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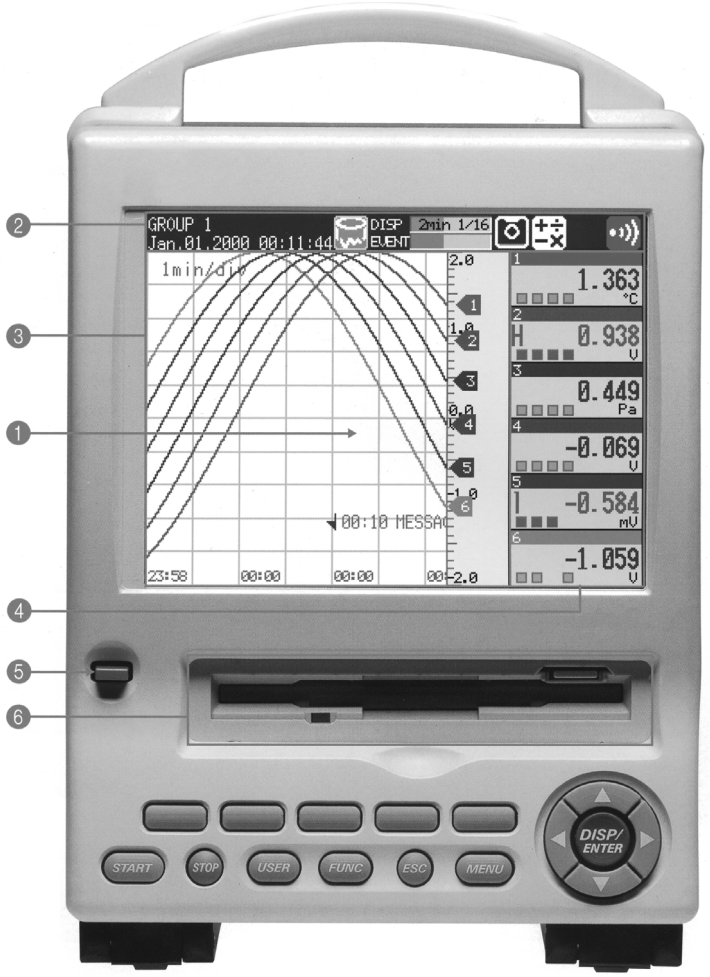

❶ 5.5-inch wide-viewing-angle color LCD display
❷ RD-MV100 status display area
❸ Trend display area
The fastest trend display updating rate is 1 min/div (approximately 615 mm/h in terms of display speed).
❹ Digital display area
The display updating interval is 1 second.
❺ Power ON/OFF switch
❻ Removable storage drive

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Communications Interface

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Foreword

Thank you for purchasing the MobileCorder RD-MV100/RD-MV200.
This Communication Interface User's Manual contains information about the communication functions such as the Ethernet/serial interface. To ensure correct use, please read this manual thoroughly before operation.
Keep this manual in a safe place for quick reference in the event a question arises.
The following four manuals, including this one, are provided as manuals for the RD-MV100/RD-MV200.

Manual Name	Manual No.	Description
RD-MV100 User's Manual	M-3641	Explains all functions and procedures of the RD-MV100 excluding the communication functions.
RD-MV200 User's Manual	M-3642	Explains all functions and procedures of the RD-MV200 excluding the communication functions.
RD-MV100/RD-MV200 Communication Interface	M-3643	This manual. Explains the communication functions of the Ethernet/ serial interface.
RD-MV100/RD-MV200 DAQSTANDARD Software	M-3644	Describes the functions and operating procedures of DAQSTANDARD Software

Notes

- This manual describes the communication function of the RD-MV100/RD-MV200 with the style number "S3."
- 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. The figures given in this manual may differ from the actual screen.
- 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.

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Revisions

- First edition: March 2000
- Second edition: September 2000

Disk No. RE25
2nd Edition: September 2000(YK)

How to Use this Manual

Structure of the Manual

The structure of this User's Manual is as follows.

Chapter 1 Overview of the Communication Functions
Describes the relationship between the communication functions and the interface and provides an outline of the communication functions.

Chapter 2 Using the Ethernet Interface
Describes the specifications and setup procedures of Ethernet.

Chapter 3 Using the Serial Interface (Option)
Describes the functions, specifications, and setup procedures of the serial interface (option). Two types of serial interfaces, RS-232 and RS-422-A/485 are available.

Chapter 4 Using the Modbus Protocol
Describes the functions, specifications, and setup procedures of the Modbus protocol. The Modbus protocol can be used through the serial interface.

Chapter 5 Commands
Describes each command that can be used.

Chapter 6 Response
Describes the data format of the panel setup information and measured/computed data that are output from this instrument.

Chapter 7 Status Report
Describes the status information.

Appendix
Provides an ASCII character code table, the flow of operation when outputting data from RD-MV, and a list of error messages.

Index
Provides an index.

Conventions Used in this Manual

Unit

- k Denotes 1000. Example: 5 kg, 100 kHz
- K Denotes 1024. Example: 720 KB (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.

Displayed characters

Alphanumeric characters enclosed with [ ] refer to characters or setting values that are displayed on the screen.

Symbols used on pages describing operating procedures

On pages that describe the operating procedures in Chapter 2 through 4, the following symbols are used to distinguish the procedures from their explanations.

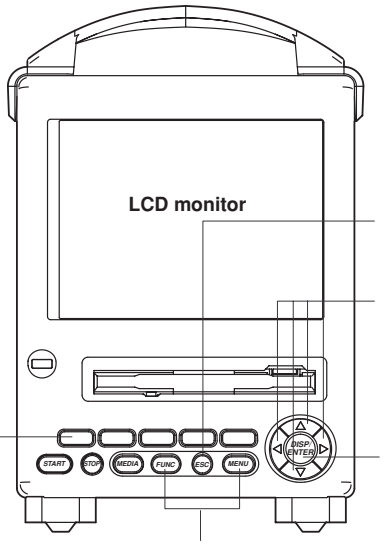
Explanation This section describes the setting parameters and the limitations regarding the procedures.

Procedure Follow the steps indicated with numbers. The procedures are given with the premise that the user is carrying out the steps for the time. Depending on the operation, not all steps need to be taken.

Names and Uses of Parts

Front Panel

RD-MV100



ESC key
Press this key to return to the previous screen or cancel the new settings.

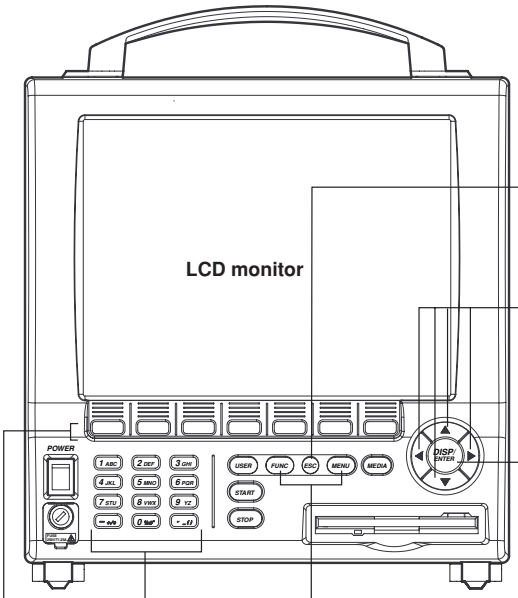
Arrow keys
Press these keys to move between the setup items displayed on the screen.

DISP/ENTER key
Press this key when confirming the setting or when closing the entry box.

Soft keys
Press these keys to select the menu displayed on the screen.

MENU and FUNC key
After pressing the MENU key, pressing the FUNC key for approximately 3 s displays the setup menu that is used to enter the communication configuration menu.

RD-MV200



ESC key
Press this key to return to the previous screen or cancel the new settings.

Arrow keys
Press these keys to move between the setup items displayed on the screen.
displayed on the screen.

DISP/ENTER key
Press this key when confirming the setting or when closing the entry box.

Character/number input key
Press these keys to enter characters or numbers for parameters such as the IP address, domain name, and server name.

MENU and FUNC key
After pressing the MENU key, pressing the FUNC key for approximately 3 s displays the setup menu that is used to enter the communication configuration menu.

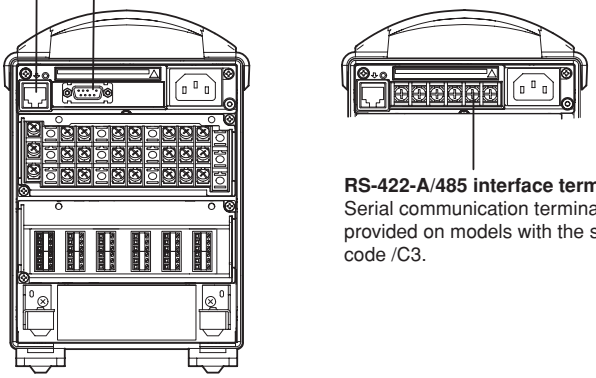
Soft keys
Press these keys to select the menu displayed on the screen.

Rear Panel

RD-MV100

Ethernet interface connector
A connector used for Ethernet communications. Comes standard with the instrument.

RS-232 interface connector
A serial communication connector provided on models with the suffix code /C2.

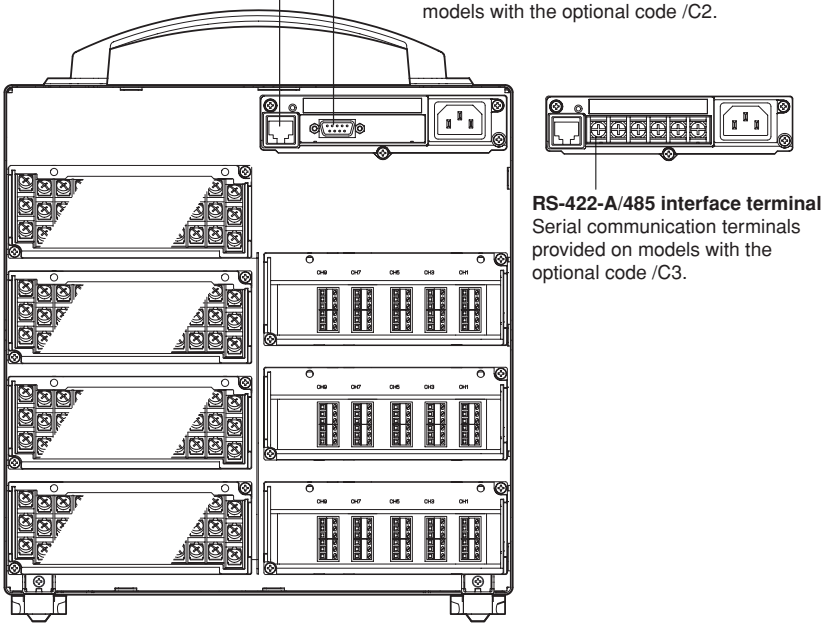


RS-422-A/485 interface terminal
Serial communication terminals provided on models with the suffix code /C3.

RD-MV200

Ethernet interface connector
A connector used for Ethernet communications. Comes standard with the instrument.

RS-232 interface connector
A serial communication connector provided on models with the optional code /C2.



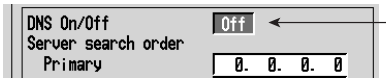
RS-422-A/485 interface terminal
Serial communication terminals provided on models with the optional code /C3.

Flow of Operation using the Operation Keys

This section will describe the basic flow of operation when changing the settings of the RD-MV using the front panel keys.

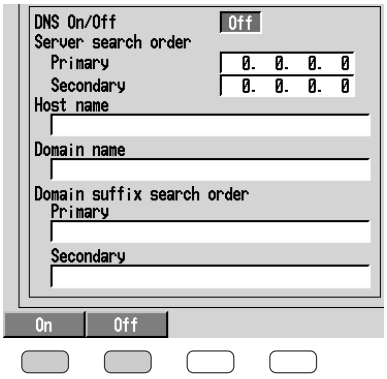
Settings related to communications are configured in the basic setting mode. The procedure used to enter the basic setting mode is described in the procedure for each item. Basic setting mode cannot be entered while data acquisition is in progress or while computation using the computation function (/M1 option) is in progress.

1. Press the arrow keys to move the cursor onto the desired parameter.

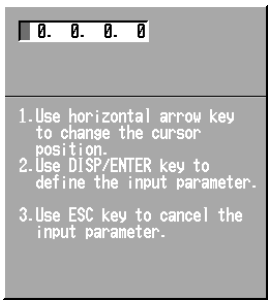


2. For parameters whose selections are shown at the bottom of the screen, press the soft key under the desired selection. For parameters that need characters to be entered in the entry box, press the [Input] soft key to display the entry box, enter the characters, and press the DISP/ENTER key.

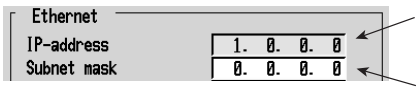
Parameter selections (Selection example for [DNS On/Off] Press either the [On] or [Off] soft key.)



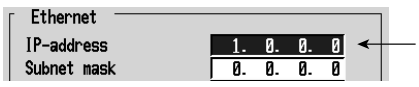
Parameter entry box (Example of the entry box for the IP address)



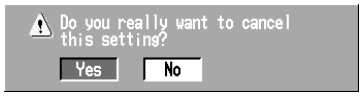
- The boxes containing parameters that have not been changed are displayed in white.
- The boxes containing parameters that have been changed are displayed in yellow.



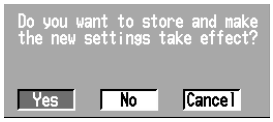
3. Set other parameters as well according to steps 1 and 2.
4. The operation is different when you are confirming or canceling the new changes (parameter boxes in yellow). See below.
   - When confirming the new changes
     Press the DISP/ENTER key. The new changes are confirmed and the yellow parameter boxes change to white. The cursor returns to the parameter at the upper left portion of the screen (the first parameter on the screen). However, if the new change is not valid, then the parameter box turns red.



- When canceling the new changes
  Press the ESC key. A window appears for you to confirm the cancellation. Selecting “YES” and pressing the DISP/ENTER key cancels the new settings and the screen returns to the previous screen.
  Selecting “No” and pressing the DISP/ENTER key does not cancel the new settings and the screen returns to the original screen.



5. To activate the new settings in the basic setting mode, the settings must be stored. Pressing the [End] soft key in the basic setting menu* displays a dialog box that asks you whether or not the new settings are to be stored.
   To store the settings, select [Yes]. To not store the settings, select [No]. To return to the basic setting menu, select [Cancel] by pressing the arrow key, and press the [DISP/ENTER] key.
   * The basic setting menu is the menu that is displayed when the ESC key is pressed several times after the basic setting parameters are changed.



Contents

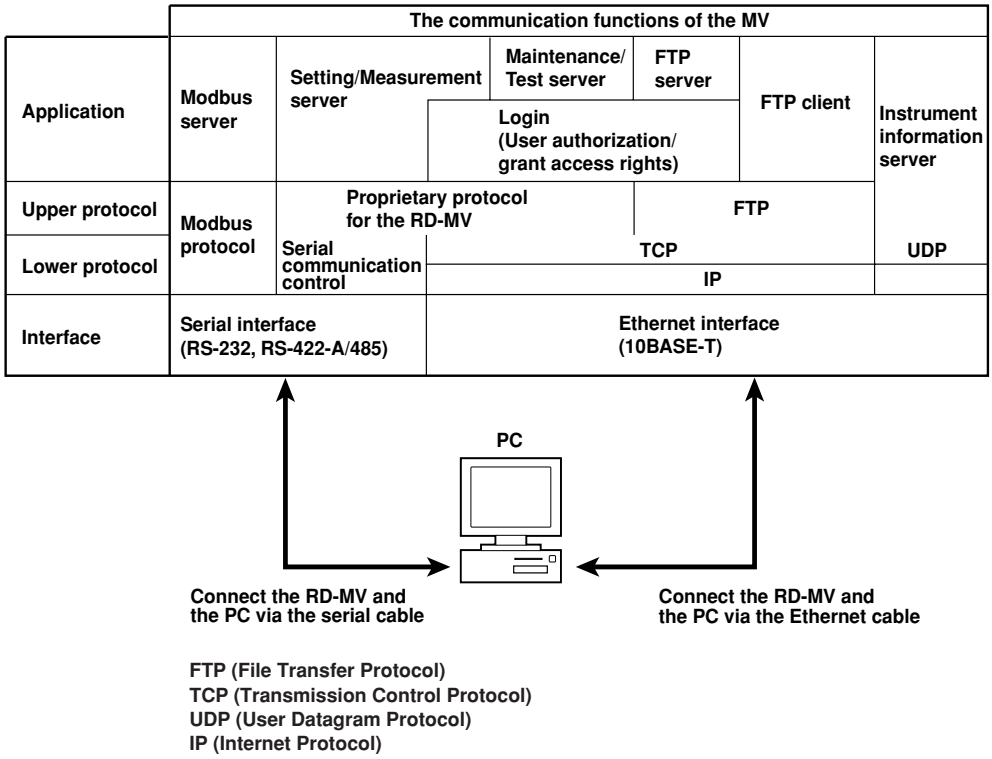
1.1 The Relationship between the Communication Functions and the Ethernet/Serial Interface

The Ethernet interface comes as standard equipment with the instrument. The serial interface (RS-232, RS-422-A/485) is available as an option.

In order to use the various communication functions of the RD-MV, the Ethernet or serial communications must be configured beforehand.

The following figure illustrates the relationship between the communication functions of the RD-MV and the Ethernet/serial interface. To use the communication functions of the RD-MV over the Ethernet/serial interface, protocols* that exist between the function and the interface must be followed.

* A protocol is a set of rules that govern the communication between two computers over a line or network.



1.2 Explanation of the Functions

Describes an outline of the communication functions of the RD-MV.

Modbus server

- By using the Modbus protocol, measured/computed data written to the RD-MV's input register can be read by the PC and communication input data can be written/read from the RD-MV's hold register.
- For the Modbus function codes that are supported by the RD-MV, see section 4.1.
- This function can be used only when communicating via the serial interface (option).
- For the settings required to use the functions, see section 4.4.

