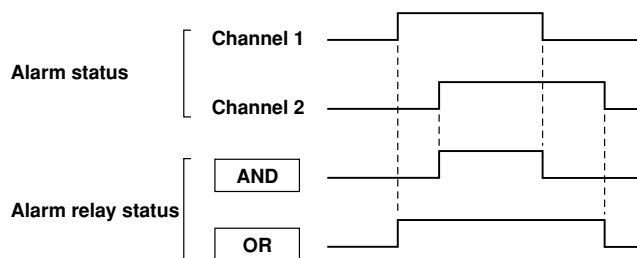
6.4 Setting the Auxiliary Alarm Function (Basic Setting Mode)

AND/OR of alarm output relays

When sharing an alarm output relay among multiple alarms, you can select from the following conditions that cause the alarm output relay to be activated.

- AND : Activated when all alarms are being generated simultaneously.
- OR : Activated when at least one of the alarms is being generated.

Specify the alarm output relay to operate under the AND condition as in [I01 (first relay) to Ixx (where xx is the relay number)]. The initial setting is set to [None].

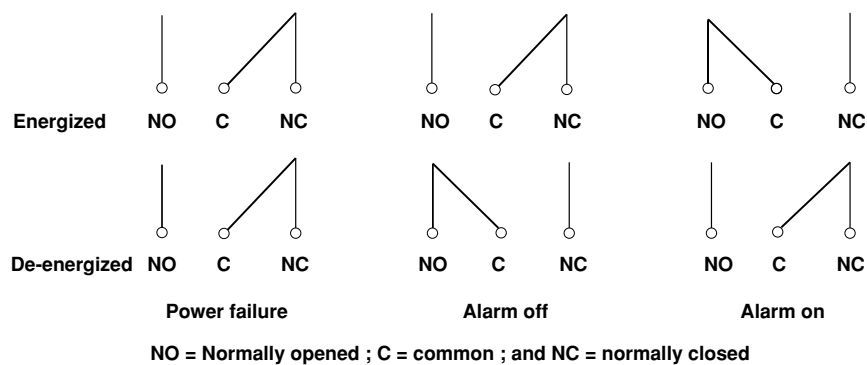


Note

If the reflash alarm is turned ON, I01 to I03 operates as reflash alarms. They are fixed to OR logic operation. Specifying AND produces no effect.

Energize/de-energize operation of the alarm output relay

You can select whether to energize or de-energize the alarm output relay when the alarm occurs. By selecting de-energize, the alarm output relay will operate in the same manner as when the alarm occurs when the power supply is disrupted. Energize or de-energize applies to all alarm output relays. The initial setting is set to [energize].



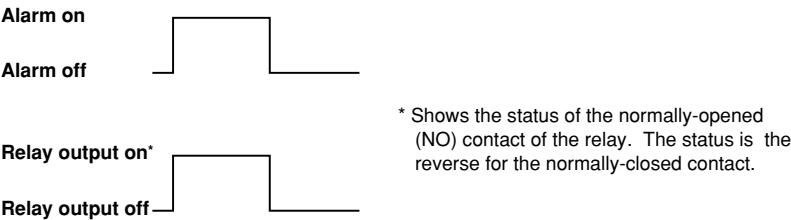
Hold/non-hold operation of the alarm output relay

When the alarm changes from an ON state to the OFF state, you can select to

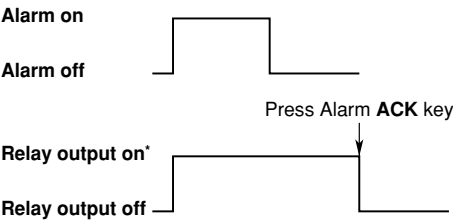
- Turn OFF the output relay in sync with the alarm release (non-hold)
- Turn OFF the output relay with an alarm acknowledge operation (hold)

This applies to all alarm output relays. The initial setting is set to [Nonhold].

• **When set to non-hold**



• **When set to hold**



Note _____
If the reflash alarm is turned ON, I01 to I03 are set to non-hold. Specifying hold produces no effect.

Hold/non-hold of the alarm indicator

When the alarm changes from the activated state to the released state, you can select to

- release the alarm indicator in sync with the alarm release (non-hold)
- release the alarm indicator with an alarm acknowledge operation (hold)

The initial setting is [Nonhold].

For details regarding the alarm indicator, see section 6.1.

7.1 Setting Tag Names

Tag names can be displayed in place of channel numbers on the operation screen (trend display, digital display, etc.). Tag names are saved to the file along with the data. The basic setting mode is used to select whether tags or channel numbers are displayed.

Procedure

Setting tag names


- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

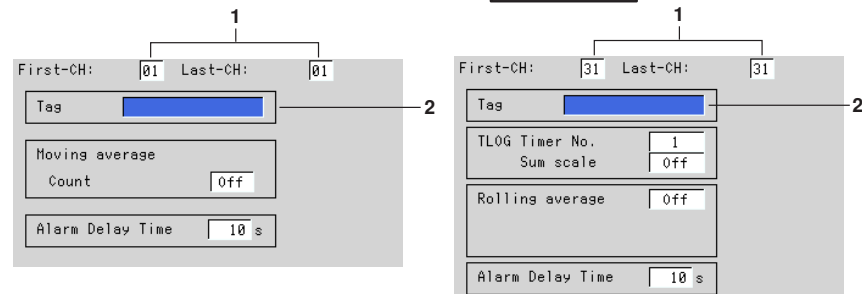
Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the measurement channels set here, [Moving Average] or [Filter], and [Alarm Delay Time] are also simultaneously set. For the computation channels, [TLOG], [Rolling Average], and [Alarm Delay Time] are also simultaneously set.)
2. Tag
Pressing the [Input] soft key displays a window used to enter the tag name. Enter the tag name (up to 16 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.


7.2 Selecting Tag Display or Channel Display (Basic Setting Mode)

Select whether tags or channel numbers are to be displayed on the operation screen (trend display, digital display, etc.). The initial setting is [Channel]. Tag names are set in the setting mode.

Procedure

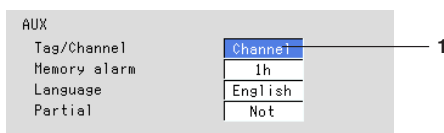
- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Tag/Channel
Select [Tag] or [Channel].
Tag : Display tags.
Channel : Display channel numbers.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Note

If a channel is set to display the tag, but the tag name is not entered, the channel will display the channel number.

7.3 Setting the Display Rate (Trend)

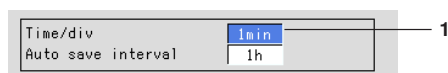
The time period corresponding to 1 division on the time axis on the trend display is specified. The time axis on the trend display is determined by the display rate. The sampling interval of the display data is also determined by the display rate. The display rate cannot be changed while data sampling is in progress.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Display update rate (Time/div)
Select the display rate from 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 h, 2 h, and 4 h.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Note

When [Auto save] is set for saving data to the external storage medium, the [Auto save interval] box is displayed under [Time/div]. [Auto save interval] is the interval at which the display data residing in the internal memory are stored to the external storage medium. The selectable values for [Auto save interval] vary depending on the [Time/div] setting. For the setting procedure, see section 8.8.

Explanation

The display data sampling interval and the speed of movement of the trend along the time axis

The following table shows the display rate, display data sampling interval, and the speed of movement of the trend along the time axis

Display Rate (/DIV)	1 min	2 min	5 min	10 min	20 min	30 min	1 h	2 h	4 h
Display data sampling interval (s)	2	4	10	20	40	60	120	240	480
Speed of movement of the trend (Estimated value) (mm/h)	594	297	119	59	30	20	10	5	2.5

7.4 Using Message Strings (Trend)

Arbitrary character strings can be registered. They can be displayed on the trend display and stored along with the display/event data.

- Number of messages : 8
- Number of characters : Up to 16 alphanumeric characters

A list of messages can be displayed on the message summary screen. See section 4.5. For models with the batch function (/BT1 option), messages 1, 2, and 3 can be altered from the operation screen to be used.

Procedure

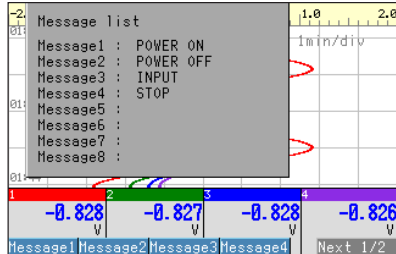
Displaying a message on the trend display/writing a message to the internal memory

This operation is carried out in the operation mode.

1. Press the FUNC key to display the soft keys.
2. Press the [Message] soft key. Eight soft keys for the messages and a window containing a list of messages are displayed.



3. Press the soft key corresponding to the message you wish to display. A message mark, time, and the message are displayed on the trend display.



Note

Messages can be displayed on the trend display and written into the internal memory along with the display data file and the event data file while data acquisition is in progress.

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7.5 Setting the Message String (Trend)

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key #4.

Message	
No.	Characters
1	POWER ON
2	POWER OFF
3	INPUT
4	STOP
5	
6	
7	
8	

The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Characters
Move the cursor to the desired message number.
Pressing the [Input] soft key displays a window used to enter the message string. Enter the message string (up to 16 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Character" on page 3-22.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

7.6 Setting Groups

Trend, digital, and bar graph displays are displayed in groups. Channels can be assigned to each group and the group name can be registered.

- Number of groups : 4
- Number of channels : Up to 6 channels/group
- As for setting the channels to display the trend, see section 8.10.

Procedure

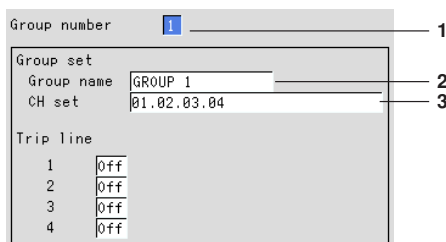
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

Press the soft key .

To display the setting screen press the soft key .



Group set	
Group name	GROUP 1
CH set	01.02.03.04
Trip line	
1	0ff
2	0ff
3	0ff
4	0ff

The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Group number
Select the group number (1 to 4).
2. Group name
Pressing the [Input] soft key displays a window used to enter the group name. Enter the group name (up to 16 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.
3. CH set
Assign measurement channels to groups.
Pressing the [Input] soft key displays a window used to enter the channel number to be assigned. Enter the channel number according to the following rules and press the DISP/ENTER key.
 - Enter the channel number using two digits.
 - Separate each channel with a period.
 - Consecutive channels can be specified using a hyphen.Example : To set CH1, CH3, CH5 to CH8 to a particular group, "01.03.05-08" is entered.

For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Note

- The channels are displayed in the order they are specified on the trend, digital, bar graph displays.
 - One channel can be assigned to multiple groups.
 - A channel cannot be assigned twice in the same group.
-

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The initial settings of the groups are as follows :

Group Name

Group 1 : GROUP 1

Group 2 : GROUP 2

Group 3 : GROUP 3

Group 4 : GROUP 4

The initial value varies depending on the number of installed channels.

Group Number	RD-MV102	RD-MV104	RD-MV106	RD-MV112
1	01.02	01.02.03.04	01.02.03.04.05.06	01.02.03.04.05.06
2	01.02	01.02.03.04	01.02.03.04.05.06	07.08.09.10.11.12
3	01.02	01.02.03.04	01.02.03.04.05.06	01.02.03.04.05.06
4	01.02	01.02.03.04	01.02.03.04.05.06	07.08.09.10.11.12

7.7 Setting the Trip Line (Trend)

A line to indicate a particular value of interest (trip line) can be displayed on the trend display.

- The maximum number of trip lines that can be displayed in one group is four.
- The position of the trip line is specified as a percentage of the display span.
- You can specify the thickness of the trip lines. See section 7.13.

Procedure

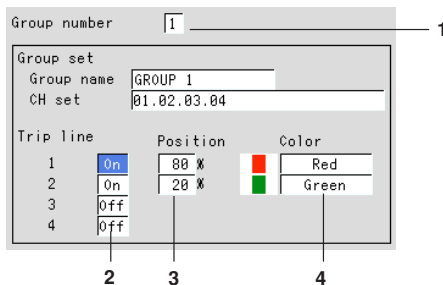
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Group number
Select the group number (1 to 4).
2. On/Off
Move the cursor to the desired trip line and press the [On] soft key.
On : Use the trip line. The [Position] and [Color] boxes appear.
Off : Not use the trip line.
3. Position (display position)
Specify the display position of the trip line in the range 0% to 100% of the display span.
4. Color
Select the color of the trip line from 16 colors.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Initial colors of the trip lines**

Trip line No.1 : Red

Trip line No.2 : Green

Trip line No.3 : Blue

Trip line No.4 : Yellow

Available colors for the trip line

Red, green, blue, blue violet, brown, orange, yellow-green, light blue, violet, gray, limes, cyan, dark blue, yellow, silver, and purple

7.8 Setting the Channel Display Colors (Trend, Bar Graph)

Trend and bar graph colors can be specified for each channel.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

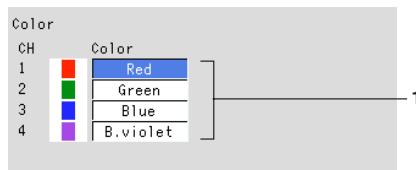
Press the soft key .

Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Channel display color
Move the cursor to the desired channel and set the channel display color (select from 16 colors).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Initial settings of channel display color

Channel 1 : Red, Channel 2 : Green, Channel 3 : Blue, Channel 4 : Blue violet, Channel 5 : Brown, Channel 6 : Orange, Channel 7 : Yellow-green, Channel 8 : Light blue, Channel 9 : violet, Channel 10 : Gray, Channel 11 : Lime, Channel 12 : Cyan

Available colors for the channels

Red, green, blue, blue violet, brown, orange, yellow-green, light blue, violet, gray, limes, cyan, dark blue, yellow, silver, and purple

7.9 Using Zone Displays (Trend)

By using zones, the waveforms of each channel can be displayed in their own zones. Because the waveforms do not overlap, they are easier to view.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

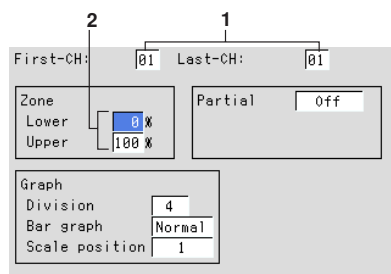
Press the soft key .

Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Graph] and [Partial] are also simultaneously set.)
2. Zone upper limit and lower limit
The waveform is displayed between the [Upper] and [Lower] limits. The [Upper] and [Lower] limits are set as percentages of the display span.
 - [Lower] : 0 to 95%
 - [Upper] : 5 to 100%

Pressing the [Input] soft key displays a window used to enter a numerical value. Enter a value and press the DISP/ENTER key.
For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

7.9 Using Zone Displays (Trend)

Note

- [Lower] must be a smaller value than [Upper].
 - The width of the zone (upper limit – lower limit) must be greater than or equal to 5%.
-

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

7.10 Setting the Scale Division, Bar Graph Base Position (Bar Graph), and Scale Position (Trend)

- The scale used on trend and bar graphs can be set.
- When the bar graph is displayed horizontally, the base position of the bar graph can be set on each channel by selecting either [normal] or [center].
Normal : The left edge or the right edge of the display span depending on which value is smaller.
Center : Position at 50% of the display span
For the procedures to set the vertical or horizontal display, see section 7.13.
- The scale display position for each channel can be specified on the trend display.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

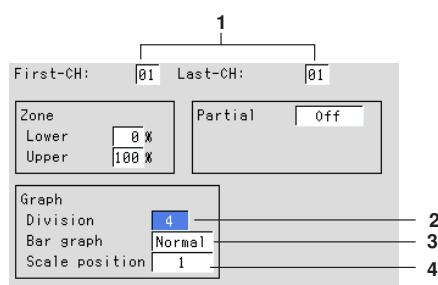
Press the soft key .

Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Zone] and [Partial] are also simultaneously set.)

7.10 Setting the Scale Division, Bar Graph Base Position (Bar Graph), and Scale Position (Trend)

Setting the number of divisions for the scale

2. Division

This is the number of scale divisions. The scale is equally divided and scale marks are displayed at the divided position. Select the number of divisions from 4 to 12.

For bar graph display : Only the main scale marks are displayed.

For trend display : See the explanation.

Setting the bar graph's base position

3. Bar graph (base position of the bar graph)

Select normal or center.

Note

When the bar graph is displayed vertically (see section 7.13), the base position is fixed to [Normal] (the bottom of the bar graph is the base position).

Setting the scale position on the trend display

4. Scale position

The [Scale position] is used to set the scale display position for each channel when the scale display is turned [On] (see section 4.3) on the trend display.

Select the position from [1] to [6]. Select [Off] for channels without scale.

Note

- The scale for the channels that are assigned to the group in the trend display are displayed.
 - The larger the number of scales to be displayed, less amount of area there is to display the waveform.
-

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

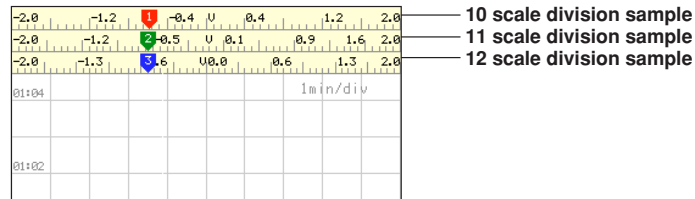
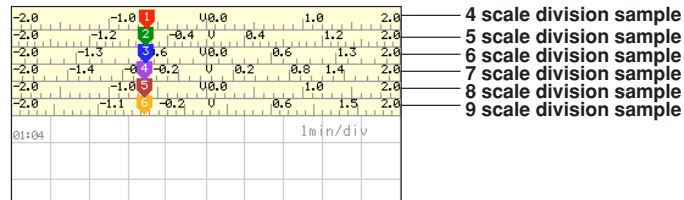
Explanation Scale Specifications

Scale display position

On the trend display, the scale display position for the channels that are assigned to groups can be displayed in 6 different positions. (See the figure below.)

- **During trend vertical display**

The scale display position is 6, 5, 4, 3, 2, and 1 from the top.



The scale is divided into 4 to 12 sections as shown in the figure above.

- If the scales for two or more channels are specified to the same position, the scale for the channel that was assigned first to the group is displayed.

Example 1 If the channels were assigned to a group in the following order :
[03.02.01.05]

If the scale display positions for channels 3, 2, 1, and 5 are all set to [1], the scale for channel 3 is displayed at position 1.

Vacant positions in between scale assigned positions are void. The scales are displayed close together from the display position 1.

Example 2 If the channels were assigned to a group in the following order :
[01.02.03.05]

If the scale display position for channels 1, 2, 3, and 5 are set to positions 1, 3, 5, and 6, respectively, the scales for the channels are actually displayed at positions 1, 2, 3, and 4, respectively.

- If the scale display position is set to [Off], the scale is not displayed.

Scale marks

The scale can be divided into 4 to 12 sections using the main scale marks. When the scale is divided into 4 or 5 section, the area between the main scale marks is divided further into 10 sections using small and medium marks. When the scale is divided into 6 to 12 sections, the area between the main scale marks is divided further into 5 sections using small marks.

However, small marks are not displayed for the following cases :

- When the measurement/computation range resolution is smaller than the total number of sections created by small marks.
- When zone display is used
- When partial expanded display is used

7.10 Setting the Scale Division, Bar Graph Base Position (Bar Graph), and Scale Position (Trend)

Scale values

The scale values are displayed at all main scale marks when the scale is divided into 4 to 7 sections using the main scale marks. When the scale is divided into 8 to 12 sections, the scale values are displayed at every other main scale mark.

In addition, the upper or lower limit of the scale is displayed at the end of the scale.

Rule 1 Up to 3 digits excluding the minus sign can be displayed for the scale values.

Rule 2 If the integer section of either value at the end of the scale is less than or equal to one digit, the value is displayed as $\square.\square$ or $0.\square$.

Example 1 If the scale is set to -0.05 to 0.5 , the scale display for the upper and lower limits is -0.0 to 0.5 .

Example 2 If the scale is set to -0.005 to 0.05 , the scale display for the upper and lower limits are -0.0 to 0.0 .

Rule 3 If the integer section of either value at the end of the scale is greater than or equal to two digits and less than three digits, the value is displayed with the decimal fraction is discarded.

Example 3 If the scale is set to 0.1 to 100.0 , the scale display for the upper and lower limits is 0 to 100 .

Rule 4 If the integer section of either value at the end of the scale is greater than or equal to four digits, a three-digit mantissa and exponent are displayed ($\times 10$ or $\times 10^2$, for example).

Example 4 If the scale is set to 10 to 2000 , the scale display for the upper and lower limits are 0 to 200×10 .

Rule 5 If the difference in the number of digits between the upper and lower limits of the scale is larger than the number of digits that can be displayed, the smaller value is set to zero (0 or 0.0).

Example 5 If the scale is set to -0.0005 to 0.5000 , the upper and lower limits of the scale are displayed as 0.0 to 0.5 .

Unit

The unit is displayed near the center of the scale. When the partial expansion display is used, the position will be shifted.

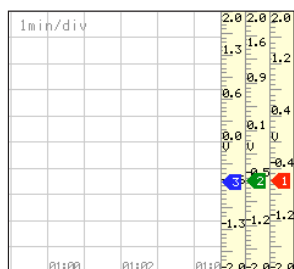
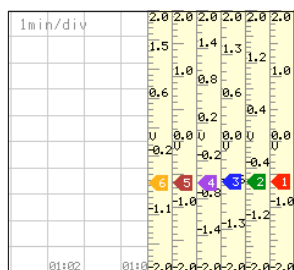
When the trend is displayed horizontally, the number of characters that can be displayed is up to 4.

The unit is not displayed if the resolution of the measuring range is less than the number of scale divisions using small marks.

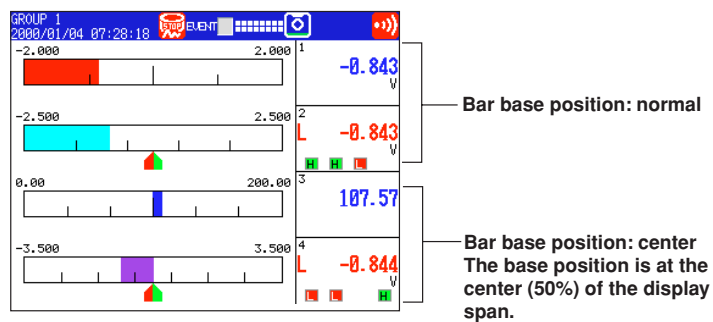
7.10 Setting the Scale Division, Bar Graph Base Position (Bar Graph), and Scale Position (Trend)

- **During trend horizontal display**

The scale display position is 6, 5, 4, 3, 2, and 1 from the left.



Bar Base Position



7.11 Using Partial Expansion Display (Trend)


By compressing a section of the display scale of the measured/computed data, the remaining section of the display is expanded. For detail, see section 1.3.

To use the partial expansion display, first, set the partial expansion display to [Use] in the basic setting mode. This will display a partial expansion display setting box in the setting mode (see section 7.12).

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

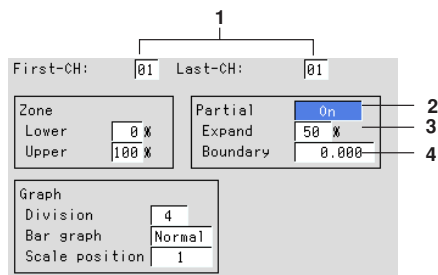
Press the soft key .

Setting on a measurement channel

To display the setting screen press the soft key .

Setting on a computation channel (option)

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, [Zone] and [Graph] are also simultaneously set.)
2. On/Off
When [On] is selected, the [Expand] and [Boundary] boxes are displayed.
On : Use the partial expansion display.
Off : Not use the partial expansion display.
3. Expand (Boundary displacement position)
Set the position to which a particular value (the boundary, see step 4) in the display span is to be moved as a percentage of the display span.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter the position and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
The range for the position : 1 to 99

4. Boundary

This is a value within the display span. By moving the value within the display span to another position (see step 3), the area on either side of the boundary is expanded or compressed.

Pressing the [Input] soft key displays a window used to enter a numerical value. Enter the boundary and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

The range for the boundary :

The minimum value of the span +1 to the maximum value of the span -1
(when the range is not set to scaling)

The minimum value of the scale +1 to the maximum value of the scale -1
(when the range is set to scale).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Note

- The partial expansion display is turned OFF for all channels if the partial expansion display setting (use/not use) in the basic setting mode is changed and stored.
- When the range setting of the channel is set to [Skip] or when the span width is less than or equal to 1, the partial expanded display cannot be specified. (The box is grayed in this case.)

7.12 Setting Whether or Not to Use the Partial Expansion Display (Basic Setting Mode)


Set whether or not to use the partial expansion display.

- The initial value is [Not].
- The display specifications of the partial expansion display are set in the setting mode.

Procedure

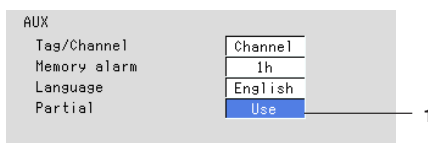
- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Partial
Select [Use] or [Not].
Use : Partial expansion display can be set in the setting mode.
Not : Partial expansion display cannot be set.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

7.13 Setting the Display Direction, Background Color, Waveform Line Width, Trip Line Width, Grid, and Scroll Time

- The display direction of the trend and bar graph can be set to horizontal or vertical.
- The background color used in the trend, digital, bar graph, and summary displays can be set to white or black (common to all screens).
- The line width of the trend can be selected as 1, 2, or 3 dots.
- The line width of the trip line can be selected as 1, 2, or 3 dots.
- The grid lines can be displayed on the trend's waveform display area by dividing the display span into 4 to 12 sections.
- The interval at which the displayed group is automatically switched on the trend, digital, and bar graph displays can be specified. The displayed group rotates from group 1 to group 4.

Procedure

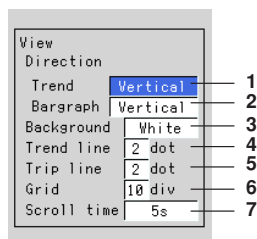
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Set the display direction of the trend

1. Direction - Trend
Select horizontal or vertical.

Set the display direction of the bar graph

2. Direction - Bar graph
Select horizontal or vertical.

7.13 Setting the Display Direction, Background Color, Waveform Line Width, Trip Line Width, Grid and Scroll Time

Set the background color

3. Background
Select white or black.

Note

The background color of the historical trend is opposite that of the trend display.

Setting the trend line width

4. Trend line
Select the width of the trend line as 1, 2, or 3 dots.

Setting the width of the trip line

5. Trip line
Select the width of the trip line as 1, 2, or 3 dots.

Setting the number of grids on the waveform display area

6. Grid
Select the number of grids from 4 to 12.

Setting the interval at which the displayed group is automatically switched

6. Scroll time
Select the interval from 5 s, 10 s, 20 s, 30 s, and 1 min.

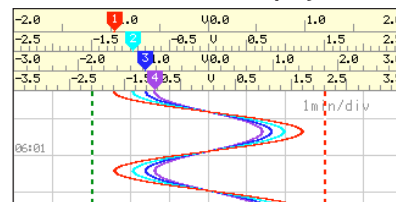
Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Grid on the waveform display area



Grid(The number of grid is 10)

7.14 Setting the Brightness of the Screen and the Backlight Saver Function


- There are eight screen brightness settings which can be selected (1 to 8).
- The lifetime of the LCD backlight can be extended by automatically dimming the light when there has been no key operation for a certain amount of time. The screen will return to the original brightness with a key operation or an alarm occurrence. The initial setting is [Off].

Procedure

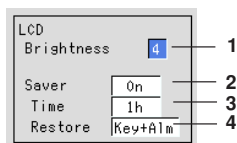
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Setting the brightness of the screen

1. Brightness
Select from 1 to 8. A higher number corresponds to a brighter screen setting.

Setting the backlight saver

2. On/Off
When [On] is selected, [Saver time] and [Restore] boxes are displayed.
3. Saver time
Select the time from 1 min, 2 min, 5 min, 10 min, 30 min, and 1 hour.
If the specified time elapses without any key operation, the LCD backlight is automatically dimmed.
4. Restore
Select [Key] or [Key + Alm] (Key + Alarm).
Key : The screen will return to the original brightness with a key operation.
Key + Alarm : The screen will return to the original brightness with a key operation or an alarm occurrence.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

8.1 Data Types to be Acquired and Saved

Data Types and File Names

Data type

The types and the contents of the data that are acquired are as follows. Beside those data listed below, the setup data (see section 9.1) and the screen image data (see section 9.6) can be saved to the external storage medium.

Type	Content
Display data	<ul style="list-style-type: none"> Waveform data that are used to display trends on the LCD screen. The maximum and minimum values from measured/computed data within the sampling intervals are held. A header string can be written into the display data file (a character string that is common to all data files). Alarm and message information is held. Data format : Binary format
Event data	<ul style="list-style-type: none"> The instantaneous values of the measured/computed data are acquired at the specified sampling interval. There is a mode in which the data acquisition is started when a trigger occurs or another mode in which the data acquisition is started when the START key is pressed. The header string can be written into the event data file (a character string that is common to all data files). Alarm and message is held. Data format : Binary format
Manual sampled data	<ul style="list-style-type: none"> Every time a key that executes manual sampling is pressed, measured/computed data (instantaneous values) of all channels at that point are acquired. Up to 50 samples of data can be stored in the internal memory. The header string can be written into the manual sampled data file (a character string that is common to all data files). Data format : ASCII format
TLOG data (option)	<ul style="list-style-type: none"> TLOG data are statistical computation data. Data are added to the internal memory at the end of every interval period. Up to 400 data sets can be stored in the internal memory. The header string can be written into the TLOG data file (a character string that is common to all data files). Data format : Binary format
Report data (option)	<ul style="list-style-type: none"> Consists of hourly, daily, weekly, and monthly reports. Data are computed at intervals depending on the report type (one hour for hourly report, one day for daily report, etc). Data are added to the internal memory at the end of every interval period. Up to 40 reports can be stored in the internal memory. Each report file can contain up to 12 measured/computed channels of report data. The header string can be written into the report data file (a character string that is common to all data files). Data format : ASCII format

8.1 Data Types to be Acquired and Saved

File name

File names are automatically assigned (month/day/hour/minute of the first sampled data + serial number. extension) for display data, event data, manual sampled data, TLOG data (option), and report data (option).