Setting/Measurement server

- This function can be used to set almost all of the settings that can be configured using the front panel keys. However, the power switch cannot be turned ON/OFF. The user name/password for communications, user name/password for key login, and the destination of the FTP client function cannot be configured.
- The following types of data can be output.
  - Measured/computed data.
  - Data in the internal memory or files in the external storage medium.
  - Setup information and the status byte.
  - A log of operation errors and communications

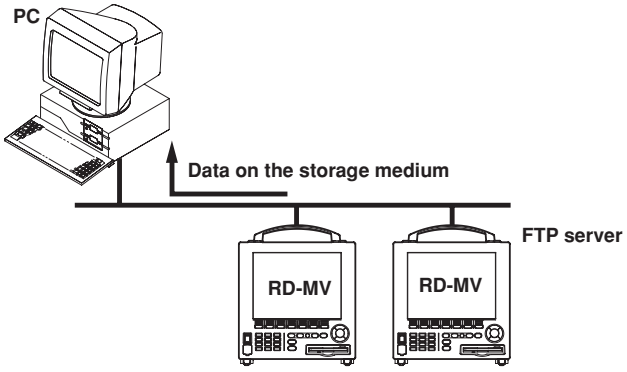
  The measured/computed data can be output in binary or ASCII format to a PC. For other types of data, ASCII format is used. For the data output format, see chapter 6. The communication commands that can be used through this function are setting commands (see sections 5.4 and 5.5), basic setting commands (see sections 5.6), and output commands (see sections 5.7 to 5.9).
- This function can be used when communicating via the Ethernet or the serial (optional) interface.
- For the configuration when using Ethernet communications, see sections 2.3 and 2.7. For the configuration when using serial communications, see section 3.5.

Maintenance/Test server

- Connection information, network information, and other information regarding Ethernet communications can be output.
- The communication commands that can be used through this function are maintenance/test commands (see section 5.10).
- This function can be used only when communicating via the Ethernet interface.
- For the configuration required to use this function, see sections 2.3 and 2.7.

FTP server

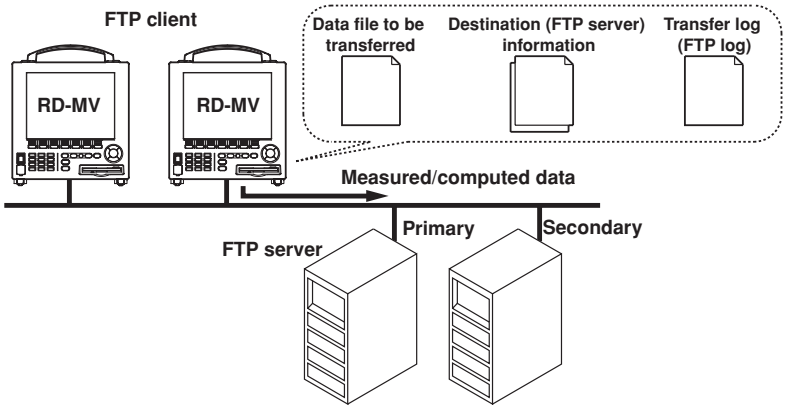
- You can use a PC to access the RD-MV via FTP. You can retrieve directories and files from the external storage medium of the RD-MV, delete files, and check the free space on the storage medium.
- This function can be used only when communicating via the Ethernet interface.
- For the configuration required to use this function, see sections 2.3 and 2.7.



FTP client

Automatic file transfer

- The display data file, event data file, and report data file, that are created in the internal memory of the RD-MV, can be automatically transferred to a remote FTP server. The result of the transfer is recorded in the FTP log. The FTP log can be displayed on the RD-MV's screen (see paragraph "Displaying error/ communications/FTP logs" described later) or output to a PC using commands.



  Up to two file transfer destinations (FTP servers) can be specified (primary and secondary). If the primary server is down, the file is automatically transferred to the secondary server.
- This function can be used only when communicating via the Ethernet interface.
- For the configuration required to use this function, see sections 2.3 and 2.5.

FTP test

- The file transfer can be checked by transferring a test file from the RD-MV to a remote FTP server.
- The result of the FTP test can be confirmed on the FTP log screen or the communication log output.
- This function can be used only when communicating via the Ethernet interface.
- For the configuration required to use this function, see section 2.6.

Instrument information server

- The serial number and model of the RD-MV connected to Ethernet can be output.
- The communication commands that can be used through this function are instrument information output commands (see section 5.11).
- This function can be used only when communicating via the Ethernet interface.
- For the configuration required to use this function, see section 2.3.

Login

- This function can be used only when communicating via the Ethernet interface and when using the setting/measurement server, maintenance/test server, and the FTP server functions.
- For the configuration required to use this function, see sections 2.3 and 2.7.

User authorization

This function allows only registered users to access the RD-MV in order to prevent invalid access from the network.

- Up to seven names can be registered. You will also specify the access authority (see below) when registering the name.
- There are limitations on the number of simultaneous connections or simultaneous uses of the RD-MV from the PC (see section 2.1).

Granting access authority

This function provides access authority (user level) to operate the RD-MV for the registered users. For example, this prevents user B (user level) from changing the measurement conditions that were set by user A (administrator level).

- There are two user levels on the RD-MV, user and administrator.
- One administrator and six users can be registered.
  - Administrator
    An administrator has the authority to use all setting/measurement server functions, maintenance/test server functions, and FTP server functions.
  - User
    A user has limited authority to use the setting/measurement server functions, maintenance/test server functions, and FTP server functions. For the limitation of commands, see section 5.2.
    - Limitations on the use of the setting/measurement server
      The user cannot change settings that would change the RD-MV's operation. Measurement and setup data can be output.
    - Limitations on the use of the maintenance/test server
      The user cannot disconnect a connection between another PC and the RD-MV. The connection between the PC that the user is operating and the RD-MV can be disconnected.
    - Limitations on the use of the FTP server
      Files cannot be saved to the RD-MV's external storage medium. Files can be retrieved from the server.

Communication timeout

This function drops the connection if no data transfer is detected between the PC and the RD-MV over a predetermined period of time. This applies to data transfer at the application level only (see section 1.1). For example, this prevents a PC from being connected to the RD-MV indefinitely which would prohibit other users from making new connections.

Other functions

Confirming the connection status of the Ethernet interface

- The connection status of the Ethernet interface can be confirmed on the rear panel and on the screen of the RD-MV.
- For the display position and the meaning of the indicator, see section 2.4.

Keepalive (Extended function of TCP)

- This function forcibly drops the connection if there are no responses to the test packets that are sent periodically at the TCP level.
- For the configuration required to use this function, see sections 2.3 and 2.7.

Displaying error/communications/FTP logs

- The operation log can be displayed on the following log screens.
  - Error log screen: Operation errors
  - Communication log screen: Communication input/output
  - FTP log screen: A log of file transfers that were executed using the FTP client function
- For the configuration required to use this function, see section 2.8.

2.1 Ethernet Interface Specifications

Basic Specifications

Electrical and mechanical specifications	Conforms to IEEE 802.3 (Ethernet frames conform to the DIX specifications.)
Transmission medium type	10BASE-T
Protocol	TCP, IP, UDP, ICMP, ARP

The maximum number of connections and the number of simultaneous uses

The following table indicates the number of simultaneous uses (number of users that can use the function simultaneously), the maximum number of connections, and the port number for each function.

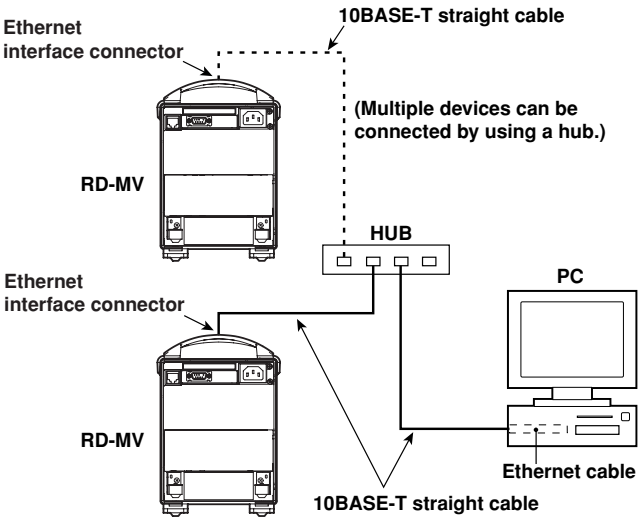
Function	Maximum Number of Connections	Number of Simultaneous Uses		Port Number*1 (Fixed)
		Administrator	User	
Setting/ measurement server	3	1	2*2	34260/tcp
Maintenance/ test server	1	1	1*2	34261/tcp
FTP server	1	1	1*2	21/tcp
Instrument information server	–	–	–	34264/udp

*1 Port numbers are fixed.
*2 There are user limitations. For details, see “Granting Access Authority” in section 1.2.

2.2 Connecting the Ethernet Interface

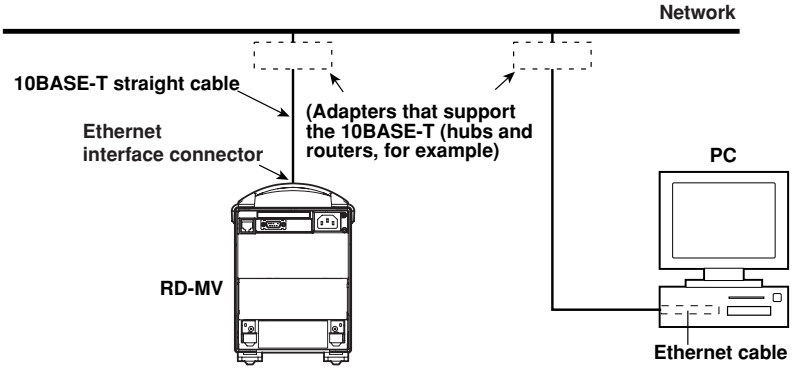
When connecting only the RD-MV and a PC

Connect the RD-MV and the PC via a HUB as in the following figure.



When connecting to a preexisting network

The following figure illustrates an example in which the RD-MV and a PC are connected to the network. When connecting the RD-MV or the PC to a preexisting network, the transfer rate, connector type, etc. must be matched. For details, consult your system or network administrator.



Note

- Depending on the reliability of the network or the volume of network traffic, all the transferred data may not be retrieved by the PC.
- Communication performance deteriorates if multiple PCs access the recorder simultaneously.

2.3 Configuring the Ethernet Interface

Explanation

The following configurations must be made in order to use the Ethernet communication functions of the RD-MV.

Setting the IP address, subnet mask, default gateway, and DNS

Confirm the settings such as the IP address, subnet mask, default gateway, and DNS with the administrator of the system or network on which the recorder is to be used.

- **IP address**
  - Set the IP address to assign to the RD-MV. The default setting is "0.0.0.0."
  - The IP address is used to distinguish between the various devices connected to the Internet when communicating using the TCP/IP protocol. The address is a 32-bit value normally expressed with four values (0 to 255), each separated by a period as in 192.168.111.24.
- **Subnet mask**
  - Specify the mask that is used to determine the network address from the IP address. The default setting is "0.0.0.0."
  - Set this value according to the system or the network to which the RD-MV belongs. In some cases, this setting may not be necessary.
- **Default gateway**
  - Set the IP address of the gateway (router, switch, etc.) used to communicate with other networks. The default setting is "0.0.0.0."
  - Set this value according to the system or the network to which the RD-MV belongs. In some cases, this setting may not be necessary.
- **DNS (Domain Name System)**

  The DNS is a system that correlates the host name/domain name to the IP address. The host name/domain name can be used instead of the IP address when accessing the network. The DNS server manages the database that contains the host name/domain name and IP address correlation.
  - DNS server
    - Set the address of the DNS server. The default setting is "0.0.0.0."
    - Up to two DNS servers can be specified (primary and secondary). If the primary DNS server is down, the secondary server is used to search the host name/domain name and IP address.
  - Host name

    Set the RD-MV's host name using up to 64 alphanumeric characters.
  - Domain name
    - Set the network domain name to which the RD-MV belongs using up to 64 alphanumeric characters.
    - When searching the data transfer destination using the DNS server, this domain name is attached after the destination name (server). The destination name is the name of the FTP server specified in section 2.5.

- Domain suffix
  If the IP address corresponding to the “domain name,” described in the previous paragraph, is not found on the DNS server, then it may be that the system is configured to use another domain name. In this case, the domain suffix is specified, so that this domain name is searched after the “domain name” specified in the previous paragraph is searched.
  - Set the domain suffix using up to 64 alphanumeric characters.
  - Up to two domain suffixes can be specified (primary and secondary).

Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

- Using output commands (ME/MI/MO commands), select the communication interface used to output the data in the internal memory (display data, event data, TLOG data, manual sampled data, and report data) and the files on the external storage medium. Since Ethernet communications and serial communications cannot be used simultaneously, you must select either one.
- When using Ethernet communications, select [Ethernet].

Storing the settings

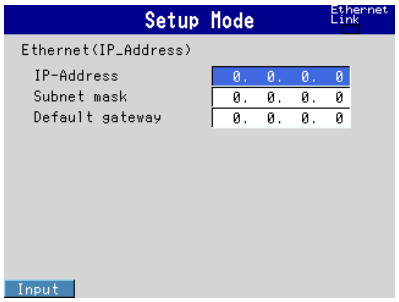
To activate the settings made in the basic setting mode, the settings must be saved. Otherwise, the settings return to the previous values.

Procedure

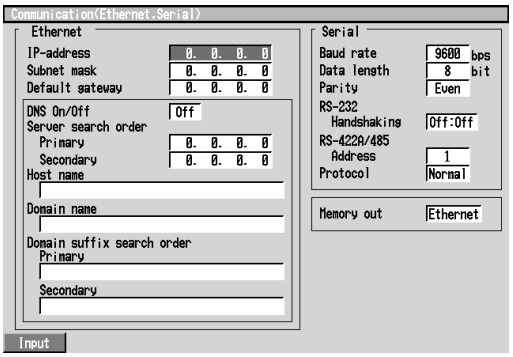
For the basic flow of operations, see “Flow of Operation using the Operation Keys” on page vi.

1. Press the MENU key to display the setting menu.
2. Press the FUNC key for approximately 3 s to display the basic setting menu.
3. Press the [#10 (Communication)](RD-MV100) or [#6 (Communication)](RD-MV200) soft key to display the communication function setting menu.
4. Press the [#1 (Ethernet (IP Address))](RD-MV100) or [#1 (Ethernet, Serial)](RD-MV200) soft key to display the communication (Ethernet, serial) menu.

RD-MV100 Communication (Ethernet) menu

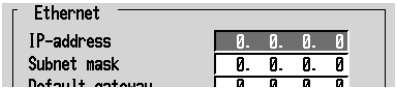


RD-MV200 Communication (Ethernet, Serial) menu



Setting the IP address

5. Press the arrow key to move the cursor to the [IP-address] box.



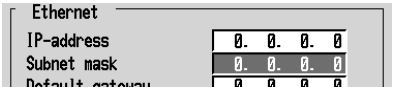
6. Press the [Input] soft key to display the entry box.

7. Enter the IP address of the RD-MV in the entry box.
   For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User’s Manual (M-3641/M-3642).
8. Press the DISP/ENTER key. The entered value is set in the [IP-address] box.

Setting the subnet mask

Set this value according to the system or the network to which the RD-MV belongs. If this setting is not necessary, go to “Setting the default gateway.”

9. Press the arrow key to move the cursor to the [Subnet mask] box.



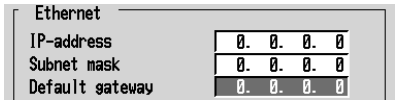
10. Press the [Input] soft key to display the entry box.

11. In the entry box, enter the subnet mask of the network to which the RD-MV belongs.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M3642/M3642).
12. Press the DISP/ENTER key. The entered value is set in the [Subnet mask] box.

Setting the default gateway

Set this value according to the system or the network to which the RD-MV belongs. If this setting is not necessary, go to "Setting the DNS (Domain Name System)."

13. Press the arrow key to move the cursor to the [Default gateway] box.



14. Press the [Input] soft key to display the entry box.

15. In the entry box, enter the default gateway of the network to which the RD-MV belongs.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M3641/M3642).
16. Press the DISP/ENTER key. The entered value is set in the [Default gateway] box.
    For RD-MV100, confirm the new settings pressing the DISP/ENTER key. To cancel, press the ESC key.
    For detailed operations regarding confirmation and cancellation, see "Flow of Operation using the Operation Keys" on page vi.

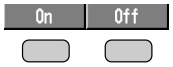
Setting the DNS (Domain Name System)

Set this value when using the DNS in the system or the network to which the RD-MV belongs. If the DNS is not going to be used, go to step 39.
For RD-MV100, when settings are confirmed by procedure 16, press the ESC key to return to the screen of procedure 4, and then press the [#2 (Ethernet (DNS))] soft key to display the communication (DNS) menu.

- **Select whether or not to use the DNS (ON/OFF)**

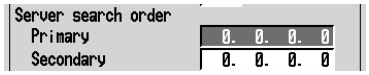
17. Press the arrow key to move the cursor to the [DNS On/Off] box.

18. Press either the [On] or [Off] soft key. When using the DNS, select [ON] and perform steps 19 through 38. Otherwise, select [Off] (you can skip steps 19 through 38).



- **Setting the primary DNS server address**

19. Press the arrow key to move the cursor to the [Primary] box under server search order.



20. Press the [Input] soft key to display the entry box.

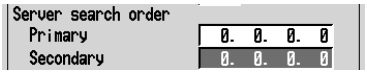
21. Enter the primary DNS server address in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M3641/M3642)

22. Press the DISP/ENTER key. The entered value is set in the [Primary] box.

- **Setting the secondary DNS server address**

  Set this value when using the secondary DNS server in the system or the network to which the RD-MV belongs. If this setting is not necessary, go to step 25.

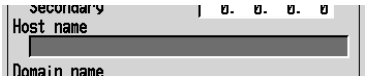
23. Press the arrow key to move the cursor to the [Secondary] box under server search order.



24. Set the secondary DNS server address using the same method from steps 20 through 22.

- **Setting the RD-MV's host name**

25. Press the arrow key to move the cursor to the [Host name] box.



26. Press the [Input] soft key to display the entry box.

27. Enter the RD-MV's host name in the entry box.

    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

28. Press the DISP/ENTER key. The entered string/value is set in the [Host name] box.

- **Setting the domain name to which the RD-MV belongs**

29. Press the arrow key to move the cursor to the [Domain name] box.

30. Press the [Input] soft key to display the entry box.

31. Enter the RD-MV's domain name in the entry box.

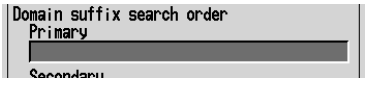
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

32. Press the DISP/ENTER key. The entered string/value is set in the [Domain name] box.

- **Setting the primary domain suffix**

  Set this value when the domain suffix is necessary. Otherwise, go to step 39.

33. Press the arrow key to move the cursor to the [Primary] box under Domain suffix search order.

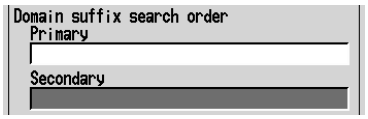


34. Press the [Input] soft key to display the entry box.

35. Enter the primary domain suffix in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/MV200 User's Manual (M-3641/M-3642).
36. Press the DISP/ENTER key. The entered value is set in the [Primary] box.

- **Setting the secondary domain suffix**
  Set this value when the secondary domain suffix exists. If this setting is not necessary, go to step 39.

37. Press the arrow key to move the cursor to the [Secondary] box under Domain suffix search order.

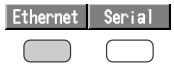


38. Set the secondary domain suffix in the same fashion as in steps 34 to 36.

Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

39. Press the arrow key to move the cursor to the [Memory out] box.

40. Press either the [Ethernet] or the [Serial] soft key. Press the [Ethernet] soft key when using Ethernet communications.



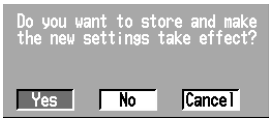
Confirming/Canceling the new settings

41. To confirm the new settings, press the DISP/ENTER key. To cancel, press the ESC key.
    For detailed operations regarding confirmation and cancellation, see "Flow of Operation using the Operation Keys" on page vi.

Storing the new settings

42. Press the ESC key several times to display the basic setting menu.
43. Pressing the [End] soft key to display a dialog box which you select whether or not to store the new settings.

44. Select the [Yes] to store the new settings, the [No] to discard them, or the [Cancel] to return to the basic setting menu by pressing the arrow key. Then, press the DISP/ENTER key.

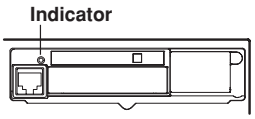


2.4 Checking the Connection Status of the Ethernet Interface

Checking the connection status using the rear panel

The connection status of the Ethernet interface can be confirmed with the indicator that is located to the upper right of the Ethernet connector on the RD-MV.

Indicator	Connection Status of the Ethernet Interface
On (green)	The Ethernet interface is electrically connected.
Blinking (green)	Transmitting data
Off	The Ethernet interface is not electrically connected.



(Rear Panel)

Checking the connection using the recorder's screen

Checking using the status display of the screen

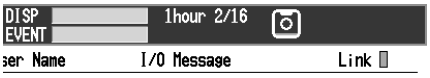
The connection status of the Ethernet interface can be checked using the indicator located on the right hand side of the status display section of the basic setting menu. The basic setting menu is displayed by pressing the FUNC key for approximately 3 s after pressing the MENU key to display the setting menu.

Indicator	Connection Status of the Ethernet Interface
On (green)	The Ethernet interface is electrically connected.
Off	The Ethernet interface is not electrically connected.

Checking using the display section located at the upper right corner of the communication log screen

The connection status of the Ethernet interface can be checked using the indicator located at the upper right corner of the communication log screen. For the procedures on how to display the communication log, see section 2.8.

Indicator	Connection Status of the Ethernet Interface
On (green)	The Ethernet interface is electrically connected.
Off	The Ethernet interface is not electrically connected.



2.5 Setting the FTP Client (Automatic Transfer of Display/Event/Report Data Files)

Explanation

By setting this function, the display/event and report data files that are created in the internal memory can be automatically transferred using FTP when the files are created. Note that the Ethernet interface must be configured beforehand (see section 2.3).

Selecting the files to transfer

- You can select whether or not to automatically transfer the display/event data file and the report data file. The default setting is "Off."
- When the method to save the data is set to "Auto," the data files are automatically transferred at appropriate times to the FTP destination described in the next section.
  - Display data file: Automatically transferred at auto save intervals.
  - Event data file: Automatically transferred when the specified length of data is written.
  - Report data file: Automatically transferred when reports are created.

Note

- For details related to saving data to the external storage medium and the auto save interval, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
- When the method to save the data is set to "Manual," auto transfer does not take place. You can still output the display/event/report data files using commands.
- For the format of the report data file, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642). However, the report data file to be transferred is divided by every timeout.
- If a file with the same name exists at the destination, it is overwritten without any warning messages.

Setting the FTP connection

Confirm the settings such as the primary and secondary FTP servers, port number, login name, password, account, PASV mode, and initial path with your system or network administrator.

- **Setting the primary and secondary servers**
  Specify the primary and secondary file transfer destinations (FTP servers) as described in the previous close. When the primary FTP server is down, the data are automatically transferred to the secondary FTP server.
- **FTP server name**
  Set the FTP server name using up to 64 alphanumeric characters.
  - When the DNS is being used, the host name can be used to specify the server name.
  - For DNS settings, see section 2.3.
  - You can also specify the IP address. In this case, DNS is not necessary.
- **Port number**
  Set the port number of the destination FTP server in the range from 0 to 65535. The default setting is 21.
- **Login name**
  Set the login name to use when accessing the FTP server. Up to 32 alphanumeric characters can be used.

- **Password**
  Set the password to use when accessing the FTP server. Up to 32 alphanumeric characters can be used.
- **Account**
  Set the account (the ID number) to use when accessing the FTP server. Up to 32 alphanumeric characters can be used.
- **PASV mode**
  When using the RD-MV behind a firewall that requires the PASV mode, turn this mode "On." A firewall is a security feature on a router which is used to prevent undesired intrusion into the network from outside parties.
- **Initial path**
  Set the destination directory for the file transfer using up to 64 alphanumeric characters. The directory delimiter varies depending on the FTP server.
  Example: When transferring files to the directory "data" which is a sub directory of the "home" directory on a UNIX file system, use the forward slash "/" as the directory delimiter:
  `/home/data`

Note

If the file transfer to both the primary and the secondary servers fails, the RD-MV aborts the file transfer. When the connection to the destination is recovered, the RD-MV transfers the data files that were not transferred along with the new data file. However, due to the limitation of the internal memory, files that are overacquired before they are transferred are lost. For details related to the acquiring operation to the internal memory, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

Storing the settings

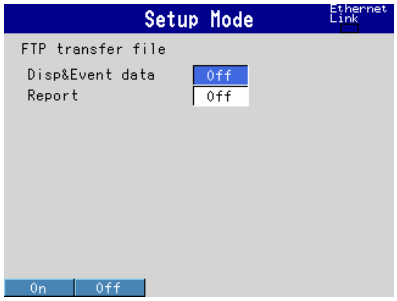
To activate the settings made in the basic setting mode, the settings must be saved. Otherwise, the settings return to the previous values.

Procedure

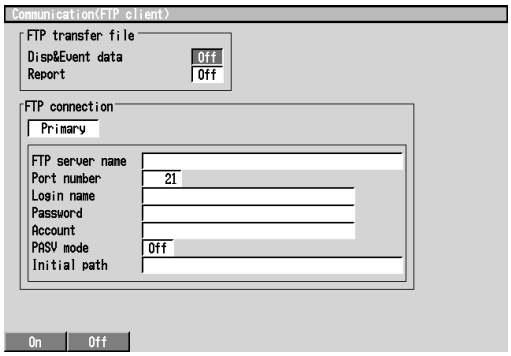
For the basic flow of operations, see “Flow of Operation using the Operation Keys” on page vi.

1. Press the Menu key to display the setting menu.
2. Press the FUNC key for approximately 3 s to display the basic setting menu.
3. Press the [#10 (Communication)](RD-MV100) or [#6 (Communication)](RD-MV100/RD-MV200) soft key to display the communication function setting menu.
4. Press the [#3 (FTP transfer file)](RD-MV100) or [#2 (FTP Client)](RD-MV200) soft key to display the Communication (FTP client) menu.

RD-MV100 Communication (FTP tramsfer file)



RD-MV200 Communication (FTP client)

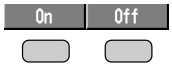


Selecting the files to be transferred

- **Selecting whether or not to transfer the display and event data files (ON/OFF)**

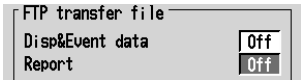
5. Press the arrow key to move the cursor to the [Disp&Event data] box.

6. Press either the [On] or [Off] soft key.

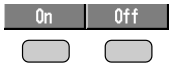


- **Selecting whether or not to transfer the report data file (ON/OFF)**

7. Press the arrow key to move the cursor to the [Report] box.



8. Press either the [On] or [Off] soft key.



For RD-MV100, confirm the new settings pressing the DISP/ENTER key. To cancel, press the ESC key.

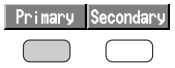
For detailed operations regarding confirmation and cancellation, see “Flow of Operation using the Operation Keys” on page vi.

Setting the primary FTP server

For RD-MV100, when settings are confirmed by procedure 8, press the ESC key to return to the screen of procedure 4, and then press the [#4 (FTP connection)] soft key to display the communication (FTP connection) menu.

9. Press the arrow key to move the cursor to the [FTP connection] box.

10. Press the [Primary] soft key.



- **Setting the FTP server name**

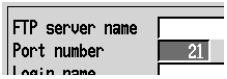
11. Press the arrow key to move the cursor to the [FTP server name] box.

12. Press the [Input] soft key to display the entry box.

13. Enter the primary FTP server name in the entry box. Generally, the IP address is entered. However, if DNS is being used, the FTP server's host name can also be specified.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
14. Press the DISP/ENTER key. The entered string/value is set in the [FTP server name] box.

- **Setting the FTP server's port number**

15. Press the arrow key to move the cursor to the [Port number] box.



16. Press the [Input] soft key to display the entry box.

17. Enter the port number of the primary FTP server in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M3641/M-3642).
18. Press the DISP/ENTER key. The entered value is set in the [Port number] box.

- **Setting the login name used when accessing the FTP server**

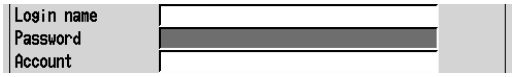
19. Press the arrow key to move the cursor to the [Login name] box.

20. Press the [Input] soft key to display the login name entry box.

21. Enter the login name that is used when accessing the primary FTP server in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
22. Press the DISP/ENTER key. The entered string/value is set in the [Login name] box.

- **Setting the password used when accessing the FTP server**

23. Press the arrow key to move the cursor to the [Password] box.

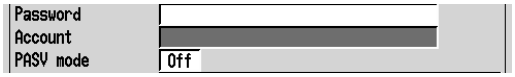


24. Press the [Input] soft key to display the entry box.

25. Enter the password that is used when accessing the primary FTP server in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
26. Press the DISP/ENTER key. The entered string/value is set in the [Password] box.

- **Setting the account used when accessing the FTP server**

27. Press the arrow key to move the cursor to the [Account] box.

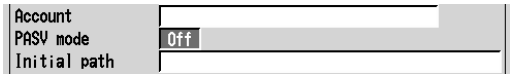


28. Press the [Input] soft key to display the entry box.

29. Enter the account that is used when accessing the primary FTP server in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
30. Press the DISP/ENTER key. The entered string/value is set in the [Account] box.

- **Enabling (On)/Disabling (Off) the PASV mode**

31. Press the arrow key to move the cursor to the [PASV mode] box.



32. Press either the [On] or [Off] soft key.

- **Setting the initial path (file transfer destination directory)**

33. Press the arrow key to move the cursor to the [Initial path] box.

34. Press the [Input] soft key to display the entry box.

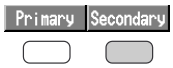
35. Enter the file transfer destination directory in the entry box.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
36. Press the DISP/ENTER key. The entered string/value is set in the [Initial path] box.

Setting the secondary FTP server

Set the secondary FTP server when specifying a secondary file transfer destination. If you are not using the secondary FTP server, go to step 40.

37. Press the arrow key to move the cursor to the [FTP connection] box.

38. Press the [Secondary] soft key.



39. Set the secondary FTP server using the same method from steps 11 through 36.

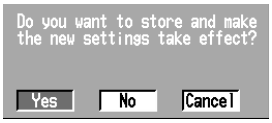
Confirming/Canceling the new settings

40. To confirm the new settings, press the DISP/ENTER key. To cancel, press the ESC key.
    For detailed operations regarding confirmation and cancellation, see "Flow of Operation using the Operation Keys" on page vi.

Storing the new settings

41. Press the ESC key several times to display the basic setting menu.
42. Pressing the [End] soft key to display a dialog box which you select whether or not to store the new settings.

43. Select the [Yes] to store the new settings, the [No] to discard them, or the [Cancel] to return to the basic setting menu by pressing the arrow key. Then, press the DISP/ENTER key.



2.6 Performing the FTP Test

Explanation

You can check whether or not files can be transferred via the Ethernet interface by transferring a test file from the RD-MV to the FTP server that was configured in section 2.5.

Items to check before performing this test

- Correctly connect the Ethernet cable. For the connection procedures, see section 2.2.
- Check that the Ethernet interface configuration is correct. For the procedures, see section 2.3 and 2.5.

When configuring Ethernet related settings, check them with the administrator of the system or network on which the RD-MV is to be used.

Checking the FTP test results

- The test file is transferred to the initial path on the destination FTP server that was specified in section 2.5. After the FTP test completes, check whether or not the test file was received on the FTP server
- The FTP test results can be confirmed on the FTP log screen (see section 2.8) or the communication log output (FL command).

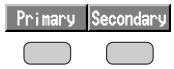
Procedure

Performing the FTP test.

1. Press the FUNC key to display the FUNC menu. The construction of the FUNC menu varies depending on the basic settings and options. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the menu that contains the [FTP test] item.

2. Press the [FTP test] soft key to display a menu used to select the destination on which the FTP test to be performed.

3. Press either the [Primary] or [Secondary] soft key. The FTP test is performed on the specified FTP server.



2.7 Setting the Login/Timeout for Ethernet Communications

Explanation

By setting the login and timeout, you can achieve the following:

- Prevent invalid access to the RD-MV from the network.
- Grant authority in operating the RD-MV via Ethernet communications.
- Disconnect connections when there are no data transfers over a predetermined time period.

Note that the Ethernet interface must be configured beforehand (see section 2.3).

Enabling/Disabling the login function

If the login function is enabled, only users that are registered can login to the RD-MV.

User registration

- **Selecting the user level**
  Select either of the user levels, administrator or user.
  - Administrator (admin)
    One administrator can be registered. An administrator has the authority to use all setting/measurement server, maintenance/test server, and the FTP server functions.
  - User (user1 to user6)
    Six user can be registered. A user has limited authority to use the setting/measurement server functions, maintenance/test server functions, and FTP server functions. For the limitation of commands, see section 5.2.
    - Limitations on the use of the setting/measurement server
      The user cannot change settings that would change the RD-MV's operation. Measurement and setup data can be output.
    - Limitations on the use of the maintenance/test server
      The user cannot disconnect a connection between another PC and the RD-MV. The connection between the PC that the user is operating and the RD-MV can be disconnected.
    - Limitations on the use of the FTP server
      Files cannot be saved to the RD-MV's external storage medium. Files can be retrieved from the server.

- **Selecting whether or not to register the user (On/Off)**
  - On
    Registers the user. You can specify the user name and password for the login.
  - Off
    Does not register the user.

- **Setting the user name**
  - Set the user name using up to 16 alphanumeric characters.
  - Each user name must be unique.
  - Since the word "quit" is reserved as a command on the instrument, the user name "quit" is not allowed.

- **Setting the password**
  Set the password using up to 6 alphanumeric characters.

Note

- The relationship between the login function and the user name that is used when accessing the RD-MV is as follows.
  - **When the login function is set to "Enable"**
    - The registered user name and password can be used to access the RD-MV.
    - The user level is the level that was specified when the user name was registered.
    - If a user name "anonymous" is registered in the RD-MV, this user name can be used to access only the FTP server on the RD-MV. The user level is the level that was specified when "anonymous" was registered. In this case, password is not necessary (access is possible regardless of whether or not the password is specified).
  - **When the login function is set to "Disable"**
    - The user name "admin" can be used to access the RD-MV as an administrator. Password is not necessary.
    - The user name "user" can be used to access the RD-MV as a user. Password is not necessary.
    - The user name "anonymous" can be used to access only the FTP server on the RD-MV. The user level is "User" in this case. Password is not necessary.
- There are limitations on the number of simultaneous connections or simultaneous uses of the RD-MV from the PC (see section 2.1).

Communication timeout

- **Enabling/Disabling the timer (ON/OFF)**
  - **On**
    The connection is dropped if no data transfer is detected over a predetermined period of time. This applies to data transfer at the application level only (see section 1.1).
  - **Off**
    Communication timeout is disabled.
- **Setting the timeout time**
  When the communication timeout is enabled and if no data transfer is detected over the time period specified here, the connection is dropped.
  Range: 1 to 120 minutes

Enabling/Disabling keepalive (On/Off)

- **On**
  If there is no response to the test packet that is periodically transmitted (every 30 s) at the TCP level, the connection is dropped.
- **Off**
  Keepalive is disabled.

Storing the settings

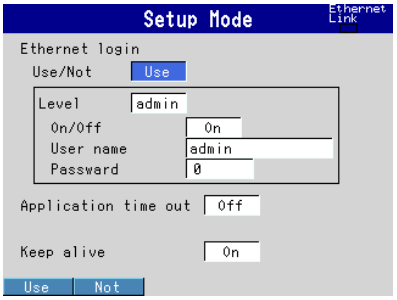
To activate the settings made in the basic setting mode, the settings must be saved. Otherwise, the settings return to the previous values.

Procedure

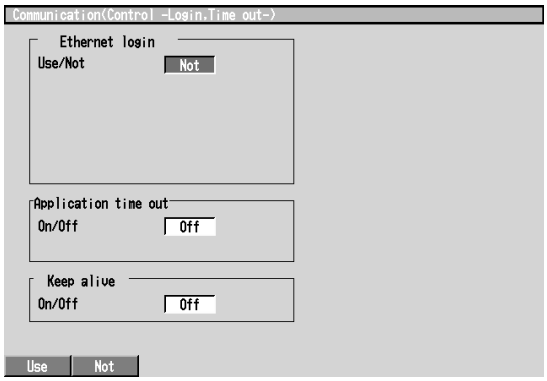
For the basic flow of operations, see “Flow of Operation using the Operation Keys” on page vi.

1. Press the Menu key to display the setting menu.
2. Press the FUNC key for approximately 3 s to display the basic setting menu.
3. Press the [#10 (Communication)](RD-MV100) or [#6 (Communication)](RD-MV200) soft key to display the communication function setting menu.
4. Press the [#5 (Control (Login, Timeout))](RD-MV100) or [#3 (Control -Login, Timeout-)](RD-MV200) soft key to display the Communication (Control -Login, Time out) menu.

RD-MV100 Communication (Control (Login, Time out))



RD-MV200 Communication (Control -Login, Time out)



Enabling/Disabling the login function of the RD-MV

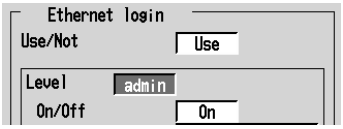
5. Press the arrow key to move the cursor to the [Use/Not] box under Ethernet login.

6. Press either the [Use] or [Not] soft key. If you select [Use], go to step 7. If you select [Not], go to step 20.

Registering users

- **Selecting the user level for the registered user**

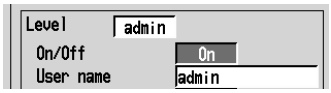
7. Press the arrow key to move the cursor to the [Level] box.