- Display data file : Mddhmma.DDS
- Event data file : Mddhmma.DEV
- Manual sampled data file : Mddhmma.DMN
- TLOG data file : Mddhmma.DTG
- Hourly report data file : Mddhmma.DHR
- Daily report data file : Mddhmma.DDR
- Weekly report data file : Mddhmma.DWR
- Monthly report data file : Mddhmma.DMR

where, M : month (1 to 9, X (10), Y (11), Z (12)), dd : date, hh : hour, mm : minute, a : serial number

Note

The serial number of the file name is set to 0. However, if the display data acquisition is started, stopped, and restarted within one minute, for example, then the file name of the two files will have serial numbers 0 and 1 for the first and second files, respectively. (The two files will have the same Mddhmma (month/day/hour/minute) section).

8.2 Function to Acquire Display Data and Event Data

The display and event data are acquired by specifying the channels, sampling interval, file size, and other information.

Specifying the Data to be Acquired

Display data and event data

Specify the type of data to be acquired depending on the application. Several examples are shown below. Please use them as references.

- Example 1. Continuously record the waveform data as in the conventional chart-type recorders.
Select "display data only."
- Example 2. Continuously record the waveform data and when an alarm occurs, record detailed data around the alarm incident.
Select "display data and event data." For the event data, select "Trigger" or "Rotate" for the mode. Specify the trigger used to start the event data acquisition and the time period during which to acquire the data (event data file size).
- Example 3. Continuously record detailed data.
Select "even data only." Select "Free" for the mode.
- Example 4. Recording is not necessary under normal circumstances. Only record detailed data around the alarm incident.
Select "event data only." Select "Trigger" or "Rotate" for the mode.
Specify the trigger used to start the event data acquisition and the time period during which to acquire the data.

Data Type

Select "display data only," "display data and event data," or "event data only."

Channels to be Stored

Select the channels to be acquired from measurement and computation channels.

Data Acquisition

• Display data

This operation is performed when the type of data acquired is set to "display data only," or "display data and event data."

Data acquisition starts when the START key is pressed and stops when the STOP key is pressed.

The display data are overwritten when the display data storage area in the internal memory becomes full, or the number of files exceeds 16.

The number of display data files is equivalent to the number of times the data acquisition is started/stopped or the number of files that are segmented by the auto save interval (during auto save). For details related to the manual save and auto save, see section 8.4.

Note

- The display data in the internal memory can be confirmed with the memory summary. ⇒ "Section 4.5"
- When a power disruption occurs the file is closed.

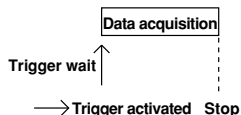
8.2 Function to Acquire Display Data and Event Data

- **Event data**

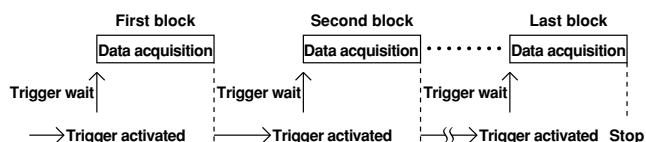
This operation is performed when the type of data acquired is set to “event data only,” or “display data and event data.” There are three modes in data acquisition, [Free], [Trigger], and [Rotate]. [Free] mode can be set when acquiring the event data only.

Mode	Description
Free	Data acquisition is started by pressing the START key. The operation is stopped by pressing the STOP key. When the storage area of the internal memory becomes full, or the number of files* in the internal memory exceeds 16, it is overwritten. * The number of display data files The number of event data files is equivalent to the number of times the data acquisition is started/stopped or the number of files that are segmented by the data length (see section 8.11, during auto save). For details related to the manual save and auto save, see section 8.4.

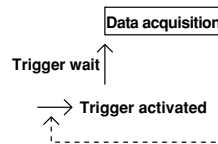
Trigger **When the internal memory is not divided into blocks :**
One event data file is created in the internal memory.
Press the START key to enter the trigger wait state.
After the trigger is activated, data are acquired for the specified time (data length, see section 8.11) and the operation is stopped. At this point, the acquisition does not start even if the trigger is activated.



When the internal memory is divided into blocks :
An event data file is created in each block.
Press the START key to enter the trigger wait state.
After the trigger is activated, data are acquired for the specified time (data length, see section 8.11) and the operation is stopped. When the trigger is activated again, data are acquired and stored to the next block. When all blocks are full, no more acquisition takes place.

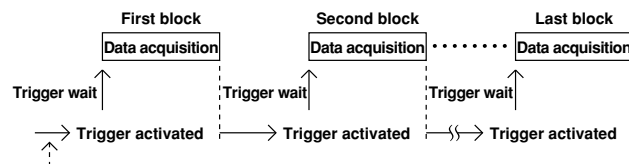


Mode	Description
Rotate	<p>When the internal memory is not divided into blocks :</p> <p>One event data file is created in the internal memory. Press the START key to enter the trigger wait state. After the trigger is activated, data are acquired for the specified time (data length, see section 8.11) and the operation is stopped. Data are overwritten when the trigger is activated again. Every time the trigger is activated during the trigger wait state, data are overwritten. Press the STOP key to terminate data acquisition.</p>



When the internal memory is divided into blocks :

An event data file each in the blocks is created.
Press the START key to enter the trigger wait state.
After the trigger is activated, data are acquired for the specified time (data length, see section 8.11) and the operation is stopped. When the trigger is activated again, data are acquired and stored to the next block. When all blocks are full and the trigger is activated, data are overwritten to the first block. Every time the trigger is activated during the trigger wait state, data are overwritten to the next block. Press the STOP key to terminate data acquisition.



Note

- The event data in the internal memory can be confirmed with the memory summary. ⇒ "Section 4.5"
- When a power failure occurs, the event data file in the internal memory is closed as one file.

Pre-Trigger for the Event Data

Pre-trigger is applied to the event data with [Trigger] or [Rotate] modes.

You can have event data before the trigger point be stored.

It is specified in terms of a percentage of the data length (0, 5, 25, 50, 75, 95, 100%). If 0% is selected, all data are after the trigger point. The initial setting is 0%.

Trigger Type for the Event Data

When [Trigger] or [Rotate] is selected, the trigger type is selected by turning each type of trigger ON/OFF. The triggers operate in an OR fashion : the trigger is activated when any of the conditions that are turned ON are satisfied.

Type	Description
Key trigger	The trigger condition is satisfied when the FUNC - [Trigger] soft key is pressed.
External trigger	The trigger condition is satisfied when the external contact specified by Remote Control function is turned ON. See section 10.9.
Alarm trigger	The trigger condition is satisfied when any of the alarms occur.

8.2 Function to Acquire Display Data and Event Data

Number of Data Points that can be Acquired and Sampling Length (The Maximum Auto Save Interval for Display Data, the Maximum Data Length for Event Data)

This section describes the number of data points of the display data/event data that can be acquired and the sampling length. Use the information when determining the amount of time it takes for the internal memory to become full or when deciding the channels to be acquired or the sampling interval.

The possible range of menus of the auto save interval of display data and the data length of event data is displayed in the soft keys based on the information described here.

Data format

The display data have minimum and maximum values for each sampling interval. Event data consists of instantaneous values.

The number of data bytes per channel is shown in the following table.

Data Type	Measurement Channel	Computation Channel
Display data	4 bytes/channel	8 bytes/channel
Event data	2 bytes/channel	4 bytes/channel

Example

Data format when the data of measurement channels 1 to 4 and a computation channel 31 are acquired.

Display data

1st scan									
CH1	CH1	CH2	CH2	CH3	CH3	CH4	CH4	CH31	CH31
min	max	min	max	min	max	min	max	min	max
2nd scan									
CH1	CH1	CH2	CH2	CH3	CH3	CH4	CH4	CH31	CH31
min	max	min	max	min	max	min	max	min	max
to									
nth scan									
CH1	CH1	CH2	CH2	CH3	CH3	CH4	CH4	CH31	CH31
min	max	min	max	min	max	min	max	min	max

2 bytes (binary data)

Event data

1st scan				
CH1	CH2	CH3	CH4	CH31
2nd scan				
CH1	CH2	CH3	CH4	CH31
to				
nth scan				
CH1	CH2	CH3	CH4	CH31

2 bytes (binary data)

Internal memory capacity

The capacity of the internal memory that is used for data storage is 1.2 MB. The internal memory is allocated depending on the acquired data as follows.

Data being Acquired	Internal Memory Capacity
Display data only	1.2 MB
Display data and event data	Display data : 0.9 MB Event data : 0.3 MB
Event data only	1.2 MB

Maximum number of data points per channel that can be acquired

The following table shows the maximum number of data points per channel that can be acquired.

Data being Acquired	Maximum Number of Data Points Per Channel
Display data only	1,200,000 bytes/(number of measurement channels \times 4 + number of computation channels \times 8) Except, the maximum number of data points is 100,000
Display data and event data	<ul style="list-style-type: none"> Display data 900,000 bytes/(number of measurement channels \times 4 + number of computation channels \times 8) Except, the maximum number of data points is 75,000 Event data 300,000 bytes/(number of measurement channels \times 2 + number of computation channels \times 4) Except, the maximum number of data points is 30,000
Event data only	1,200,000 bytes/(number of measurement channels \times 2 + number of computation channels \times 4) Except, the maximum number of data points is 120,000

Sampling length

The sampling length can be derived from the following equation.

Sampling length = the maximum number of data points per channel \times sampling interval

Calculation example

- Display data only

Measurement channel : 2, computation channel : none

Data	Maximum Number of Data Points and Sampling Length
Display data	Maximum number of data points = $1,200,000 / (2 \text{ CH} \times 4 \text{ bytes} + 0 \times 8 \text{ bytes}) = 150,000$. However, since 100,000 data points is the limit, Maximum number of data points = 100,000 Display rate When set to 30 min/div (60 s sampling interval) Sampling length = 100,000 data points \times 60 s = 6,000,000 s (approx. 69 days)

Measurement channel : 12, computation channel : 6

Data	Maximum Number of Data Points and Sampling Length
Display data	Maximum number of data points = $1,200,000 / (12 \text{ CH} \times 4 \text{ bytes} + 6 \times 8 \text{ bytes}) = 12,500$ Display rate When set to 30 min/div (60 s sampling interval) Sampling length = 12,500 data points \times 60 s = 750,000 s (approx. 8 days)

- Event data only

Measurement channel : 2, computation channel : None

Data	Maximum Number of Data Points and Sampling Length
Display data	Maximum number of data points = $1,200,000 / (2 \text{ CH} \times 2 \text{ bytes} + 0 \times 4 \text{ bytes}) = 300,000$ However, since 120,000 data points is the limit, Maximum number of data points = 120,000 When the event data sampling interval is 1 s Sampling length = 120,000 data points \times 1 s = 120,000 s (approx. 33 hours)

Measurement channel : 12, computation channel : 6

Data	Maximum Number of Data Points and Sampling Length
Event data	Maximum number of data points = $1,200,000 / (12 \text{ CH} \times 2 \text{ bytes} + 6 \times 4 \text{ bytes}) = 25,000$ When the event data sampling interval is 1 s Sampling length = 25,000 data points \times 1 s = 25,000 s (approx. 7 hours)

8.2 Function to Acquire Display Data and Event Data

- Display data and event data
Measurement channel : 2, computation channel : none

Data	Maximum Number of Data Points and Sampling Length
Display data	Maximum number of data points = $900,000 / (2 \text{ CH} \times 4 \text{ bytes} + 0 \times 8 \text{ bytes}) = 112,500$ However, since 75,000 data points is the limit, Maximum number of data points = 75,000 Display rate When set to 30 min/div (60 s sampling interval) Sampling length = 75,000 data points \times 60 s = 4,500,000 s (approx. 52 days)
Event data	Maximum number of data points = $300,000 / (2 \text{ CH} \times 2 \text{ bytes} + 0 \times 4 \text{ bytes}) = 75,000$ However, since 30,000 data points is the limit, Maximum number of data points = 30,000 data points When the event data sampling interval is 1 s Sampling length = 30,000 data points \times 1 s = 30,000 s (approx. 8 hours)

Measurement channel : 12, computation channel : 6

Data	Maximum Number of Data Points and Sampling Length
Display data	Maximum number of data points = $900,000 / (12 \text{ CH} \times 4 \text{ bytes} + 6 \times 8 \text{ bytes}) = 9,375$ Display rate When set to 30 min/div (60 s sampling interval) Sampling length = 9,375 data points \times 60 s = 562,500 s (approx. 6.5 days)
Event data	Maximum number of data points = $300,000 / (12 \text{ CH} \times 2 \text{ bytes} + 6 \times 4 \text{ bytes}) = 6,250$ When the event data sampling interval is 1 s Sampling length = 6,250 data points \times 1 s = 6,250 s (approx. 1.7 hours)

8.3 Function to Acquire Other Data

Manual Sampled Data

- When the manual sample key is pressed, the instantaneous values of all channels (excluding the measurement channels that are set to [Skip] and the computation channels that are turned Off) are acquired.
- Up to 50 data sets can be stored in the internal memory. When this number is exceeded, data are overwritten from the oldest data.

Note

The number of manual sampled data in the internal memory can be confirmed with the memory summary. ⇒ "Section 4.5"

TLOG Data (Option)

- TLOG data are acquired at each time interval set by timers.
- Up to 400 data sets can be stored in the internal memory. When this number is exceeded, data are overwritten from the oldest data.

Note

- Up to 16 TLOG files (number of start and stop) can be stored to the internal memory. When the number of files in the internal memory exceeds 16, TLOG data are overwritten even if the number of data sets is less than 400.
- The number of TLOG data sets in the internal memory can be confirmed with the memory summary. ⇒ "Section 4.5"

Report Data (Option)

- Report data are acquired at each time interval (one hour for hourly report, one day for daily report, etc).
- Up to 40 data sets can be stored in the internal memory. When this number is exceeded, data are overwritten from the oldest data.
For "hourly only", this constitutes 40 minutes of report data. For "daily+monthly", this constitutes 39 daily reports and one monthly report or 38 daily reports and two monthly reports.

Note

The number of report data sets in the internal memory can be confirmed with the memory summary. ⇒ "Section 4.5"

8.4 Function that Saves the Data in the Internal Memory to the External Storage Medium

There are two methods in which the data are saved to the external storage medium, manual save and auto save.

Manual Save

The external storage medium is inserted into the drive only when storing the data residing in the internal memory.

The data residing in the internal memory are saved to the external storage medium when the storage medium is inserted into the drive and press MEDIA key.

Whether to store the entire data in the memory or only the data that have not been saved is specified beforehand.

Auto Save

The external storage medium is placed in the drive at all times. Data saving to the external storage medium is done automatically.

Note

Even in the Auto Save mode, the MEDIA key must be pressed to detect the external medium when it is first inserted into the drive.

Displayed data

The display data in the internal memory are saved to the external storage medium at the specified interval (auto save interval, see section 8.8).

Event data

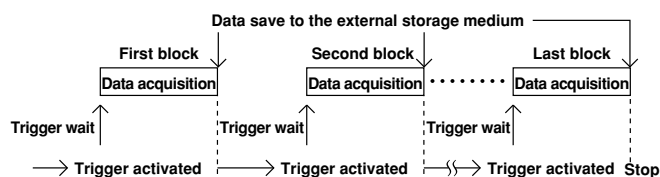
- **During the free mode**

The event data in the internal memory are saved to the external storage medium at the specified interval (data length, see section 8.11).

- **During trigger or rotate mode**

After acquiring the data to the internal memory over the specified period (data length, see section 8.11), the event data in the internal memory are saved to the external storage medium.

The following figure shows the operation when the acquisition area in the internal memory is divided using the trigger mode.



Manual sampled data

The first time manual sample is executed, a manual sampled data file is created on the external storage medium. The data are appended to this file for each successive manual sample operation.

Note

If the external storage medium is not inserted, the unsaved data are saved the first time when manual sample is executed after the external storage medium is inserted.

TLOG data

The first time TLOG computation is executed, a TLOG computation data file is created on the external storage medium. The data are appended to this file at each time interval. When the number of TLOG data sets exceeds 400, a new file is created.

Note

- When auto save is selected and there is no medium in the drive at the time when data are supposed to be saved, all unsaved data are saved the first time when the interval time expires after the storage medium is reinserted into the drive.
 - The “maximum value - minimum value” are not saved to the external medium.
-

Report data

The first time report computation is executed, a report data file is created on the external storage medium. The data are appended to this file at each time interval. A file is created for each type of report such as hourly reports and daily reports.

Note

When auto save is selected and there is no medium in the drive at the time when data are supposed to be saved, all unsaved data are saved the first time when the interval time expires after the storage medium is reinserted into the drive.

Dividing report files

The report files are divided at the following times.

- When data acquisition is stopped.
- For hourly reports
 - When the 0:00 report is created every day.
 - When the number of data sets in the file reaches 25.
- For daily reports
 - When the report for the first day of the month is created every month
 - When the number of data sets in the file reaches 32.

8.5 Acquiring Display Data

This operation is performed when the type of data acquired is set to [Display] or [E + D].
For setting the data acquisition method, see sections 8.10 and 8.11.

Procedure

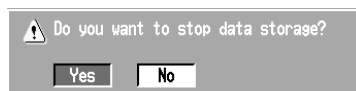
Start data acquisition

To begin data acquisition, press the START key. The icon in the status display section will change accordingly.

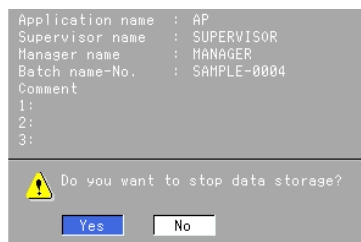


Stop data acquisition

1. Press the STOP key. A confirmation window opens.



On models with the computation option, the confirmation window displays the following choices : [Mem + Math] (terminate acquisition and all computations), [Memory] (terminate acquisition), and [Cancel].



2. Select [Yes] ([Mem + Math] or [Memory] for models with the computation function) using the arrow keys and press the DISP/ENTER key to stop the data acquisition. The icon in the status display section changes to a stop icon.

Note

- One file is created for one set of start and stop operations. The maximum number of files that can be stored in the internal memory is 16.
- When the memory area becomes full or the number of files exceeds 16, existing data will be overwritten starting with the oldest data.
- When a power disruption occurs the file is closed. When the power resumes, data are written to a new file.
- Data acquisition can also be started or stopped via remote control or communication commands.
- The START/STOP operation also starts/stops the report function.
- When the computation is stopped, it is started with the START key.

8.6 Acquiring Event Data

This operation is performed when the type of data acquired is set to [Event] or [E + D].
For setting the data acquisition method, see sections 8.10 and 8.11.

Procedure

During [Free] Mode

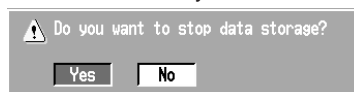
Start data acquisition

To begin data acquisition, press the START key. The icon in the status display section will change accordingly.

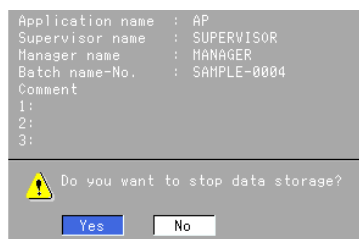


Stop data acquisition

1. Press the STOP key. A confirmation window opens.



On models with the computation option, the confirmation window displays the following choices : [Mem + Math] (terminate acquisition and all computations), [Memory] (terminate acquisition), and [Cancel].



2. Select [Yes] ([Mem + Math] or [Memory] for models with the computation function) using the arrow keys and press the DISP/ENTER key to stop the data acquisition. The icon in the status display section changes to a stop icon.

Note

- One file is created for one set of start and stop operations. The maximum number of files that can be stored in the internal memory is 16.
- When the memory area becomes full or the number of files exceeds 16, existing data will be overwritten starting with the oldest data.
- When a power disruption occurs the file is closed. When the power resumes, data are written to a new file.
- Data acquisition can also be started or stopped via remote control or communication commands.
- The START/STOP operation also starts/stops the report function.
- When the computation is stopped, it is started with the START key.

During [Trigger] Mode or [Rotate] Mode

Start data acquisition

1. Press the START key to enter the trigger wait state. The icon in the status display section will change accordingly. A bar indicating the pre-trigger data in the status display section is displayed in orange.
2. When the trigger occurs, data acquisition starts.

Providing the key trigger that starts the data acquisition to the internal memory

This operation is carried out in the trigger wait state. For all other cases, this operation produces no effect. For details related to triggers other than the key trigger, see section sections 8.2 or 8.11.

1. Press the FUNC key to display the soft key menu.
2. Press the [Trigger] soft key to start the data acquisition of the event data to the internal memory.

Stop data acquisition

Writing stops upon reaching the specified time (data length). In the status display section, the block to which data were stored turns green. See section 4.2.

Note

During the [Trigger] mode, [Full] is displayed when data acquisition to all blocks is complete. When [Full] is displayed, event data are no longer acquired even if the trigger condition is met. In this case, save the data in the internal memory to the external storage medium.

Terminate data acquisition with a key operation (in sync with the termination of the display data acquisition when acquiring the display data and the event data)

1. Press the STOP key. A confirmation window opens.
On models with the computation option, the confirmation window displays the following choices : [Mem + Math] (terminate acquisition and all computations), [Memory] (terminate acquisition), and [Cancel].
2. Select [Yes] ([Mem + Math] or [Memory] for models with the computation function) using the arrow keys and press the DISP/ENTER key to stop the data acquisition. The icon in the status display section changes to a stop icon.

Note

- One file is created for one set of start and stop operations. The maximum number of files that can be stored in the internal memory is the specified number of blocks.
 - When a power disruption occurs the file is closed. When the power resumes, data are written to a new file.
 - Memory write operation can also be started or stopped via remote control or communication commands.
 - The START/STOP operation also starts/stops the report function.
 - When the computation is stopped, it is started with the START key.
-

8.7 Saving the Data in the Internal Memory to the External Storage Medium

This operation saves the data in the internal memory to the external storage medium. Here, data refers to display data, event data, manual sampled data, TLOG data (option), and report data (option).

When Using Manual Save

Procedure

The operation to save data in the internal memory to the external storage medium can be carried out when the storage medium is inserted into the drive.

1. Insert the storage medium into the drive and press MEDIA key. A window with a confirming message, [Do you want to save measured data?] appears.
2. Select [Yes] using the arrow keys and press the DISP/ENTER Key to save data. Select [No] using the arrow keys and press the DISP/ENTER key not to save data.

Note

- You can select whether to save all the data residing in the internal memory or only the data that have not been saved to the storage medium. See section 8.10.
- If saving to the storage medium is prevented with the key lock function and the key lock is enabled, data cannot be saved when the medium is inserted into the drive. Turn OFF the key lock before inserting the medium.
- It is possible that the data in the internal memory are overwritten before the data are stored to the external storage medium due to limitations such as the capacity of the internal memory. Refer to sections 8.2 and 8.3 and save the data to the external storage medium before they are overwritten. For the memory usage display of the internal memory, see section 4.2, "Using the Status Display Section."
- When press MEDIA key, the recorder checks whether or not an external storage medium is inserted in the drive.

When the external storage medium does not have enough space

Change the external storage medium to save the remaining data.

1. The message [Exchange media to continue the saving operation] will be displayed. Change the external storage medium and press MEDIA key. The message [Do you want to continue to save measured data?] will be displayed.
2. Selecting [Yes] and pressing the DISP/ENTER key saves the remaining data to the external storage medium. Selecting [No] and pressing the DISP/ENTER key does not save the remaining data.

Note

The data saving operation is interrupted in five minutes after the message [Exchange media to continue.....] was displayed. The message [Memory save to media was interrupted] will be displayed in this case.

The remaining data can be saved to the external storage medium by another manual save operation.

8.7 Saving the Data in the Internal Memory to the External Storage Medium

Explanation

Name of the directory to which to save the data

For the setting procedure of the directory to which to save the data, see section 8.9.

- Each time the storage medium is inserted into the drive and the data are saved, the sequence number of the directory name increments by one.

Example When the specified directory name is "DATA0," the first set of data are saved to "DATA0.000" and the second set of data are saved to "DATA0.001."

- When the directory name is changed, the sequence number is reset to zero.
- When the data are divided and saved over multiple external storage media due to lack of space on the storage medium, the same directory name is used.
- If the specified directory already exists in the external storage medium, an error message is displayed and the operation terminates (data are not saved).

When Using Auto Save

Procedure

Data are automatically stored by leaving the external storage medium inserted in the drive. For the data storage operation, see section 8.4.

1. Insert the external medium into the drive and then press the MEDIA key to detect it.

Note

- For the memory usage display of the internal memory, see section 4.2.
 - To check the free space on the storage medium, see section 9.5.
 - For the name of the directory in which the data are saved, see section 8.9.
-

When the external storage medium does not have enough space

Replace the storage medium that is inserted in the drive.

1. The message [Not enough free space on media] appears.
Change the external storage medium. The unsaved data are saved to the external storage medium at the time for the next "auto save" execution.

Note

Be aware that data in the internal memory will be overwritten if there is not enough free space on the external storage medium or if the storage medium is not inserted in the drive in the following cases:

- When the number of display data files exceeds 16. A file is created for each auto save interval (see section 8.8).
 - When the event data are acquired to the internal memory in the free run mode and the number of files exceeds 16. A file is created at specified acquisition periods (data length, see section 8.11).
-

Saving the data to the external storage medium using key operation during auto save mode

This operation applies when the data acquisition of the display data, or the data acquisition of event data in the free mode is in progress and the data storage to the storage medium is set to auto save. The display data or event data can be saved to the external storage medium at arbitrary times. The data acquisition to the internal memory continues even if this operation is carried out.

- Press the FUNC key to display the soft key menu shown below.
 [Save Display] : When the type of data acquired to the internal memory*1 is display data or display data and event data.
 [Save Event] : When the type of data acquired to the internal memory*1 is event data and the trigger is set to free mode*1*2
 *1 For the setting procedure, see section 8.11.
 *2 The soft key is not displayed in the trigger or rotate mode.

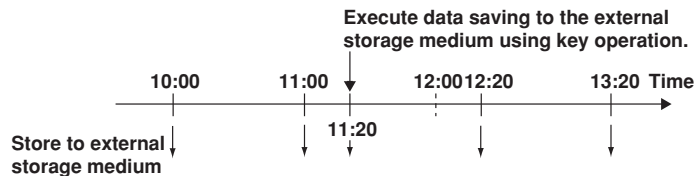
- Press the soft key to save the data in the internal memory to the external storage medium.



- [Save Display] : The display data file in the internal memory is closed and saved to the external storage medium. The event data in the trigger or rotate mode are unaffected by this operation.
- [Save Event] : The event data file in the internal memory is closed and saved to the external storage medium.

Explanation

The data are acquired to the internal memory for the specified period from the point at which the data were previously saved to the external storage medium using key operation. Then, the data in the internal memory are saved to the storage medium. This operation is repeated.



Saving the Data to the Storage Medium Using Key Operation

All data in the internal memory are saved to the external storage medium. This cannot be executed while data acquisition or computation is in progress. For the operating procedure, see section 9.2.

Note

See section 9.7 or 9.8 to clear data in the internal memory.

8.8 Setting the Auto Save Interval for the Display Data

When the method to save the data residing in the memory to the external storage medium is [auto save], you set the auto save interval.

- The auto save interval is used in saving the display data.
- The display data residing in the internal memory is automatically saved to the external storage medium as a single file at each auto save interval.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

To display the setting screen press the soft key .



1. Auto save interval
Displayed when [auto save] is selected. See section 8.8.
Select from the choices shown on the soft keys.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Choices for the auto save interval**

The maximum auto save interval varies depending on the display update rate (sampling interval is determined from the display update rate), the data type (display data only/ display data and event data), and the number of measurement and computation channels to be stored (see section 8.10). The available choices for the auto save interval are displayed on the soft key. See the table below.

Display Update Rate (/DIV)	1 min	2 min	5 min	10 min	20 min	30 min	1 h	2 h	4 h
Sampling interval (s)	2	4	10	20	40	60	120	240	480
Auto save interval (choices)	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day

8.9 Setting the File Header, Directory Name, and the Saved Data during Manual Save

File header

Up to 32 alphanumeric characters can be used to write a header comment to the display data, event data, manual sample data, TLOG data (option) and report data (option).

Directory name

When saving data to the external storage medium, you can specify the name of the directory to which the files are to be saved. All data other than the setup data (display data, event data, manual sampled data, TLOG data (option), report data (option), and screen image data) are saved to this directory. Setup data are saved to the root directory.

Saved data during manual save

When using manual save, you can select whether to save all the data residing in the internal memory or only the data that have not previously been saved to the storage medium.

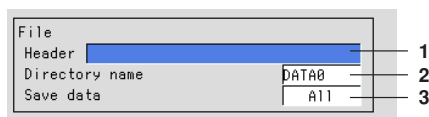
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Header
Pressing the [Input] soft key displays a window used to enter a string. Enter the header (up to 32 alphanumeric characters) and press the DISP/ENTER key.
For the procedures related to entering character strings, see "Entering Characters" on page 3-22.
2. Directory name
Pressing the [Input] soft key displays a window used to enter a string. Enter the directory (up to 8 alphanumeric characters) and press the DISP/ENTER key.
For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Note

- The following character combinations can not be used as directory names : "AUX", "CON", "PRN", "NUL", "CLOCK".
 - All spaces, or spaces at the top or in the middle of character strings are also not allowed for directory names.
-

3. Save data

Displayed when [Manual Save] is selected. Select [Unsave] or [All].