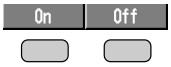
8. Press one of the keys from [admin] to [user6] to select the user level. To set the user level to administrator, select [admin]. To set the user level to user, select [user1] to [user6].

- **Selecting whether or not to register the user (On/Off)**

9. Press the arrow key to move the cursor to the [On/Off] box under Level.



10. Press either the [On] or [Off] soft key. If you select [On], go to step 11. If you select [Off], go to step 19.



- **Setting the user name**

11. Press the arrow key to move the cursor to the [User name] box.

12. Press the [Input] soft key to display the entry box.

13. In the box, enter the user name for the user at the specified level.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
14. Press the DISP/ENTER key. The entered string/value is set in the [User name] box.

- **Setting the password**

15. Press the arrow key to move the cursor to the [Password] box.

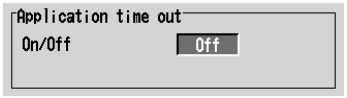
16. Press the [Input] soft key to display the entry box.

17. In the box, enter the password for the user.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
18. Press the DISP/ENTER key. The entered string/value is set in the [Password] box.
19. To register another user, repeat steps 7 to 18.

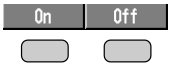
Setting the communication timeout

- **Enabling/Disabling communication timeout (On/Off)**

20. Press the arrow key to move the cursor to the [On/Off] box under communication timeout.

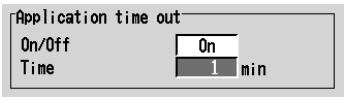


21. Press either the [On] or [Off] soft key. If you select [On], go to step 22. If you select [Off], go to step 26.



- **Setting the communication timeout time**

22. Press the arrow key to move the cursor to the [Time] box.



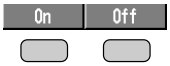
23. Press the [Input] soft key to display the entry box.

24. In the box, enter the communication timeout time.
    For the procedures related to entering character strings and values, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
25. Press the DISP/ENTER key. The entered value is set in the [Time] box.

Enabling/Disabling keepalive (On/Off)

26. Press the arrow key to move the cursor to the [On/Off] box under keepalive.

27. Press either the [On] or [Off] soft key.



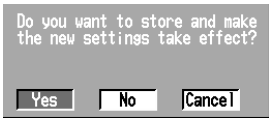
Confirming/Canceling the new settings

28. To confirm the new settings, press the DISP/ENTER key. To cancel, press the ESC key.
    For detailed operations regarding confirmation and cancellation, see "Flow of Operation using the Operation Keys" on page vi.

Storing the new settings

29. Press the ESC key several times to display the basic setting menu.
30. Pressing the [End] soft key to display a dialog box which you select whether or not to store the new settings.

31. Select the [Yes] to store the new settings, the [No] to discard them, or the [Cancel] to return to the basic setting menu by pressing the arrow key. Then, press the DISP/ENTER key.

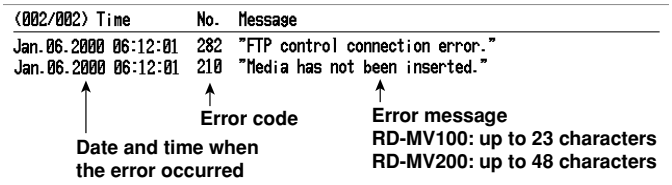


2.8 Displaying the Log Screen of the Error, Communication, and FTP

Explanation

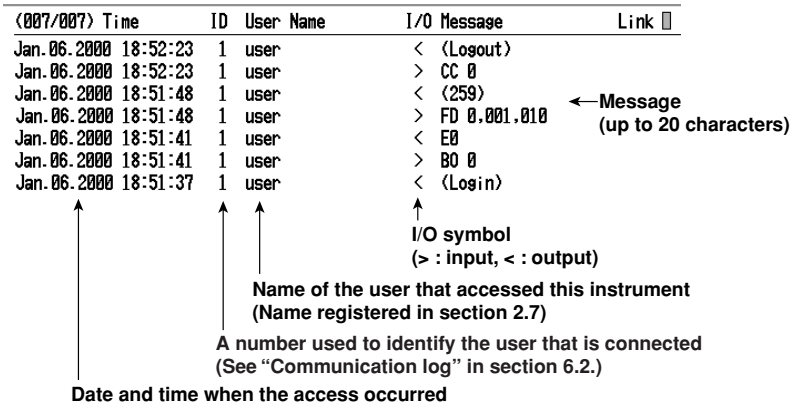
Displaying the error log

A log of operation errors is displayed on the error log screen. Up to the last 50 operation errors are logged. When the number of log entries exceeds 50, room is made by clearing the oldest entries. For the meanings of the error messages, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).



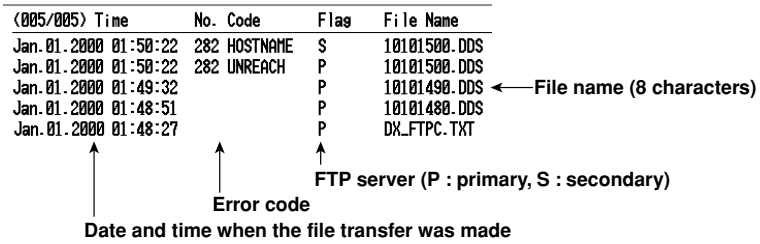
Displaying the communication log

A log of input and output incidents of the communication interface is displayed on the communication log screen. Up to a total of 200 incidents of input and output are logged. When the number of log entries exceeds 200, room is made by clearing the oldest entries. For the meanings of the messages, see "Communication Log" in section 6.2.



Displaying the FTP log

A log of file transfers is displayed on the FTP log screen. Up to the last 50 accesses are logged. When the number of log entries exceeds 50, room is made by clearing the oldest entries. For the meanings of the error messages, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).



Note

- In addition to these logs, there is also a key login log. For details regarding the key login log screen, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).
- The error/communication/FTP log data can be output. For the data output format, see section 6.2.

Procedure

Displaying the error log

1. Press the FUNC key to display the FUNC menu. The construction of the FUNC menu varies depending on the basic settings and options. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the menu that contains the [Log] item.
2. Press the [Log] soft key to display the log screen menu.

3. Press the [Error] soft key to display the error log screen.

Displaying the communication log

1. Press the FUNC key to display the FUNC menu. The construction of the FUNC menu varies depending on the basic settings and options. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the menu that contains the [Log] item.
2. Press the [Log] soft key to display the log screen menu.

3. Press the [Commu] soft key to display the communication log screen.

Displaying the FTP log

1. Press the FUNC key to display the FUNC menu. The construction of the FUNC menu varies depending on the basic settings and options. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the menu that contains the [Log] item.
2. Press the [Log] soft key to display the log screen menu.

3. Press the [FTP] soft key to display the FTP log screen.

3.1 Serial Interface (Option) Specifications

The specifications for the two types of serial interfaces (RS-232 and RS-422-A/485) on the RD-MV are given below.

RS-232 Interface Specifications

Connector type	D-Sub 9 pin plug
Electrical, mechanical specifications	Conforms to the EIA-574 standard (for the 9-pin interface of the EIA-232 (RS-232) standard)
Connection	Point-to-point
Communication	Half-duplex
Synchronization	Start-stop synchronization
Baud rate	Select from 1200, 2400, 4800, 9600, 19200, or 38400[bps]
Start bit	1 bit (fixed)
Data length (Select 8 bits when outputting data in binary format.)	Select 7 or 8 bits
Parity	Select odd, even, or none
Stop bit	1 bit (fixed)
Hardware handshaking	Select whether to fix the CA and CB signals to TRUE or to use the signal for flow control.
Software handshaking	Select whether to use the X-ON and X-OFF signals to control the transmitted data only or both the transmitted and received data. X-ON (ASCII 11H), X-OFF (ASCII 13H)
Received buffer size	2047 bytes

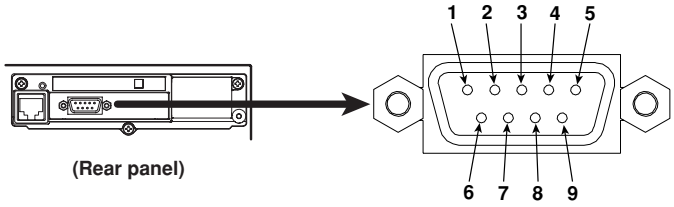
RS-422-A/485 Interface Specifications

Terminal block type	6 point, terminal block, terminal screws: ISO M4/nominal length 6 mm		
Electrical, mechanical specifications	Conforms to EIA-422-A (RS-422-A) and EIA-485 (RS-485) standards		
Connection	Multidrop	Four-wire type Two-wire type	1 : 32 1 : 31
Communication	Half-duplex		
Synchronization	Start-stop synchronization		
Baud rate	Select from 1200, 2400, 4800, 9600, 19200, or 38400[bps]		
Start bit	1 bit (fixed)		
Data length	Select 7 or 8 bits		
Parity	Select odd, even, or none		
Stop bit	1 bit (fixed)		
Received buffer size	2047 bytes		
Escape sequence	Open and close		
Electric characteristics	FG, SG, SDB, SDA, RDB, RDA (six points) SG, SDB, SDA, RDB, and RDA terminals and the internal circuit of the RD-MV is functionally isolated. FG terminal is the frame ground.		
Communication distance	Up to 1.2 km		
Terminator	External: recommended resistance 120 Ω, 1/2 W		

3.2 RS-232 Interface Connector Pin Arrangement and Signal Names, the Connection Procedure, and Handshaking

Connector Pin Arrangement and Signal Names

Connector pin arrangement



Pin No.	Signal Name	Signal Meaning
2	RD (Received Data)	Received data from the PC. Input signal.
3	SD (Send Data)	Send data to the PC. Output signal.
5	SG (Signal Ground)	Signal ground.
7	RS (Request to Send)	Handshaking signal used when receiving data from the PC. Output signal.
8	CS (Clear to Send)	Handshaking signal used when sending data to the PC. Input signal.

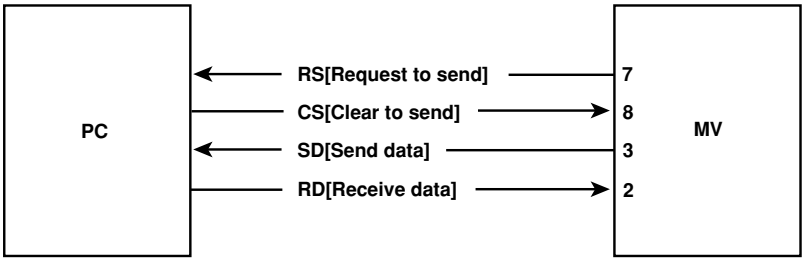
* Pins 1, 4, 6, and 9 are not used.

Table of RS-232 Standard Signal and Their JIS and ITU-T Abbreviations

Pin No. (9-pin connector)	Abbreviation			Description
	RS-232	ITU-T	JIS	
5	AB (GND)	102	SG	Signal ground
3	BA (TXD)	103	SD	Transmitted data
2	BB (RXD)	104	RD	Received data
7	CA (RTS)	105	RS	Request to send
8	CB (CTS)	106	CS	Clear to send

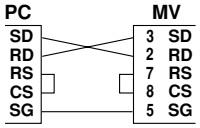
Connection Procedure

Signal direction

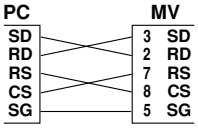


Connection example

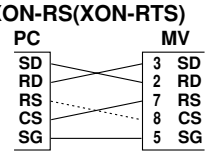
• OFF-OFF/XON-XON



• CS-RS(CTS-RS)



• XON-RS(XON-RTS)



The RS on the PC side and the CS on the instrument side do not need to be connected for control. However, we recommend that they be connected so that the cable can be connected in either direction.

Handshaking

When using the RS-232 interface for transferring data, it is necessary for equipment on both sides to agree on a set of rules to ensure the proper transfer of data. The set of rules is called handshaking. Because there are many handshaking methods that can be used between the instrument and the PC, one must make sure that the same method is chosen by both the RD-MV and the PC. You can choose any of the four methods shown in the following table.

Table of Handshaking Methods (○indicates that it is supported)

Handshaking method	Data Transmission Control (Control used to send data to a PC)			Data Reception Control (Control used to receive data from a PC)		
	Software handshaking	Hardware handshaking		Software handshaking	Hardware handshaking	
	Stops transmission when X-OFF is received. Resume when X-ON is received.	Stops transmission when CB (CTS) is false. Resume when it is true.	No handshaking	Send X-OFF when the received data buffer is 3/4th filled. Send X-ON when the received data buffer becomes 1/4th filled.	Set CA (RTS) to False when the received data buffer is 3/4th filled. Set to True when the received data buffer becomes 1/4th filled.	No handshaking
OFF-OFF			○			○
XON-XON	○			○		
XON-RS	○				○	
CS-RS		○			○	

OFF-OFF

- Data transmission control
  There is no handshaking between the RD-MV and the PC. The X-OFF and X-ON signals are treated as data, and the CS signal is ignored.
- Data reception control
  There is no handshaking between the RD-MV and the PC. When the received buffer becomes full, all overflow data are discarded.
  The RS signal is fixed to True.

XON-XON

- Data transmission control
  Software handshaking is performed between the RD-MV and the PC. When an X-OFF code is received while sending data to the PC, the RD-MV stops the data transmission. When it receives the next X-ON code, it resumes the data transmission. The CS signal received from the PC is ignored.
- Data reception control
  Software handshaking is performed between the RD-MV and the PC. When the amount of used space in the received buffer reaches 1537 bytes, the X-OFF code is transmitted. When the amount of used space in the received buffer falls to 511 bytes, X-ON code is transmitted. The RS signal is fixed to True.

XON-RS

- Data transmission control
  Software handshaking is performed between the RD-MV and the PC. When an X-OFF code is received while sending data to the PC, the RD-MV stops the data transmission. When it receives the next X-ON code, it resumes the data transmission. CS signal from the PC is ignored.
- Data reception control
  Hardware handshaking is performed between the RD-MV and the PC. When the amount of used space in the received buffer reaches 1537 bytes, the RS signal is set to “False.” When the amount of used space in the received buffer falls to 511 bytes, the RS signal is set to “True.”

CS-RS

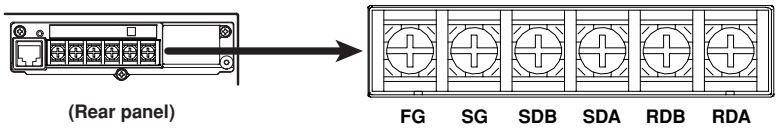
- Data transmission control
  Hardware handshaking is performed between the RD-MV and the PC. When the CS signal becomes False while sending data to the PC, the RD-MV stops the data transmission. When the CS signal becomes True, it resumes the data transmission. X-OFF is treated as data.
- Data reception control
  Hardware handshaking is performed between the RD-MV and the PC. When the amount of used space in the received buffer reaches 1537 bytes, the RS signal is set to “False.” When the amount of used space in the received buffer falls to 511 bytes, the RS signal is set to “True.”

Note

- The PC program must be designed so that the received buffers of both the RD-MV and the PC do not become full.
- When using XON-XON, output the data in ASCII format.

3.3 RS-422-A/485 Interface Pin Arrangement and Signal Names and the Connection Procedure

Pin Arrangement and Signal Names



FG (Frame Ground)	Case ground of the RD-MV.
SG (Signal Ground)	Signal ground.
SDB (Send Data B)	Send data B (+).
SDA (Send Data A)	Send data A (–).
RDB (Received Data B)	Received data B (+).
RDA (Received Data A)	Received data A (–).

Connection Procedure

Cable

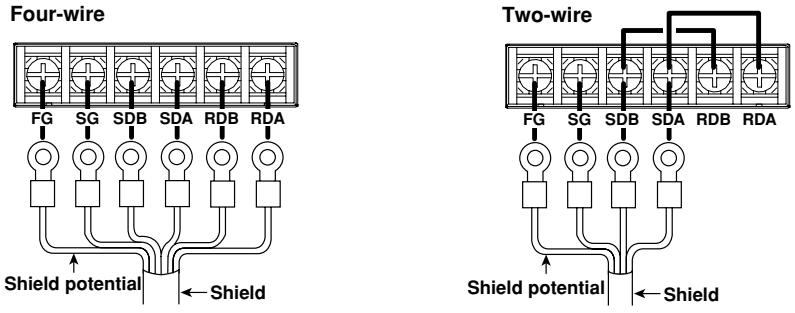
There are two types of cables available, the four-wire cable and the two-wire cable (used only for the Modbus protocol). The cable should meet the following specifications.

Cable	Twisted-pair cable 3 pairs 24 AWG or more (four-wire), 2 pair 24AWG or more (two-wire)
Characteristic impedance	100 Ω
Capacitance	50 pF/m
Cable length	Up to 1.2 km*

* The transmission distance of the RS-422-A/485 interface is not the straight-line distance, but rather the total length of the (twisted-pair shielded) cable.

Cable connection procedure

As shown in the figure below, attach a crimp-style terminal with an isolating sleeve for 4-mm screws to the end of the cable. Keep the section that is exposed from the shielded cable to 5 cm or less.



WARNING

To prevent electric shock, turn OFF the power when connecting cables.

Note

- As shown on the next page, connect the RD pin to the SD (TD) pin on the PC (converter) side and the SD pin to the RD pin on the PC side.
- The two-wire cable can be used only when using the Modbus protocol.

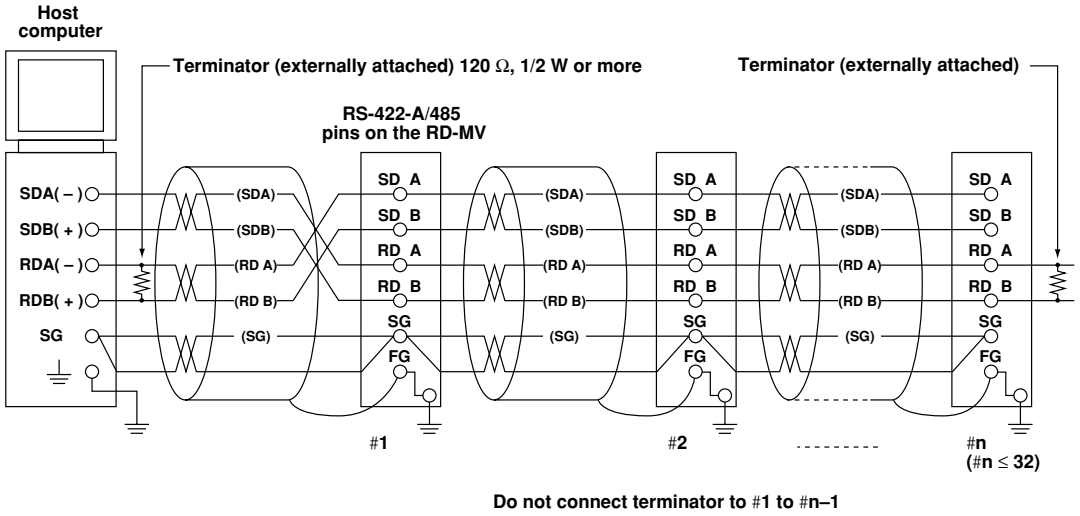
Connection Example with the Host Computer

The instrument can be connected to a host computer that has an RS-232, RS-422-A, or RS-485 port.