The initial setting is [All].

- Unsave : Saves only the data that have not been saved when the medium is inserted into the drive.
- All : Save all the data residing in the memory when the medium is inserted into the drive.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

8.10 Setting the Channels to Display the Trend and Acquire the Data (Basic Setting Mode)


Select the channels for which the trend is to be displayed. The measured and computed data of these channels can be acquired.

The waveforms for the channels that are turned OFF are not displayed, but numerical values, bar graphs and alarms are displayed.

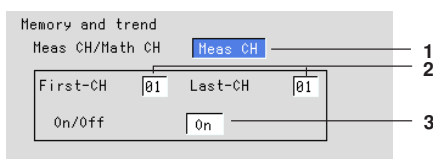
Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Meas CH/Math CH
To set the measurement channels, select [Meas CH]. To set the computation channels, select [Math CH].
2. First channel and last channel
Select the desired channel numbers.
3. On/Off
On : Display the trend
Off : Do not display the trend
The initial setting is [On] for all channels.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

The number of measurement and computation channels available in the different models

Model	Measurement Channel	Computation Channel
RD-MV102	2 channels (1 to 2)	4 channels (31 to 34)
RD-MV104	4 channels (1 to 4)	4 channels (31 to 34)
RD-MV106	6 channels (1 to 6)	12 channels (31 to 42)
RD-MV112	12 channels (1 to 12)	12 channels (31 to 42)


8.11 Setting the Method of the Display/Event Data Acquisition (Basic Setting Mode)

Set the method of the display/event data acquisition.

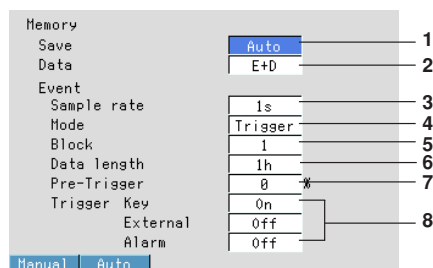
Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Data save to the external storage medium

1. Save
Set save method to the external storage medium.
Select [Auto] or [Manual].
Auto : auto save
Manual : manual save

Note

If [Manual] (manual save) is selected in step 1, set whether to save all the data in the internal memory or only the data that have not been saved when the storage medium is inserted into the drive and the front cover is closed. See section 8.9.

Data acquisition

- **Acquiring only the display data**
 2. Data
Select [Display].

Note

If [Auto] (auto save) is selected in step 1 and [Display] is selected in step 2, set the auto save interval for the display data. See section 8.8.

8.11 Setting the Method of the Display/Event Data Acquisition (Basic Setting Mode)

- **Acquiring only the event data**

2. Data

Select [Event].

Boxes used to set the method for event data acquisition are displayed.

Note

If [Manual] (manual save) is selected in step 1, set whether to save all the data in the internal memory or only the data that have not been saved when the storage medium is inserted into the drive and the front cover is closed. See section 8.10.

3. Event - Sample rate

This is the sampling interval for the event data.

RD-MV102, RD-MV104 : 125 ms, 250 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 30 s, 60 s, and 120 s

RD-MV106, RD-MV112 : 1 s, 2 s, 5 s, 10 s, 30 s, 60 s, 120 s

4. Event - Mode

Select from [Free], [Trigger], or [Rotate].

If [Free] is selected, item 6 is displayed.

If [Trigger] or [Rotate] is selected, items 5, 6, 7, and 8 are displayed.

5. Event - Block

The event data storage area in the internal memory is divided by the specified number.

Select 1, 2, 4, 8, or 16. (Select 1, 2, or 4 when acquiring display and event data)

6. Event - Data length

The size of the event data file is expressed as a length of time over which data are acquired.

The data length that can be specified varies depending on the sampling interval ([sample rate] in item 3), number of blocks, and the number of measurement and computation channels that are acquired.

7. Event - Pre-Trigger

This is the range of data to be acquired before the trigger point. It is specified as a percentage of the data length (0, 5, 25, 50, 75, 95, and 100%). If 0% is selected, all data after the trigger point are acquired. The initial setting is 0%.

8. Event - Trigger

Key : When using key operation to activate the trigger, turn this parameter On.

External : When using remote control function (option) to activate the trigger, turn this parameter On.

Alarm : When using alarms as triggers, turn this parameter On.

Note

- If the [Alarm] parameter is turned On, trigger is activated if any one of the alarms occurs.
 - If [Alarm] parameter is turned On and the alarm was already activated when the START key is pressed, trigger is also activated.
 - OR logic applies to the [Key], [External], and [Alarm] parameters. If any one of the conditions that are turned On is met, the trigger is activated.
-

- **Acquiring display data and event data**

2. Data type

Select [E + D].

Note

If [Auto] (auto save) is selected in step 1 and [E + D] is selected in step 2, set the auto save interval for the display data. See section 8.8.

8.11 Setting the Method of the Display/Event Data Acquisition (Basic Setting Mode)

Boxes used to set the method for event data acquisition are displayed.

The procedures used to set each parameter are the same as those described for "Acquiring only the event data." [Free] is not selectable.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Choices for the data length

The maximum value of the data length varies depending on the sampling interval. It is also dependent on the type of data to be acquired (display data and event data or event data only) and the number of measurement and computation channels to be acquired (See section 8.6). The available choices for the data length are displayed on the soft key menu. See the table below.

Sample Rate (s)	0.125	0.25	0.5	1	2	5	10	30	60	120
Data length (choices)	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day	3 min 5 min 10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day	10 min 20 min 30 min 1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day	1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day	1 h 2 h 3 h 4 h 6 h 8 h 12 h 1 day 2 day 3 day 5 day 7 day 10 day 14 day 31 day

8.12 Storing Measured/Computed Data at Arbitrary Times (Manual Sampling)

The instantaneous values of all measurement and computation channels (excluding the measurement channels that are set to [Skip] and the computation channels that are turned Off) can be stored to the internal memory with a key operation.

Computation channels are options.

See section 8.3.

Procedure

This operation is carried out in the operation mode.

1. Press the FUNC key to display the soft key menu.
2. Press the [Manual sample] soft key. The instantaneous values of all channels (excluding the measurement channels that are set to [Skip] and the computation channels that are turned Off) are stored to the internal memory.



Note

The manual sampling can also be carried out via remote control or communication commands.

9.1 Saving/Loading Setup Data

You can save the setup data to or load setup data from the external storage medium. The operation can be carried out in both the setting mode and the basic setting mode. A setup data file has approximately 25 KB in size (maximum).

Saving Setup Data (In the Setting Mode)


Saves the setup data (set in both the setting mode and the basic setting mode) to the external storage medium. The function is the same as that in the basic setting mode.


Procedure

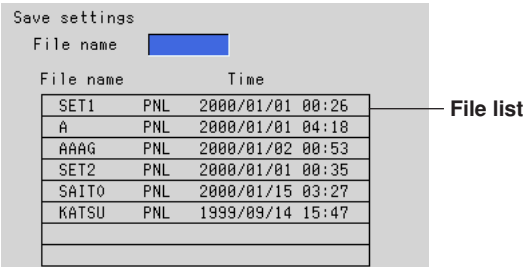
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press  soft key to display the [Save settings] screen.



1. Enter the name of the setup data file to be saved.
Pressing the [Input] soft key displays a window used to enter a string. Enter the string (up to 8 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see “Entering Characters” on page 3-22.
To cancel the operation and return to the [Save/Load, Clear data] menu, press the ESC key.

Note

- The extension “PNL” will automatically be added to the file name.
- The following character combinations cannot be used as file names.
“AUX”, “CON”, “PRN”, “NUL”, “CLOCK”
- All spaces are not allowed for file names.
- Spaces at the top or in the middle of a character string are also not allowed.

2. Press the DISP/ENTER key to save the data. The saved file appears in the file list.
If a file with the same name as you entered exists on the external storage medium, a message will appear to confirm overwriting. Select [Yes] or [No] and press the DISP/ENTER key.

Loading Setup Data (In the Setting Mode)


Loads the setup data set in the setting mode only, from a setup file in the external storage medium and make the settings effective. Setting items that are inconsistent with the content of the basic setting mode of the recorder will not be acquired. Returns to the operation mode when loading is completed.

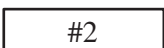
Procedure

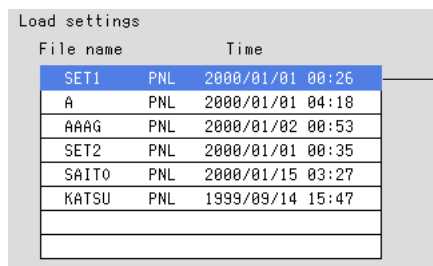
- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press  soft key to display the [Load settings] screen.



File list

Load settings		
File name		Time
SET1	PNL	2000/01/01 00:26
A	PNL	2000/01/01 04:18
AAAG	PNL	2000/01/02 00:53
SET2	PNL	2000/01/01 00:35
SAITO	PNL	2000/01/15 03:27
KATSU	PNL	1999/09/14 15:47

1. A list of setup files in the storage medium appears.
Select the file to be loaded (The extension of setup files is "PNL").
To cancel the operation and return to the [Save/Load, Clear data] menu, press the ESC key.
2. Press the DISP/ENTER key to load the file.
After loading, the screen returns to the operation mode. The loaded setup data are made effective.

Note

If the loaded data does not take effect, refer to the error log. For the procedure related to displaying the error log, see section 10.5.


Saving Setup Data (In the Basic Setting Mode)

Saves the setup data (set in both the setting mode and the basic setting mode) to the external storage medium. The function is the same as that in the setting mode.

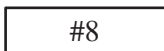
Procedure


- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

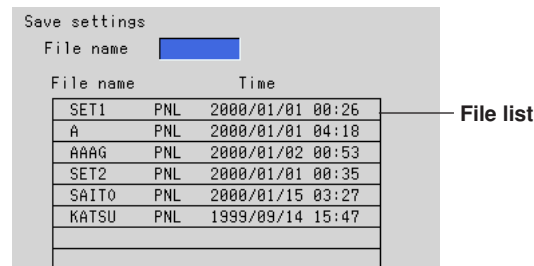
Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

Press  soft key to display the [Save/Load, Initialize] menu screen.

Press  soft key to display the [Save settings] screen.



1. Enter the name of the setup data file to be saved.
Pressing the [Input] soft key displays a window used to enter a string. Enter the string (up to 8 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.
To cancel the operation and return to the [Save/Load, Initialize] menu, press the ESC key.

Note

- The extension "PNL" will automatically be added to the file name.
- The following character combinations cannot be used as file names.
"AUX", "CON", "PRN", "NUL", "CLOCK"
- All spaces are not allowed for file names.
- Spaces at the top or in the middle of a character string are also not allowed.

2. Press the DISP/ENTER key to save the data. The saved file appears in the file list.
If a file with the same name as you entered exists on the external storage medium, a message will appear to confirm overwriting. Select [Yes] or [No] and press the DISP/ENTER key.


Loading Setup Data (In the Basic Setting Mode)

Loads the setup data (set in both the setting mode and the basic Setting mode) from a setup file in the external storage medium and make the settings effective.
Returns to the operation mode when loading is completed.


Procedure


- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

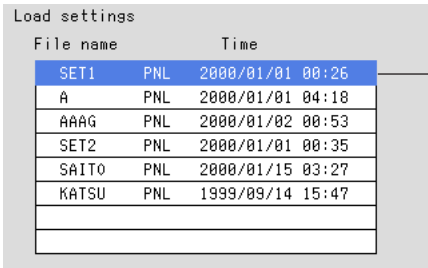
Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

Press  soft key to display the [Save/Load, Initialize] menu screen.

Press  soft key to display the [Load settings] screen.



File name	Time
SET1 PNL	2000/01/01 00:26
A PNL	2000/01/01 04:18
AAAG PNL	2000/01/02 00:53
SET2 PNL	2000/01/01 00:35
SAITO PNL	2000/01/15 03:27
KATSU PNL	1999/09/14 15:47

1. A list of setup files in the storage medium appears.
Select the file to be loaded (The extension of setup files is “PNL”).
To cancel the operation and return to the [Save/Load, Initialize] menu, press the ESC key.
2. Press the DISP/ENTER key to load the file.
After loading, the screen returns to the operation mode. The loaded setup data take effect.

Note
If the loaded data does not take effect, refer to the error log. For the procedure related to displaying the error log, see section 10.5.

9.2 Saving Data in the Internal Memory to the External Storage Medium Using Key Operation

The following data in the internal storage memory are saved to the external storage medium using key operation.


Display data/Event data/Manual sampled data/TLOG data (option)/Report data (option)


Procedure

- These procedures are carried out in the setting mode.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press  [Save data] soft key to save the data in the internal memory to the external storage medium.

Note

The data in the internal memory cannot be saved to the external storage medium while data acquisition or computation is in progress.

Explanation

Name of the directory to which to save the data

The name of the directory to which to save the data is “the specified name”. AXX, where XX is the sequence number. Each time carrying out the key operation and the data are saved, the sequence number of the directory name increments by one.

Example When the specified directory name is “DATA0”, the first set of data are saved to “DATA0.A00” and the second set of data are saved to “DATA0.A01”.

9.3 Viewing Display Data in the External Storage Medium

Loads the display data saved in the external storage medium and displays the waveform on the historical trend screen. This operation can be carried out when the acquisition of display data is set ([Display] or [E+D] in section 8.11). See section 4.6, for the use of the historical trend.


Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press  soft key to display the [Load display data] screen.

Load display data				File list
Directory	File name	DDS	Time	
/	10100500	DDS	2000/01/01 00:59	
DATA23	10104120	DDS	2000/01/01 04:12	
HS2	10104130	DDS	2000/01/01 10:14	
DATA21	10105130	DDS	2000/01/01 10:14	
DATA22	10106130	DDS	2000/01/01 10:14	
TRASH	10110090	DDS	2000/01/01 10:15	

For models with the batch function (/BT1 option), press the [Time] soft key when displaying the date and time of file creation and the [Batch] soft key when displaying the batch number and lot number.

Batch	Time
-------	------

1. The directories in the external storage medium are displayed in the [Directory name] column. Press the up or down arrow key to select the directory containing the display data to be loaded. A list of files in the selected directory is displayed in the right column. Root directory is denoted by [/].
2. Press the right arrow key to move the cursor on to the file list. Press the up or down arrow key to select the display data file to be loaded. To move back to the [Directory name] column, press the left arrow key.
3. Press the DISP/ENTER key to display the waveform on the historical trend screen. To return to the [Save/Load, Clear data] menu screen without displaying the historical trend, press the ESC key.

Note

Files saved in the internal memory as Event Data File Only can't be loaded.

9.4 Viewing Event Data in the External Storage Medium


Loads the event data saved in the external storage medium and displays the waveform on the historical trend screen. This operation can be carried out when the acquisition of event data is set ([Event] or [E+D] in section 8.11). See section 4.6, for the use of the historical trend.

Procedure


- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press the soft key .

Press  soft key to display the [Load event data] screen.

Load event data			
Directory	File name	Time	File list
/	10306230 DEV	2000/01/03 06:24	
DATA23	10307210 DEV	2000/01/03 07:21	
HS2	10307220 DEV	2000/01/03 07:22	
DATA21	10307221 DEV	2000/01/03 07:22	
DATA22			
TRASH			

For models with the batch function (/BT1 option), press the [Time] soft key when displaying the date and time of file creation and the [Batch] soft key when displaying the batch number and lot number.

Batch	Time
-------	------

1. The directories in the external storage medium are displayed in the [Directory name] column. Press the up or down arrow key to select the directory containing the event data to be loaded. A list of files in the selected directory is displayed in the right column. Root directory is denoted by [/].
2. Press the right arrow key to move the cursor on to the file list. Press the up or arrow key to select the event data file to be loaded. To move back to the [Directory name] column, press the left arrow key.
3. Press the DISP/ENTER key to display the waveform on the historical trend screen. To return to the [Save/Load, Clear data] menu screen without displaying the historical trend, press the ESC key.

9.5 Managing Files/Displaying Free Space on the External Storage Medium

Displays a list of files and the amount of free space on the external storage medium. (in the setting mode only)

Deletes files and directories on the external storage medium.

Formats the external storage medium.

Display the List of Files and the Free Space on the External Storage Medium (In the Setting Mode)


A list of files on the external storage medium can be displayed. In addition, the amount of free space is also displayed.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press the soft key .

Press  soft key to display the [File list] screen.

File list				File list
Directory	File name	Time		
/	SET1	PNL	2000/01/01 00:26	
B	A	PNL	2000/01/01 04:18	
B 000	AAAG	PNL	2000/01/02 00:53	
B 001	SET2	PNL	2000/01/01 00:35	
B 002	SAITO	PNL	2000/01/15 03:27	
B 003	KATSU	PNL	1999/09/14 15:47	
	VR1000H	LZH	1999/08/28 10:32	
	VRSUB00	LZH	1999/08/17 22:56	
Free space				
90472 Kbytes				

1. The directories in the external storage medium are displayed. Using the arrow keys select the directory. Files in the directory are listed to the right. [/] is the root directory.
2. Pressing the right arrow key moves the cursor to the file list. The list can be scrolled using the arrow keys. To move back to the [Directory name] column, press the left arrow key.
3. Free space
Displays the amount of free space on the external storage medium.
4. Press the ESC key to return to the [Save/Load, Clear data] menu screen.

Deleting Files and Directories on the External Storage Medium (In the Setting Mode)

Deletes files and directories on the external storage medium. The function is the same as that in the basic setting mode.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press the soft key .

Press  soft key to display the [Delete] screen.

Delete				File list
Directory	File name	Time		
/	SET1	PNL	2000/01/01 00:26	
B	A	PNL	2000/01/01 04:18	
B 000	AAAG	PNL	2000/01/02 00:53	
B 001	SET2	PNL	2000/01/01 00:35	
B 002	SAITO	PNL	2000/01/15 03:27	
B 003	KATSU	PNL	1999/09/14 15:47	
	VR1000H	LZH	1999/08/28 10:32	
	VRSUB00	LZH	1999/08/17 22:56	

Deleting a file in a directory

1. Of the directories listed in the [Directory name] frame, select the directory in which the file you wish to delete exists using the up and down arrow keys. The [File name] frame displays a list of files in the selected directory. [/] is the root directory.
2. Pressing the right arrow key moves the cursor onto the [File name] frame. Use the up and down arrow keys to select the file to be deleted.
3. Pressing the DISP/ENTER key displays a confirmation dialog box.
4. Use the arrow keys to select [Yes] and press the DISP/ENTER key to delete the selected file. The file is cleared from the file list.
To cancel the delete operation, select [No] and press the DISP/ENTER key.

Note

If the ESC key is pressed in the middle of the operation, the screen returns to the [Save/Load, Clear Data] menu.

Deleting all the files in the directory

1. Of the directories listed in the [Directory name] frame, select the directory in which the files you wish to delete exist using the up and down arrow keys. The [File name] frame displays a list of files in the selected directory. [/] is the root directory.
2. Pressing the DISP/ENTER key displays a confirmation dialog box.
3. Use the arrow keys to select [Yes] and press the DISP/ENTER key to delete all the files in the directory. All files are cleared from the file list.
To cancel the delete operation, select [No] and press the DISP/ENTER key.

Note

If the ESC key is pressed in the middle of the operation, the screen returns to the [Save/Load, Clear Data] menu.

Deleting a directory

A directory can be deleted if there are no files in the directory. To delete a directory that has files, delete all the files in the directory first.

1. Of the directories listed in the [Directory name] frame, select the directory you wish to delete using the up and down arrow keys. Check that no files are displayed in the [File name] frame. [/] is the root directory. The root directory cannot be deleted.
2. Pressing the DISP/ENTER key displays a confirmation dialog box.
3. Use the arrow keys to select [Yes] and press the DISP/ENTER key to delete the directory. The directory name is cleared from the [Directory name] frame.
To cancel the delete operation, select [No] and press the DISP/ENTER key.

Note

If the ESC key is pressed in the middle of the operation, the screen returns to the [Save/Load, Clear Data] menu.

Formatting the External Storage Medium (In the Setting Mode)


Formats the external storage medium. The function is the same as the formatting the external storage medium in the basic setting mode.

Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

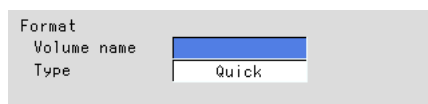
Press .

Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Press the soft key .

Press  soft key to display the [Format] screen.



1. To change the volume name after formatting, enter the new volume name. Pressing the [Input] soft key displays a window used to enter a string. Enter the string (up to 11 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see “Entering Characters” on page 3-22.

Note

- The following character combinations cannot be used as volume names.
“AUX”, “CON”, “PRN”, “NUL”, “CLOCK”
 - All spaces are not allowed for volume names.
 - Spaces at the top or in the middle of a character string are also not allowed.
2. Select [Quick] or [Normal] to set in the [Type] box.
To cancel the operation and return to the [Save/Load, Clear data] menu, press the ESC key.
 3. Pressing the DISP/ENTER key displays a confirmation window. Pressing the DISP/ENTER key formats the medium.

Explanation

Type

[Quick] : Performs only a logical format.

[Normal] : Performs both a physical format and a logical format.

Format type

Floppy disk : 2HD, 1.44 MB

Zip disk : FDISK 1 partition (hard disk format)

ATA flash memory card : FDISK 1 partition (hard disk format)

Format time

Type of Storage Media	Quick	Normal	Note
Floppy disk	Approx. 6 s	Approx. 1 min. 30 s	
Zip disk	Approx. 3 s	Approx. 10 min.	
ATA flash memory card	Approx. 3 s	Approx. 1 min. 30 s	20 MB
	Approx. 5 s	Approx. 6 min.	160 MB


Deleting Files and Directories on the External Storage Medium (In the Basic Setting Mode)

Deletes files and directories on the external storage medium. The function is the same as that in the setting mode.


Procedure


- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.


Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

Press  soft key to display the [Save/Load, Initialize] menu screen.

Press  soft key to display the [Delete] screen.

Delete				File list
Directory	File name		Time	
/	SET1	PNL	2000/01/01 00:26	
B	A	PNL	2000/01/01 04:18	
B 000	AAAG	PNL	2000/01/02 00:53	
B 001	SET2	PNL	2000/01/01 00:35	
B 002	SAITO	PNL	2000/01/15 03:27	
B 003	KATSU	PNL	1999/09/14 15:47	
	VR1000H	LZH	1999/08/28 10:32	
	VRSUB00	LZH	1999/08/17 22:56	

Deleting files and directories can be excuted in the same procedure as that in the setting mode. See page 9-9.


Formatting the External Storage Medium (In the Basic Setting Mode)

Formats the external storage medium. The function is the same as that in the setting mode.

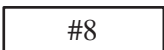
Procedure


- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.


Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

Press  soft key to display the [Save/Load, Initialize] menu screen.

Press  soft key to display the [Format] screen.

Format	
Volume name	
Type	Quick

Formatting the external storage medium can be excuted in the same procedure as that in the setting mode. See page 9-11.

9.6 Saving the Screen Image

The screen image that is displayed is saved to the external storage medium using the FUNC key operation. The data size of the screen image is approximately 12 KB.

Procedure

This operation is carried out in the operation mode. The images of soft keys or messages are not saved.

1. Press the FUNC key to display the soft key menu.
2. Press the [Snapshot] soft key. The screen image is saved to the external storage medium.



Explanation

File format

Screen image data is in “PNG” format.

File name

File names are automatically assigned (Month, date, hour, and minute when the screen image data were stored + serial number) to screen image data files.

Mddhhmma. PNG

where, M : month (1 to 9, X (10), Y (11), Z (12)), dd : date, hh : hour, mm : minute, a : serial number

Note

The serial number of the file name is normally set to 0. However, if the screen image data is saved twice within a minute, for example, then the file name of the two files will have serial numbers 0 and 1 for the first and second files, respectively. (The two files will have the same Mddhhmm (month/day/hour/minute) section.)

9.7 Clearing Data from the Internal Memory


Clears display data, event data, manual sampled data, TLOG data (option), report data (option), and logs from the internal memory.


Procedure


- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate position.

Press .

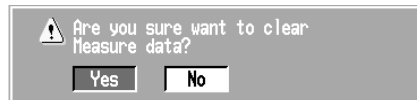
Press the soft key .

Press  soft key to display the [Save/Load, Clear data] menu screen.

Twice press the soft key .

Press  [Clear data] soft key to display a confirmation window.

Selecting [Yes] and pressing the DISP/ENTER key clears the data from the internal memory.




9.8 Initializing Setup Data

Initializes the setup data in the internal memory. Also Clears display data, event data, manual sampled data, TLOG data (option), report data (option), and logs from the internal memory (this is the same function as clearing data in the setting mode explained in section 9.7). The recorder returns to the operation mode. For the initial settings of the setup data, see Appendix 1.

Procedure

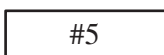
- These procedures are carried out in the basic setting mode.

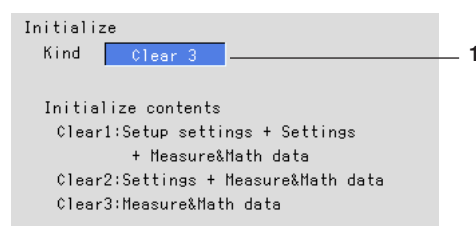
Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

Press  soft key to display the [Save/Load, Initialize] menu screen.

Press  soft key to display the [Initialize] screen.



- Select the type of initialization to set in the [Type] box.
To cancel the operation and return to the [Save/Load, Initialize] menu, press the ESC key.
Clear 1 : Clears the settings in the basic setting mode, settings in the setting mode and the internal memory.
Clear 2 : Clears the settings in the setting mode and the internal memory.
Clear 3 : Clears the internal memory.
- Pressing the DISP/ENTER key displays a confirmation window. Pressing the DISP/ENTER key initializes the settings and returns to the operation mode.

10.1 Using Key Lock

Key lock is a function used to prevent key operations, Zip disk removal, and saving data to the external storage medium in the manual save mode.

To release a key lock, you must enter a password.

The key lock ON/OFF condition is retained even if the power is turned OFF. Thus, the next time the power is turned ON, the preexisting state is restored.

Key lock is set in the basic setting mode.

Procedure

Enabling key lock

This operation is carried out in the operation mode.

1. Press the FUNC key to display the soft key menu.
2. Press the [Keylock] soft key. The key lock function is enabled.



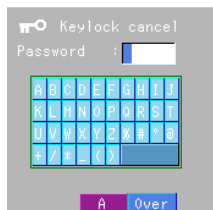
Note

- If a locked key is pressed when the key lock function is engaged, a message "This key is locked." is displayed.
- When manual save is specified, even if the external storage medium is inserted into the drive and the front cover is closed, the data cannot be saved to the external storage medium if the key lock function for the external storage medium is engaged.
- If the key lock function for the external storage medium is engaged when using a Zip disk, the disk cannot be ejected even if the eject button is pressed.
- A key lock icon appears in the status display section when the key lock is enabled. See section 4.2.

Releasing the key lock

This operation is carried out in the operation mode.

1. Press the FUNC key to display the soft key menu.
2. Press the [Keylock] soft key. A window appears for you to enter the password.



3. Enter the password and press the DISP/ENTER key. (The password is set in the basic setting mode. See section 10.2.) For the procedures related to entering [Free] is not selectable.character strings, see "Entering Characters" on page 3-22.

The key lock is released.


10.2 Setting the Key Lock Function (Basic Setting Mode)

Select whether or not to enable the key lock on the individual keys and the external storage medium. The initial setting is [Free] (disabled) on all parameters.

Procedure

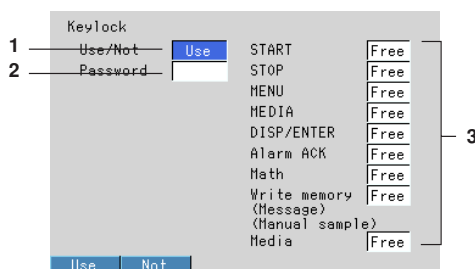
- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Use/Not
Select [Use] or [Not]. If [Use] is selected, various parameters are displayed.
[Use] : Use key lock.
[Not] : Do not use key lock.
2. Password
Set the password used to release the key lock in the operation mode.
Pressing the [Input] soft key displays a window used to enter a string. Enter the string (up to 6 alphanumeric characters) and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.
3. For each parameter, select whether or not to enable the key lock.
[Free] : Disable
[Lock] : Enable

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Key locked parameter and the behavior during key lock (can be set individually)**

Parameter	Behavior during Key Lock
[START] key	Disabled
[STOP] key	Disabled
[MENU] key	Disabled
[MEDIA] key	Disabled
[DISP/ENTER] key	Disabled to change operation screens
[Alarm ACK] soft key	Disabled
Math (Computation)	
• [Math START] soft key ^{*1}	Disabled
• [Math STOP] soft key ^{*1}	Disabled
• [Math reset] soft key ^{*1}	Disabled
Write memory	
• [Message] soft key ^{*2}	Disabled
• [Manual sample] soft key ^{*2}	Disabled
• [Trigger] soft key ^{*2}	Disabled
• [Save Display] soft key ^{*2}	Disabled
• [Save Event] soft key ^{*2}	Disabled
Media (External storage medium)	Prevent Zip disk removal.

*1 Set together by [Math] parameter.

*2 Set together by [Write memory] parameter.

10.3 Using the Key Login/Logout Function

This function allows only certain users to access the recorder. The users are distinguished by their user IDs and passwords. You can select whether or not to use User IDs. In addition, you can set whether or not to allow operations in the basic setting mode for each user. When logged out, only the login operation can be accessed. Enabling/Disabling the key login/logout and using/not using the user ID are set in the basic setting mode. See the next section.

When logged in, the user name is displayed in the status display section. See section 4.2.

The records of key login/logout can be viewed on the log screen. See section 10.7.

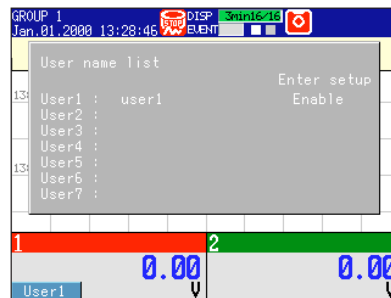
Note

When the power is turned OFF and turned ON again, the recorder starts in the logged out condition.

Procedure

Logging in

1. Press the FUNC key. Soft keys and a list of user names are displayed.
2. Select the user using the soft key.



3. When using the user ID, a window appears for you to enter the user ID. Enter the user ID and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.



4. A window appears for you to enter the password. Enter the password and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.



The user name is displayed in the status display section.



Logging out

1. Press the FUNC key. The [Logout] soft key is displayed.
2. Press the [Logout] soft key. The user name shown in the status display section disappears.

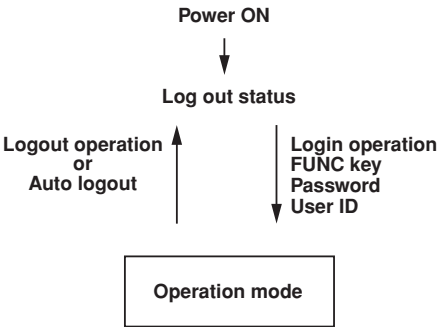


Auto logout

This function is available in the operation mode.
If there is no key operation for ten minutes, the user is automatically logged out. The auto logout function can be activated in the basic setting mode.

Explanation

Power up operation



When the basic setting mode is terminated

When the basic setting mode is terminated and the mode returns to the operation mode, the recorder is in the logged out condition.

Saving the user name


The user name is stored to the display and event data files at the following points : when the display or event data acquisition starts and ends and when a message is written.

10.4 Setting the Key Login/Logout Functions (Basic Setting Mode)

Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .

Key login		
Use/Not	Use	1
Auto logout	Off	2
UserID Use/Not	Use	3
Number	1	4
On/Off	On	5
User name	user1	6
User ID		7
Password		8
Enter setup	Enable	9
Use Not		

The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Use/Not
Select [Use] or [Not]. If [Use] is selected, items 2, 3, 4, 5, 6, 8, and 9 are displayed.
[Use] : Use key login.
[Not] : Do not use key login.
2. Auto logout
Select [On] or [Off].
[On] : Use the auto logout.
[Off] : Do not use the auto logout.
3. User ID Use/Not
[Use] : Use the user ID.
[Not] : Do not use the user ID.
If [Use] is selected, item 7 (User ID) appears.

Note

For models with the batch function, The key login function of all users (1 to 7, item 4) turns [Off](item 5), when [User ID] is changed to [Use] from [Not].

4. Number
This is the user registration number (1 to 7). Select the user number to be set.
5. On/Off
Set whether or not to enable the key login function for the selected user. Even if the user name and other parameters below are specified, the login function cannot be used if it is turned Off here.
[On] : Enable the key login function for the selected user.
[Off] : Disable the key login function for the selected user.

6. User name
Enter the user name (up to 16 alphanumeric characters).
Pressing the [Input] soft key displays a window used to enter a string. Enter the string and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Note

- For models with the batch function (/BT1 option), duplicate user names cannot be registered. See "Confirming operation" below.
- "quit" cannot be used as the user name.
- All spaces are also not allowed for the user name.

7. User ID
Enter the user ID (up to 4 alphanumeric characters).
Pressing the [Input] soft key displays a window used to enter a string. Enter the string and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

8. Password
Enter the password (up to 6 alphanumeric characters).
Pressing the [Input] soft key displays a window used to enter a string. Enter the string and press the DISP/ENTER key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Note

For models with the batch function (/BT1 option), the combinations of user IDs and passwords that are identical to those that have been registered by any user in the past cannot be specified. See "Confirming operation" below.

9. Enter setup
Select whether or not to allow the login user to enter the basic setting mode.
[Enable] : The user can enter the basic setting mode.
[Disable] : The user can not enter the basic setting mode.

Note

The [Enter Setup] of all users cannot be set to [Disabled]. If specified, the user with the lowest registration number with the fifth parameter turned [On] is automatically set to [Enabled] (The setting is changed when the setup data is stored and the basic setting mode is terminated.).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

- For models without the batch function (/BT1 option)
 - If the user name already exists, a confirmation message "This username is already registered," is displayed. At this point the user name is confirmed (confirmed but not yet registered). If necessary, change the user name to be registered. Press the DISP/ENTER key to register the user name.
- For models with the batch function (/BT1 option),
 - If the user name already exists, an error message "This username is already registered," is displayed. The user name entry box stays yellow, and the user name is not registered. Change the user name to be registered.
 - If the combination of the user ID and password already exists, an error message "Duplicate used combination of user ID and password," is displayed. Change the combination of the user ID and password to be registered.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

10.5 Displaying the Log Screen/System Screen

The following list is displayed on the log screen.

- Error messages (the newest 50)
- A record of key login/logout (the newest 50)
- A record of communication commands (the newest 200)
- A record of file transfers made using the FTP client function (the newest 50)

If the number exceeds the limit, entries are deleted starting with the oldest one.

The number of input points, capacity of the internal memory, options, and MAC address of the RD-MV100 can be displayed on the screen for confirmation.

The log screen will be displayed in English regardless the language set for the recorder.

Procedure

Display the log screen

1. Press the FUNC key to display the soft key menu.
2. Press the [Log] soft key. The types of logs that can be displayed are assigned to the soft keys and displayed.



3. Press a soft key to display the log.
 - [Error] soft key : Displays a log of error messages.
 - [Key login] soft key : Displays a log of key login/logout.
 - [Commu] soft key : Displays a log of communication commands that have been executed.
 - [FTP] soft key : Displays a log of file transfers made using the FTP client function.
 - [System] soft key : Displays a system screen.
4. Use the up and down keys to scroll through the log.

Returning to the operation screen

To return to the operation screen from the log screen or the system screen, press the DISP/ENTER key to display the screen menu, select the desired screen using the up and down arrow keys, and then press the DISP/ENTER key.

Explanation

Error message log

The number of the log displayed at the last line of the screen / total number of logs

Date and time of occurrence

Error code

Error message

(005/005)	Time	No.	Message
Jan.12.2000	00:36:47	201	"Not enough free space on media."
Jan.12.2000	00:36:19	210	"Media has not been inserted."
Jan.11.2000	04:15:30	005	"The input numerical value exceeds the set range.."
Jan.11.2000	04:15:28	005	"The input numerical value exceeds the set range.."
Jan.11.2000	03:23:19	001	"Measured data have been initialized."

Key login/logout log

<007/007>	Time	I/O	No.	User Name
Jan. 01. 2000	08:59:34	In	01	user1
Jan. 01. 2000	08:59:29	Out		
Jan. 01. 2000	08:52:51	In	01	user1
Jan. 01. 2000	08:21:45	In	01	user1
Jan. 01. 2000	08:15:17	In	01	user1
Jan. 01. 2000	08:14:45	Out		
Jan. 01. 2000	08:14:35	In	01	user1

Date/time Login/logout User No. User name

Communication command log

For detail, see "RD-MV100 Communication Interface User's Manual."

<007/007>	Time	ID	User Name	I/O Message	Link
Jan. 06. 2000	18:52:23	1	user	< (Logout)	
Jan. 06. 2000	18:52:23	1	user	> CC 0	
Jan. 06. 2000	18:51:48	1	user	< (259)	
Jan. 06. 2000	18:51:48	1	user	> FD 0.001.010	
Jan. 06. 2000	18:51:41	1	user	< EB	
Jan. 06. 2000	18:51:41	1	user	> B0 0	
Jan. 06. 2000	18:51:37	1	user	< (Login)	

Date and time when the access occurred I/O symbol
 (> : input, < : output) Name of the user that accessed this instrument
 A number used to identify the user that is connected Message

FTP log

For detail, see "RD-MV100 Communication Interface User's Manual."

<005/005>	Time	No.	Code	Flag	File Name
Jan. 01. 2000	01:50:22	282	HOSTNAME	S	10101500.DDS
Jan. 01. 2000	01:50:22	282	UNREACH	P	10101500.DDS
Jan. 01. 2000	01:49:32			P	10101490.DDS
Jan. 01. 2000	01:48:51			P	10101480.DDS
Jan. 01. 2000	01:48:27			P	DX_FTPC.TXT

Date and time when the file transfer was made Error code FTP server (P : primary, S : secondary) File name

System screen

See section 1.8.

10.6 Setting the Memory End Relay Output Time (Option, /F1, Basic Setting Mode)


This function activates the relay output when the remaining space (time) in the internal memory or storage medium becomes small.

- Set the minimum storage time of the internal memory at which the relay should be activated. (The initial setting is 1 hour.)
- This function is valid when the FAIL/Memory End output relay (/F1) option is installed.

Procedure

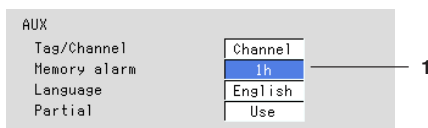
- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Memory alarm
This is the minimum storage time of the internal memory at which the relay should be activated.
Select a value from 1 h, 2 h, 5 h, 10 h, 20 h, 50 h, and 100 h.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.


10.7 Setting the Remote Control Functions (Option, /R1, Basic Setting Mode)

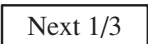
Various actions can be assigned to the eight remote control terminals. The assigned action can then be executed by applying a remote input signal to the corresponding terminal.

Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Twice press the soft key .

Press the soft key .

To display the setting screen press the soft key .

Remote	
No.	Action
1	None
2	None
3	None
4	None
5	None
6	None
7	None
8	None

The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Action
Assign actions to Remote numbers 1 to 8. For the functions that can be assigned, see the explanation.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Actions that can be assigned

- **None**
No action is assigned.

10.7 Setting the Remote Control Functions (Option, /R1, Basic Setting Mode)

- **Start/Stop**
 - Remote input : Rising/start, falling/stop
 - Start
Starts/stops the acquisition of the display data and the event data, the computation (option) , and the report (option).
 - Stop
Stops the acquisition of the display data and the event data, and the report (option).
 - If the RD-MV100 is started, applying a rising signal produces no effect. If the RD-MV100 is stopped, applying a falling signal produces no effect.
- **Trigger**
 - Remote input : Trigger, 250 ms or more
 - This becomes the external trigger that starts the acquisition of the event data to the internal memory. This is valid only when acquiring the event data to the internal memory using the trigger or rotate mode, the acquisition start trigger is set to external trigger, and the RD-MV100 is in the trigger wait state (see section 8.2). For all other cases, applying the remote signal produces no effect.
- **Alarm ACK**
 - Remote input : Trigger, 250 ms or more
 - Releases the alarm indication and relay output (option). This is the same function as when the [Alarm ACK] soft key is pressed.
- **Time adj**
 - Remote input : Trigger, 250 ms or more
 - Adjusts the internal clock of the RD-MV100 to the nearest hour depending on the time when the remote signal is applied.

Time of Signal Input	New Time
00 min. 00 s to 01 min. 59 s	Adjusts the internal clock down to the nearest hour. Example : 10 hr. 01 min. 50 s becomes 10 hr. 00 min. 00 s.
02 min. 00 s to 57 min. 59 s	Time is unchanged.
58 min. 00 s to 59 min. 59 s	Adjusts the internal clock down to the nearest hour. Example : 10 hr. 59 min. 50 s becomes 11 hr. 00 min. 00 s.

- **Math (option)**
 - Remote input : Rising/start, falling/stop
 - Starts/stops the computation. This is valid only on models with the computation function (/M1 option).
 - If the computation is started, applying a rising signal produces no effect. If the computation is stopped, applying a falling signal produces no effect.
- **Math rst (option)**
 - Remote input : Trigger, 250 ms or more
 - Resets the data on all computation channels. This is valid only on models with the computation function (/M1 option) and while the computation is stopped. For all other cases, applying the remote signal produces no effect.
- **M. sample**
 - Remote input : Trigger, 250 ms or more
 - The instantaneous values of all measurement and computation channels (excluding the measurement channels that are set to [Skip] and the computation channels that are turned Off) can be stored to the internal memory.

- **Pnl 1 to Pnl 3 load**

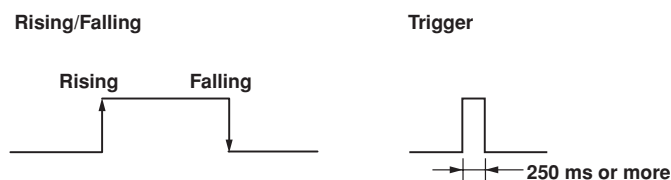
- Remote input : Trigger, 250 ms or more
- The setup data of the file "LOAD 1.PNL," "LOAD 2.PNL," or "LOAD 3.PNL" that is saved in the external storage medium are loaded for use. The file, "LOAD 1.PNL," "LOAD 2.PNL," or "LOAD 3.PNL" must be created and saved to the external storage medium beforehand.

- **Message 1 to message 8**

- Remote input : Trigger, 250 ms or more
- Displays a message at the position corresponding to the time when the signal was applied on the trend display. The displayed message is also written to the internal memory. When the data acquisition to the internal memory is stopped, messages cannot be displayed or written. Applying a remote signal produces no effect.

Remote input signal

The above operations are carried out on the rising or falling edge of the remote signal (edge) or the ON signal lasting at least 250 ms (trigger).



For contact inputs, the remote signal rises when the contact switches from open to closed and falls when the contact switches from closed to open. For open collector signals, the remote signal rises when the collector signal (voltage level of the remote terminal) goes from high to low and falls when the collector signal goes low to high.

10.8 Setting the Displayed Language (Basic Setting Mode)


Select the language that is used on the screen.

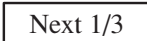
- The language setting applies to all modes (operation mode, setting mode, and basic setting mode).
- The initial setting is English.

Procedure

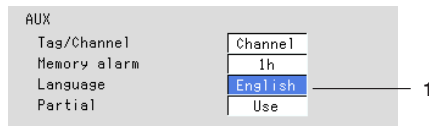
- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Aux - Language
Select the language.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

Range of screen elements that are displayed in the specified language

English and Japanese are used on all the screens.

German and French are used on the following screens. For other screens, the displays will be the same as those for English.

- Screen menu in the operation mode (displayed using the DISP/ENTER key or arrow key)
- FUNC key menu in the operation mode (displayed when the FUNC key is pressed)
- Error Messages
- Operation guide screens (confirmation screen that appears when the STOP key is pressed or the selection screen that appears when exiting the basic setting mode, for example.).

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10.12 Using the Daylight Savings Time Adjustment Function

- When the specified time is reached at which the daylight savings time adjustment is to be enabled (the time set at [Summer]), the recorder automatically sets the clock ahead by one hour.
(Example : If the time is set to 9 O'clock on June 1, the time is set ahead to 10 O'clock June 1.)
- When the specified time is reached at which the daylight savings time adjustment is to be disabled (the time set at [Winter]), the recorder automatically sets the clock back by one hour.
(Example : If the time is set to 9 O'clock on December 1, the time is set back to 8 O'clock December 1.)
- The daylight savings time adjustment function is set using year, month, day, and time. Set the time for every year.
- The year is specified using the lower two digits. 00 to 79 represent year 2000 to 2079. 80 to 99 represent 1980 to 1999.

Procedure

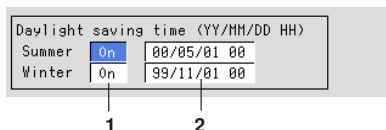
Setting the time at which the daylight savings time adjustment is to be enabled/disabled

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed.)
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. On/Off

Select whether or not to use the daylight savings time adjustment function. If [On] is selected, a box used to enter the year, month, and day appears. If this parameter is set to [On] and the summer/winter time is set, this parameter turns [Off] automatically when the set time is elapsed.

2. Summer/Winter

Set the time at which the daylight savings time adjustment is to be enabled/disabled. Pressing the [Input] soft key displays a window used to enter the year, month, day, and time. Enter the values and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.


10.13 Setting the Temperature Unit (Basic Setting Mode)

Select the temperature unit from [C] or [F].

Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Temperature Unit

Select [C] or [F].

C : Celsius

F : Fahrenheit

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

11.1 Overview of the Computation Function

Equations can be written to computation channels by using the measured data of measurement channels or computed data from computation channels as variables. The result of the computation can be displayed or stored. Computation is performed every scan interval. In addition, a moving average ("rolling average") can be calculated on the computed result of a computation channel, and the moving average value can be used as the computed data for that channel.

For report functions, see sections 11.11 to 11.13.

Computation Function

Computation channels

Model	Channels
RD-MV102	Channel 31 to 34 (4 channels)
RD-MV104	Channel 31 to 34 (4 channels)
RD-MV106	Channel 31 to 42 (12 channels)
RD-MV112	Channel 31 to 42 (12 channels)

Types of Computations

The following computations can be performed:

In the table below, y represents the computed result. X and n generally represent the measured data of a measurement channel and a constant. For details, see "Data that can be used in equations."

Type	Description
Four arithmetical operations	Addition (+), subtraction (−), multiplication (×), and division (/)
**	Determines the power. $y = X^n$
SQR	Determines the square root.
ABS	Determines the absolute value.
LOG	Determines the common logarithm. $y = \log_{10}X$
EXP	Determines the exponent. $y = e^x$
Relational computation	Determines <, ≤, >, ≥, =, ≠ and outputs "0" or "1".
Logical computation	Determines the AND (logical product), OR (logical sum), XOR (exclusive logical sum) of two channels, NOT (negation) of an arbitrary channel and outputs "0" or "1".
Statistical computation (TLOG)	Determines the sum, maximum, minimum, average, and maximum – minimum (P–P) values at specified time intervals over the time interval. There are three timers used to set the time interval. For detail, see section 11.7.

Data that can be Used in Equations

The following types of data are used to perform computations. For TLOG computation, only measured and computed data can be used. For all other computations, all types of data can be used.

Measured data

The data are specified using channel numbers in computing equations. If scaling is in effect, the scaled values are used in the computation.

Computed data

The data are specified using channel numbers in computing equations.

Constants (K01 to K12)

The values assigned to K01 to K12 can be used as constants. Enter the values as K01 to K12 in the equations.

Range of constants (Maximum number of significant digits is 5) :

−9.9999E + 29 to −1.0000E − 30, 0, 1.0000E − 30 to 9.9999E + 29

11.1 Overview of the Computation Function

Communication input data (C01 to C12)

Data that have been specified through the communication interface can be used. Enter the data as C01 to C12 in the equations. For the procedure used to set the data, see the "RD-MV100 Communication Interface User's Manual" (IM RD-MV100-17E).

Range of numerical values (Maximum number of significant digits is 5) :
-9.9999E + 29 to -1.0000E - 30, 0, 1.0000E - 30 to 9.9999E + 29

Conditions of the remote control terminals (D01 to D08)

The conditions of the remote input signal can be assigned to "1" and "0," and used in the equations. Enter the data as D01 to D08 (the number following the letter D is the remote terminal number) in the equations.

The correlation between the conditions of the remote input signal and the value "1" and "0" are shown below.

Type of the Remote Input Signal	Status	"1" or "0"
Contact	close	1
	open	0
Open collector	Voltage level is Lo at the remote terminal	1
	Voltage level is Hi at the remote terminal	0

Unit Handling

The unit corresponding to the measured/computed data in the equation is not compensated. In computations, measured and computed data are handled as values without units. For example, if the measured data from channel 01 is 20 mV and the measured data from channel 02 is 20 V, the computed result of 01 + 02 is 40.

Order of Precedence of the Operators

The order of precedence of the operators in the equation is as follows. The operators are placed in order from the highest precedence.

Type	Operator
	(higher precedence)
Functions	ABS(), SQR(), LOG(), EXP(), TLOG.MAX(), TLOG.MIN(), TLOG.P-P(), TLOG.SUM(), TLOG.AVE()
Power	**
Logical negation	NOT
Multiplication and division	*, /
Addition and subtraction	+, -
Greater than/less than	.GT., .LT., .GE., .LE.
Equal/not equal	.EQ., .NE.
Logical AND	AND
Logical OR, exclusive OR	OR, XOR
	(lower precedence)

Displaying the Computed Result

The computed data of computation channels can be displayed in each operation screen.

Displaying the waveform and bar graph

The data are displayed in the range defined by the upper and lower limits of the span.

For the settings related to displaying the computed result, see sections below.

Set computation channels : See section 11.4.

Assign channels to groups : See section 7.6.

Display tags : See sections 7.1 and 7.2.

Set the channel display color : See section 7.8.

Use zone display : See section 7.9.

Set the number of scale divisions : See section 7.10.

Set the base position of the bar graph : See section 7.10.

Specify the scale display position : See section 7.10.

Use partial expansion display : See sections 7.11 and 7.12.

Numerical display

The range of displayed values of computed data is from -9999999 to 99999999 excluding the decimal point. The decimal point position corresponds to the position of the decimal point of the upper and lower limit span of the computation channel.

However, special displays are used for cases given in the table below.

Data Condition	Computation	Display
The computed result exceeds 99999999.	plus over	+*****
The computed result is below -9999999 .	minus over	-*****
The value exceeds $3.4E + 38$, or is below $-3.4E + 38$ in the middle of computation.	overflow	+***** or -*****
An error is detected. When the following computation is specified, a computation error occurs.	error	+*****
<ul style="list-style-type: none"> • X/0 • SQR (–X) • LOG (–X) • When a skipped channel No. is entered in the equation. 		
The number of stacks (see section 11.2) in the equation exceeds 17.	stack over	+*****

Rolling Average

The moving average of the computed result of the equation specified for the computation channel is determined, and the result is displayed as computed data for that channel.

The sampling interval and the number of samples can be specified for each channel.

The maximum sampling interval is 1 hour; the maximum number of samples is 64. The initial setting is [OFF] (do not perform moving average). For the setting procedure, see section 11.10.

Alarm

You can set up to 4 alarms on each computation channel. The alarm types are upper limit alarm (H), lower limit alarm (L), delay upper limit alarm (T), and delay lower limit alarm (t). The hysteresis is fixed to 0. For the procedures to set the alarms, see section 11.5. For the alarm indication, see section 4.2 and 6.1.

Acquiring the Computed Data

Display data and event data

The computed data from the computation channels can be acquired as the display data and event data in the same manner as for the measurement channels. See chapter 8.

Manual sampled data

The instantaneous values of all computation channels (excluding the computation channels that are turned Off) can be stored to the internal memory with the manual sampling operation. For the operating procedure, see sections 8.12.

TLOG data

The TLOG computation data are acquired every interval. For the setting procedure, see sections 11.8 and 11.9.

Setting Computation Channels

The computation channel specifications are set in the setting mode. For detail, see sections 11.4 through 11.6.

The timer used in the TLOG computation is set in the basic setting mode. For detail, see section 11.9.

11.2 Explanation of Computing Equations

This section describes the meaning of the computation equation and how to write them.

Four Arithmetical Computations

The types of data that can be used in equations are measurement channels, computation channels, constants (K01 to K12), communication interface data (C01 to C12), and the remote control terminal conditions (D01 to D08).

EXAMPLE :

Addition (+) : 01+02

Computes the value of channel 1 plus the value of channel 2

Subtraction (−) : 01-02

Computes the value of channel 1 minus the value of channel 2

Multiplication (*) : 01*K03

Computes the value of channel 1 multiplied by constant number 3

Division (/) : 01/K02

Computes the value of channel 1 divided by constant number 2

Note

When you set an expression as e.g. 31 = 31 + 01, the summation of channel number 1 will be displayed in channel 31.

Power, SQR, ABS, LOG, EXP Computations

The types of data that can be used in equations are measurement channels, computation channels, constants (K01 to K12), communication interface data (C01 to C12), and the remote control terminal conditions (D01 to D08). You can nest a computing element inside the parentheses of another computing element.

EXAMPLE :

Power (**) : 01**02

Raises measured value of channel 1 to the power of measured value of channel 2

Square root (SQR) : SQR (01)

Returns the square root of the measured value of channel 1

Absolute value (ABS) : ABS (01)

Returns the absolute value of the measured value of channel 1

Logarithm (LOG) : LOG (01)

Returns the common logarithm of the measured value of channel 1

Exponent (EXP) : EXP (01)

Raises e to the power of the measured value of channel 1

Note

The natural logarithm is not directly provided, but can be obtained by using the following :

$\log_b x = \log_a x / \log_a b$ or $\ln x = \log x / \log e$

Therefore, to calculate the natural logarithm of the value of channel 01, set K01 = 1.

Then the expression will become : LOG (01)/LOG (EXP(K01))

Relational Computation

The types of data that can be used in equations are measurement channels, computation channels, constants (K01 to K12), communication interface data (C01 to C12), and the remote control terminal conditions (D01 to D08). You can specify a computing equation that performs relational computation on a computing element (Example : 01.LT.ABS(02)).

EXAMPLE :

02.LT.03

The computed result will be "1" if the measured value in channel 2 is less than the measured value in channel 3, otherwise the value will be "0".

02.GT.03

The computed result will be "1" if the measured value in channel 2 is greater than the measured value in channel 3, otherwise the value will be "0".

02.EQ.03

The computed result will be "1" if the measured value in channel 2 is equal to the measured value in channel 3, otherwise the value will be "0".

02.NE.03

The computed result will be "1" if the measured value in channel 2 is not equal to the measured value in channel 3, otherwise the value will be "0".

02.GE.03

The computed result will be "1" if the measured value in channel 2 is greater than or equal to the measured value in channel 3, otherwise the value will be "0".

02.LE.03

The computed result will be "1" if the measured value in channel 2 is less than or equal to the measured value in channel 3, otherwise the value will be "0".

Logical Computation

The computation is performed using e1 and e2 which are identified as either "zero" or "non zero". The types of data that can be used in equations are measurement channels, computation channels, constants (K01 to K12), communication interface data (C01 to C12), and the remote control terminal conditions (D01 to D08). You can specify a computing equation that performs relational computation on a computing element.

AND Logical product

Syntax : e1ANDe2

Condition : If both e1 and e2 are "non 0", the operation results in "1", otherwise in "0".

Status : e1 = 0, e2 = 0
e1ANDe2 = 0

e1 ≠ 0, e2 = 0
e1ANDe2 = 0

e1 = 0, e2 ≠ 0
e1ANDe2 = 0

e1 ≠ 0, e2 ≠ 0
e1ANDe2 = 1

11.2 Explanation of Computing Equations

OR Logical sum

Syntax : $e1ORe2$

Condition : If both $e1$ and $e2$ are "0", the operation results in "0", otherwise in "1".

Status : $e1 = 0, e2 = 0$
 $e1ORe2 = 0$

$e1 \neq 0, e2 = 0$
 $e1ORe2 = 1$

$e1 = 0, e2 \neq 0$
 $e1ORe2 = 1$

$e1 \neq 0, e2 \neq 0$
 $e1ORe2 = 1$

XOR Mutually exclusive logical sum

Syntax : $e1XORe2$

Condition : If $e1$ and $e2$ have different values, the operation results in "1", otherwise in "0".

Status : $e1 = 0, e2 = 0$
 $e1XORe2 = 0$

$e1 \neq 0, e2 = 0$
 $e1XORe2 = 1$

$e1 = 0, e2 \neq 0$
 $e1XORe2 = 1$

$e1 \neq 0, e2 \neq 0$
 $e1XORe2 = 0$

NOT Logical negation

Syntax : $NOTe1$

Condition : Reverses the value of data $e1$

Status : $e1 = 0$ $NOTe1 = 1$
 $e1 \neq 0$ $NOTe1 = 0$

EXAMPLE :

01-02OR03.GT.04

Determines the OR of the computed results of "01-02" and "03.GT.04."

TLOG Computation (MAX, MIN, AVE, SUM, MAX-MIN)

Only measurement channels and computation channels can be used in the TLOG computation. In the explanation below, e1 is used to represent a measurement or computation channel. You cannot specify an equation that contains a computing element inside e1. In addition, only one TLOG computation can be specified in a single computing equation.

TLOG.MAX ()

Syntax : TLOG.MAX (e1)

Result : Computes the maximum value of channel e1

TLOG.MIN ()

Syntax : TLOG.MIN (e1)

Result : Computes the minimum value of channel e1

TLOG.AVE ()

Syntax : TLOG.AVE (e1)

Result : Computes the average value of channel e1

TLOG.SUM ()

Syntax : TLOG.SUM (e1)

Result : Computes the summation of channel e1

TLOG.P-P ()

Syntax : TLOG.SUM (e1)

Result : Computes the maximum value–minimum value of channel e1

Rules for Writing an Equation (Common Items)

Follow the rules below in writing the computing equations.

- Use up to 40 characters to write equations.
- The precedence of computing terms can be specified using parentheses.
- Specify the channels in the equation using channel numbers. (Example: Channel 1 is "01" or "1")
- You can use "01" or "1," for example, to specify one-digit numbers for channels, constants, communication input data, and conditions of the remote control terminals in equations.

Example : 01, 1, K01, K1, C01, C1, D01, D1

- The data value for the channel used in the equation, and for all channels greater in number than that channel, are substituted with data from the previous scan.
- Do not use more than 16 stacks (channel, K01 to K12, C01 to C12, D01 to D08) in one equation. Otherwise, a computation error may occur. The computed result is set to positive overflow (displayed as +*****x) in this case.

Example: The number of stacks in the equation $01+K01*(03+04*K02)$ is five.

11.3 Using the Computation Function

Operations related to the computation function are as follows :

- **Start/stop computation.**
This operation can be carried out with the START/STOP key or the FUNC key. The computation can also be started or stopped via remote control or communication commands.
- **Reset computation data.**
This operation can be carried out with the FUNC key. The computation data can also be reset via remote control or communication commands.
- **Release the computation data dropout display.**
This operation is carried out with the FUNC key. The computation data dropout display can also be released via communication commands.

For the remote control function, see section 10.7. For the communication function, see MV100 Communication Interface User's Manual.