- For RS-232, use the converter.
- For recommended converters, see the latter section “Serial Interface converter.”
- The two-wire cable can be used only when using the Modbus protocol. For the configuration procedure, see section 3.5, “Configuring the Serial Interface.”

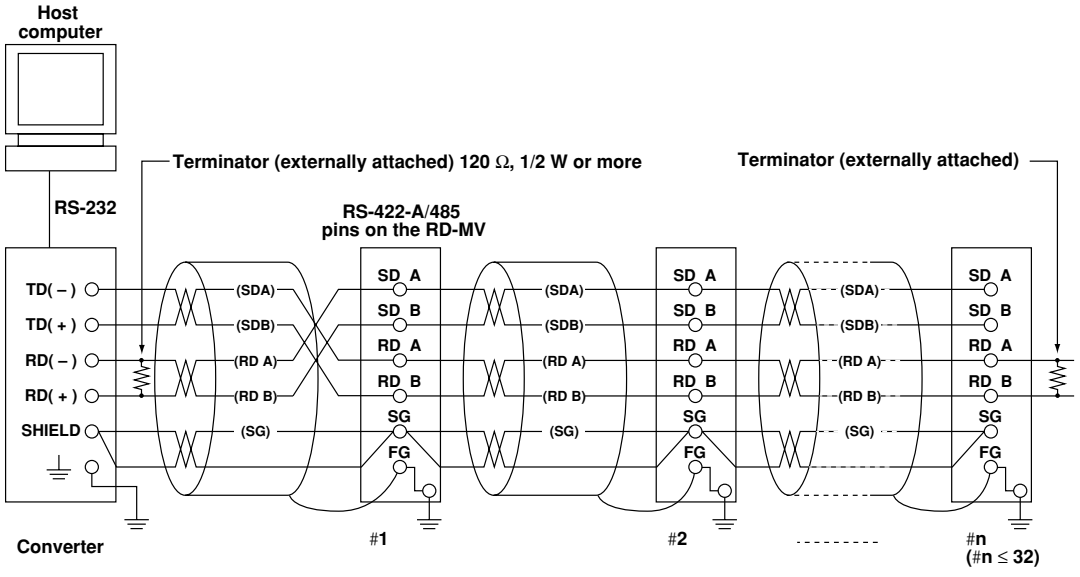
Four-wire system

In general, the instrument and the host computer are connected using a four-wire cable. For the four-wire system, the transmission and reception lines must be crossed.



Do not connect terminator to #1 to #n–1

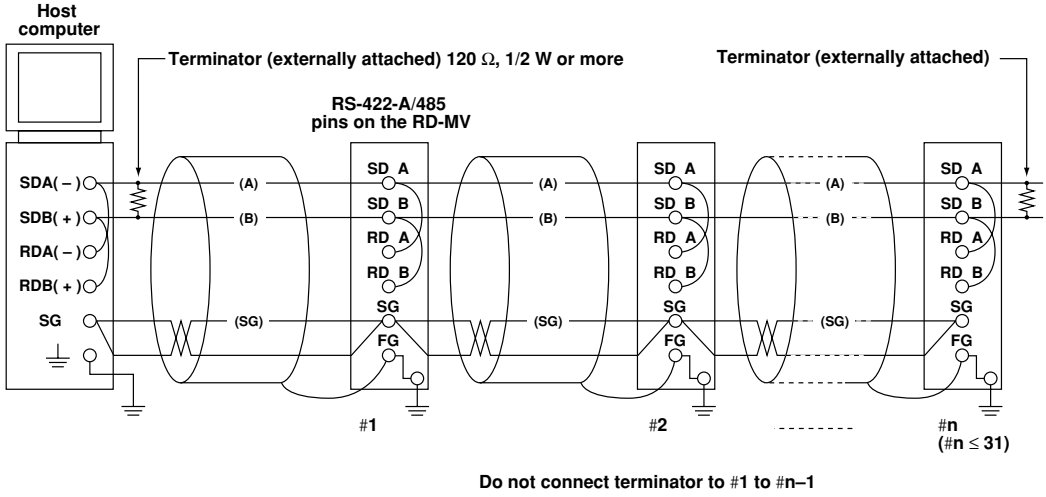
(The following diagram illustrates the case when the host computer's interface is RS-232)



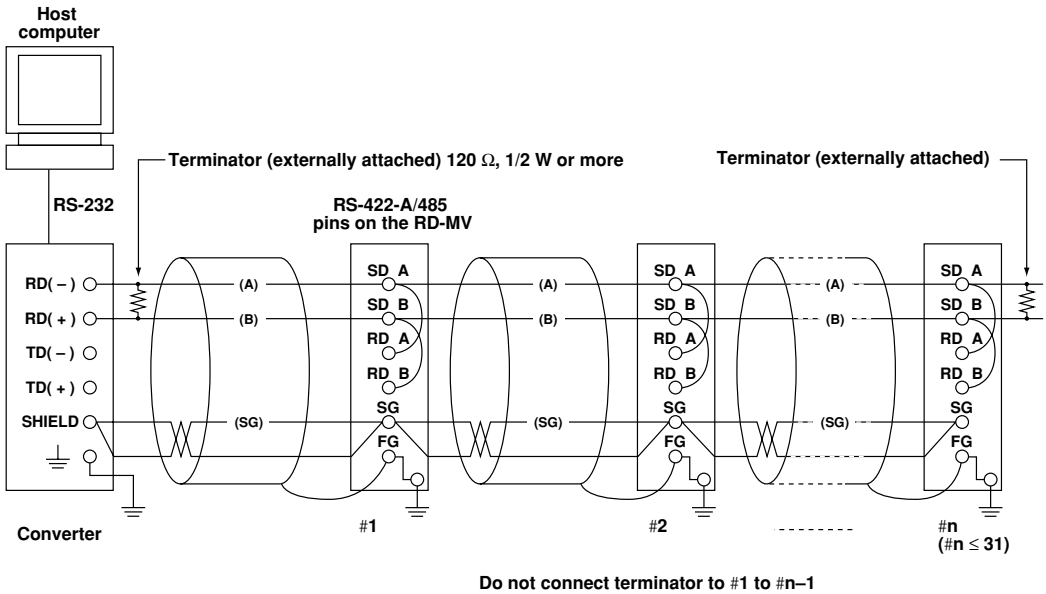
Do not connect terminator to #1 to #n–1

Two-wire system

Connect the transmission and reception signals with the same polarity on the RS-422-A/485 terminal block. The two-wire system can be used only when using the Modbus protocol.



(The following diagram illustrates the case when the host computer's interface is RS-232)



Note

- The method used to eliminate noise varies depending on the situation. In the connection example, only the cable shield on the RD-MV side is connected to ground (one-sided grounding). This is effective when there is a difference in the electric potential between the PC's ground and the RD-MV's ground. This may be the case for long distance communications. If there is no difference in the electric potential between the PC and the RD-MV, two-sided grounding, in which the PC side is also grounded, may be effective. Furthermore, using two-sided grounding and connecting a serial capacitance on one-side may be effective. Consider these possibilities to eliminate noise.
- When using the two-wire type interface (Modbus protocol), the 485 driver must be set to high impedance within 3.5 characters after the last data byte is sent by the host computer.

Serial Interface Converter

Recommended converter: MODEL RC-57 by RA SYSTEMS CORP., or Z-101HE by Sharp

CAUTION

Some converters not recommended by Omega FG and SG pins that are not isolated. In this case, do not connect anything to the FG and SG pins as shown in the diagram on the previous page. This can generate a potential difference, especially for long distance communications, and can damage the instrument or cause communication abnormalities. For converters that do not have the SG pin, they can be used without using the signal ground. For details, see the manual that came with the converter.

On some non-recommended converters, the signal polarity may be reversed (A/B or +/– indication). In this case, reverse the connection.

For a two-wire system, the host computer must control the transmission driver of the converter in order to prevent collisions of transmit and received data. When using the recommended converter, the driver is controlled using the RS (RTS) signal on the RS-232.

When the instrument that support only the RS-422-A interface exist in the system

When using the four-wire type interface, up to 32 RD-MVs can be connected to a single host computer. However, this may not be true if the instrument that support only the RS-422-A interface exist in the system.

When Omega's recorders that support only the RS-422-A interface exist in the system

The maximum number of connection is 16. Some of Omega's conventional recorders (HR2400 and μR, for example) only support the RS-422-A driver. In this case, only up to 16 units can be connected.

Note

In the RS-422-A standard, 10 is the maximum number of connections that are allowed on one port (for a four-wire system).

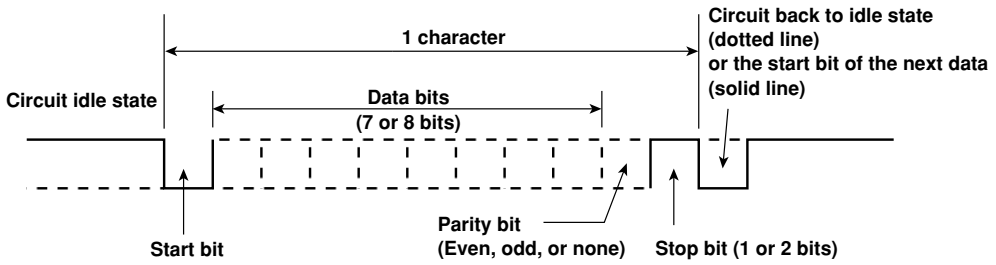
Terminator

When using a multidrop connection (including a point-to-point connection), connect a terminal resistance to the RD-MV on the end of the chain. Do not connect a terminal resistance to a RD-MV in the middle of the chain. In addition, turn the terminator on the host computer ON (see the computer's manual). If a converter is being used, turn ON its terminator. An external terminator must be attached to the recommended converter. However, there are converters that have built-in terminations.

3.4 The Bit Structure of One Character and the Operation of the Receive Buffer

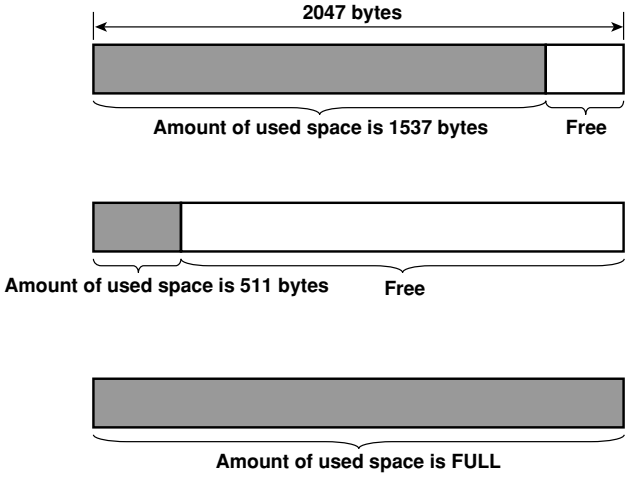
The Bit Structure of One Character

The serial interface on the RD-MV communicates using start-stop synchronization. With the start-stop synchronization, a start bit is added every time a character is transmitted. The start bit is followed by the data bits, parity bit, and stop bit. (See the figure below.)



Receive Buffer and Received Data

The data received from the computer are first placed in the receive buffer of the RD-MV. Depending on the available free space in the receive buffer, the received data are processed as shown in the figure below. When the receive buffer becomes FULL, overflow data are discarded.



When handshaking is used, the MV stops data reception when data in the buffer cannot be processed fast enough and the amount of used space reaches 1537 bytes.

After the data reception is stopped as described above, data in the buffer continues to be passed to the internal program. When the amount of used space falls to 511 bytes, it resumes data reception.

If the buffer becomes full in spite of the handshaking control, all overflow data are discarded.

3.5 Configuring the Serial Interface

Explanation

Selecting the baud rate

Select the baud rate from the following list.
1200, 2400, 4800, 9600, 19200, 38400

Selecting the data length

Select the data length from the following list. Make sure to select 8 bits when outputting data in binary format.
7, 8

Selecting the parity check

Select the parity check from the following list.
Odd, Even, None

Selecting the handshaking method

Select the handshaking method from the following list. This setting is valid only for the RS-232 interface.
Off:Off, XON:XON, XON:RS, CS:RS

Selecting the address

Select the address from the following values. This setting is valid for the RS-422-A/485 interface and the Modbus protocol.
1 to 32

Selecting the "Normal" protocol

When using the "Normal" protocol to communicate via RS-232 or RS-422-A/485, select [Normal].

Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

- Using output commands (ME/MI/MO commands), select the communication interface used to output the data in the internal memory (display data, event data, TLOG data, manual sampled data, and report data) and the files on the external storage medium. Since Ethernet communications and serial communications cannot be used simultaneously, you must select either one.
- When using serial communications, select [Serial].

Storing the settings

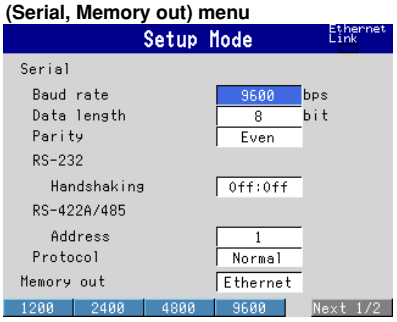
To activate the settings made in the basic setting mode, the settings must be saved. Otherwise, the settings return to the previous values.

Procedure

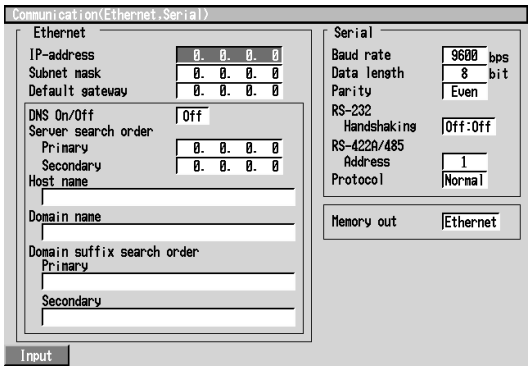
For the basic flow of operations, see “Flow of Operation using the Operation Keys” on page vi.

1. Press the MENU key to display the setting menu.
2. Press the FUNC key for approximately 3 s to display the basic setting menu.
3. Press the [#10 (Communication)](RD-MV100) or [#6 (Communication)](RD-MV200) soft key to display the communication function setting menu.
4. Press the [#6 (Serial, Memory out)](RD-MV100) or [#1 (Ethernet, Serial)](RD-MV200) soft key to display the communication (Serial) menu.

RD-MV100 Communication (Serial, Memory out) menu

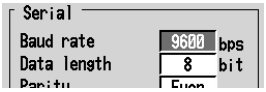


RD-MV200 Communication (Ethernet, Serial) menu

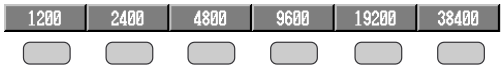


Selecting the baud rate

5. Press the arrow keys to move the cursor to the [Baud rate] box.

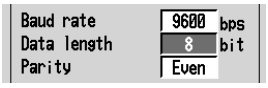


6. Press one of the soft keys from [1200] to [38400] to select the baud rate.

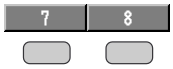


Selecting the data length

7. Press the arrow key to move the cursor to the [Data length] box.

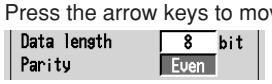


8. Press the [7] or [8] soft key to select the data length.



Selecting the parity

9. Press the arrow keys to move the cursor to the [Parity] box.



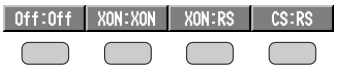
10. Press one of the soft keys from [Odd] to [None] to select the parity check.

Selecting the handshaking

(Valid only for the RS-232 interface.)

11. Press the arrow keys to move the cursor to the [Handshaking] box.

12. Press one of the soft keys from [Off:Off] to [CS:RS] to select the handshaking method.



Selecting the address

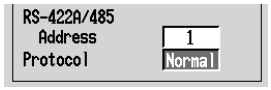
(Valid for the RS-422-A/485 interface and the Modbus protocol)

13. Press the arrow keys to move the cursor to the [Address] box.

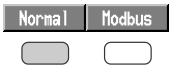
14. Press one of the soft keys from [1] to [32] to select the address. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the desired address and press the corresponding soft key.

Setting the protocol to "Normal"

15. Press the arrow keys to move the cursor to the [Protocol] box.



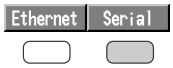
16. Press the [Normal] soft key.



Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

17. Press the arrow key to move the cursor to the [Memory out] box.

18. Press either the [Ethernet] or the [Serial] soft key. Press the [Serial] soft key when using serial communications.



Confirming/Canceling the new settings

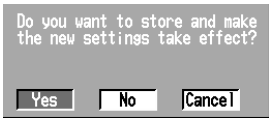
19. To confirm the new settings, press the DISP/ENTER key. To cancel, press the ESC key.

    For detailed operations regarding confirmation and cancellation, see “Flow of Operation using the Operation Keys” on page vi.

Storing the new settings

20. Press the ESC key several times to display the basic configuration menu.
21. Press the [End] soft key to display a dialog box which you select whether or not to store the new settings.

22. Select the [Yes] to store the new settings, the [No] to discard them, or the [Cancel] to return to the basic setting menu by pressing the arrow key. Then, press the DISP/ENTER key



4.1 Modbus Protocol Specifications

The Modbus protocol can be used over the serial interface (RS-232 or RS-422-A/485).

The Modbus specifications of the RD-MV are as follows.

Specification	Description
Transmission medium	RS-232 or RS-422-A/485
Control (Flow control is not available.)	RS-232: None only RS-422-A/485: None only
Baud rate	Select from 1200, 2400, 4800, 9600, 19200, or 38400 [bps]
Start bit	1 bit (fixed)
Stop bit	1 bit (fixed)
Parity check	Odd, Even, None
Transfer mode	RTU (Remote Terminal Unit) mode only • Data length: 8 bits • Data interval: time equivalent to 24 bits or less* • Error detection: Uses CRC-16 * Time interval equivalent to 3.5 characters or more is used to detect the end of the message.
Slave address	RS-232: 1 to 32 RS-422A/485: 1 to 32

The function code of Modbus protocol that are supported by the RD-MV are as follows.

Function Code	Function	Operation
3	Read the hold register (4xxxx).	Read communication input data.
4	Read the input register (3xxxx).	Read measured, computed, and time data.
8	Loop back test	Supports message return (test code (0x00) only.
16	Write to the hold register (4xxxx)	Write communication input data.

4.2 Register Assignments

The register assignments of the Modbus protocol are given below. The data in the register do not contain unit and decimal position information. The unit and decimal position information must be set to the Modbus master (host) beforehand.

Input register	Data
30001	Measured data of CH01
30002	Measured data of CH02
.	.
30030	Measured data of CH30
The corresponding registers vary depending on the model as follows: 30001 to 30002 on the RD-MV102. 30001 to 30004 on the RD-MV104. 30001 to 30006 on the RD-MV106. 30001 to 30012 on the RD-MV112. 30001 to 30004 on the RD-MV204. 30001 to 30008 on the RD-MV208. 30001 to 30010 on the RD-MV210. 30001 to 30020 on the RD-MV220. 30001 to 30030 on the RD-MV230.	
31001	Alarm status of the measured data of CH01
31002	Alarm status of the measured data of CH02
.	.
31030	Alarm status of the measured data of CH30
The corresponding registers vary depending on the model as follows: 31001 to 31002 on the RD-MV102. 31001 to 31004 on the RD-MV104. 31001 to 31006 on the RD-MV106. 31001 to 31012 on the RD-MV112. 31001 to 31004 on the RD-MV204. 31001 to 31008 on the RD-MV208. 31001 to 31010 on the RD-MV210. 31001 to 31020 on the RD-MV220. 31001 to 31030 on the RD-MV230.	
32001	Computed data of CH31 (upper byte)
32002	Computed data of CH31 (lower byte)
32003	Computed data of CH32 (upper byte)
32004	Computed data of CH32 (lower byte)
.	.
32059	Computed data of CH60 (upper byte)
32060	Computed data of CH60 (lower byte)
• The corresponding registers vary depending on the model as follows: 32001 to 32008 on the RD-MV102/RD-MV104. 32001 to 32024 on the RD-MV106/RD-MV112. 32001 to 32016 on the RD-MV204/RD-MV208. 32001 to 32060 on the RD-MV210/RD-MV220/RD-MV230. • These registers are for models with the computation function option /M1.	
33001	Alarm status of the Computed data of CH31
33002	Alarm status of the Computed data of CH32
.	.
33030	Alarm status of the Computed data of CH60
• The corresponding registers vary depending on the model as follows: 33001 to 33004 on the RD-MV102/RD-MV104. 33001 to 33012 on the RD-MV106/RD-MV112. 33001 to 33008 on the RD-MV204/RD-MV208. 33001 to 33030 on the RD-MV210/RD-MV220/RD-MV230. • These registers are for models with the computation function option /M1.	
39001	Year (4 digits)
39002	Month
39003	Day
39004	Hour
39005	Minute
39006	Second
39007	Millisecond
39008	Summer/Winter time

Hold register	Data
40001	Communication input data of C01
40002	Communication input data of C02
.	.
40030	Communication input data of C30
A value in the range from –32768 to 32767 can be written in the hold register. For RD-MV100, the hold register is from 40001 to 40012 (from C01 to C12.)	

4.3 Modbus Error Response

The following table contains only the Modbus error responses. For other communication error messages, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

Code	Meaning	Cause
1	Bad function code	Requested a function that is not supported. For supported functions, see section 4.1, "Modbus Protocol Specifications."
2	Bad register number	Tried to read/write to a register that has no corresponding channel.
3	Bad number of registers	The number of specified registers is zero.
7	Cannot be executed.	Tried to read a computation register from a model that has no computation option.

However, no response is returned for the following cases.

- CRC error
- Errors other than the ones shown above.

4.4 Setting the Configuration that is Used When the Modbus Protocol is Used

Explanation

Selecting the baud rate

Select the baud rate from the following list.
1200, 2400, 4800, 9600, 19200, 38400

Selecting the parity check

Select the parity check from the following list.
Odd, Even, None

Selecting the address

Select the address from the following values.
1 to 32

Selecting the "Modbus" protocol

When communicating using the "Modbus" protocol, select [Modbus].

Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

- Using output commands (ME/MI/MO commands), select the communication interface used to output the data in the internal memory (display data, event data, TLOG data, manual sampled data, and report data) and the files on the external storage medium. Since Ethernet communications and serial communications cannot be used simultaneously, you must select either one.
- When using serial communications, select [Serial].

Storing the settings

To activate the settings made in the basic setting mode, the settings must be saved. Otherwise, the settings return to the previous values.

Note

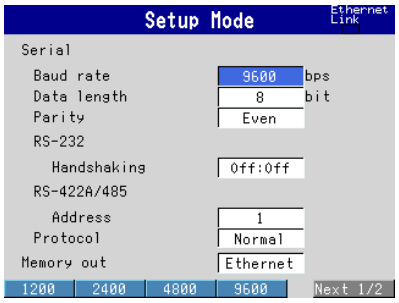
When using the Modbus protocol, moving the cursor and setting the data length and handshaking produces no effect. These settings become valid when the protocol selection is set to [Normal] and the settings are saved.

Procedure

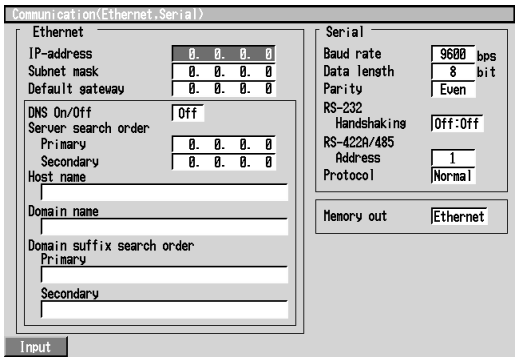
For the basic flow of operations, see “Flow of Operation using the Operation Keys” on page vi.

1. Press the MENU key to display the setting menu.
2. Press the FUNC key for approximately 3 s to display the basic setting menu.
3. Press the [#10 (Communication)](RD-MV100) or [#6 (Communication)](RD-MV200) soft key to display the communication function setting menu.
4. Press the [#6 (Serial, Memory out)](RD-MV100) or [#1 (Ethernet, Serial)](RD-MV200) soft key to display the communication (Serial) menu.

RD-MV100 Communication (Serial, Memory out) menu



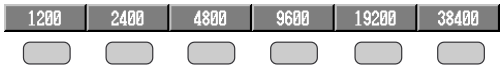
RD-MV200 Communication (Ethernet, Serial) menu



Selecting the baud rate

5. Press the arrow keys to move the cursor to the [Baud rate] box.

6. Press one of the soft keys from [1200] to [38400] to select the baud rate.



Selecting the parity check

7. Press the arrow keys to move the cursor to the [Parity] box.

8. Press one of the soft keys from [Odd] to [None] to select the parity check.

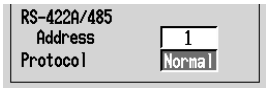
Selecting the address

9. Press the arrow keys to move the cursor to the [Address] box.

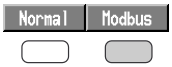
10. Press one of the soft keys from [1] to [32] to select the address. If [Next] is displayed as a selection, multiple lines of selections are available. Press the [Next] soft key to display the desired address and press the corresponding soft key.

Setting the protocol to "Modbus"

11. Press the arrow keys to move the cursor to the [Protocol] box.



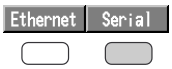
12. Press the [Modbus] soft key.



Selecting the communication interface used to output the data in the internal memory and the files on the external storage medium

13. Press the arrow key to move the cursor to the [Memory out] box.

14. Press either the [Ethernet] or the [Serial] soft key. Press the [Serial] soft key when using serial communications.



Confirming/Canceling the new settings

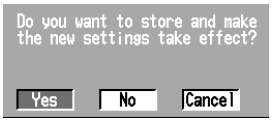
15. To confirm the new settings, press the DISP/ENTER key. To cancel, press the ESC key.

For detailed operations regarding confirmation and cancellation, see "Flow of Operation using the Operation Keys" on page vi.

Storing the new settings

16. Press the ESC key several times to display the basic setting menu.
17. Pressing the [End] soft key to display a dialog box which you select whether or not to store the new settings.

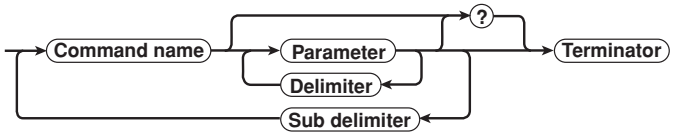
18. Select the [Yes] to store the new settings, the [No] to discard them, or the [Cancel] to return to the basic setting menu by pressing the arrow key. Then, press the DISP/ENTER key.



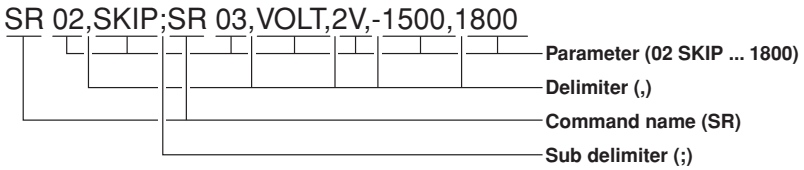
5.1 Command Syntax

Command Syntax

The syntax of the setting/basic setting/output commands (see sections 5.4 to 5.9) of the instrument is given below. ASCII codes are used for the character codes. For the syntax of the maintenance/test commands (see section 5.10) and instrument information output commands (see section 5.11), see the corresponding sections or the examples for each command.



Command example



Command name

Defined using two alphabet characters.

Parameter

- Command parameters.
- Set using alphabet characters or numerical values.
- Parameters are separated by delimiters.
- All numerical values are specified using integers.
- When the parameter is a numerical value, the valid range varies depending on the command.
- Spaces before and after of the parameter are ignored (except for parameters that are specified using an ASCII character string (unit), when spaces are valid.)
- You can omit the parameters that do not need to be changed from their current settings. However, delimiters cannot be omitted.

  Example SR 01,,2V<terminator>

  If multiple parameters are omitted and delimiters occur at the end of the command, those delimiters can be omitted.

  Example SR 01,VOLT,,,<terminator> → SR 01,VOLT<terminator>
- The number of digits of the following parameters is fixed. If the number of digits is not correct when entering the command, a syntax error results.
  - Date YY/MM/DD (8 characters)
    YY: Year (Enter the lower two digits of the year.)
    MM: Month
    DD: Day
  - Time HH:MM:SS (8 characters)
    HH: Hour
    MM: Minute
    SS: Second
  - Channel number: 2 characters
  - Relay number: 3 characters

Query

- A question mark is used to specify a query.
- By placing a query after a command or parameter, the setting information of the corresponding command can be queried. Some commands cannot execute queries. For the query syntax of each command, see sections 5.4 to 5.7.
  Example 1 SR[p1]? SR? or SR p1? can be executed.
  Example 2 SA[p1[,p2]]? SA?, SA p1? or SA p1,p2? can be executed.

Delimiter

- A comma is used as a delimiter.
- Parameters are separated by delimiters.

Sub delimiter

- A semicolon is used as a sub delimiter.
- By separating each command with a sub delimiter, up to 10 commands can be specified one after another. However, the following commands and queries cannot be specified one after another. Use them independently.
  - Output commands other than BO, CS, and IF commands.
  - Y0 command
  - Queries

* If there are consecutive sub delimiters, they are considered to be single. In addition, sub delimiters at the front and at the end are ignored.
Example ;SR01,VOLT;;;SR02,VOLT;<terminator> is taken to be SR01,VOLT;SR02,VOLT<terminator>.

Terminator (Terminating character)

Use either of the following two characters for the terminator.

- CR + LF (0DH 0AH in ASCII code.)
- LF (0AH in ASCII code.)

Note

- Do not specify a channel or relay number that is not available on the RD-MV. An error will occur.
- The total data length from the first character to the terminator must be less than 2047 bytes.
- Commands are not case sensitive (with the exception of user-specified character strings).
- All the commands that are listed using sub delimiters are executed even if one of the commands is erroneous.
- Spaces that are inserted before and after a parameter are ignored. However, if spaces are inserted before a command, after a sub delimiter, or after a query, an error occurs.

Response

The RD-MV returns a response (affirmative/negative response) to a command that is delimited by a single terminator*. The controller should follow the one command to one response format. When the command-response rule is not followed, the operation is not guaranteed. For the response syntax, see section 6.1.

* Commands dedicated to RS-422-A/485 (see section 5.9) and instrument information output commands (section 5.11) are exceptions.

5.2 A List of Commands

Setting Commands

Command Type	Command Name	Function	Execution Mode	Administrator	User	Page
Setting						
	SR	Sets the input range	Operation mode	Yes	No	5-9
	SO	Sets the computing equation	Operation mode	Yes	No	5-10
	SA	Sets the alarm	Operation mode	Yes	No	5-10
	SD	Sets the date and time	Operation mode	Yes	No	5-11
	SW	Sets the display update rate/auto-save interval	Operation mode	Yes	No	5-11
	SZ	Sets the zone	Operation mode	Yes	No	5-11
	SP	Sets the partial expanded display	Operation mode	Yes	No	5-12
	ST	Sets the tag	Operation mode	Yes	No	5-12
	SX	Sets the group	Operation mode	Yes	No	5-12
	SL	Sets the trip line	Operation mode	Yes	No	5-12
	SG	Sets the message	Operation mode	Yes	No	5-12
	SH	Sets the file header	Operation mode	Yes	No	5-13
	SE	Sets the display direction, background color, trend line width, trip line width, number of grids, and scroll time	Operation mode	Yes	No	5-13
	SB	Sets the number of scale divisions, base position of the bar graph, and the display position of the trend scale	Operation mode	Yes	No	5-13
	SV	Sets the moving average of the measured channel	Operation mode	Yes	No	5-13
	SF	Sets the filter	Operation mode	Yes	No	5-13
	SC	Sets the channel display color	Operation mode	Yes	No	5-14
	SQ	Sets the LCD brightness and the screen backlight saver	Operation mode	Yes	No	5-14
	SY	Sets the 4 screen display (only for RD-MV200)	Operation mode	Yes	No	5-14
	SU	Sets the USER key (only for RD-MV200)	Operation mode	Yes	No	5-15
	SK	Sets the computation constant	Operation mode	Yes	No	5-15
	SI	Sets the rolling average of the computation channel	Operation mode	Yes	No	5-15
	SJ	Sets the TLOG timer	Operation mode	Yes	No	5-15
	SS	Set the date and time at which to switch the daylight savings time	Operation mode	Yes	No	5-16
	FR	Sets the acquiring interval to the FIFO buffer	Operation mode	Yes	No	5-16
	BA	Sets the application name, the supervisor name, and the manager name	Operation mode	Yes	No	5-16
	BB	Sets the batch number, the lot number, automatic increment of the lot number, and the displayed information	Operation mode	Yes	No	5-17
	BC	Sets the comment number and the character string	Operation mode	Yes	No	5-17
	BD	Sets the alarm delay time	Operation mode	Yes	No	5-17

Yes: Command usable
No : Command not usable

Note

- There are two execution modes on the RD-MV. If you attempt to execute a command in a mode that is different from the specification, a syntax error occurs. Use the DS command to switch to the execution mode, then set or control the RD-MV. Query commands can be executed in either mode.
  - **Basic setting mode**
    Measurement/computation is stopped and settings are changed in this mode.
  - **Operation mode**
    As a general rule, commands other than those for the basic setting mode described above are used in this mode.
- The administrator and user specifications in the table indicate the user level that is specified using the login function for Ethernet communications. For details, see section 1.2.

Command Type	Command Name	Function	Execution Mode	Administrator	User	Page
Control						
	UD	Switches the screen	Operation mode	Yes	No	5-17
	PS	Starts/Stops measurements	Operation mode	Yes	No	5-18
	AK	Confirms the alarm status (alarm acknowledge)	Operation mode	Yes	No	5-18
	EV	Manual sample, manual trigger, snapshot, saving the display data, saving the event data	Operation mode	Yes	No	5-19
	MS	Writes the message (display and save)	Operation mode	Yes	No	5-19
	TL	Starts/stops/resets computation (MATH)/ Clears the computation dropout status display	Operation mode	Yes	No	5-19
	DS	Switches execution modes (operation/basic setting)	All modes	Yes	No	5-19
	LO	Loads the setting data for setting commands	Operation mode	Yes	No	5-19
	LI	Saves the setting data	Operation mode	Yes	No	5-19
	CM	Sets the communication input data	Operation mode	Yes	No	5-20

Yes: Command usable
No : Command not usable

Basic Setting Commands

- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.
- The settings that are returned in response to a query in the basic setting mode will contain the new settings even if they are not saved with the XE command. However, the new settings will not be activated until they are saved. In order to activate the new settings, the XE command must be issued as described earlier. If the settings are not saved or cleared using the XE command and the execution mode is changed from the basic setting mode to the operation mode, the settings that are returned in response to a query will contain the settings that existed before they were changed.

Note

- The settings that are changed using the YA/YK/YN/YQ/YS command are activated after saving the new settings using the XE command and rebooting the RD-MV.
- When executing the YO command, the communication is disconnected.