Start/Stop Computation

Procedure

Operation using the START/STOP key

- **Starting the computation (also starts the data acquisition to the internal memory)**
 1. Press the START key to start the computation. At this point, the data acquisition to the internal memory is also started. When the computation is started, a computation icon is displayed in the status display section. For details related to the status display section, see section 4.2.
- **Stopping the computation (also stops the data acquisition to the internal memory)**
 1. Press the STOP key. A confirmation window is displayed. For models with the batch function (/BT1 option), the batch information is also displayed.
 2. Use the arrow keys to select [Mem + Math] and press DISP/ENTER to stop the computation. At this point, the data acquisition to the internal memory is also stopped. The computation icon in the status display section also disappears.

Operation using the FUNC key

1. Press the FUNC key to display the soft key menu.
When the computation is suspended the [Math START] soft key is displayed. If the computation is in progress the [Math STOP] soft key is displayed.
- **Starting the computation**
 2. Press the [Math START] key to start the computation. When the computation is started, a computation icon is displayed in the status display section. For details related to the status display section, see section 4.2.



- **Stopping the computation**
 2. Press the [Math STOP] key to stop the computation. The computation icon in the status display section also disappears.



Resetting the Computation

This is executable only when the computation is suspended. Data from all computation channels are cleared.

Procedure

1. Pressing the FUNC key displays the soft key menu.
The [Math RESET] soft key is displayed only when the computation is suspended.
2. Pressing the [Math RESET] soft key clears the data from all computation channels.



Clearing the Computation Dropout Display

When a computation data dropout occurs during computation, the computation icon displayed in the status display section turns yellow. The computation icon will return to a white color once the computation data dropout has been acknowledged.

Computation icon



Procedure

1. Pressing the FUNC key displays the soft key menu.
The [Math ACK] soft key is displayed only when a computation data dropout occurs.
2. Pressing the [Math ACK] soft key causes the yellow computation icon in the status display section to return to a white color.

Explanation

Computation data dropout occurs when the computation is not completed within the scan interval. When this occurs frequently, lower the CPU load by reducing the number of computation channels or making the scan interval longer.

11.4 Setting Computation Channels

This section describes the procedures to set equations to computation channels. The equation is set in the setting mode. Equations cannot be set while data acquisition or computation is in progress.

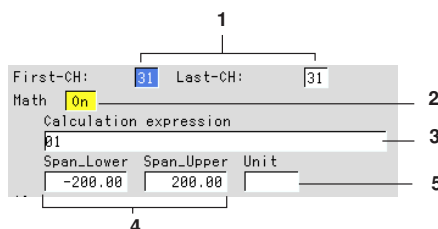
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

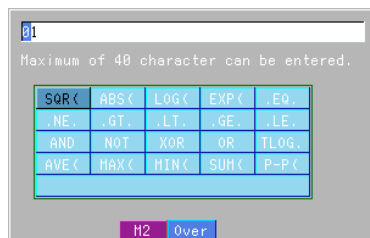
Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels.
2. Math On/Off
If On is selected a box used to enter the equation will appear. When not using computation, select Off.
3. Calculation expression
Enter the equation (up to 40 characters).
Pressing the [Input] soft key displays a window used to enter an equation. Enter the equation using the following key operations and press the DISP/ENTER key. For writing equations, see "Rules for writing an equation (common items)" in section 11.2.



- **Left and right arrow key** : Select the input position.
- **Up and down arrow key** : Select the input character.

Use the [M1/M2] soft key to switch the function of the window between number input and computing element input. See the explanation.

Each time the [M1/M2] soft key is pressed the function of the window switches between number input and computing element input. The selected function is displayed to the top of the soft key display section.

[M1] : Number is selected.

[M2] : Computing element is selected.

- **[Del] soft key** : Delete the character at the cursor position.
- **[Bs] soft key** : Delete the character before the cursor position.
- **[Ins] soft key** : Switch between insert and overwrite.

Each time the [Ins] soft key is pressed insert and overwrite switches. The selected function is displayed to the right of the soft key display section.

[Over] : Overwrites the cursor position.

[Ins] : Inserts at the cursor position.

Note

When using TLOG computation, timers must be set in the basic setting mode and the number of the timer and the sum unit (only for TLOG.SUM) must be set in the setting mode.

4. Upper and lower limits of span

Set the upper and lower limits of the display span.

Pressing the [Input] soft key displays a window used to enter a numerical value.

Enter a value in the allowed range given below and press the DISP/ENTER key.

For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.

Allowed range : -99999999 to 99999999

The decimal can be set in the following positions :

"□.□□□□" "□□.□□□" "□□□.□□" "□□□□.□"
"□□□□□"

Note

The upper and lower limits of span cannot be set to the same value.

5. Unit

Set the unit

Pressing the [Input] soft key displays a window used to enter a character string.

Enter the unit (up to 6 alphanumeric characters) and press the DISP/ENTER

key. For the procedures related to entering character strings, see "Entering Characters" on page 3-22.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Note

When computation is turned On/Off or when equations and span settings are changed, the alarm setting for that channel is turned OFF.

11.5 Setting the Alarm

You can set up to 4 alarms on each computation channel. The alarm types are upper limit alarm (H), lower limit alarm (L), delay upper limit alarm (T), and delay lower limit alarm (t). The hysteresis is fixed to 0.

Note


When [Math On/Off] is turn ON, an entry box used to enter the equation is displayed and the alarm setting boxes are activated (white color). Set the alarm after setting the equation.

When computation is turned On/Off or when equations and span settings are changed, the alarm setting for that channel is turned OFF.

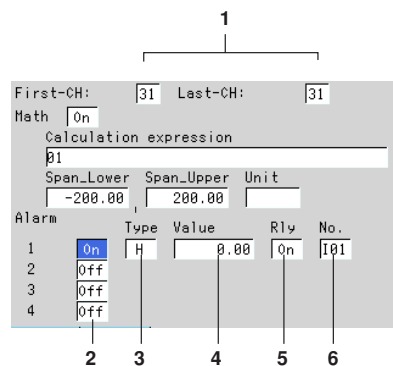
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, the [Math range] is also simultaneously set.)
2. On/Off
Turn the alarm On (enabled). Items 3, 4 and 5 are displayed.
[On] : Use alarm
[Off] : Do not use alarm

3. Type
Set the alarm type.
H : Upper limit alarm
L : Lower limit alarm
T : Delay upper limit alarm
t : Delay lower limit alarm

Note

If you select delay alarm (T or t) for the alarm type, you must set the alarm delay period. See section 6.3.

4. Value
Set the value at which the alarm is activated.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
- 5.* Relay On/Off
Set whether or not to activate the relay output. If [On] is selected, output relay [Number] is displayed.
- 6.* Number
Set the output relay number.
For the correspondence between the output relay number and the output relay position, see section 2.4 "Alarm Output Wiring (Option)".

* If the alarm output relay option (/A*) is not installed, this setting is void.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Alarm type**

Two types of alarms are available.

Name	Symbol	Description
Upper limit alarm	H	An alarm occurs when the measured value becomes greater than or equal to the alarm value.
Lower limit alarm	L	An alarm occurs when the measured value becomes smaller than or equal to the alarm value.
Delay upper limit alarm	T	An alarm occurs when the measured value remains above or equal to the alarm value for the specified time period (delay period, see section 6.3, "Setting the Alarm Delay Period.").
Delay lower limit alarm	t	An alarm occurs when the measured value remains below or equal to the alarm value for the specified time period (delay period, see section 6.3, "Setting the Alarm Delay Period.").

11.6 Setting Constants

Total of 12 constants (K01 to K12) can be defined.

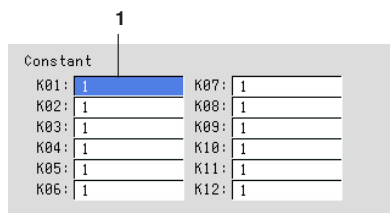
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Constant
Set the constant.
Pressing the [Input] soft key displays a window used to enter a numerical value.
Enter a value in the allowed range and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
[E], [+]: Used when setting numbers with exponents.
Example : 5.0E+12

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

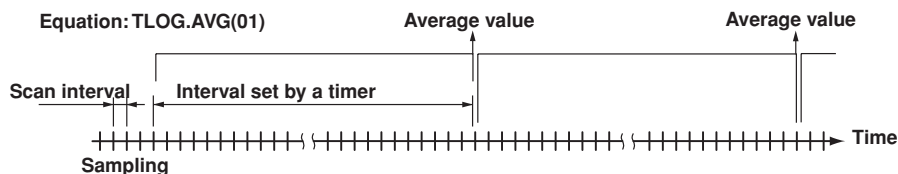
The number of significant digits is 5 excluding the decimal. When using exponents to set values, use 5 or less digits for the mantissa and two digits for the exponent.

The allowed range is as follows.

−9.9999E + 29 to −1.0000E − 30, 0, 1.0000E − 30 to 9.9999E + 29

11.7 TLOG Computation

Determines the sum, maximum, minimum, average, and maximum – minimum (P–P) values of the specified channel at specified time intervals. The interval is set by timers. The example shown in the following figure indicates the case in which the average value of channel 1 over each interval, TLOG.AVE(01), is determined.



TLOG computation cannot be performed when the corresponding measurement channel is set to [Skip] or the corresponding computation channel is turned Off.

Timer Mode and Action

Timer mode

There are two timer modes : absolute mode and relative mode.

• Absolute mode

Timer expires at times determined from the reference time and the interval. The reference time is specified by the hour (00 to 23).

Example 1 : Reference time : 14:00

Interval : 12 h

The expiration time is set to 2:00 (2:00 AM) and 14:00 (2:00 PM).

Example 2 : Reference time : 00:00

Interval : 10 min

The expiration time is set to 0:00, 0:10, 0:20, ..., 23:40, and 23:50. For example, if the computation is started at 9:30, the time expiration will occur at 09:40, 09:50, 10:00, and so on.

• Relative mode

The timer is started when the computation is started. The timer is repeated at each interval. The timer is suspended while the power is lost.

Example : Interval : 00:15

The timer expires every 15 minutes after the computation is started.

Setting timers

Timers are set in the basic setting mode. For detail, see section 11.9.

Setting the timer No. for TLOG computation

The number of the timer used by the channel computing the TLOG is selected from 1, 2, and 3 in the setting mode. For the setting procedure, see section 11.8.

About the Sum Unit of the TLOG.SUM

In the sum computation (TLOG.SUM) of time series, data are summed over the scan interval. However, for flow values that have units /s, /min, or /h, a simple summation results in the actual value not matching the computed result, because the scan interval and the unit of the input values are different. In these cases, the unit of the data measured over the scan interval is converted to match the unit of the input values and the computation is performed.

11.7 TLOG Computation

For example, if the scan interval is 2 s, and the input value is 100 m³/min, a simple summation would add 100 every 2 s resulting in 3000 after one minute. However, if the computing unit is set to /min, then 2s/60s is multiplied every scan interval before the value is added giving a result that is close to the actual input value. The scan interval unit is in seconds.

OFF $\Sigma(\text{measured value})$

/S $\Sigma(\text{measured value}) \times \text{scan interval}$

/MIN $\Sigma(\text{measured value}) \times \text{scan interval}/60$

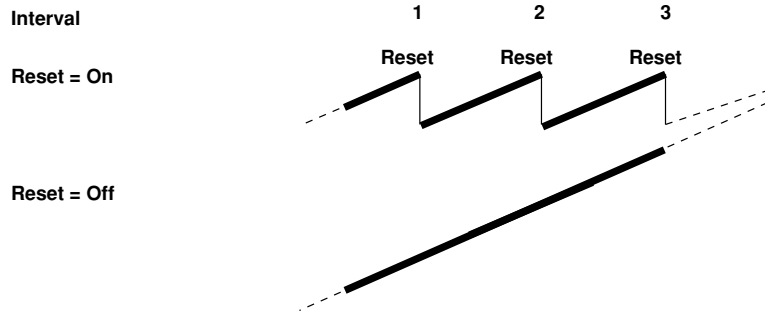
/HOUR $\Sigma(\text{measured value}) \times \text{scan interval}/3600$

For the setting procedure, see section 11.8.

About [Reset]

Whether or not to reset the computed result at every timeout is selectable. The figure below shows the action of TLOG.SUM computation.

Example : Result of the TLOG.SUM computation



In case of TLOG.MAX computation, for example, the maximum value is derived for every interval when "Reset" is "On," and the maximum value from the start of computation is derived when "Reset" is "Off."

If Power is Lost while the TLOG Computation was in Progress

The TLOG computation is resumed when the power is restored. The operation varies depending on whether power is restored before or after the scheduled time to create the TLOG data.

Time of Recovery	TLOG Computation Operation
After the time to create the TLOG data	TLOG data are created immediately when power is restored. The measured/computed data up to the time of the power disruption are used. At the next scheduled TLOG computation time, data will be used from the point in time after the power was restored.
Before the time to create the TLOG data	After power is restored, TLOG data are created at the normally scheduled time to perform the TLOG computation. All measured/computed data excluding the power disruption period are used.

How the Measured/Computed Data are Handled when there is an Abnormality in the Data

Type of Abnormal Data	Report Data AVE	MAX/MIN/P-P	SUM
Positive overflow	not used	used	not used
Negative overflow	not used	used	not used
Error	not used	not used	not used

11.8 Setting the Timer Number and Sum Unit for TLOG Computation

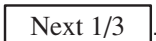
Set the number of the timer used by the channel computing the TLOG. Also, set the [sum scale] that is used when determining the sum in TLOG.SUM. These are set in the setting mode.

The timer specifications are set in the basic setting mode.

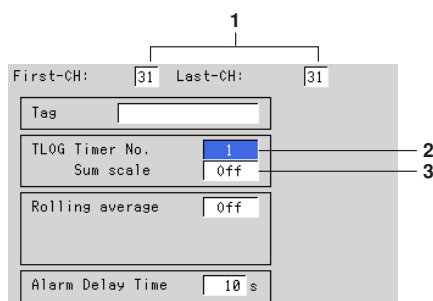
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First-CH and Last-CH
Select the desired channels. (For the channels set here, the [Tag] and [Rolling average] are also simultaneously set.)
2. Timer No.
This is the timer specified in the basic setting mode. Select 1, 2, or 3.
3. Sum scale
When the channel is computing TLOG.SUM, select [Off], [/s], [/min], or [/h]. The initial setting is [Off]. You do not have to set this for channels that are not computing TLOG.SUM (leave it [Off]).

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.


11.9 Setting the Timer (Basic Setting Mode)


Up to three timers can be specified. The timers specified here are used to determine the interval for the TLOG computation. In addition, all the data of measurement and computation channels can be saved at the interval determined by the timers.

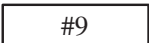
Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

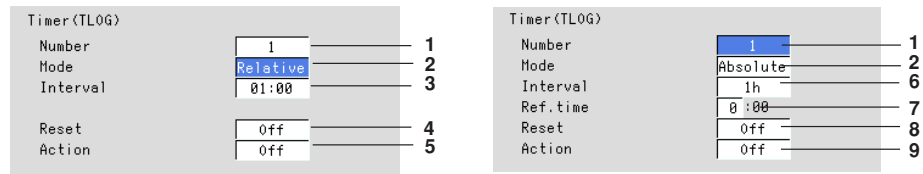
Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Twice press the soft key .

Press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

Setting the relative timer

1. Timer Number
Select the desired timer number.
2. Mode
Select [Relative]. [Interval], [Reset], and [Action] are displayed.
3. Interval
Set the time to the next timeout.
Pressing the [Input] soft key displays a window used to enter the time. Enter the time (00:01 to 24:00) and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
4. Reset
[On] : Resets the TLOG value when the timer expires.
[Off] : Does not reset the TLOG value when the timer expires.
5. Action
[DataSave] : Stores the instantaneous values of all measurement/computation channels to the internal memory when the time expires.
[Off] : Does not store the measured/computed data.

Setting the absolute timer

2. Mode
Select [Absolute]. [Interval], [Reset], [Ref. time], and [Action] are displayed.
6. Interval
Set the time to the next timeout from 19 choices below.
1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 10 min, 12 min, 15 min, 20 min, 30 min,
1 h, 2 h, 3 h, 4 h, 6 h, 8 h, 12 h, 24 h.
7. Ref. time
Pressing the [Input] soft key displays a window used to enter the time. Enter the time and press the DISP/ENTER key. For the procedures related to entering numerical values, see “Entering Numbers” on page 3-21.
8. Reset
[On] : Resets the TLOG value when the timer expires.
[Off] : Does not reset the TLOG value when the timer expires.
9. Action
[DataSave] : Stores the instantaneous values of all measurement/computation channels to the internal memory when the time expires.
[Off] : Does not store the TLOG data.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Acquiring the data of all channels to the internal memory at each interval (setting at the [Action] box)**

If [Save data] is specified in the [Action] box, the instantaneous values of not only the channels set to compute the TLOG computation, but also those of every channel can be acquired to the internal memory at the specified interval (whether or not any channel is set to compute the TLOG computation has no relevance).

The data along with the TLOG data are written to the area for writing the TLOG computed data of the internal memory. When storing to the external storage medium, the data are stored to the TLOG data file (“DTG” extension). For details related to the data acquisition of data to the internal memory and the storage to the external storage medium, see the explanation on the TLOG data in chapter 8.

Note

TLOG data are written to the internal memory at the interval determined by the timer when the timer is specified (see section 11.8) (writing to the internal memory is carried out regardless of the setting specified in the above-mentioned [Action] box).

11.10 Using the Rolling Average

A rolling average can be specified as the moving average on the computed results of each computation channel. Set the sampling interval and the number of samples. The maximum sampling interval is 1 hour, the maximum number of samples is 64. The rolling average can be used to suppress fluctuations in the computed results.

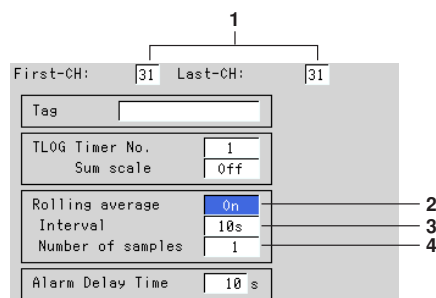
Procedure

- These procedures are carried out in the setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter. (The parameters that cannot be changed are grayed).
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Twice press the soft key .

To display the setting screen press the soft key .



The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. First channel and last channel
Select the desired channels. (For the channels set here, the [Tag] and [TLOG] are also simultaneously set.)
2. On/Off
[On] : Use rolling average
[Off] : Do not use rolling average
If [On] is selected, [Interval] and [Number of samples] are displayed.
3. Interval
Select the interval from the selections below. However, when the scan interval is set to 2 s, even if the sampling interval is set to 1 s, 3 s, 5 s, or 15 s, the sampling will be performed at 2 s, 4 s, 6 s, or 16 s.
1 s, 2 s, 3 s, 4 s, 5 s, 6 s, 10 s, 12 s, 15 s, 20 s, 30 s, 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 10 min, 12 min, 15 min, 20 min, 30 min, 1 h
4. Number of samples
This is the number of data points used to compute the rolling average. Set an integer value between 1 and 64.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.
To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation

- While the number of samples acquired is less than the specified number of samples, the average of acquired data is computed.
- The computation error data are not included in the rolling average computation.
- When the measured data exceed the upper and lower limits indicated below, the value is clipped at the upper or lower limit and the moving average is calculated. The upper and lower limits vary depending on the decimal position of the span upper and lower limits of the computation channel.

Decimal Position of the Span Upper/Lower Limit of the Computation Channel	Upper/Lower Limit
□□□□□□	±100000000
□□□□□.□	±10000000
□□□□.□□	±1000000
□□□.□□□	±100000
□□.□□□□	±10000
□.□□□□□	±1000

11.11 Overview of the Report Function

This function is used to create hourly, daily, weekly, and monthly reports. The report data can be displayed on the screen. The report data are saved to the external storage medium in ASCII format. For data formats, see appendix 2, "Data Formats of ASCII Files."

Types of Reports and Specifications

Types of reports

- **Hourly report**

On every hour on the hour, the average, maximum, minimum, and sum values of the specified channels are determined from an hour of data up to the current hour and written to the internal memory.

- **Daily report**

At the specified time everyday, the average, maximum, minimum, and sum values of the specified channels are determined from a day of data up to the specified time and written to the internal memory.

- **Weekly report**

At the specified time of the specified day every week, the average, maximum, minimum, and sum values of the specified channels are determined from a week of data up to the specified time and written to the internal memory.

- **Monthly report**

At the specified time of the specified date every month, the average, maximum, minimum, and sum values of the specified channels are determined from a month of data up to the specified time and written to the internal memory. The number days in a month may be 28, 29, 30, or 31 days depending on the month.

Types of reports

- Hourly only : Creates reports every hour.
- Daily only : Creates reports every day.
- Daily and weekly : Creates daily and weekly reports.
- Daily and monthly : Creates daily and monthly reports.

For the report data display, see section 4.5.

Combinations of reports that can be created

The reports created by the RD-MV100 can be set to "hourly only," "daily only," "daily and weekly," or "daily and monthly."

Number of measurement and computation channels that can be assigned to the report

Up to 12 channels can be assigned to one report.

The report data are not created for channels that are set to [Skip] or those that have the computation turned [Off].

About the sum unit (sum scale)

In the sum computation (TLOG.SUM) of time series, data are summed over the scan interval. However, for flow values that have units /s, /min, /h, or /day a simple summation results in the actual value not matching the computed result, because the scan interval and the unit of the input values are different. In these cases, the unit of the data measured over the scan interval is converted to match the unit of the input values and the computation is performed.

For example, if the scan interval is 2 s, and the input value is 100 m³/min, a simple summation would add 100 every 2 s resulting in 3000 after one minute. However, if the sum unit is set to /min, then 2s/60s is multiplied every scan interval before the value is added giving a result that is close to the actual input value. The scan interval unit is in seconds.

OFF $\Sigma(\text{measured value})$

/S $\Sigma(\text{measured value}) \times \text{scan interval}$

/MIN $\Sigma(\text{measured value}) \times \text{scan interval}/60$

/HOUR $\Sigma(\text{measured value}) \times \text{scan interval}/3600$

/DAY $\Sigma(\text{measured value}) \times \text{scan interval}/86400$

For the setting procedure, see section 11.13.

If power is lost while the report function is in progress

If a power disruption occurred while the report function was in progress, the report function will resume after the power is restored. The exact operation will vary depending on whether the power is restored before or after the scheduled time to create a report.

Time of Recovery	Report Operation
After the time to create the report	Report data are created immediately after power is restored. The measured/computed data up to the time of the power disruption are used. For the next scheduled report, data after the power recovery are used.
Before the time to create the report	After power is restored, report data are created at the time of the next normally scheduled report. All measured/computed data excluding the power disruption period are used.

How the measured/computed data are handled when there is an abnormality in the data

Type of Abnormal Data	Report Data		
	Average Value	Maximum/Minimum Value	Integrated Value
Positive overflow	not used	used	not used
Negative overflow	not used	used	not used
Error	not used	not used	not used

Displaying the Report

Report data display

The reports can be displayed from the [Information] - [Memory Summary] menu in the operation mode. See section 4.5.

Status display

If the data of a measurement or a computation channel enter any of the conditions listed below within the relevant time period (one hour for hourly reports and one day for daily reports, for example), status "E" or "O" is output to the report. In addition, if a power failure occurred or the time was changed, status "P" and "C" are output to the report, respectively. For the displayed position, see the report data output example in section 4.5.

11.11 Overview of the Report Function

Data Condition	Status
Common to measurement and computation channels	
Measurement error or computation error	E
For measurement channels	
Plus (+) over range	O
Minus (–) over range	O
<p>Over range occurs when the input type is voltage and the input exceeds $\pm 5\%$ of the measurable range.</p> <p>For example, consider the case when the measurement range is 2 V and the measurable range is from –2.000 to 2.000 V. If the input signal exceeds 2.200 V, + over range occurs. If the input signal falls below –2.200 V, – over range occurs.</p> <p>Over range occurs when the input type is TC (thermocouple) or RTD (resistance temperature detector) and the input exceeds approximately $\pm 10^{\circ}\text{C}$ of the measurable range. For example, consider the case when the measurement range is R and the measurable range is from 0.0 to 1760.0$^{\circ}\text{C}$. If the input signal exceeds approximately 1770.0$^{\circ}\text{C}$, + over-range occurs. If the input signal falls below approximately –10.0$^{\circ}\text{C}$, – over range occurs.</p>	
For computation channels	
+ computation overflow (when the value exceeds $3.4\text{E} + 38$)	O
– computation overflow (when the value falls below $-3.4\text{E} + 38$)	O

Numerical display

The range of displayed values of report data is from –9999999 to 99999999 excluding the decimal point. The decimal point position corresponds to the position of the decimal point of the upper and lower limit span of the computation channel.

However, special displays are used for cases given in the table below.

• Measurement channel

Item	Data Condition of Measurement Channels	Displayed Value
AVE (Average value)	When all data are measurement errors or over range	(Blank)
MAX, MIN (Maximum value, minimum value)	<ul style="list-style-type: none"> When all data are measurement errors + over range – over range 	(Blank) 99999 –99999
SUM (Sum value)	<ul style="list-style-type: none"> When all data are measurement errors or over range When the sum value exceeds $3.4\text{E} + 38$ When the sum value is below $-3.4\text{E} + 38$ 	(Blank) 9.999999E + 99 –9.999999E + 99

• Computation channel

Item	Data Condition of Computation Channels	Displayed Value
AVE (Average value)	When all data are computation errors or over range	(Blank)
MAX, MIN (Maximum value, minimum value)	<ul style="list-style-type: none"> When all data are computation errors When the maximum value exceeds 99999999 When the minimum value is below –9999999 	(Blank) 99999999 –99999999

The decimal position that was specified when the span for the equation was specified is reflected in the maximum and minimum values. For example, if the span setting of the equation is “200.0,” then “99999999” is output when the value exceeds “99999999.9” and “–99999999” is output when the value is below “–9999999.9.”

SUM (Sum value)	<ul style="list-style-type: none"> When all data are computation errors or computation overflow When the sum value exceeds $3.4\text{E} + 38$ When the sum value is below $-3.4\text{E} + 38$ 	(Blank) 9.999999E + 99 –9.999999E + 99
--------------------	--	--

Storing to the Internal Memory and Saving to the External Storage Medium

Report data are stored to the internal memory at the end of each time interval.

The maximum number of report data files (data set for each interval) that can be stored in the internal memory is 40. For detail, see chapter 8.

11.12 Using the Report Function

Starting/Stopping the Report Function

The report start/stop is in sync with the data acquisition start/stop. The report can also be started or stopped via remote control or communication commands. For the remote control function, see section 10.9. For the communication function, see RD-MV100 Communication Interface User's Manual.

Procedure

Starting the report (also starts the data acquisition to the internal memory)

1. Press the START key. The icon that indicates the data acquisition to the internal memory turns to a start icon and the computation icon appears. For details related to the status display section, see section 4.2.
The report function starts. When the time to create the report arrives, the report data are written to the internal memory.

Stopping the report (also stops the data acquisition to the internal memory)

1. Press the STOP key. A confirmation window opens.
2. Use the arrow keys to select [Mem + Math] (stop the data acquisition to the internal memory and computation) or [Mem] (stop the data acquisition), and press the DISP/ENTER key.
The icon that indicates the data acquisition to the internal memory turns to a stop icon and the computation icon disappears.
The report stops.

Note

When the report function is stopped, the report file is closed. When the report is restarted, data are written to a new file.

Clearing the Report Data in the Internal Memory

These procedures are carried out in the setting mode. The report data are cleared along with the display data, for example. For the procedures, see section 9.7.


11.13 Setting the Report Function


Set the report type, report channels, the time and date to create the report. The report function is set in the basic setting mode.

Procedure

- These procedures are carried out in the basic setting mode.
- Use the arrow keys to move the cursor (blue) to the appropriate parameter.
- The possible selections are displayed at the bottom of the screen. Select using the soft keys.
- The parameter boxes that are changed are displayed in yellow. By confirming the new settings, they change back to white.

Press .

Press  for 3 seconds. The menu screen for the basic setting mode appears.

Twice press the soft key .

Press the soft key .

To display the setting screen press the soft key .

Report		
Report set	Hour	1
Date	1	2
Time	0	3
Report CH	R01	4
On/Off	On	5
Channel	01	6
Sum scale	/s	7

The numbers in front of the operating procedure shown below correspond to the numbers in the above figure.

1. Report set
[Hour] : Creates hourly reports.
[Day] : Creates daily reports.
[Day+Week] : Creates daily and weekly reports.
[Day+Month] : Creates daily and monthly reports.
2. Date/Day of the week
This is the date or day of the week on which the report is created.
If the [Report set] is set to [Day+Month], [Date] is displayed. If [Day+Week] is specified, [Day] is displayed. If [Hour] or [Day] is specified, [Date] is displayed. However, this setting is void.
 - Date (for monthly reports)
Pressing the [Input] soft key displays a window used to enter the date. Enter the date (01-28)* and press the DISP/ENTER key. Procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
* You cannot specify 30 or 31.
 - Day (for weekly reports)
Enter the day of the week using the soft key.

3. Time (hour)
Set the time to create daily, weekly, and monthly reports with the time on the hour (00 to 23).
Pressing the [Input] soft key displays a window used to enter the time. Enter the time and press the DISP/ENTER key. For the procedures related to entering numerical values, see "Entering Numbers" on page 3-21.
This setting is void for hourly reports.
4. Report CH
This is the report data number to which the measurement/computation channel is assigned. Select from R01 to R12. The reports are output in order according to this number.
5. On/Off
[On] : Assign channels to "Report CH."
[Off] : Do not assign report channels to "Report CH."
6. Channel
Set the measurement or computation channel to assign to the report channel.
All measurement and computation channels can be specified. However, the reports are not created for channels that are set to [Skip] or those that have the computation turned [Off].
7. Sum scale (sum unit)
Select [Off], [/s], [/min], [/h], or [/day]. See section 11.11.