Command Name	Function	Execution Mode	Administrator	User	Page
XA	Sets alarm related settings	Basic setting mode	Yes	No	5-20
XI	Sets the A/D integral time	Basic setting mode	Yes	No	5-21
XB	Sets the burn out	Basic setting mode	Yes	No	5-21
XJ	Sets the RJC	Basic setting mode	Yes	No	5-21
XV	Sets the scan interval	Basic setting mode	Yes	No	5-21
XT	Selects the temperature unit	Basic setting mode	Yes	No	5-21
XS	Sets the channels to display the trend and acquire the data	Basic setting mode	Yes	No	5-21
XM	Sets the conditions used to acquire display/event data to the internal memory or save the data to the external storage medium	Basic setting mode	Yes	No	5-21
XU	Sets the channel identification display, memory alarm time, language, whether or not to use the partial expanded display function and the batch function	Basic setting mode	Yes	No	5-22
XR	Sets the remote action	Basic setting mode	Yes	No	5-22
XQ	Sets the timer	Basic setting mode	Yes	No	5-23
RO	Sets the report type and generation time	Basic setting mode	Yes	No	5-23
RM	Sets the report channel	Basic setting mode	Yes	No	5-24
XO	Selects the communication interface used to output data residing in the internal memory (display, event, TLOG, manual sampled, and report data) and files on the external storage medium using output commands (ME/MI/MO commands)	Basic setting mode	Yes	No	5-24
XH	Sets whether or not to use the key login, auto logout, and user ID functions	Basic setting mode	Yes	No	5-24
XE	Sets whether or not to store the basic settings	Basic setting mode	Yes	No	5-24
YA	Sets the IP address, subnet mask, and default gateway	Basic setting mode	Yes	No	5-25
YK	Sets keepalive	Basic setting mode	Yes	No	5-25
YN	Sets the DNS	Basic setting mode	Yes	No	5-25
YQ	Sets the communication timeout	Basic setting mode	Yes	No	5-25
YS	Sets the serial interface	Basic setting mode	Yes	No	5-25
YO	Loads setting data	Basic setting mode	Yes	No	5-26
YI	Saves setting data	Basic setting mode	Yes	No	5-26
YC	Clears the measured/computed data, initializes setup data	Basic setting mode	Yes	No	5-26
YT	Sets the FTP transfer timing	Basic setting mode	Yes	No	5-26

Yes: Command usable
No : Command unusable

Output Commands

Command Type	Command Name	Function	Execution Mode	Administrator	User	Page
control						
	BO	Sets the output byte order	All modes	Yes	Yes	5-27
	CS	Sets the checksum (This command can be used only during serial communications)	All modes	Yes	Yes	5-27
	IF	Sets the status filter	All modes	Yes	Yes	5-27
	CC	Disconnects an Ethernet connection (This command can be used only during Ethernet communications)	All modes	Yes	Yes	5-27
Setup, measured, and computed data output						
	FC	Outputs screen image data	All modes	Yes	Yes	5-27
	FE	Outputs setup data	All modes	Yes	Yes	5-27
	FD	Outputs the most recent measured/computed data	Operation mode	Yes	Yes	5-27
	FF	Outputs FIFO data	Operation mode	Yes	Yes	5-28
	FL	Outputs communication log	All modes	Yes	Yes	5-28
	IS	Outputs status information	All modes	Yes	Yes	5-28
	FU	Outputs user level	All modes	Yes	Yes	5-28
	ME	Outputs data saved in the external storage medium (Either Ethernet or serial communication can be used)	Operation mode	Yes	No	5-29
	MI	Outputs display data and event data acquired in the internal memory (Either Ethernet or serial communication can be used)	Operation mode	Yes	No	5-29
	MO	Outputs TLOG data, manual sampled data, and report data acquired in the internal memory (Either Ethernet or serial communication can be used)	Operation mode	Yes	No	5-30
RS-422-A/485 dedicated commands						
	Esc O	Opens the instrument	All modes	Yes	Yes	5-30
	Esc C	Closes the instrument	All modes	Yes	Yes	5-30

Yes: Command usable
No : Command unusable

Maintenance/Test Commands (Available when using the maintenance/test server function via Ethernet communications)

Command	Function	Administrator	User	Page
close	Disconnects the connection between other devices	Yes	No	5-31
con	Outputs connection information	Yes	Yes	5-31
eth	Outputs Ethernet statistical information	Yes	Yes	5-31
help	Outputs help	Yes	Yes	5-31
net	Outputs network statistical information	Yes	Yes	5-31
quit	Disconnects the connection of the device being operated	Yes	Yes	5-32

Yes: Command usable
No : Command unusable

Instrument Information Output Commands (Available when using the instrument information server function via Ethernet communications)

Parameter	Function	Page
all	Outputs all information that are output using the parameters below	5-32
serial	Outputs the serial number	5-32
model	Outputs the manufacturer, model, and firmware version	5-32
host	Outputs the host name	5-32
ip	Outputs the IP address	5-32

5.3 Input Range Parameter

The following tables show which measurement ranges of the instrument correspond to the input types of the SR command (input range setting command), VOLT, TC, RTD, DI, and SQRT. The table also shows the ranges for the upper and lower limits of the span. These relationships are not given in the section describing the SR command that appears later in the chapter. Please refer to this section for the information.

DC voltage (VOLT)

Measurement Range	Parameter for the SR Command	Value of the Upper and Lower Limits of the Span (Upper and Lower Limits of the Measurement Range)	Value of the Upper and Lower Limits of the SR Command
20 mV	20 mV	−20.00 to 20.00 mV	−2000 to 2000
60 mV	60 mV	−60.00 to 60.00 mV	−6000 to 6000
200 mV	200 mV	−200.0 to 200.0 mV	−2000 to 2000
2 V	2 V	−2.000 to 2.000 V	−2000 to 2000
6 V	6 V	−6.000 to 6.000 V	−6000 to 6000
20 V	20 V	−20.00 to 20.00 V	−2000 to 2000

Thermocouple (TC)

Measurement Range	Parameter for the SR Command	Value of the Upper and Lower Limits of the Span (Upper and Lower Limits of the Measurement Range)	Value of the Upper and Lower Limits of the SR Command
R	R	0.0 to 1760.0°C	0 to 17600
S	S	0.0 to 1760.0°C	0 to 17600
B	B	0.0 to 1820.0°C	0 to 18200
K	K	−200.0 to 1370.0°C	−2000 to 13700
E	E	−200.0 to 800.0°C	−2000 to 8000
J	J	−200.0 to 1100.0°C	−2000 to 11000
T	T	−200.0 to 400.0°C	−2000 to 4000
N	N	0.0 to 1300.0°C	00 to 13000
W	W	0.0 to 2315.0°C	00 to 23150
L	L	−200.0 to 900.0°C	−2000 to 9000
U	U	−200.0 to 400.0°C	−2000 to 4000

Resistance Temperature Detector (RTD)

Measurement Range	Parameter for the SR Command	Value of the Upper and Lower Limits of the Span (Upper and Lower Limits of the Measurement Range)	Value of the Upper and Lower Limits of the SR Command
Pt100	PT	−200.0 to 600.0°C	−2000 to 6000
JPt100	JPT	−200.0 to 550.0°C	−2000 to 5500
Cu10 (GE)*	CU1	−200.0 to 300.0°C	−2000 to 3000
Cu10 (L&N)*	CU2	−200.0 to 300.0°C	−2000 to 3000
Cu10 (WEED)*	CU3	−200.0 to 300.0°C	−2000 to 3000
Cu10 (BAILEY)*	CU4	−200.0 to 300.0°C	−2000 to 3000
Cu10 α = 0.00392 at 20°C*	CU5	−200.0 to 300.0°C	−2000 to 3000
Cu10 α = 0.00393 at 20°C*	CU6	−200.0 to 300.0°C	−2000 to 3000
Cu25 α = 0.00425 at 0°C*	CU25	−200.0 to 300.0°C	−2000 to 3000

* Measurement range that can be specified on models with the Cu10, Cu25 resistance temperature detector option /N1.

Digital Input (DI)

Measurement Range	Parameter for the SR Command	Value of the Upper and Lower Limits of the Span (Upper and Lower Limits of the Measurement Range)	Value of the Upper and Lower Limits of the SR Command
Voltage	LEVEL	0 or 1*1	0 or 1
Contact	CONT	0 or 1*2	0 or 1

*1: "0" when less than 2.4 V, "1" when greater than or equal to 2.4 V.
*2: "0" when contact is OFF, "1" when contact is ON.

Square Root (SQRT)

Measurement Range	Parameter for the SR Command	Value of the Upper and Lower Limits of the Span (Upper and Lower Limits of the Measurement Range)	Value of the Upper and Lower Limits of the SR Command
20 mV	20 mV	−20.00 to 20.00 mV	−30000 to 30000
60 mV	60 mV	−60.00 to 60.00 mV	−30000 to 30000
200 mV	200 mV	−200.0 to 200.0 mV	−30000 to 30000
2 V	2 V	−2.000 to 2.000 V	−30000 to 30000
6 V	6 V	−6.000 to 6.000 V	−30000 to 30000
20 V	20 V	−20.00 to 20.00 V	−30000 to 30000

Note

For the measurement accuracy of each measurement range, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642)

5.4 Setting Commands (Setting)

SR Sets the input range

When setting channels to skip

Syntax SR p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Range mode (SKIP)

Query SR[p1]?

Example Skips channel 01.
SR 01,SKIP

Description
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- Measurements are not made on channels that are set to SKIP.

When setting the channels to voltage, thermocouple, RTD, or digital input

Syntax SR p1,p2,p3,p4,p5<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Input type
VOLT DC VOLTAGE
TC Thermocouple
RTD Resistance temperature detector
DI Digital input
p3 Measurement range
p4 Lower limit of span
p5 Upper limit of span

Query SR[p1]?

Example Set the input type for channel 01 to thermocouple type R, span lower limit to 0°C, and span upper limit to 1760.0°C.
SR 01,TC,R,0,17600

Description
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- Set parameters p3, p4, and p5 according to the table in section 5.3.
- For parameters p4 and p5, enter a value using 5 digits or less excluding the decimal. The decimal position is fixed to the position indicated in the table in section 5.3.

When computing the difference between channels

Syntax SR p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Range mode (DELTA)
p3 Input type
VOLT DC VOLTAGE
TC Thermocouple
RTD Resistance temperature detector
DI Digital input
p4 Measurement range
p5 Lower limit of span
p6 Upper limit of span
p7 Reference channel (RD-MV100: 01 to 12, RD-MV200: 01 to 30)

Query SR[p1]?

Example Set the range mode of channel 10 to the difference computation between channels with the reference channel set to 01 and set the input type to TC. Set the range to R. Set the span lower limit to 10.0°C and span upper limit to 100.0°C.
SR 10,DELTA,TC,R,100,1000,01

Description
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- Set parameters p4, p5, and p6 according to the table in section 5.3.
- For parameters p5 and p6, enter a value using 5 digits or less, excluding the decimal. The decimal position is fixed to the position indicated in the table in section 5.3.

When setting the scaling

Syntax SR p1,p2,p3,p4,p5,p6,p7,p8,p9, p10<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Range mode (SCALE)
p3 Input type
VOLT DC VOLTAGE
TC Thermocouple
RTD Resistance temperature detector
DI Digital input
p4 Measurement range
p5 Lower limit of span
p6 Upper limit of span
p7 Scaling lower limit (-30000 to 30000)
p8 Scaling upper limit (-30000 to 30000)
p9 Scaling decimal position (0 to 4)
p10 Unit (Up to 6 characters)

Query SR[p1]?

Example Convert the DC voltage measured on channel 02 to a DC current. Set the measurement range to 6 V, span lower limit to 1 V, span upper limit to 5 V, scaling lower limit to 1.00 A, and scaling upper limit to 5.00 A.
SR 02,SCALE,VOLT,6V,1000,5000,100,500,2,A

Description
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- Set parameters p4, p5, and p6 according to the table in section 5.3.

- For parameters p5 and p6, enter a value using 5 digits or less excluding the decimal. The decimal position is fixed to the position indicated in the table in section 5.3.
- For parameters p7, p8, and p9, either set all three parameters or omit all three parameters.

When setting the square root

Syntax SR p1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Range mode (SQRT)
p3 Measurement range
p4 Lower limit of span
p5 Upper limit of span
p6 Scaling lower limit (-30000 to 30000)
p7 Scaling upper limit (-30000 to 30000)
p8 Scaling decimal position (0 to 4)
p9 Unit (Up to 6 characters)

Query SR[p1]?

Example Convert the DC voltage measured on channel 01 to the amount of flow using the square root computation. Set the measurement range to 6 V, span lower limit to 1 V, span upper limit to 5 V, scaling lower limit to 10.0 m^3/s, and scaling upper limit to 100.0 m^3/s.
SR 01,SQRT,6V,1000,5000,100,1000,1,m3/S

Description
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- Set parameters p3, p4, and p5 according to the table in section 5.3.
- For parameters p4 and p5, enter a value using 5 digits or less excluding the decimal. The decimal position is fixed to the position indicated in the table in section 5.3.
- For parameters p6, p7, and p8, either set all three parameters or omit all three parameters.

SO Sets the computing equation

Syntax SO p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Computation channel number (RD-MV100: 31 to 42, RD-MV200: 31 to 60)
p2 Turn ON/OFF computation
p3 Computing equation (Up to 40 characters)
p4 Lower limit of span(-9999999 to 99999999)
p5 Upper limit of span(-9999999 to 99999999)
p6 Decimal position of span (0 to 4)
p7 Unit (Up to 6 characters)

Query SO[p1]?

Example Set the computation channel to 31, the computation to ON, the computing equation to the sum of channel 01 and 02, span lower limit to -10.0000, span upper limit to 15.0000, and the unit to V.
SO 31,ON,01+02,-100000,150000,4,V

Description
- This command can be used on models with the computation function option /M1.
- This command cannot be specified while measurement/computation is in progress or while a report is being created.
- For computing equations, see the RD-MV100/RD-MV200 User's Manual.
- For parameters p4 and p5, enter a value using 7 digits or less ,excluding the decimal, for negative numbers and 8 digits or less for positive numbers.
- For parameters p4, p5, and p6, either set all three parameters or omit all three parameters.

SA Sets the alarm

When not using the alarm

Syntax SA p1,p2,p3<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Alarm number (1 to 4)
p3 Alarm ON/OFF state (OFF)

Query SA[p1[,p2]]?

Example Set off the alarm number 1 of channel 10.
SA 10,1,OFF

Description Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.

When using the alarm

Syntax SA p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Alarm number (1 to 4)
p3 Alarm ON/OFF state (ON)
p4 Alarm type
H Upper limit alarm
L Lower limit alarm
h Difference upper-limit alarm
l Difference lower-limit alarm
R Upper limit on rate-of-change alarm
r Lower limit on rate-of-change alarm
T Delay upper limit alarm
t Delay lower limit alarm
(Upper and lower case letters are distinguished.)
p5 Alarm value
p6 Relay setting
ON Relay setting ON
OFF Relay setting OFF

p7 Relay number (RD-MV100: I01 to I06, RD-MV200: I01 to I06/ I11 to I16/ I21 to I26, I31 to I36)

Query SA[p1[,p2]]?

Example Set an upper limit alarm (alarm value = 1000) in alarm number 1 of channel 02, and activate relay number 1 when an alarm occurs.
SA 02,1,ON,H,1000,ON,I01

Description
- When the input range setting (SR command) is set to SKIP, p3 cannot be turned ON.
- When the computation channel setting (SO command) is turned OFF, p3 cannot be turned ON.
- The alarm settings are all turned OFF for the following cases.
  - When the input type is changed (VOLT, TC……).
  - When the measurement range is changed.
  - When the span and scaling values are changed during scaling display (includes changing the decimal position).
  - When the computation channel is turned ON/OFF or when the computing equation or the span value is changed on the computation channel.
- The h and l settings of p4 are valid only when the measurement range is set to computation between channels.
- If p4 is set to R or r, set the interval for the upper/lower limit on the rate-of-change using the XA command.
- If p4 is set to T or t, set the alarm delay time for the delay upper/lower limit alarm using the BD command.
- For the range of alarm values of p5, see the table in section 5.3.
- Set the alarm value of a computation channel within the range of the span.
- For the alarm value of p5, enter a value using 5 digits or less, excluding the decimal. For computation channels, enter a value using 8 digits or less, excluding the decimal.
- An error occurs if a number of a relay that is not installed is specified in p7. For the procedures used to set the relay numbers, see the RD-MV100/RD-MV200 User's Manual.
- Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.
- For computation channels, the alarm types that can be specified are only H (upper limit alarm), L (lower limit alarm), T (delay upper limit alarm), and t (delay lower limit alarm).
- For computation channels, the alarm hysteresis is fixed to zero. Use the XA command to set the alarm hysteresis.

SD Sets the date and time

Syntax SD p1,p2<terminator>
p1 Date (YY/MM/DD fixed form)
YY Year (00 to 99)
MM Month (01 to 12)
DD Day (01 to 31)
p2 Time (HH/MM/SS fixed form)
HH Hour (00 to 23)
MM Minute (00 to 59)
SS Second (00 to 59)

Query SD?

Example Set the internal clock to 13:00:00, October 1, 1999.
SD 99/10/01,13:00:00

Description The form of p1 and p2 is fixed to 8 characters. Use the following form. Do not enter spaces in between the digits, as an error will occur.
p1 = YY/MM/DD (Lower two digits of the year/ month/day)
p2 = HH:MM:SS (Hour:minute:second)

SW Sets the display update rate/ auto-save interval

Syntax SW p1,p2<terminator>
p1 Display update rate (15S, 30S, 1MIN, 2MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H, 2H, 4H)
p2 Auto-save interval (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 10DAY, 14DAY, 31DAY)

Query SW?

Example Set the display update rate to one minute and the auto-save interval to 10 minutes.
SW 1MIN,10MIN

Description
- This command cannot be specified while measurement is in progress.
- The selectable auto-save interval (p2) varies depending on the display update rate (p1) setting. For details, see the RD-MV100/RD-MV200 User's Manual.
- 15S and 30S of p1 apply only to models RD-MV102, RD-MV104, RD-MV204 and RD-MV208.
- The p2 setting is valid when the saving method to the external storage medium is set to auto using the XM command (p1 of the XM command is set to AUTO).

SZ Sets the zone

Syntax SZ p1,p2,p3<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)

p2 Zone lower limit (0 to 95)[%]
p3 Zone upper limit (5 to 100)[%]

Query SZ[p1]?

Example Display channel 02 in a zone between 30% and 50%.
SZ 02,30,50

Description
- Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.
- The total display width of the screen in the direction of the amplitude is taken to be 100%.
- The zone width must be at least 5%.
- Set the parameters for the zone upper and lower limits so that the upper limit is greater than the lower limit.

SP Sets the partial expanded display

Syntax SP p1,p2,p3,p4<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Enable/disable (ON/OFF) the partial expansion setting.
p3 Boundary position (1 to 99)[%]
p4 Boundary value

Query SP[p1]?

Example Partially expand the display of channel 01. Set the boundary position to 25% and the boundary value to 1.00 V.
SP 01,ON,25,100

Description
- Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.
- When the input range setting (SR command) is set to SKIP, p2 cannot be turned ON.
- When the computation channel setting (SO command) is turned OFF, p2 cannot be turned ON.
- The range of the upper and lower limits of the span (scaling upper and lower limits when scaling is enabled) is taken to be 100% for parameter p3.
- Parameter p4 can be set in the range (span upper limit –1) to (span lower limit +1). If scaling is enabled, the range is (scaling upper limit –1) to (scaling lower limit +1).
- The decimal position and the number of digits become the same as the span and scaling settings (see the SR command).
- This command cannot be specified unless the partial expanded display function (p4) of the XU command is set to USE.
- This command cannot be specified if the partial expanded display range does not exist (when the span width is set to 1, for example).

ST Sets the tag

Syntax ST p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Tag (Up to 16 characters)

Query ST[p1]?

Example Set the tag of channel 02 to TAG2.
ST 02,TAG2

Description
- For the characters that can be used for the tags, see appendix 1, “ASCII Character Codes.” Note that semicolons and commas cannot be used.
- Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.

SX Sets the group

Syntax SX p1,p2,p3<terminator>
p1 Group number (1 to 4)
p2 Group name (Up to 16 characters)
p3 Channel construction

Query SX[p1]?

Example Set channels 01, 03, 04 to 06 to group number 1, and group name is GROUP2.
SX 1,GROUP2,01.03.04-06
Set the channel configuration by using periods "." to separate each channel or by using a hyphen "-" to specify a range of channels.