Confirming operation

To confirm the new settings, press the DISP/ENTER key.

To cancel the new settings, press the ESC key. A window appears for you to confirm the cancellation. Select [Yes] using the arrow keys and press the DISP/ENTER key.

Explanation**Date/Day of the week**

This is the date for monthly reports or the day of the week for weekly reports. The report is created at the specified time on the specified date or day of the week.

Time

This is the time at which daily, weekly, and monthly reports are created. Hourly reports are created every hour on the hour.

12.1 A List of Messages

Occasionally, error codes and messages appear on the screen while using the recorder. The entire list of messages is given below. Error codes and messages related to communications are also listed here.

The messages are displayed in the language that you have chosen. For the procedures regarding language selection, see section 10.10.

However, the following messages are displayed only in English.

- messages displayed on the error log screen
- messages corresponding to communication commands

Errors Related to Parameter Settings

• Setting Errors

Code	Message	Explanation/Countermeasures/Ref. Section
1	System error.	Contact your nearest Omega dealer.
2	Incorrect date or time setting.	See section 3.7.
3	A disabled channel is selected.	See Communication Interface User's Manual.
4	Incorrect function parameter.	See Communication Interface User's Manual.
5	The input numerical value exceeds the set range.	Enter a proper value.
6	Incorrect input character string.	Enter a proper character string.
7	Too many characters.	Enter specified number of characters.
8	Incorrect input mode.	See Communication Interface User's Manual.
9	Incorrect input range code.	See Communication Interface User's Manual.
21	Cannot set an alarm for a skipped channel.	See Communication Interface User's Manual.
22	The upper and lower span limits are equal.	See sections 5.1 to 5.7.
23	The upper and lower scale limits are equal.	See sections 5.5 and 5.6.
30	The partial boundary value exceeds the range of the span.	See section 7.11.
31	Partialexpansion display is set ON for a SKIPPED channel.	See Communication Interface User's Manual.
35	The upper and lower limits of the display band are equal.	See section 7.9.
36	The lower limit of the display band is greater than the upper limit.	See section 7.9.
37	The display band is narrower than 4% of the entire display.	See section 7.9.
40	Incorrect group set character string.	See section 7.6.
41	There is no specified input channel.	See Communication Interface User's Manual.
42	Exceeded the number of channels which can be set.	See Communication Interface User's Manual.
43	A channel number cannot repeat in a group.	See section 7.6.
45	There is no character string saved in the clipboard.	Copy a character string to the clipboard.
46	The character string saved in the clipboard is too long.	Paste a character string with the specified number of characters.
61	There is no channel specified by the MATH expression.	See section 11.4.
62	MATH expression grammar is incorrect.	See section 11.2.
63	MATH expression sequence is incorrect.	See section 11.2.
64	MATH upper and lower span values are equal.	See section 11.4.
70	The range of the MATH constant is exceeded.	See section 11.4.
71	Set range of the MATH constant is exceeded.	See section 11.6.
81	All space or 'quit' string cannot be specified.	See section 10.4.
83	Duplicate used combination of user ID and password.	See section 10.4.
85	The login password is incorrect.	See section 10.1.
86	The key-lock release password is incorrect.	See section 10.1.
87	This key is locked.	See section 10.1.
88	This function is locked.	See section 10.1.
89	Press [FUNC] key to login.	See section 10.3.

12.1 A List of Messages

Code	Message	Explanation/Countermeasures/Ref. Section
90	No permission to enter to the SETUP mode.	See sections 10.3 and 10.4.
91	Password is incorrect.	See sections 10.1 and 10.3.
92	Press [ESC] key to change to the operation mode.	Press the ESC key.
100	IP address doesn't belong to class A, B, or C.	See Communication Interface User's Manual.
101	The result of the masked IP address is all 0s or 1s.	See Communication Interface User's Manual.
102	SUBNET mask is incorrect.	See Communication Interface User's Manual.
103	The net part of default gateway is not equal to that of IP address.	See Communication Interface User's Manual.
104	FTP client failed because the memory mode is 'manual'.	See Communication Interface User's Manual.

• Execution Errors

Code	Message	Explanation/Countermeasures/Ref. Section
150	This action is not possible because sampling is in progress.	See sections 8.5 and 8.6.
151	This action is not possible during sampling or calculating.	See sections 8.5, 8.6, and 11.3.
152	This action is not possible because saving is in progress.	Wait till the saving ends.
153	This action is not possible because formatting is in progress.	Wait till the formatting ends.
155	The message is not written while sampling is stopped.	See sections 8.5 and 8.6.
160	Cannot load the specified data. Change the memory setting.	See sections 4.5, 9.3, and 9.4.

Operation Errors

• Errors Related to External Storage Medium

Code	Message	Explanation/Countermeasures/Ref. Section
200	Operation aborted because an error was found in media.	See Communication Interface User's Manual.
201	Not enough free space on media.	Use another storage medium.
202	Media is read-only.	Release the write protection.
210	Media has not been inserted.	Insert a storage medium into the drive.
211	Media is damaged or not formatted.	Use another storage medium or carry out formatting.
212	Format error.	Try formatting again or use another storage medium.
213	The file is read-only.	Access to other files or make the file write-enable.
214	There is no file or directory.	See Communication Interface User's Manual.
215	Exceeded the allowable number of files.	Delete files or change storage medium.
216	The file or directory name is incorrect.	See sections 8.9 and 9.1.
217	Unknown file type.	Access to other files.
218	Directory exists. Delete the directory or change directory name.	See section 8.9.
219	Invalid file or directory operation.	Cannot handle files and directories in the 2nd and deeper layers.
220	The file is already in use. Try again later.	Wait till file is free.
230	There is no setting file.	Access to other files.
231	Abnormal setting exists in file.	Access to other files.

• Errors Related to Historical Trend

Code	Message	Explanation/Countermeasures/Ref. Section
232	There is no available data.	This message may appear when recalling historical trend. Access to other files.
233	The specified historical data do not exist.	This message may appear when recalling historical trend. See section 4.5.
234	The specified channel is not assigned to the display group.	This message may appear when switching to trend or bar graph from overview. See sections 4.4 and 7.6.

• Errors Related to FTP Client

For information regarding the FTP client function of this recorder, see the RD-MV100 Communication Interface User's Manual (M3643).

Code	Message
280	<p>IP address is not set or FTP function is not available.</p> <p>Further details are provided by the character string that appears after error code 280.</p> <hr/> <p>Character String and Details</p> <hr/> <p>HOSTADDR The recorder's IP address has not been specified. Check the IP address.*¹</p> <p>DORMANT Internal processing error.*²</p> <p>LINK Data link is disconnected. Check the cable connection.</p>
281	<p>FTP mail box operation error.</p> <p>Further details are provided by the character string that appears after error code 281.</p> <hr/> <p>Character String and Details</p> <hr/> <p>MAIL Internal processing error.*²</p> <p>STATUS Internal processing error.*²</p> <p>TIMEOUT Internal processing error.*²</p> <p>PRIORITY Internal processing error.*²</p> <p>NVRAM Internal processing error.*²</p>
282	<p>FTP control connection error.</p> <p>Further details are provided by the character string that appears after error code 282.</p> <hr/> <p>Character String and Details</p> <hr/> <p>HOSTNAME Failed the DNS lookup (search the IP address corresponding to the host name). Check the DNS setting and the destination host name.</p> <p>TCPIP Internal processing error.*²</p> <p>UNREACH Failed to connect to a control connection server. Check the address setting and that the server is running.</p> <p>OOBINLINE Internal processing error.*²</p> <p>NAME Internal processing error.*²</p> <p>CTRL The control connection does not exist. Check that the server does not drop the connection and that it responds within the proper time period.</p> <p>IAC Failed to respond in the TELNET sequence. Check that the server does not drop the connection and that it responds within the proper time period.</p> <p>ECHO Failed to transmit data on the control connection. Check that the server does not drop the connection and that it responds within the proper time period.</p> <p>REPLY Failed to receive data on the control connection. Check that the server does not drop the connection and that it responds within the proper time period.</p> <p>SERVER The server is not in a condition to provide the service. Check that the server is in a condition in which service can be provided.</p>

12.1 A List of Messages

Code	Message
283	<p>FTP command was not accepted.</p> <p>Further details are provided by the character string that appears after error code 283.</p> <hr/> <p>Character String and Details</p> <hr/> <p>USER</p> <p>Failed user name verification.</p> <p>Check the user name setting.</p> <p>PASS</p> <p>Failed password verification</p> <p>Check the password setting.</p> <p>ACCT</p> <p>Failed account verification.</p> <p>Check the account setting.</p> <p>TYPE</p> <p>Failed to change the transfer type.</p> <p>Check that the server supports the binary transfer mode.</p> <p>CWD</p> <p>Failed to change the directory.</p> <p>Check the initial path setting.</p> <p>PORT</p> <p>Failed to set the transfer connection.</p> <p>Check that the security function is disabled.</p> <p>PASV</p> <p>Failed to set the transfer connection.</p> <p>Check that the server supports PASV commands.</p> <p>SCAN</p> <p>Failed to read the transfer connection settings.</p> <p>Check that proper response to the PASV command is received from the server.</p> <hr/>
284	<p>FTP transfer setting error.</p> <p>Further details are provided by the character string that appears after error code 284.</p> <hr/> <p>Character String and Details</p> <hr/> <p>MODE</p> <p>Internal processing error.*²</p> <p>LOCAL</p> <p>Internal processing error.*²</p> <p>REMOTE</p> <p>The destination file name is not correct.</p> <p>Check that you have the authority to create or overwrite files.</p> <p>ABORT</p> <p>File transfer abort was requested by the server.</p> <p>Check the server for the reason for the abort request.</p> <hr/>

Code	Message
285	FTP data connection error. Further details are provided by the character string that appears after error code 285.
Character String and Details	
	SOCKET Failed to create a socket for the transfer connection.* ³
	BIND Failed the transfer connection command.* ³
	CONNECT Failed the transfer connection.* ³
	LISTEN Failed the transfer connection reception.* ³
	ACCEPT Failed to accept the transfer connection.* ³
	SOCKNAME Internal processing error.* ²
	RECV Failed to receive data over the transfer connection.* ³
	SEND Failed to send data over the transfer connection.* ³
286	FTP file transfer error.

*1 See the RD-MV100 Communication Interface User's Manual (M3643).

*2 Contact your nearest Omega dealer.

*3 These errors may occur if the network experiences trouble during the data transmission (bad cable connection, duplicate addresses, network equipment failure).

Note

- The FTP client function on the recorder has a timer function that drops the connection if there is no data transfer for two minutes. If the server does not respond within this time period, the transfer fails.
- The FTP client function on the recorder overwrites files with the same file names on the server without any warnings, unless the server rejects the request.
- For information regarding the FTP client function of this recorder, see the RD-MV100 Communication Interface User's Manual (M3643).

Communication Errors

For information regarding the communication function of this recorder, see the RD-MV100 Communication Interface User's Manual (M3643).

• Errors during Setting and Basic Setting Modes, Output Communication Command Execution, and Setup Data Loading

Code	Message
300	Command is too long.
301	Too many number of commands delimited with ';'.
302	This command has not been defined.
303	Data request command can not be enumerated with sub-delimiter.
350	Command is not permitted to the current user level.
351	This command cannot be specified in the current mode.
352	The option is not installed.
353	This command cannot be specified in the current setting.
354	This command is not available during sampling or calculating.

12.1 A List of Messages

- **Memory Access Errors during Setting and Basic Setting Modes and Output Communication Command Execution**

An English error message is returned via the communication interface. It is not displayed on the screen.

Code	Message
360	Output interface must be chosen from Ethernet or RS by using 'XO' command.
361	The memory data is not saved for the communication output.
362	There are no data to send 'NEXT' or 'RESEND'.
363	All data have already been transferred.

- **Maintenance and Test Communication Command Errors**

An English error message is returned via the communication interface. It is not displayed on the screen.

Code	Message
390	Command error.
391	Delimiter error.
392	Parameter error.
393	No permission.
394	No such connection.
395	Use 'quit' to close this connection.
396	Failed to disconnect.
397	No TCP control block.

- **Other Communication Errors**

An English error message is returned via the communication interface. It is not displayed on the screen.

Code	Message
400	Input username.
401	Input password.
402	Select username from 'admin' or 'user'.
403	Login incorrect, try again!
404	No more login at the specified level is acceptable.
410	Login successful. (The special user level)
411	Login successful. (The general user level)
420	Connection has been lost.
421	The number of simultaneous connection has been exceeded.
422	Communication has timed-out.

Note

For information regarding the communication function of this recorder, see the RD-MV100 Communication Interface User's Manual (M3643).

Status Messages

Code	Message
500	Execution is complete.
501	Please wait a moment...
503	Data are being saved to media...
504	File is being loaded from media...
505	Formatting...
506	Memory save to media was interrupted.
507	Exchange media to continue the saving operation.
510	Range cannot be changed during sampling or calculating.
511	MATH expression cannot be changed during sampling or calculating.
512	Because memory save is 'manual' mode, FTP is not available.
520	Connecting to the line...
521	The data file is being transferred.
551	FTP test is being executed...

Cautions

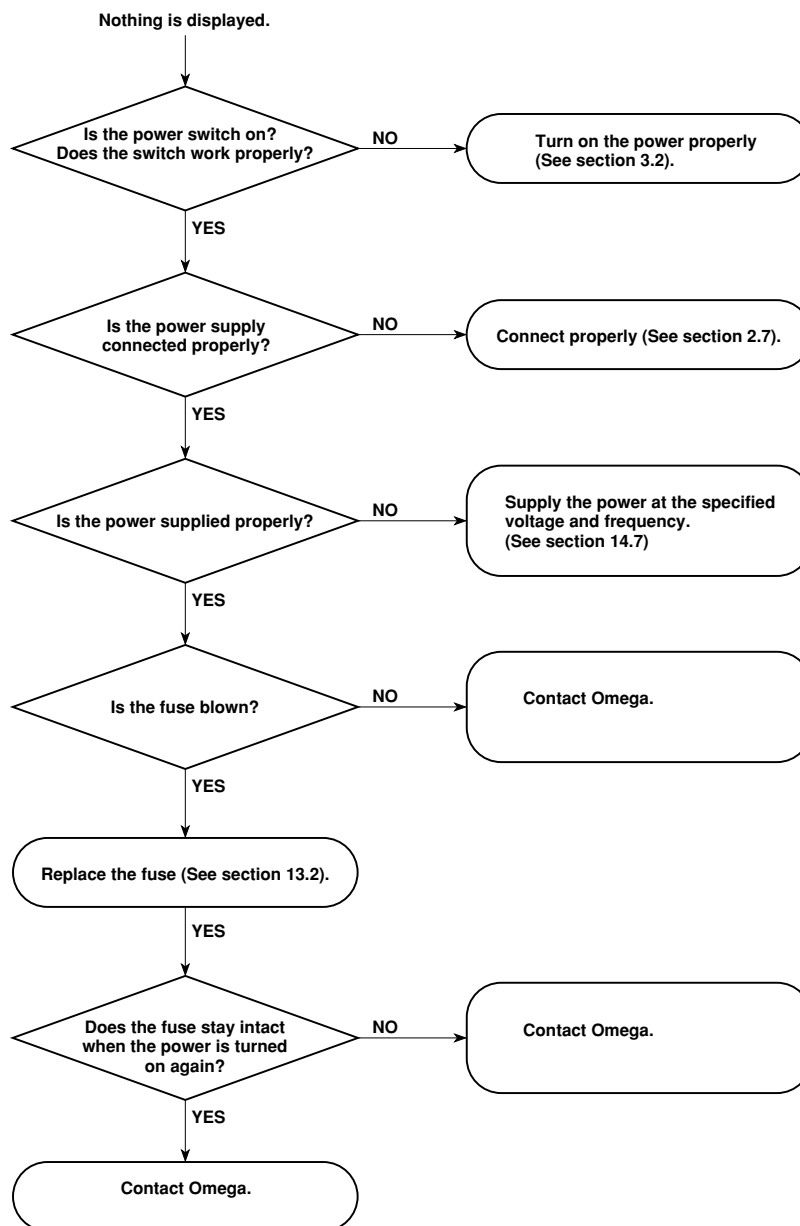
Code	Message	Ref. Section
600	Measured data and Settings have been initialized.	—
601	Measured data have been initialized.	—
610	This username is already registered.	See section 10.6.
611	There is no user who can enter to the SETUP mode.	See section 10.6.

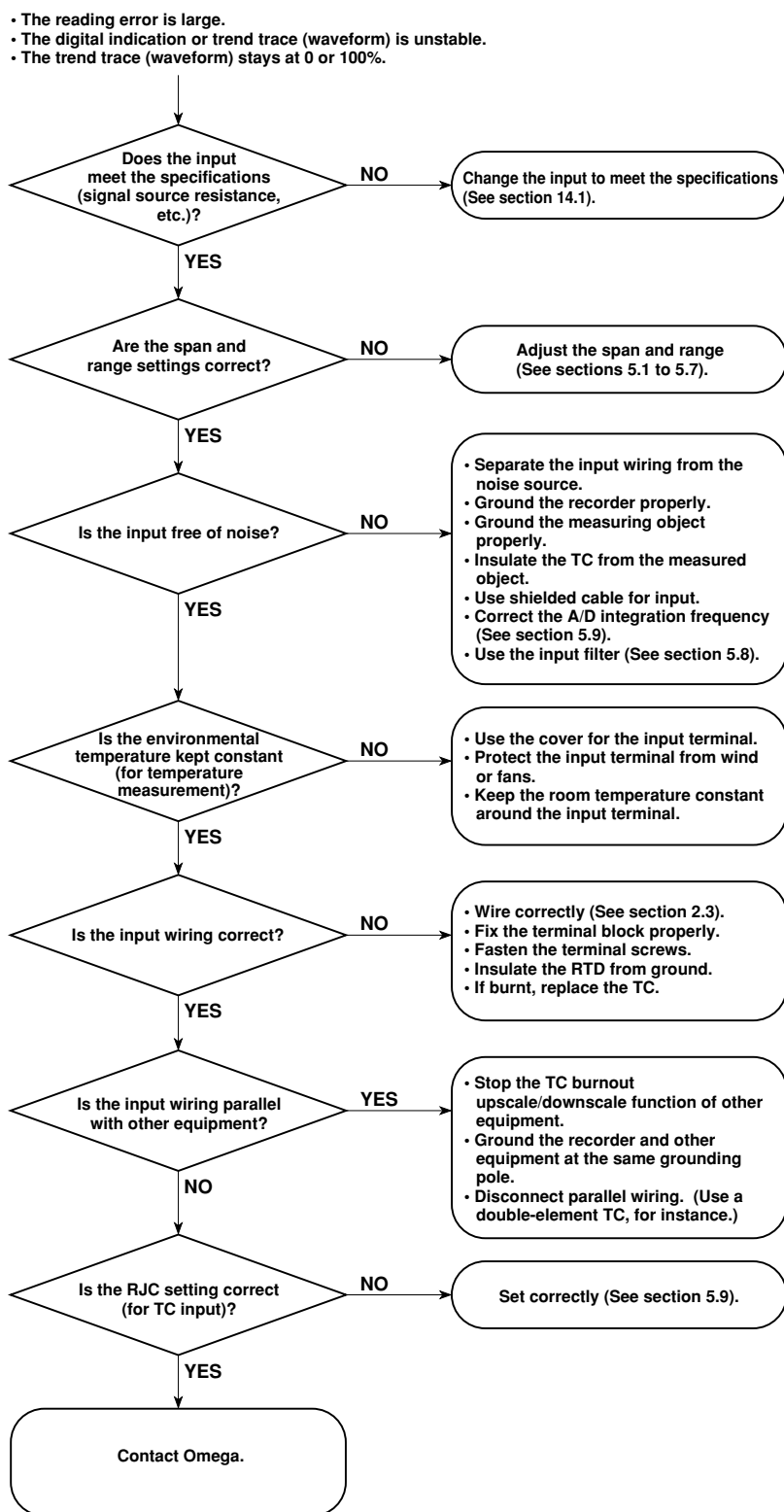
System Errors

Servicing is required when a system error occurs. Contact your nearest Omega dealer for repairs.

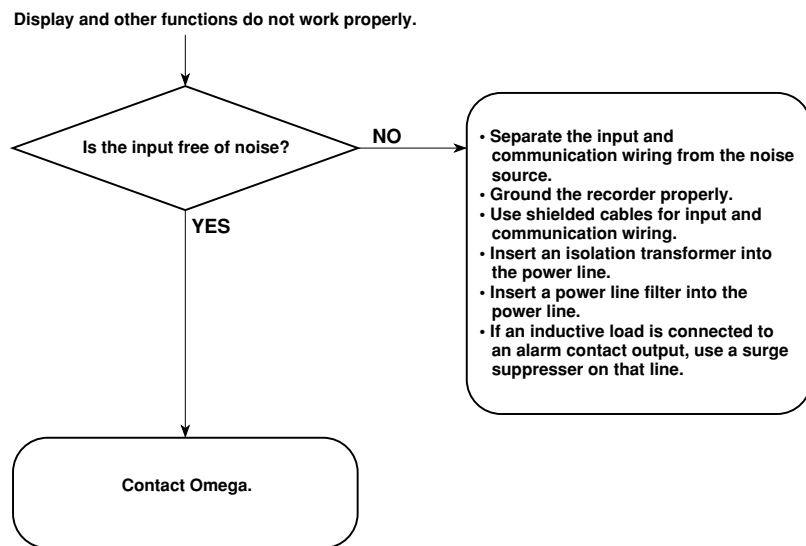
Code	Message
901	ROM failure.
902	RAM failure.
910	A/D memory failure for all input channels.
911	Channel 1 A/D memory failure.
912	Channel 2 A/D memory failure.
913	Channel 3 A/D memory failure.
914	Channel 4 A/D memory failure.
921	Channel 1 A/D calibration value error.
922	Channel 2 A/D calibration value error.
923	Channel 3 A/D calibration value error.
924	Channel 4 A/D calibration value error.
930	Memory acquisition failure.
940	The Ethernet module is down.

12.2 Troubleshooting Flow Chart





12.2 Troubleshooting Flow Chart



13.1 Periodic Maintenance

Check the recorder operation periodically to keep the recorder in good working order. Perform the following checks and replace worn parts as needed.

- Is the display and storage functioning properly?
In the event of problems, see section 12.2.
- Has the brightness of the LCD backlight deteriorated?
If replacement is necessary, see section 13.4 "Recommended Replacement Periods for Worn Parts."

13.2 Replacing the Fuse

Don't replace the fuses for 100-120 VCA/200-240 VCA power supply models by yourself.
For replacement, please, contact Omega.
Replace the fuse every two years for preventive maintenance.

For 12 VDC Power Supply Model

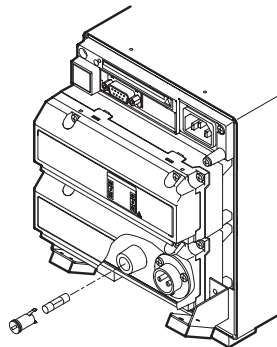


WARNING

- For safety reasons, make sure to turn OFF the power switch and disconnect the recorder from the main power supply before replacing the fuse.
 - To prevent the possibility of fire, use only the specified fuse purchased from Omega.
 - Never short circuit the fuse holder to bypass the use of a fuse.
-

Follow the procedures below to replace the fuse of the 12 VDC power supply model.
For fuse rating, see section 13.4 "Recommended Replacement Periods for Worn Parts."
Follow the procedures below to replace the fuse.

1. Turn OFF the power switch.
2. Disconnect the recorder from the main power supply.
3. While pressing the fuse carrier located to the right of the power switch, turn it counter-clockwise approximately 45 degrees. The carrier and the fuse will slide out.
4. Replace with a new fuse, insert the carrier in the fuse holder, and turn it clockwise while pressing the carrier to fix it in place.



For 100-120 VAC/200-240 VAC Power Supply Model



WARNING

- Don't replace the fuse by yourself. Never take RD-MV100 part to replace a fuse.
-

Fuse ratings

Rated voltage: 250 V
Rated current: 1 A
Type: Time lag
Approved standard: IEC/VDE

13.3 Calibration

To maintain the measurement accuracy, we recommend the recorder be calibrated once a year. Calibration service is also provided by Omega. For details contact Omega.

Required Instruments

For calibrating the recorder, calibration instruments with the following resolution are necessary.

Recommended instruments

- DC voltage standard : Omega Model 2552 or equivalent
Main specifications
Accuracy of output in the range 20 mV to 20 V : $\pm 0.005\%$
- Decade resistance box : Omega Model 2793-01 or equivalent
Main specifications
Accuracy of output in the range 0.1 to 500 Ω : $\pm 0.001\%$
Resolution : 0.001 Ω

(To purchase these instruments, contact the supplier of this recorder.)

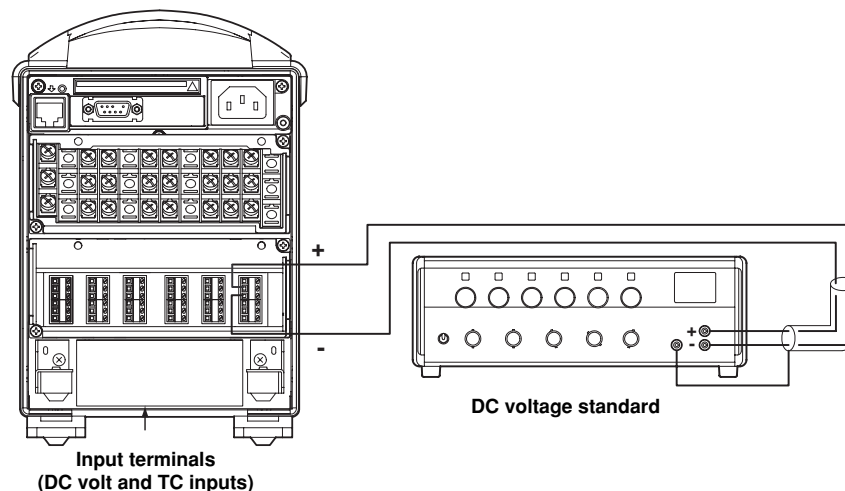
Calibration Procedure

1. Connect the recorder and the calibration instruments as shown in the following figure, and allow the instruments to warm-up adequately. (The warm-up time for the recorder is at least 30 minutes.)
2. Check that the ambient temperature and humidity are within the normal operating conditions (See chapter 14).
3. Apply input signals corresponding to 0, 50, and 100% of the specified input range and calculate the errors from the readings.
If the error is not within the accuracy specifications, contact Omega.

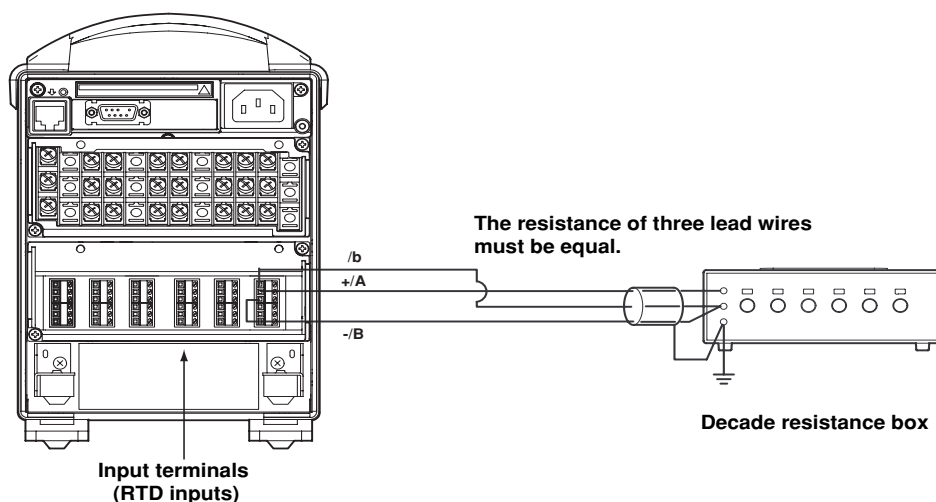
Note

For TC input, the temperature of the input terminals must be measured and a voltage corresponding to the temperature at the reference junction must be added.

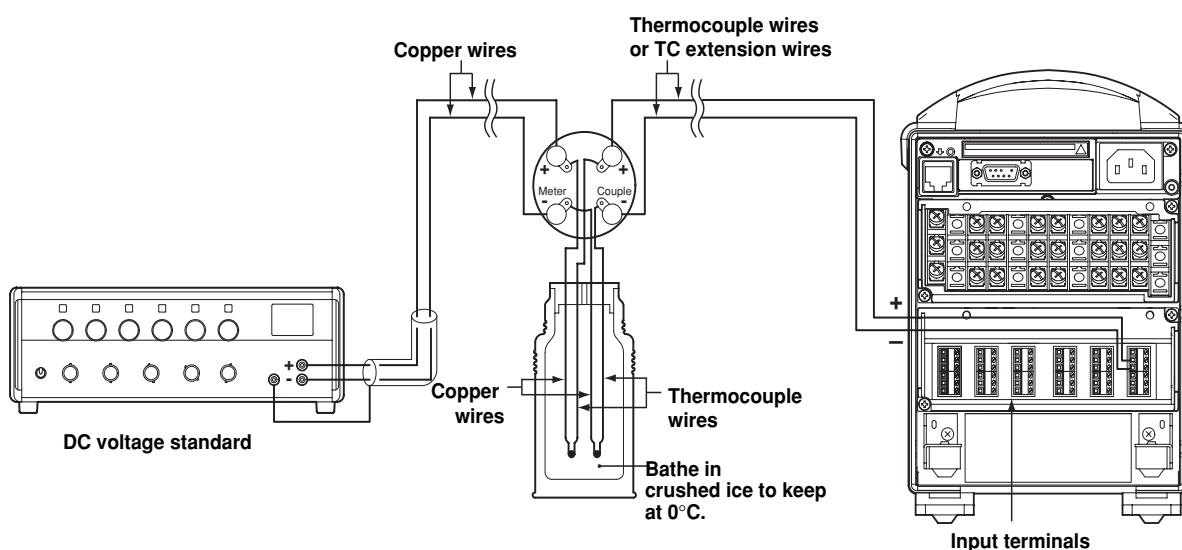
DC voltage measurement (example for the RD-MV112)



Temperature measurement using the RTD (example for the RD-MV112)



Temperature measurement using the TC (example for the RD-MV112)



Reference junction compensation for the thermocouple input

As the measurement terminal of the recorder is generally at room temperature, the actual output of the thermocouple is different from the values given on the thermoelectromotive force table based on 0°C. The recorder measures the temperature of the terminal and makes adjustments by calculation. Therefore, when the measurement terminals are shorted (equivalent to 0°C at the detector tip), the temperature at the measurement terminal is displayed. When calibrating the RD-MV100, this compensation voltage (thermoelectromotive force of 0 °C reference corresponding to the input terminal temperature) must be subtracted from the output of the standard generator before application. As shown in the figure, by using a Model T-MJ reference junction pot to compensate the reference junction at 0 °C, you can input the thermoelectromotive force of 0 °C reference from the standard generator and make the calibration.

13.4 Recommended Replacement Periods for Worn Parts

To maintain the reliability of the recorder and to use it in good working order for a long time, we recommend periodic replacement of worn parts as preventive maintenance.

The recommended replacement periods for worn parts are shown in the following table. The replacement periods apply when the recorder is operated under standard operating conditions.

Please consider the actual operating conditions when determining the actual replacement periods for your recorder.

The replacement of the LCD, the battery, and the rubber strips must be conducted by a qualified Omega personnel. Contact Omega to have the LCD replaced.

Item	Replacement Period	Part Name	Part Number	Specifications	Quantity Used
Fuse (for 12 VDC power supply)	2 years	FUSE	A1352EF	250 V, 4 A, time lag (for /P1 model)	1
LCD	5 years	Back light module			1
Battery	10 years	Lithium battery			1
Rubber strip	5 years	Dust and water proof rubber strip		for front panel, for front cover	1 each
Floppy disk drive	5 years	—	—		1
ZIP drive	5 years	—	—		1

Note

The recommended replacement period for the back light module is the period when the brightness falls to half. The speed of degradation of the brightness varies depending on the operating conditions and the judgement is subjective.

These factors should be considered when determining the actual replacement period.

14.1 Input Specifications

Number of Inputs :	RD-MV102 : two channels RD-MV104 : four channels RD-MV106 : six channels RD-MV112 : twelve channels
Scan Interval :	RD-MV102, MV104 : 125 ms or 250 ms RD-MV106, RD-MV112 : 1 s or 2 s (2 s when an A/D integration time is set to 100 ms)
Inputs :	Volt (DC voltage), TC (thermocouple), RTD (resistance temperature detector), DI (digital input), DC current (with external shunt resistor attached)

Input Type	Range	Measuring Range
Volt	20 mV	-20.00 to 20.00 mV
	60 mV	-60.00 to 60.00 mV
	200 mV	-200.0 to 200.0 mV
	2 V	-2.000 to 2.000 V
	6 V	-6.000 to 6.000 V
	20 V	-20.00 to 20.00 V
TC	R ^{*1}	0.0 to 1760°C 32 to 3200°F
	S ^{*1}	0.0 to 1760°C 32 to 3200°F
	B ^{*1}	0.0 to 1820°C 32 to 3200°F
	K ^{*1}	-200.0 to 1370°C -328 to 2498°F
	E ^{*1}	-200.0 to 800°C -328.0 to 1472.0°F
	J ^{*1}	-200.0 to 1100°C -328.0 to 2012.0°F
	T ^{*1}	-200.0 to 400°C -328.0 to 752.0°F
	N ^{*1}	0.0 to 1300°C 32 to 2372°F
	W ^{*2}	0.0 to 2315°C -328.0 to 4199°F
	L ^{*3}	-200.0 to 900°C -328.0 to 1652.0°F
RTD ^{*5}	Pt100 ^{*4}	-200.0 to 600°C -328.0 to 1112.0°F
	JPt100 ^{*4}	-200.0 to 550°C -328.0 to 1022.0°F
DI	DCV input (TTL)	OFF : less than 2.4 V ON : more than 2.4 V
	Contact input	Contact ON/OFF

*1 R, S, B, K, E, J, T, N : IEC584-1 (1995), DIN IEC584, JIS C1602-1995

*2 W : W-5% Rd/W-26% Rd (Hoskins Mfg. Co.), ASTM E988

*3 L : Fe-CuNi, DIN43710, U : Cu-CuNi, DIN43710

*4 Pt100 : JIS C1604-1997, IEC751-1995, DIN IEC751-1996
JPt100 : JIS C1604-1989, JIS C1606-1989

*5 Measuring current : i = 1 mA

A/D Integration Time :	Selectable from 20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (50/60 Hz for RD-MV106/112), or AUTO (automatic selection from 20 ms and 16.7 ms by detection of power supply frequency)
Thermocouple Burnout :	Burnout upscale/downscale function can be switched ON/OFF (for each channel). Burnout upscale/downscale selectable
Filter :	RD-MV102, RD-MV104 : Signal damping On/off selectable for each channel Time constant : selectable from 2, 5, and 10 seconds RD-MV106, RD-MV112 : Moving average On/off selectable for each channel Number of samples to be averaged is selectable from 2 to 16

14.1 Input Specifications

Computation :	Differential computation :	Between any two channels Available for Volt, TC, RTD, and DI ranges.
	Linear scaling :	Available for Volt, TC, RTD, and DI ranges. Scaling limits : -30000 to 30000 Decimal point : user selectable Engineering unit : user definable, up to 6 characters
	Square root :	Square root computation and linear scaling Available for Volt range. Scaling limits : -30000 to 30000 Decimal point : user selectable Engineering unit : user definable, up to 6 characters

14.2 Display Specifications

Display unit :	5.5-inch TFT color LCD (VGA, 320 × 240 dot resolution)
Channel display color :	Trend/Bar graph : Selectable from 16 colors (Red, Green, Blue, Blue violet, Brown, Orange, Yellow green, Lightblue, Violet, Gray, Lime, Cyan, Darkblue, Yellow, Light Gray, Purple) Initial settings of channel display color : Channel 1 : Red, Channel 2 : Green, Channel 3 : Blue, Channel 4 : Blue violet, Channel 5 : Brown, Channel 6 : Orange, Channel 7 : Yellow-green, Channel 8 : Light blue, Channel 9 : violet, Channel 10 : Gray, Channel 11 : Lime 12 : Cyan
Trend screen :	Background : White or black selectable Direction : vertical or horizontal selectable Number of indication channels : 6 channels per screen (maximum) Number of group screens : 4 All channels indication : 24 channels (maximum, including computation channels) Line width : 1, 2, and 3 dots selectable Display rate : Waveform : 1, 2, 5, 10, 20, 30 min., 1, 2, 4 hours/div selectable (One division has 30 dots.) Numerical value : 1 s (2 s when the scan interval is 2 s.) Contents : Waveform, Numerical value (numerical display section can be turned ON/OFF), scale (scale display can be turned ON/OFF), grid lines (number of divisions selectable from 4 to 12), hours : minutes on time axis, trip lines (line widths are selectable from 1, 2 and 3 dots), messages (up to eight different messages of up to 16 characters for each), alarm indication Zone display and partial expansion display is available.
Bar graph screen :	Direction : Vertical or horizontal selectable Number of indication channels : 6 channels per screen (maximum) Number of group screens : 4 Scales : 4 to 12 divisions selectable Base position of bar : Left, right or center (only for horizontal display) Display update rate : 1 s (2 s when the scan interval is 2 s) Contents : Bar graph, numerical value, unit, scale, alarm indication

14.2 Display Specifications

Digital screen :	Number of indication channels : 6 channels per screen (maximum) Number of group screens : 4 Display update rate : 1 s (2 s when the scan interval is 2 s) Contents : Numerical value, unit, alarm indication
Automatic display switching :	The displayed group can be automatically changed on the trend, digital, and bar graph displays. The display switching interval is selectable from 5 s, 10 s, 20 s, 30 s, and 1 min.
Overview screen :	Number of indication channels : Measured values and alarm status of all channels
Information screen :	Alarm summary : Displays the list of alarms. Capable to switch to historical trend screen by cursor pointing. Message summary : Display the list of messages and time. Capable to switch to historical trend screen by cursor pointing. Memory summary : Display the file list in internal memory. Capable to switch to historical trend screen by cursor pointing.
Tags :	Number of characters : 16 characters maximum
Historical trend screen :	Display the retrieved data from internal or external memory. Display format : Whole screen display or divided into 2 areas Time axis operation : Can be expanded, reduced, and scrolled Memory information : The following information of the retrieved data are displayed: File name, serial number of the RD-MV which is used to acquire data, starting and ending time of data acquisition, user name (when using key login function), and batch information (models with /BT1)
Log display :	Display the logs of error messages, key login/logout, communication interface commands, and file transfers via FTP.
System screen :	Display the number of input points, capacity of the internal memory, options, and MAC address.
Backlight saver function :	The LCD backlight automatically dims if no key is pressed for a certain preset time (can be set from 1, 2, 5, 10, 20 and 60 minutes).
Display language :	Selectable from English, German, French, and Japanese. German and French are used on the following screens. For other screens, the displays will be the same as those for English. Screen menu in the operation mode FUNC key menu in the operation mode Error Messages Operation guide screens
Temperature unit :	°C or °F selectable

14.3 Data Storage Specifications

External storage medium :	Selectable from : 1) 3.5-inch floppy disk (2HD, 1.44 MB) 2) PCMCIA ATA flash memory card (4 to 160 MB) 3) Zip disk (100 MB)
Saving method :	Manual or automatic selectable
Manual saving :	Data saving by inserting external storage medium and pressing MEDIA key
Automatic saving :	Display data : Periodic saving (10 min to 31 days) to external storage medium Event data : In case of trigger free...Periodic saving (3 min to 31 days) to external storage medium In case of using trigger...Save the data when data acquisition is finished
Sampling Interval :	Display data : Linked with the waveform display rate Event data : Linked with the specified sampling interval
Sampling Interval for Event Data :	RD-MV102, RD-MV104 : Selectable from 125, 250, 500 ms, and 1, 2, 5, 10, 30, 60, 120 s RD-MV106, RD-MV112 : Selectable from 1, 2, 5, 10, 30, 60 and 120 s
File types :	The following two file types can be created. <ul style="list-style-type: none"> • Event data file (stores instantaneous values acquired periodically at a specified sampling interval) • Display data file (stores the maximum and minimum values for each sampling interval from among measured data acquired at scan intervals) Files can be created in the following combinations. (a) Event data file (only for trigger mode) + display data file (b) Display data file only (c) Event data file only Data format : Binary Data size per channel : Display data : Measurement data...4 bytes/datum, computation data...8 bytes/datum Event data : Measurement data...2 bytes/datum, computation data...4 bytes/datum
Trigger function :	Event data : Selectable from Free, Trigger or Rotate Display data + Event data : Selectable from Trigger or Rotate
Sampling length :	The sampling length(the maximum data length) can be derived from the following equation. Sampling length = the maximum number of data points per channel × sampling interval Maximum number of data points per channel : calculated from internal memory capacity, types of data, data size, and number of measurement or computation channels data to be stored

14.3 Data Storage Specifications

Internal memory capacity

Data Type	Capacity of Internal Memory
Display data only	1.2 MB
Display data and event data	Display data : 0.9 MB Event data : 0.3 MB
Event data only	1.2 MB

Maximum number of data points per channel that can be stored

Data Type	Maximum Number of Data Points Per Channel
Display data only	$1,200,000 \text{ bytes} / (\text{number of measurement channels} \times 4 + \text{number of computation channels} \times 8)$ Except, the maximum number of data points is 100,000
Display data and event data	<ul style="list-style-type: none">Display data $900,000 \text{ bytes} / (\text{number of measurement channels} \times 4 + \text{number of computation channels} \times 8)$ Except, the maximum number of data points is 75,000Event data $300,000 \text{ bytes} / (\text{number of measurement channels} \times 2 + \text{number of computation channels} \times 4)$ Except, the maximum number of data points is 30,000
Event data only	$1,200,000 \text{ bytes} / (\text{number of measurement channels} \times 2 + \text{number of computation channels} \times 4)$ Except, the maximum number of data points is 120,000

This logic is explained in more detail below :

1) When acquiring display data only

If we assume that the number of measuring channels is 20, the number of computing channels is 10, and the display rate is 30 min/div (60 sec sampling interval), then :

Number of data per channel = $1,200,000 \text{ bytes} / (20 \times 4 \text{ bytes} + 10 \times 8 \text{ bytes}) = 7,500 \text{ data}^*$

* Maximum number of data points is 100,000.

Sampling length per file = $7,500 \times 60 \text{ sec} = 450,000 \text{ sec}$
= approx. 5 days

2) When acquiring event data only

If we assume that the number of measuring channels is 20, the number of computing channels is 10, and the sampling interval is 1 sec, then :

Number of data per channel = $1,200,000 \text{ bytes} / (20 \times 2 \text{ bytes} + 10 \times 4 \text{ bytes}) = 15,000 \text{ data}^*$

* Maximum number of data points is 120,000.

Sampling length = $15,000 \times 1 \text{ sec} = 15,000 \text{ sec}$
= approx. 4 hours

3) When acquiring both display data and event data

The sampling length is calculated by defining the capacity for display data as 900,000 bytes and the capacity for event data as 300,000 bytes. The method of calculation is the same as shown above.

Except, the maximum number of data points is 75,000 for display data and 30,000 for event data.

Example of sampling length :

In case measurement ch = 4 ch, mathematical ch = 0 ch

Display data file only (approx.)

Display Rate (min/div)	1 min	5 min	20 min	30 min	60 min	240 min
Sampling Interval (s)	2 s	10 s	40 s	60 s	120 s	480 s
Sampling Length	41 h	8 days	34 days	52 days	104 days	416 days

Event data file only (approx.)

Sampling Interval	125 ms	500 ms	1 s	5 s	30 s	120 s
Sampling Length	4.2 h	16 h	33 h	6 days	41 days	166 days

Display data file + Event data file

Display data file (approx.)

Display Rate (min/div)	1 min	5 min	20 min	30 min	60 min	240 min
Sampling Interval (s)	2 s	10 s	40 s	60 s	120 s	480 s
Sampling Length	31 h	6 days	26 days	39 days	78 days	312 days

Event data file (approx.)

Sampling Interval	125 ms	500 ms	1 s	5 s	30 s	120 s
Sampling Length	1 h	4.2 h	8.3 h	41 h	10 days	41 days

In case measurement ch = 6 ch, mathematical ch = 0 ch

Display data file only (approx.)

Display Rate (min/div)	1 min	5 min	20 min	30 min	60 min	240 min
Sampling Interval (s)	2 s	10 s	40 s	60 s	120 s	480 s
Sampling Length	27 h	5 days	23 days	34 days	69 days	277 days

Event data file only (approx.)

Sampling Interval	1 s	5 s	10 s	30 s	60 s	120 s
Sampling Length	27 h	5 days	11 days	34 days	69 days	138 days

Display data file + Event data file

Display data file (approx.)

Display Rate (min/div)	1 min	5 min	20 min	30 min	60 min	240 min
Sampling Interval (s)	2 s	10 s	40 s	60 s	120 s	480 s
Sampling Length	20 h	4 days	17 days	26 days	52 days	208 days

Event data file (approx.)

Sampling Interval	1 s	5 s	10 s	30 s	60 s	120 s
Sampling Length	6.9 h	34 h	2 days	8 days	17 days	34 days

Manual sample data :

Trigger : Key operation or remote contact

Data format : ASCII

Max. number of data sets internal memory can hold : 50 data sets

TLOG data (only for computation option) :

Trigger : Timeout of the timer

Report data (only for computation option) :

Types : Hourly, daily, daily + monthly and daily + weekly

Data format : ASCII

Screen image data :

Trigger : Key operation

Data format : png format

Output : External storage medium or communication interface

14.4 Alarm Function Specifications

Number of alarms :	Up to four alarms for each channel
Alarm types :	Upper and lower limits, delay upper and lower limits, difference upper and lower limits, and upper limit and lower on rate-of-change
Alarm delay time :	Selectable from 0 s to 3600 s for each channel
Interval time of rate-of-change alarms :	The scan interval times 1 to 15, common to all channels.
Display :	The alarm status (type) is displayed in the numerical value display area upon occurrence of an alarm. A common alarm indication is also displayed in the status display section. The alarm indication behavior : non-hold or hold-type can be selectable for common to all channels.
Hysteresis :	On (0.5% of display span)/off selectable (applied to upper and lower limits alarms, common to all measurement channels)
Relay outputs (option) :	Number of points : 2, 4, 6 points Relay action : Energized/deenergized, hold/non-hold, AND/OR, reflash function selectable.
Alarm information :	The times of alarm occurrences/recoveries, alarm types, etc. Up to 120 latest alarms are stored in the internal memory. Displayed on the alarm summary screen.

14.5 Specifications of Communication Functions

Connection : Ethernet (10BASE-T)
Protocols : TCP/IP
FTP client functions : Automatic file transport from RD-MV (FTP client protocol)
FTP server functions : File transport on request by host computer (FTP server protocol)
Directory operation, file output, file delete and informing of the rest of memory space on the external storage medium
Files can be transported : Display data file, event data file and report data file
Real time monitor function : Monitor the measured/computed data on RD-MV.
Omega private protocol is used.

14.6 Specifications of Optional Functions

Alarm Output Relays (/A1, /A2, /A3) :

An alarm signal is output from the rear panel as a relay contact signal.

/A1 and /A2 includes remote control functions (/R1)

Relay contact rating : 250 VAC (50/60 Hz)/3 A, 250 VDC/0.1 A (for resistance load)

Terminal configuration : SPDT (NO-C-NC). Energized-at-alarm/deenergized-at-alarm, AND/OR, and hold/non-hold actions are selectable.

Batch Function (/BT1) :

Information added to the measured/computed data :

Serial number of the RD-MV, Application name, Supervisor name, Manager name, Batch number, Lot number, Comment information

Identifying operators (users) by using the key login function :

User names that are already registered cannot be specified.
The combinations of user IDs and passwords that are identical to those that have been registered in the past cannot be specified.

Messages : Messages 1 through 3 can be changed in the operation mode.

Confirming the stored data :

Batch information can be shown on the memory information display.

Serial Communication Interface (/C2, /C3) :

This interface allows the host computer to control and make settings for the recorder as well as receive data from the recorder.

Connection : EIA RS-232 (/C2) or RS-422-A/485 (/C3)

Protocols : Omega private protocol, Modbus protocol

Synchronization method : Start-stop asynchronous transmission

Connection method (RS-422-A/485) :

4-wire half-duplex multi-drop connection
(1 : N where N = 1 to 31)

Transmission speed : 1200, 2400, 4800, 9600, 19200 or 38400 bps

Data length : 7 or 8 bits

Stop bit : 1 bit

Parity : Odd, even, or none

Communication distance (RS-422-A/485) :

Up to 1200 m

Communication mode : ASCII for input/output for control and setting

ASCII or binary for output of measured data

Modbus : Mode : RTU SLAVE

Data type : Data read, data write

Wiring : 4 wires (for RS-422-A/485)

Fail/Memory End Output (/F1) :

The relay contact output on the rear panel informs of the occurrence of a system error.

Another relay contact output informs of the time until end of the internal memory space (selectable from 1, 2, 5, 10, 20, 50 or 100 hours) before the data is overwritten, or of the time when the remaining space on the external storage medium reaches to 10% of whole capacity.

Relay contact rating : 250 VAC (50/60 Hz)/3 A

250 VDC/0.1 A (for resistance load)

Clamped Input Terminal (/H2) :

Clamped input terminal is used for input terminal.

Desk Top Type (/H5[]) :

Provides carrying handle and power cord when /H5D, /H5F/, H5R, or /H5J is specified.

Computation Functions (/M1) :

Can perform computation, display the computed data assigned to channels in trends and numerical values, and store computed data.

Channels assignable to computed data :

RD-MV102, RD-MV104 : Up to 4 channels

RD-MV106, RD-MV112 : Up to 12 channels

Operation :

General arithmetic operations :

Four arithmetic operations, square root, absolute, common logarithm, exponential, power, relational operations (<, ≤, >, ≥, =, ≠), logical operations (AND, OR, NOT, XOR)

Statistical operations : Average, maximum, minimum and summation

Special operations : Rolling average

Constant :

Available (Up to 12 constants)

Digital input data via communication :

Digital data via communication can be used in calculation expression (Up to 12 data)

Remote input status :

Remote input status (0/1) can be used in calculation expression (Up to 8 inputs)

Report functions :

Report type : Hourly, daily, daily + monthly and daily + weekly

Operation : Average, maximum, minimum and summation

Data format : ASCII

14.6 Specifications of Optional Functions

3 terminal Isolated RTD Input (/N2) :

A, B, b terminals are of isolated input type.

* Can be specified only for RD-MV106 and RD-MV112.

A,B,b terminals of RD-MV102 and RD-MV104 are isolated as standard.

12 VDC Power Supply:

Powered by 12 VDC

For related specifications, see "Power Supply," "Normal Operating Conditions," "Effects of Operating Conditions," and "Other Specifications" in section 14.7.

Rated power supply : 12 VDC

Allowable power supply voltage range :

10 to 18 VDC

Rated power consumption :

30 VA

Remote Control (/R1) :

This option allows the following functions to be controlled remotely by a contact input (up to eight contact inputs) :

- Start/stop of memory (rising and falling edge)
- Trigger for event data acquisition (trigger, 250 ms or longer)
- Time adjustment (adjusting the time to a preset time upon contact signal, trigger, 250 ms or longer)

Time of Trigger-On	Processing
hh:00:00 to hh:01:59	Cut off reading of less than one minute. e.g. 10:00:50 is corrected as 10:00:00
hh:58:00 to hh:59:59	Round up reading of less than one minute. e.g. 10:59:50 is corrected as 11:00:00
hh:02:00 to hh:57:59	No process is to be performed.

- Start/stop of computation (rising and falling edge)
- Reset of computation data (trigger, 250 ms or longer)
- Manual sample (trigger, 250 ms or longer)
- Message display (Up to 8 different messages can be set, trigger, 250 ms or longer)
- Load of setting parameters (Up to 3 settings can be set, trigger, 250 ms or longer)
- Alarm acknowledgement (trigger, 250 ms or longer)

14.7 General Specifications

Construction

Installing:	Standing on its front feet, the recorder can be inclined backwards up to 30 degrees from a horizontal plane.
Dimensions :	approx. 152(W) × 225(H) × 240(D) mm
Weight :	RD-MV102 : approx. 3.7 kg RD-MV104 : approx. 3.7 kg RD-MV106 : approx. 3.8 kg RD-MV112 : approx. 3.8 kg

Standard Performance

Measuring and Recording Accuracy :

The following specifications apply to operation of the recorder under standard operation conditions :

Temperature : $23 \pm 2^{\circ}\text{C}$

Humidity : $55\% \pm 10\% \text{ RH}$

Power supply voltage : 90 to 132 or 180 to 250 VAC

Power supply frequency : 50/60 Hz $\pm 1\%$

Warm-up time : At least 30 minutes.

Other ambient conditions such as vibration should not adversely affect recorder operation.

Input	Range	Measurement Accuracy (Digital Display)	Max. Resolution of Digital Display
DC voltage	20 mV	$\pm (0.1\% \text{ of rdg} + 2 \text{ digits})$	10 μV
	60 mV		10 μV
	200 mV		100 μV
	2 V		1 mV
	6 V		1 mV
	20 V		10 mV
TC (Excluding the reference junction compensation accuracy)	R	$\pm (0.15\% \text{ of rdg} + 1^{\circ}\text{C})$ However, R, S : $\pm 3.7^{\circ}\text{C}$ at 0 to 100°C , $\pm 1.5^{\circ}\text{C}$ at 100 to 300°C	0.1 $^{\circ}\text{C}$
	S	B : $\pm 2^{\circ}\text{C}$ at 400 to 600°C (Accuracy at less than 400°C is not guaranteed.)	
	B	$\pm (0.15\% \text{ of rdg} + 0.7^{\circ}\text{C})$ However, $\pm (0.15\% \text{ of rdg} + 1^{\circ}\text{C})$ at -200 to -100°C	
	K	$\pm (0.15\% \text{ of rdg} + 0.5^{\circ}\text{C})$	
	E	$\pm (0.15\% \text{ of rdg} + 0.5^{\circ}\text{C})$	
	J	$\pm (0.15\% \text{ of rdg} + 0.5^{\circ}\text{C})$	
	T	However, $\pm (0.15\% \text{ of rdg} + 0.7^{\circ}\text{C})$ at -200 to -100°C	
	N	$\pm (0.15\% \text{ of rdg} + 0.7^{\circ}\text{C})$	
	W	$\pm (0.15\% \text{ of rdg} + 1^{\circ}\text{C})$	
	L	$\pm (0.15\% \text{ of rdg} + 0.5^{\circ}\text{C})$	
	U	However, $\pm (0.15\% \text{ of rdg} + 0.7^{\circ}\text{C})$ at -200 to -100°C	
RTD	Pt100	$\pm (0.15\% \text{ of rdg} + 0.3^{\circ}\text{C})$	
	JPt100		

14.7 General Specifications

Measuring accuracy in case of scaling (digits) :

Accuracy during scaling (digits) =
measuring accuracy (digits) \times multiplier + 2 digits (rounded up)

where the multiplier = scaling span (digits)/measuring span (digits).

Example : Assuming that

- range : 6 V
- measuring span : 1.000 to 5.000 V
- scaling span : 0.000 to 2.000

Then,

Measuring accuracy = $\pm(0.1\% \times 5 \text{ V} + 2 \text{ digits})$
= $\pm(0.005 \text{ V [5 digits]} + 2)$
= $\pm(7 \text{ digits})$

Multiplier = $2000 \text{ digits (0.000 to 2.000)} / 4000 \text{ digits (1.000 to 5.000 V)} = 0.5$

Accuracy during scaling = $7 \text{ digits} \times 0.5 + 2 = 6 \text{ digits (rounded up)}$

Reference junction compensation :

Internal/External selectable for each channel

Reference junction compensation accuracy (above 0°C) :

Types R, S, B, W : $\pm 1^\circ\text{C}$

Types K, J, E, T, N, L, U : $\pm 0.5^\circ\text{C}$

Maximum allowable input voltage :

$\pm 10 \text{ V DC}$ (continuous) for ranges of 2 V or less and TC ranges

$\pm 30 \text{ V DC}$ (continuous) for 6 V DC and 20 V DC ranges

Input resistance :

Approximately $10 \text{ M}\Omega$ or more for ranges of 2 V DC or less and TC

Approximately $1 \text{ M}\Omega$ for 6 V DC and 20 V DC ranges

Input source resistance :

Volt, TC : $2 \text{ k}\Omega$ or less

RTD : 10Ω or less per wire (The resistance of all three wires must be equal).

Input bias current : 10 nA or less

Maximum common mode noise voltage :

250 Vrms AC (50/60 Hz)

Maximum noise voltage between channels :

250 Vrms AC (50/60 Hz)

Interference between channels :

120 dB (when the input source resistance is 500Ω and the inputs to other channels are 30 V)

Common mode rejection ratio :

120 dB (50/60 Hz $\pm 0.1\%$, 500Ω imbalance, between the minus terminal and ground)

Normal mode rejection ratio :

40 dB (50/60 Hz $\pm 0.1\%$)

Power Supply

- Rated power supply : 100 to 240 VAC (automatic switching)
 12 VDC/AC (for 12 VDC power supply model)
- Allowable power supply voltage range :
 90 to 132 or 180 to 264 VAC
 10 to 18 VDC (for 12 VDC power supply model)
- Rated power supply frequency :
 50/60 Hz (automatic switching, for AC)
- Rated Power consumption :
 53 VA (except for /P1 model)
 30 VA (for 12 VDC power supply model)
- Power consumption :

Supply Voltage	Backlight Saving Mode	Normal	Max.
100 VAC	17 VA	20 VA	38 VA
240 VAC	26 VA	30 VA	53 VA
12 VDC	10VA	11VA	30VA

Normal Operating Conditions

- Power supply voltage : 90 to 132 or 180 to 250 VAC
 10 to 18 VDC (for 12 VDC power supply model)
- Power supply frequency : 50 Hz $\pm 2\%$, 60 Hz $\pm 2\%$
- Ambient temperature : 0 to 50°C (when using FDD or Zip drive : 5 to 40°C)
- Ambient humidity : 20% to 80% RH (at 5 to 40°C)
- Vibration : 10 to 60 Hz, 0.2 m/s² or less
- Shock : Not acceptable
- Magnetic field : 400 A/m or less (DC and 50/60 Hz)
- Noise : Normal mode (50/60 Hz) :
 Volt : The peak value including the signal must be less than 1.2 times the measuring range.
 TC : The peak value including the signal must be less than 1.2 times the measuring thermal electromotive force.
 RTD : 50 mV or less
- Common mode noise(50/60 Hz) :
 250 Vrms AC or less for all ranges
- Maximum noise voltage between channels (50/60 Hz) :
 250 Vrms AC or less
- Mounting position : Can be inclined up to 30 deg backward. Mounting at an angle away from the perpendicular is not acceptable.
- Warm-up time : At least 30 minutes after power on
- Altitude : 2000 m or less

Effects of Operating Conditions

- Ambient temperature : With temperature variation of 10°C :
 $\pm(0.1\%$ of rdg + 1 digit) or less for Volt and TC ranges
 Excluding the error of reference junction compensation
 $\pm(0.1\%$ of rdg + 2 digit) or less for RTD ranges
- Power supply : For 100 to 240 VAC power supply model
 With variation within 90 to 132 V and 180 to 250 VAC (50/60 Hz) : ± 1 digit or less
 With variation of ± 2 Hz from rated power frequency (at 100 VAC) : $\pm(0.1\%$ of rdg + 1 digit) or less
 For 12 VDC power supply model
 With variation within 10 to 18 VDC ± 1 digit or less
- Magnetic field : AC (50/60 Hz) and DC 400 A/m fields :
 $\pm(0.1\%$ of rdg + 10 digits) or less

14.7 General Specifications

- Input source resistance :
- (1) Volt range
 - With variation of $+1\text{ k}\Omega$:
 - Ranges of 2 V or less : within $\pm 10\text{ }\mu\text{V}$
 - Ranges of 6 V or greater : -0.1% of rdg or less
 - (2) TC range
 - With variation of $+1\text{ k}\Omega$:
 - Within $\pm 10\text{ }\mu\text{V}$ ($\pm 100\text{ }\mu\text{V}$ when the burnout upscale/downscale function is switched on)
 - (3) RTD range (Pt100)
 - With variation of $10\text{ }\Omega$ per wire (resistance of all three wires must be equal) :
 - $\pm(0.1\% \text{ of rdg} + 1 \text{ digit})$ or less
 - With maximum difference of 40 mohms between wires : approximately 0.1°C

Transport and Storage Conditions

The following specifies the environmental conditions required during transportation from shipment to the start of service and during storage as well as during transportation and storage if this instrument is temporarily taken out of service.

No malfunction will occur under these conditions with serious damage, which is impossible to repair; however, calibration may be necessary to recover normal operation performance.

- Ambient temperature : -25°C to 60°C
Humidity : 5% to 95% RH (No condensation is allowed).
Vibration : 10 to 60 Hz, 4.9 m/s^2 maximum
Shock : 392 m/s^2 maximum (while being packed)

Other Specifications

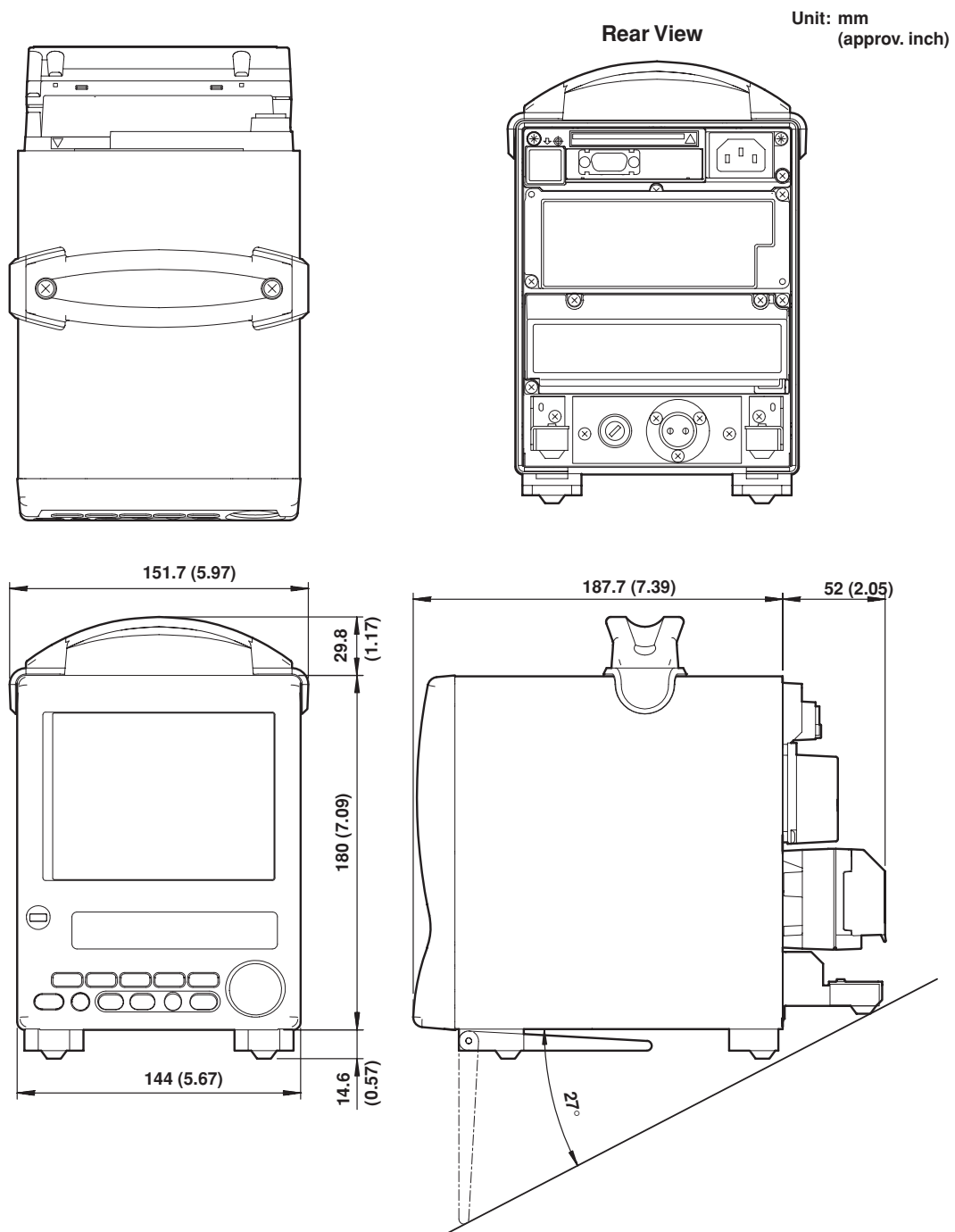
- Clock : With calendar function (year of grace)
The time can be adjusted by a remote contact (with the remote control option).
- Daylight saving : Summer and wintertime can be set.
- Accuracy of clock : $\pm 100\text{ ppm}$, excluding a delay (of 1 second, maximum) caused each time the power is turned on.
- Memory backup : A built-in lithium battery backs up the setup parameters (battery life : approximately ten years at room temperature).
- Key lock function : ON/OFF and password can be set.
- Key login function : Power on with log out mode and all key operations are not permitted.
"User name", "User ID" and "password" are required to enter the operation mode.
- Insulation resistance : Each terminal to ground terminal : $20\text{ M}\Omega$ or greater (at 500 VDC)

Dielectric strength :	Power supply to ground terminal : 1500 VAC (50/60 Hz), 1 minute (except for /P1 model)
	Power supply to ground terminal : 500 VAC (50/60 Hz), 1 minute (for /P1 model)
	Contact output terminal to ground terminal : 1500 VAC (50/60 Hz), 1 minute
	Measuring input terminal to ground terminal : 1500 VAC (50/60 Hz), 1 minute
	Between measuring input terminals : 1000 VAC (50/60 Hz), 1 minute (except for b-terminal of RTD input of RD-MV106 and RD-MV112)
	Between remote control terminal to ground terminal : 500 VDC, 1 minute

Safety and EMC Standards

Safety standards :	Certified by CSA22.2 No. 1010.1 and UL3111-1 (CSA NRTL/C) Complies with EN61010-1 (option) Installation category (Overvoltage category) II ^{*1} Pollution degree 2 ^{*2} *1 "Installation category (Overvoltage category)" describes a number which defines a transient overvoltage condition. It implies the regulation for impulse withstand voltage. "II" applies to electrical equipment which is supplied from the fixed installation like distribution board. *2 "Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs.
EMC standards :	Complies with EN61326-1 (option)

14.8 Dimentional Drawings



Appendix 1 Parameters and Initial Settings

Setting Mode

Initial settings are thick-framed.

Parameters		Menu				Notes	
Range	Volt	20 mV	60 mV	200 mV	2 V	Other parameters : Upper/lower limits of span	
		6 V	20 V				
	TC	R	S	B	K		
		E	J	T	N		
		W	L	U			
	RTD		PT	JPT		Other parameters : Upper/lower limits of span	
	Scale	Volt	20 mV	60 mV	200 mV	2 V	Other parameters : Upper/lower limits of span Upper/lower limits of scale
			6 V	20 V			
		TC	R	S	B	K	
			E	J	T	N	
			W	L	U		
		RTD	PT	JPT			
		DI	Level	Cont			
	Unit					Character string	
	Delta	Volt	20 mV	60 mV	200 mV	2 V	Other parameters : Upper/lower limits of span
			6 V	20 V			
		TC	R	S	B	K	
			E	J	T	N	
W			L	U			
RTD		PT	JPT				
DI		Level	Cont				
Ref. CH					Up to model types		
DI		Level	Cont			Other parameters : Upper/lower limits of span	
Sqrt		20 mV	60 mV	200 mV	2 V	Other parameters : Upper/lower limits of span Upper/lower limits of scale	
		6 V	20 V				
	Unit					Character string	
Skip							
Alarm	On/Off		On	Off			
	Type	H	L	h	l		
		R	r	T	t		
	Value						Numerical value
	Relay On/Off		On	Off			
Number		I01 to I06				Up to model types	
Tag	Tag					Character string, Initial setting is "all space"	
Moving average	Count	Off	2	3	4	RD-MV106/RD-MV112	
		5	6	7	8		
		9	10	11	12		
		13	14	15	16		
Filter		Off	2 s	5 s	10 s	RD-MV102/RD-MV104	
Alarm delay time		1 s to 3600 s	10 s			Numerical value	
Trend/Save interval	Time/div	1 min	2 min	5 min	10 min		
		20 min	30 min	1 h	2 h		
		4 h					
	Auto save interval		10 min to 31 days	1 h			Up to other parameters set
Message	Characters No.1 to No.8					Character string, Initial setting is "all space"	
File	Header					Character string, Initial setting is "all space"	
	Directory name					Character string, Initial setting is [DATA 0]	
	Save data		Unsave	All			

Appendix 1 Parameters and Initial Settings

Parameters			Menu				Notes	
Group set	Group number		1	2	3	4	Fixed	
	Group name		GROUP 1	GROUP 2	GROUP 3	GROUP 4	Character string	
	CH set						See section 7.6 for initial settings.	
	Trip line	On/Off	On	Off				
		Position						Numerical value
		Color	Red	Green	Blue	B. violet	Initial values are No.1 : Red, No.2 : Green, No.3 : Blue, No.4 : Yellow	
	Brown		Orange	Y. green	Lightblue			
Violet	Gray		Lime	Cyan				
Darkblue	Yellow		Lightgray	Purple				
Color	CH1 to CH12		Red	Green	Blue	B. violet	See section 14.2 for initial settings.	
			Brown	Orange	Y. green	Lightblue		
			Violet	Gray	Lime	Cyan		
			Darkblue	Yellow	Lightgray	Purple		
Zone	Lower	0 to 95					Numerical value	
	Upper	5 to 100						
Graph	Division	4	5	6	7			
		8	9	10	11			
		12						
	Bar graph	Normal	Center					
	Scale position	1	2	3	4			
		5	6	7	8			
		9	10	Off				
Partial	On/Off	On	Off					
	Expand	1 to 99					Numerical value	
	Boundary							
View	Direction	Trend	Horizontal	Vertical				
		Bar graph	Horizontal	Vertical				
	Background		White	Black				
	Trend line		1	2	3			
	Trip line		1	2	3			
	Grid	4	5	6	7			
		8	9	10	11			
	Scroll	5 s	10 s	20 s	30 s			
		1 min						
LCD	Brightness		1	2	3	4		
			5	6	7	8		
	Backlight saver	On/Off	On	Off				
		Saver time	1 min	2 min	5 min	10 min		
			30 min	1 h				
	Restore		Key	Key + Alm				
	Math color	CH31 to CH60		Red	Green	Blue	B. violet	See section 14.2 for initial settings.
Brown				Orange	Y. green	Lightblue		
Violet				Gray	Lime	Cyan		
Darkblue				Yellow	Lightgray	Purple		
Math Zone	Lower	0 to 95					Numerical value	
	Upper	5 to 100						
Math partial	On/Off	On	Off					
	Expand	1 to 99					Numerical value	
	Boundary							

Appendix 1 Parameters and Initial Settings

Parameters		Menu				Notes		
Math Graph	Division	4	5	6	7			
		8	9	10	11			
		12						
	Bar graph	Normal	Center					
	Scale position	1	2	3	4			
		5	6	7	8			
		9	10	Off				
Save/Load, Clear data	Save settings							
	Load settings							
	Save data							
	Load display data							
	Load event data							
	File list							
	Delete							
	Format							
Clear data								
Time set						Numerical value		
Math set	Math range	On/Off	On	Off				
		Calculation expression						Equation for computation
		Span Lower						Numerical value
		Span Upper						
		Unit						Character string
	Math alarm	On/Off	On	Off				
		Type	H	L	T	t		
		Value						Numerical value
		Relay On/Off	On	Off				
		Number	I01 to I06					Up to model types
	Constant	K01 to K12						Numerical value, Initial setting is [1]
	Tag	Tag						Character string, Initial setting is "all space"
	TLOG	Timer No.	1	2	3			
		Sum scale	Off	/s	/min	/h		
	Rolling average	On/Off	On	Off				
		Interval	1 s	2 s	3 s	4 s		
			5 s	6 s	10 s	12 s		
			15 s	20 s	30 s	1 min		
			2 min	3 min	4 min	5 min		
			6 min	10 min	12 min	15 min		
			20 min	30 min	1 h			
	Number of samples	1 to 64					Numerical value	
	Alarm delay time	1 s to 3600 s	10 s				Numerical value	

Appendix 1 Parameters and Initial Settings

Basic Setting Mode

Initial settings are thick-framed.

Parameters			Menu				Notes
Alarm	Reflash		On	Off			
	Relay	AND	None	I01	I01 - I02	I01 - I03	Up to model types
			I01 - I04	I01 - I05	I01 - I06		
	Action		Energize	De-energ			
	Behavior		Hold	Nonhold			
	Indicator		Hold	Nonhold			
	Rate of change	Increase Decrease	1	2	3	4	
			5	6	7	8	
			9	10	11	12	
13			14	15			
Hysterisis		On	Off				
A/D	Integrate		Auto	50 Hz	60 Hz	100 ms	100 ms is for DX106 and RD-MV112 only
	Scaninterval		125 ms	250 ms			RD-MV102/RD-MV104
			1 s	2 s			RD-MV106/RD-MV112
	Burnout set		Off	Up	Down		
	RJC		Internal	External			
		Volt (μV)					Numerical value
Memory	Save		Auto	Manual			
	Data		Display	E + D	Event		
	Event	Sample rate	125 ms	250 ms	500 ms	1 s	125 ms, 250 ms, and 500 ms are for RD-MV102 and RD-MV104 only
			2 s	5 s	10 s	30 s	
			60 s	120 s			
		Mode	Free	Trigger	Rotate		
		Block	1	2	4	8	1, 2, and 4 when [Data] is set to [E + D]
			16				
		Data length	3 min to 31 days				Up to other parameters set
		Pre-trigger	0	5	25	50	
			75	95	100		
		Trigger					
	Key	On	Off				
	External	On	Off				
	Alarm	On	Off				
	Memory and trend	Meas CH/Math CH		Meas CH	Math CH		
First-CH						Up to model types	
Last-CH							
On/Off		On	Off				
AUX	Tag/Channel		Tag	Channel			
	Memory alarm		1 h	2 h	5 h	10 h	
			20 h	50 h	100 h		
	Language		English	Japanese	German	French	
	Partial		Use	Not			
	Batch		Use	Not			For models with /BT1

Appendix 1 Parameters and Initial Settings

Parameters		Menu				Notes	
Keylock	Use/Not	Use	Not				
	password					Character string	
	START	Free	Lock				
	STOP	Free	Lock				
	MENU	Free	Lock				
	MEDIA	Free	Lock				
	DISP/ENTER	Free	Lock				
	Alarm ACK	Free	Lock				
	Math	Free	Lock				
	Write memory (Messege) (Manual sample)	Free	Lock				
Media	Free	Lock					
Key login	Use/Not	Use	Not				
	Auto logout	On	Off				
	User ID Use/Not	Use	Not				
	Number	1	2	3	4		
		5	6	7			
	On/Off	On	Off				
	User name	User 1 to User 7				Character string	
	User ID	1 to 7					
Password							
Save/Load, Initialize	Enter setup	Enable	Disable				
	Save settings						
	Load settings						
	Delete						
	Format						
Option Remote	Action NO.1 to NO.8	None	Start Stop	Trigger	Alatm ACK		
		Time adj	Math Start Stop	Math rst	M. sample		
		Pnl 1 load	Pnl 2 load	Pnl 3 load	Message 1		
		Message 2	Message 3	Message 4	Message 5		
		Message 6	Message 7	Message 8			
Option Timer (TLOG)	Mode		Off	Relative	Absolute	Initial setting Timer 1 : Absolute Timer 2, 3 : Off	
	Interval	(Absolute)	1 min	2 min	3 min		4 min
			5 min	6 min	10 min		12 min
			15 min	20 min	30 min		1 h
			2 h	3 h	4 h		6 h
			8 h	12 h	24 h		
			(Relative)				Numerical value
	Ref. time					Numerical value, Initial setting is [0 : 00]	
	Reset		On	Off			
	Action		Off	Datasave			
Option Report	Report set		Off	Hour	Day	Day + Week	
			Day + Month				
	Date					Numerical value	
	Date of the week		SUN	MON	TUE	WEN	
			THU	FRI	SAT		
Time (hour)					Numerical value		

Appendix 1 Parameters and Initial Settings

Parameters		Menu				Notes	
Option Report	Report CH	R01	R02	R03	R04		
		R05	R06	R07	R08		
		R09	R10	R11	R12		
	On/Off	On	Off				
	Channel					Up to model types	
Sum scale	Off	/s	/min	/h			
	/day						
Communication Ethernet	IP-address					Numerical value	
	Subnet mask						
	Default gateway						
	DNS On/Off		On	Off			
	Server search order					Numerical value	
	Primary						
	Secondary						
	Host name					Character string	
	Domain name						
	Domain suffix search order					Character string	
Primary							
Secondary							
Communication Serial	Baud rate		1200	2400	4800	9600	
			19200	38400			
	Data length		7	8			
	Parity		Even	Odd	None		
	RS-232	Handshaking	Off : Off	XON : XON	XON : RS	CS : RS	
	RS-422A /485	Address	1	2	3	4	
			5	6	7	8	
			9	10	11	12	
			13	14	15	16	
			17	18	19	20	
			21	22	23	24	
			25	26	27	28	
			29	30	31	32	
			Protocol	Normal	Modbus		
	Memory out		Ethernet	Serial			
	FTP transfer file	Disp & Event data	On	Off			
		Report	On	Off			
	FTP connection		Primary	Secondary			
		FTP server name					
Port number		21				Numerical value	
Login name					Character string		
Password							
Account							
PASV mode		On	Off				
Initial pass					Character string		
Ethernet login	Use/Not	Use	Not				
	Level	Admin	User 1	User 2	User 3		
		User 4	User 5	User 6			
		On/Off	On	Off			
	User name				Character string		
Password							
Application time out		On	Off				
Time	1 to 120 min				Numerical value		
Keep alive		On	Off				

Appendix 2 Data Formats of ASCII Files

This section describes the data format of the ASCII file. The RD-MV100 creates two types of ASCII files, the manual sampled data file and the report file.

Data Format of the Manual Sampled Data File

- The manual sampled data are output in ASCII format using values and strings that are separated by commas.
- The channel/tag, unit, and manual sampled values are not output for channels in which the input range is set to [Skip] or for which the computation is turned OFF.

Example

The following example is for channels 1, 2, 3, 4, and 31.

```
"MANUAL SAMPLE DATA"
"Model Serial No.:", "XXXXXXXXXXXXXXXXXX"
"File Header : ", "AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA"
"CH/TAG", 1 "CH01", "CH02", "CH03", "CH04", "CH31"
"UNIT", "V", "V", "V", "V", "mV"
2000/01/01 01:08:43, 0.000, 0.000, 0.000, -0.014, 12.00
2000/01/01 01:08:48, 0.000, 0.000, 0.000, -0.014, 12.00
2000/01/01 01:09:15, 0.000, 0.000, 0.000, -0.014, 12.00

"CH/TAG", 1 "CH01", "CH02", "CH03", "CH04", "CH31"
"UNIT", "V", "V", "V", "V", "V"
2000/01/01 01:15:30, 0.000, 0.000, 0.000, -0.014, 12.00
2000/01/01 01:18:12, 0.000, 0.000, 0.000, -0.014, 12.00
```

Data size

• Size of the header section

The following equation can be used to derive the size of the header section.

Title + carriage return line feed + serial number + carriage return line feed + file header + carriage return line feed + channel/tag (8 + 19 × number of channels that are output) + carriage return line feed + unit (6 + 9 × number of channels that are output) + carriage return line feed

- The size of the title is fixed to 20 bytes.
- The size of the serial number is fixed to 38 bytes.
- The size of the file header is fixed to 49 bytes.
- The size of the carriage return line feed is fixed to 2 bytes.

Calculation example

Manual sampled data for 30 channels

$$20 + 2 + 38 + 2 + 49 + 2 + (8 + 19 \times 30) + 2 + (6 + 9 \times 30) + 2 = 971 \text{ bytes}$$

• Size of the data section of one data set

The following equation can be used to derive the size of data section of one data set.

Date and time of manual sampling + measured value (8 × number of measurement channels) + computed value (10 × number of computation channels) + carriage return line feed

- The size of the date and time of creation is fixed to 19 bytes.
- The size of the carriage return line feed is fixed to 2 bytes.

Calculation example

Manual sampled data for 30 measurement channels

$$19 + (8 \times 30) + (10 \times 0) + 2 = 261 \text{ bytes}$$

- **Number of data sets and file size**

The file size of 50 data sets* for 30 measurement channels is calculated as follows.

Size of the header section + $50 \times$ size of the data section of one data set = 14019 bytes

* 50 data sets is the maximum number of manual sampled data sets that can be written in the internal memory. If there are more than 50 data sets, they are overwritten starting with the oldest data set.

Note

- Plus (+)/minus (–) over range in measurement channels
Over range occurs when the input type is voltage and the input exceeds $\pm 5\%$ of the measurable range. For example, consider the case when the measurement range is 2 V and the measurable range is from –2.000 to 2.000 V. If the input signal exceeds 2.200 V, + over range occurs. If the input signal falls below –2.200 V, – over range occurs.
Over range occurs when the input type is TC (thermocouple) or RTD (resistance temperature detector) and the input exceeds approximately $\pm 10^{\circ}\text{C}$ of the measurable range. For example, consider the case when the measurement range is R and the measurable range is from 0.0 to 1760.0°C . If the input signal exceeds approximately 1770.0°C , + over range occurs. If the input signal falls below approximately -10.0°C , – over range occurs.
- Plus (+)/minus (–) computation overflow in computation channels
Plus (+) computation overflow occurs when the value exceeds $3.4\text{E} + 38$.
Minus (–) computation overflow occurs when the value falls below $-3.4\text{E} + 38$.
- Output value when detected erroneous data, measurement over range data, or computation overflow data

Channels	Data	Output Value
Measurement channels	measurement error	Blank
	plus (+) over range	99999
	minus (–) over range	–99999
Computation channels	computation error	999999999
	plus (+) computation overflow	999999999
	minus (–) computation overflow	–999999999

- CH/TAG and UNIT lines
In the following cases, both the CH/TAG line and the UNIT line are rewritten after a carriage return line feed and followed by manual sampled data.
 - When the measurement channel is switched from some setting other than [Skip] to [Skip].
 - When the measurement channel is switched from [Skip] to some other setting.
 - When the computation channels are turned On or turned Off.
 - When the unit is changed.Four lines from the bottom of the file example shows the output when the unit for channel 31 is changed from “mV” to “V.”
-

Data Format of the Report File

- The hourly, daily, weekly, and monthly reports are output in ASCII format using values and strings that are separated by commas.
- The channel/tag, unit, average value, maximum value, minimum value, and sum value are not output for channels in which the input range is set to [Skip] or for which the computation is turned OFF.

Example

The following example is the daily report for four channels.

```

"DAILY REPORT", "START TIME", 2000/01/31 20:00
"Model Serial No.:", "XXXXXXXXXXXXXXXXXX"
"File Header:", "AAAAAAAAAAAAAAAAAAAAAAAAAAAA"
"CH/TAG", "CH01", "CH02", "CH03", "CH04"
"UNIT", "V", "V", "V", "V"

2000/01/01 00:00, "C", "C", "C", "C"
"AVE", 0.00, 0.10, 0.20, 0.30
"MAX", 0.00, 1.00, 2.00, 3.00
"MIN", 0.00, -1.00, -2.00, -3.00
"SUM", 0.000000E-01, 1.000000E+04, 2.000000E+04, 3.000000E+04

```

Status

- Various events that occur while creating the report data are saved as status data and output in the report.
- The positions of the various statuses in the report are fixed.

E : Error (an error is detected)

O : Over (an over range/computation overflow is detected)

P : Power failure (a power disruption has occurred)

C : Change (the time has been changed)

Data size

Size of the header section

The following equation can be used to derive the size of the header section.

Title + carriage return line feed + serial number + carriage return line feed + file header + carriage return line feed + channel/tag (8 + 19 × number of channels that are output) + carriage return line feed + unit (6 + 9 × number of channels that are output) + carriage return line feed

- The size of the title varies depending on the report type as follows.
 - For hourly reports (HOURLY) : 45 bytes
 - For daily reports (DAILY) : 44 bytes
 - For weekly reports (WEEKLY) : 45 bytes
 - For monthly reports (MONTHLY) : 46 bytes
- The size of the serial number is fixed to 38 bytes.
- The size of the file header is fixed to 49 bytes.
- The size of the carriage return line feed is fixed to 2 bytes.

Calculation example

Monthly data for 30 channels

$$46 + 2 + 38 + 2 + 49 + 2 + (8 + 19 \times 30) + 2 + (6 + 9 \times 30) + 2 = 997 \text{ bytes}$$

- **Size of the data section of one report data set**

The following equation can be used to derive the size of data section of one report data.

Carriage return line feed + date and time of creation + status ($11 \times$ number of channels that are output) + carriage return line feed + average value ($5 + 14 \times$ number of channels that are output) + carriage return line feed + maximum value ($5 + 14 \times$ number of channels that are output) + carriage return line feed + minimum value ($5 + 14 \times$ number of channels that are output) + carriage return line feed + sum value ($5 + 14 \times$ number of channels that are output) + carriage return line feed

- The size of the date and time of creation is fixed to 16 bytes.
- The size of the carriage return line feed is fixed to 2 bytes.

Calculation example

Monthly data for 30 channels

$$2 + 16 + (11 \times 30) + 2 + (5 + 14 \times 30) + 2 + (5 + 14 \times 30) + 2 + (5 + 14 \times 30) + 2 + (5 + 14 \times 30) + 2 = 2058 \text{ bytes}$$

- **Number of report data sets and file size**

The file size varies depending on the number of report data sets as follows.

- One report data set of monthly reports
Size of the header section + size of the data section of one report data set = 3055 bytes
 - 40 report data sets* of monthly reports
Size of the header section + $40 \times$ size of the data section of one report data set = 83317 bytes
- * 40 report data sets is the maximum number of report data sets that can be written in the internal memory. If there are more than 40 data sets, they are cleared starting with the oldest data set.

Note

- When the measurement and computation channel data enter the condition described in the following table, status "E" and "O" are output in the report.

Data Condition	Status
Common to measurement and computation channels	
Measurement error or computation error	E
For measurement channels	
Plus (+) over range	O
Minus (–) over range	O
Over range occurs when the input type is voltage and the input exceeds $\pm 5\%$ of the measurable range.	
For example, consider the case when the measurement range is 2 V and the measurable range is from -2.000 to 2.000 V. If the input signal exceeds 2.200 V, + over range occurs. If the input signal falls below -2.200 V, – over range occurs.	
Over range occurs when the input type is TC (thermocouple) or RTD (resistance temperature detector) and the input exceeds approximately $\pm 10^\circ\text{C}$ of the measurable range. For example, consider the case when the measurement range is R and the measurable range is from 0.0 to 1760.0°C . If the input signal exceeds approximately 1770.0°C , + over-range occurs. If the input signal falls below approximately -10.0°C , – over range occurs.	
For computation channels	
+ computation overflow (when the value exceeds $3.4\text{E} + 38$)	O
– computation overflow (when the value falls below $-3.4\text{E} + 38$)	O

- Measurement/computation errors are discarded when MAX and MIN are determined.
- Measurement/computation errors, over range, and computation overflow are discarded when determining AVE and SUM.
- The report output values of AVE, MAX, MIN and SUM vary depending on the data condition of the measurement and computation channels as shown in the table below.

Item	Data Condition of Measurement Channels	Report Output Value
AVE (Average value)	When all data are measurement errors or over range	(Blank)
MAX, MIN (Maximum value, minimum value)	<ul style="list-style-type: none"> • When all data are measurement errors • + over range • – over range 	(Blank) 99999 –99999
SUM (Sum value)	<ul style="list-style-type: none"> • When all data are measurement errors or over range • When the sum value exceeds $3.4E + 38$ • When the sum value is below $-3.4E + 38$ 	(Blank) 9.999999E + 99 –9.999999E + 99

Item	Data Condition of Computation Channels	Report Output Value
AVE (Average value)	When all data are computation errors or over range	(Blank)
MAX, MIN (Maximum value, minimum value)	<ul style="list-style-type: none"> • When all data are computation errors • When the maximum value exceeds 99999999 • When the minimum value is below –9999999 	(Blank) 99999999 –9999999

The decimal position that was specified when the span for the equation was specified is reflected in the maximum and minimum values. For example, if the span setting of the equation is “200.0,” then “99999999” is output when the value exceeds “99999999.9” and “–99999999” is output when the value is below “–999999.9.”

SUM (Sum value)	<ul style="list-style-type: none"> • When all data are computation errors or computation overflow • When the sum value exceeds $3.4E + 38$ • When the sum value is below $-3.4E + 38$ 	(Blank) 9.999999E + 99 –9.999999E + 99
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