Description
- An error occurs if a number of a channel that is not installed in the instrument is specified.
- An error occurs if a number of a computation channel that is not provided on the instrument is specified.
- For the characters that can be used for the group name, see appendix 1, “ASCII Character Codes.” Note that semicolons and commas cannot be used.

SL Sets the trip line

Syntax SL p1,p2,p3,p4,p5<terminator>
p1 Group number (1 to 4)
p2 Number of trip line (1 to 4)
p3 Turn ON/OFF the trip line display
p4 Display position (0 to 100)[%]
p5 Display color (RED, GREEN, BLUE, B.VIOLET, BROWN, ORANGE, Y.GREEN, LIGHTBLUE, VIOLET, GRAY, LIME, CYAN, DARKBLUE, YELLOW, LIGHTGRAY, PURPLE)

Query SL[p1[,p2]]?

Example Display trip line 1 in red for group 1.
SL 1,1,ON,RED

Description The total display width of the screen in the direction of the amplitude is taken to be 100%.

SG Sets the message

Syntax SG p1,p2<terminator>
p1 Message number (1 to 8)
p2 Message (Up to 16 characters)
Query SG[p1]?
Example Set character string "MESSAGE1" in message number 1.
SG 1,MESSAGE1
Description For the characters that can be used for the message, see appendix 1, "ASCII Character Codes." Note that semicolons and commas cannot be used.

SH Sets the file header

Syntax SH p1,p2,p3<terminator>
p1 Header for the files saved to the external storage medium (Up to 32 characters)
p2 Directory (Up to 8 characters)
p3 Data to be saved to the external storage medium (UNSAVE, ALL)
Query SH?
Example Add a header, DATA1 and save the file to the DATAFILE directory. Save only the data in the internal memory that has not been saved.
SH DATA1,DATAFILE,UNSAVE
Description
- "Data to be saved to the external storage medium" includes the display, event, TLOG, manual sampled, and report data.
- Parameter p3 is valid when the saving method to the external storage medium is set to manual using the XM command (parameter p1 of the XM command is set to MANUAL).

SE Sets the display direction, background color, trend line width, trip line width, number of grids, and scroll time

Syntax SE p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Display direction of the trend waveform (HORIZONTAL, VERTICAL)
p2 Display direction of the bar graph waveform (HORIZONTAL, VERTICAL)
p3 Background color (WHITE, BLACK)
p4 The line width of the trend (1 to 3)[dot]
p5 The width of the trip line (1 to 3)[dot]
p6 Number of grids (4 to 12)
p7 The time interval (scroll time) for switching displayed group (5s, 10s, 20s, 30s, 1min)
Query SE?
Example Set the display direction of the trend waveform to horizontal, the direction of the bar graph to vertical, the background color to white, the line width of the trend to 1 dot, the width of the trip line to 2 dots, and the number of grids to 10, the time interval for switching displayed group to 20s.
SE HORIZONTAL,VERTICAL,WHITE,1,2,10,20s

SB Sets the number of scale divisions, base position of the bar graph, and the display position of the trend scale

Syntax SB p1,p2,p3,p4<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Number of scale divisions (4 to 12)
p3 Base position of the bar graph display (NORMAL, CENTER)
p4 Position of the scale for the trend display (OFF, RD-MV100: 1 to 6, RD-MV200: 1 to 10)
Query SB[p1]?
Example Set the number of scale divisions of the bar graph of channel 02 to 5, and display the bar graph from the span lower limit (scaling lower limit if scaling is enabled). Display the scale at the third position.
SB 02,5,NORMAL,3
Description
- Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option /M1.
- The base position (p3) is valid when the display direction of the bar graph is set to HORIZONTAL. Use the SE command to set the display direction of the bar graph.

SV Sets the moving average of the measured channel

Syntax SV p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Number of times to measure the moving average (OFF, 2 to 16) [times]
Query SV[p1]?
Example Set the number of times to measure the moving average on channel 02 to 12.
SV 02,12
Description This command can be used on models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230.

SF Sets the filter

Syntax SF p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 04, RD-MV200: 01 to 08)
p2 Filter (OFF, 2S, 5S, 10S)
Query SF[p1]?
Example Set the filter on channel 02 to 2 s.
SF 02,2s
Description • An error occurs if a channel number other than those shown above is specified.
• This command can be used on models RD-MV102, RD-MV104, RD-MV204 and RD-MV208.

SC Sets the channel display color

Syntax SC p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p2 Display color (RED, GREEN, BLUE, B.VIOLET, BROWN, ORANGE, Y.GREEN, LIGHTBLUE, VIOLET, GRAY, LIME, CYAN, DARKBLUE, YELLOW, LIGHTGRAY, PURPLE)
Query SC[p1]?
Example Set the display color of channel 02 to blue.
SC 02,BLUE
Description Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option / M1.

SQ Sets the LCD brightness and the screen backlight saver

When the screen backlight saver function is OFF

Syntax SQ p1,p2<terminator>
p1 LCD brightness (RD-MV100: 1 to 8, RD-MV200: 1 to 4)
p2 Screen backlight saver function ON/OFF (OFF)
Query SQ?
Example Set the LCD brightness to 2 and the screen backlight saver function to OFF.
SQ 2,OFF

When the screen backlight saver function is ON

Syntax SQ p1,p2,p3,p4<terminator>
p1 LCD brightness (RD-MV100: 1 to 8, RD-MV200: 1 to 4)
p2 Screen backlight saver function ON/OFF (ON)
p3 Time after which to enable the screen saver function (1MIN, 2MIN, 5MIN, 10MIN, 30MIN, 1H)
p4 Factors that causes the screen to return from the saver mode (KEY, KEY+ALM)
Query SQ?
Example Set the LCD brightness to 2, the screen backlight saver function to ON, the time after which to enable the screen backlight saver function to 1MIN, and the factor that causes the screen to return from the saver mode to KEY.
SQ 2,ON,1MIN,KEY

SY Sets the 4 screen display (only for RD-MV200)

Syntax SY p1,p2,p3,p4,p5,p6,p7,p8,p9, p10<terminator>
p1 Four screen display number (1 to 4)
p2 Four screen display name (Up to 16 characters)
p3 The display item of the upper left quadrant of the divided screen (screen 1)
TREND Trend display
DIGITAL Digital display
BAR Bar graph display
OVERVIEW Overview display (Alarm indicator)
ALARM Alarm summary display
MESSAGE Message summary display
MEMORY Memory summary display
MEDIA Medium summary display
p4 The group number (1 to 4) to display in the upper left quadrant of the divided screen (screen 1)
p5 The display item of the lower left quadrant of the divided screen (screen 2), same as the selections for p3.
p6 The group number (1 to 4) to display in the lower left quadrant of the divided screen (screen 2)
p7 The display item of the upper right quadrant of the divided screen (screen 3), same as the selections for p3.
p8 The group number (1 to 4) to display in the upper right quadrant of the divided screen (screen 3)
p9 The display item of the lower right quadrant of the divided screen (screen 4), same as the selections for p3.
p10 The group number (1 to 4) to display in the lower right quadrant of the divided screen (screen 4)
Query SY?
Example Set the four screen display number to 1, four screen display name to 4DISPLAY1, the display item of screen 1 to trend display, the group number to display in screen 1 to 1, the display item of screen

2 to digital display, the group number to display in screen 2 to 2, the display item of screen 3 to bar graph display, the group number to display in screen 3 to 3, the display item of screen 4 to message summary display, and the group number to display in screen 4 to 4,
SY 1,4DISPLAY1,TREND,1,DIGITAL,2,BAR,3,MESSAGE,4

Description The p4, p6, p8, and p10 parameters are valid when p3, p5, p7, and p9 are set to a display other the OVERVIEW, respectively.

SU Sets the USER key (only for RD-MV200)

Syntax SU p1<terminator>
p1 Key action
NONE No action
ALARM ACK Alarm acknowledge
MANUAL SAMPLE
Manual sampling
TRIGGER External trigger input (Event data)
MESSAGE1 Write message 1
MESSAGE2 Write message 2
MESSAGE3 Write message 3
MESSAGE4 Write message 4
MESSAGE5 Write message 5
MESSAGE6 Write message 6
MESSAGE7 Write message 7
MESSAGE8 Write message 8
SNAPSHOT Snapshot of the screen
MATH START/STOP
Start/Stop MATH
MATH RESET Reset MATH

Query SU?

Example Set the key action to the snapshot of the screen.
SU SNAPSHOT

SK Sets the computation constant

Syntax SK p1,p2<terminator>
p1 Computation constant number (RD-MV100: K01 to K12, RD-MV200: K01 to K30)
p2 Constant (Up to 11 characters)
The range is −9.9999E+29 to −1.0000E−30, 0, and 1.0000E−30 to 9.9999E+29. (The + sign of "E+" can be omitted.)

Query SK[p1]?

Example Set constant 1.0000E-10 for computation constant number K01.
SK K01,1.0000E-10

Description
- This command can be used on models with the computation function option /M1.
- This command cannot be specified while measurement/computation is in progress or while a report is being created.

SI Sets the rolling average of the computation channel

When the rolling average of a computation channel is OFF

Syntax SI p1,p2<terminator>
p1 Computation channel number (RD-MV100: 31 to 42, RD-MV200: 31 to 60)
p2 Rolling average ON/OFF (OFF)

Query SI[p1]?

Example Turn OFF the rolling average of computation channel number 31.
SI 31,OFF

Description This command can be used on models with the computation function option /M1.

When the rolling average of a computation channel is ON

Syntax SI p1,p2,p3,p4<terminator>
p1 Computation channel number (RD-MV100: 31 to 42, RD-MV200: 31 to 60)
p2 Rolling average ON/OFF (ON)
p3 Sampling interval (1S, 2S, 3S, 4S, 5S, 6S, 10S, 12S, 15S, 20S, 30S, 1MIN, 2MIN, 3MIN, 4MIN, 5MIN, 6MIN, 10MIN, 12MIN, 15MIN, 20MIN, 30MIN, 1H)
p4 Number of samples (1 to 64)

Query SI[p1]?

Example Turn the rolling average of computation channel 31 ON, set the sampling interval to 1 minute, and the number of samples to 20.
SI 31,ON,1MIN,20

Description This command can be used on models with the computation function option /M1.

SJ Sets the TLOG timer

Syntax SJ p1,p2,p3<terminator>
p1 Computation channel number (RD-MV100: 31 to 42, RD-MV200: 31 to 60)
p2 Timer (1 to 3)
p3 Conversion of the time unit for TLOG. SUM computation
OFF No conversion.
/S Convert to a physical amount in unit of seconds that are integrated.
/MIN Convert to a physical amount in unit of minutes that are integrated.

/H Convert to a physical amount in unit of hours that are integrated.

Query SJ[p1]?

Example Set timer 1 to computation channel number 31. No conversion of time unit.
SJ 31,1

Description
- This command can be used on models with the computation function option /M1.
- This command cannot be specified while computation is in progress.
- About p3
  In the sum computation, sampled data are summed over the scan interval. However, when a physical value is measured over a period of time, the actual value may not match the computed result. (This is due to the fact that the scan interval and the time unit are different.) In these cases, set p3 to the same unit as the time unit of the physical value. The summed value is calculated according to the following converting equation depending on the parameter.

OFF	Σ(measured value)
/S	Σ(measured value) × scan interval
/MIN	Σ(measured value) × scan interval/60
/HOUR	Σ(measured value) × scan interval/3600

  The scan interval unit is in seconds.

SS Sets the date and time at which to switch the daylight savings time

When the switching the daylight savings time is OFF

Syntax SS p1,p2<terminator>
p1 Summer time or winter time (SUMMER, WINTER)
p2 Enable/disable (ON/OFF) the switching (OFF)

Query SS[p1]?

Example Set the summer time is OFF.
SS SUMMER,OFF

Description This command can be used on models with the display language code "-2."

When the switching the daylight savings time is ON

Syntax SS p1,p2,p3<terminator>
p1 Summer time or winter time (SUMMER, WINTER)
p2 Enable/disable (ON/OFF) the switching (ON)
p3 Date and time (yy/mm/dd hh fixed form. Insert a space between dd and hh.)
yy Year (00 to 99)
mm Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)

Query SS[p1]?

Example Set the summer time to the 23rd hour of June 30, 2000.
SS SUMMER,ON,00/06/30 23
(The 23rd hour of June 30, 2000 is set to 0 hour of July 1, 2000.)

Description This command can be used on models with the display language code "-2."

FR Sets the acquiring interval to the FIFO buffer

Syntax FR p1<terminator>
p1 FIFO acquiring interval (125MS, 250MS, 500MS, 1S, 2S)

Query FR?

Example Set the FIFO acquiring interval to 1 s.
FR 1S

Description
- 125MS, 250MS, and 500MS apply only to models RD-MV102, RD-MV104, RD-MV204, and RD-MV208.
- Set the acquiring interval to a value greater than the scan interval.
- If the scan interval is set to a value less than the acquiring interval using the XV command or from the screen, the acquiring interval is automatically set equal to the scan interval.
- The RD-MV has a circular FIFO buffer. The measured/computed values are acquired to the internal memory at predetermined time intervals from the time the power is turned ON, and the data are output when a FF command is received. The previous output position is held for each connection and is updated when the next set of data is output with the FF command. Using this functionality, data can be collected without data dropouts if the PC reads the data in the circular buffer before the data are overacquired. This compensates for the communication time differences that result from periodically retrieving data from the RD-MV at a rate determined by the processing power of the measurement PC. For the output flow of FIFO data, see appendix 4.

5.5 Setting Commands (Control)

UD Switches the screen.

When switching the screen back to the screen that existed before settings were changed using the communication commands.

Syntax UD p1<terminator>
p1 Switching the screen (0)

Example Switch the screen back to the screen that existed before settings were changed using communication commands.
UD 0

When changing to 1 screen display

Syntax UD p1,p2,p3<terminator>
p1 Switching the screen (1)
p2 Display item

TREND	Trend display
DIGITAL	Digital display
BAR	Bar graph display
OVERVIEW	Overview display (Alarm indicator)
ALARM	Alarm summary display
MESSAGE	Message summary display
MEMORY	Memory summary display

p3 Group number (1 to 4)

Example Set the display to 1 screen display, display the trend, and set the group number to 4.
UD 1,TREND,4

When switching to 4 screen display (only for RD-MV200)

Syntax UD p1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>
p1 Switching the screen (2)
p2 The display item of the upper left quadrant of the divided screen (screen 1)

TREND	Trend display
DIGITAL	Digital display
BAR	Bar graph display
OVERVIEW	Overview display (Alarm indicator)
ALARM	Alarm summary display
MESSAGE	Message summary display
MEMORY	Memory summary display

p3 The group number (1 to 4) to display in the upper left quadrant of the divided screen (screen 1)
p4 The display item of the lower left quadrant of the divided screen (screen 2), same as the selections for p2.

p5 The group number (1 to 4) to display in the lower left quadrant of the divided screen (screen 2)
p6 The display item of the upper right quadrant of the divided screen (screen 3), same as the selections for p2.
p7 The group number (1 to 4) to display in the upper right quadrant of the divided screen (screen 3)
p8 The display item of the lower right quadrant of the divided screen (screen 4), same as the selections for p2.
p9 The group number (1 to 4) to display in the lower right quadrant of the divided screen (screen 4)

Example Set the screen to four screen display, the display item of screen 1 to trend display, the group number to display in screen 1 to 1, the display item of screen 2 to digital display, the group number to display in screen 2 to 2, the display item of screen 3 to bar graph display, the group number to display in screen 3 to 3, the display item of screen 4 to message summary display, and the group number to display in screen 4 to 4,
UD 2,TREND,1,DIGITAL,2,BAR,3,MESSAGE,4

Description The p3, p5, p7, and p9 parameters are valid when p2, p4, p6, and p8 are set to a display other the OVERVIEW, respectively.

When displaying the 4 screen display set with the SY command (only for RD-MV200)

Syntax UD p1,p2<terminator>
p1 Switching the screen (3)
p2 4 screen display number (0 to 4)
0 Set the screen to the 4 screen display of which parameter p1 was set to 2 with the UD command. This setting (p1 = 3, p2 = 0) is valid only when the 4 screen display is enabled by setting p1 to 2 beforehand.
1 Display the screen of 4 screen display number 1 that was specified with the SY command.
2 Display the screen of 4 screen display number 2 that was specified with the SY command.
3 Display the screen of 4 screen display number 3 that was specified with the SY command.
4 Display the screen of 4 screen display number 4 that was specified with the SY command.

Example Display the screen of 4 screen display number 1 that was specified with the SY command.
UD 3,1

When turning ON or OFF automatic switching of the displayed groups, switching to all channel display from group display or vice versa, turning ON or OFF the scales, and turning ON or OFF the numerical section on the trend screen

Syntax UD p1,p2,p3,p4,p5<terminator>
p1 Switching the screen (4)
p2 Enables/disables automatic switching of the displayed groups (ON, OFF)
p3 Switches all channel display and group display (ALL, GROUP)
p4 Turns the scale display ON/OFF (ON/OFF)
p5 Turns the numerical display section ON/OFF (ON, OFF)

Example Enables the automatic switching of the displayed groups, switches to group display from all channel display, turns ON the scale display, and turns OFF the numerical section.
UD 4,ON,GROUP,ON,OFF

Description
- Parameter p2 is valid on the trend, digital, or bar graph screens. Automatically switches the displayed groups. Use the SE command to set the switching interval (scroll time).
- Parameters p3 and p4 are valid on the trend screen.
- Parameter p5 is valid on the trend screen or on the trend screen on the 4 screen display (only for RD-MV200).

PS Starts/Stops measurements

Syntax PS p1<terminator>
p1 Starts/Stops measurements
0 Start
1 Stop

Example Start measurement.
PS 0

Description Acquires the display, event, and report data to the internal memory when the measurement is started.

AK Confirms the alarm status (alarm acknowledge)

Syntax AK p1<terminator>
p1 Executes alarm acknowledge (0)

Example Confirm the current held condition of the alarm (executes alarm acknowledge).
AK 0

EV Manual sample, Manual trigger, snapshot, saving display data, and saving event data

Syntax
```
EV p1<terminator>
p1  Operation type
    0   Perform manual sampling.
    1   Activate manual trigger.
    2   Snapshot.
    3   Save the display data to the
        storage medium.
    4   Save the event data to the
    storage medium.
```
Example
```
Perform manual sampling.
EV 1
```
Description
- EV3 is valid when display data are being acquired to the internal memory, and the RD-MV100/RD-MV200 is set to store the data to the external storage medium using auto save. The display data residing in the internal memory can be stored to the external storage medium at arbitrary times.
- EV4 is valid when event data are being acquired to the internal memory in the free mode, and the RD-MV100/RD-MV200 is set to store the data to the external storage medium using auto save. The event data residing in the internal memory can be stored to the external storage medium at arbitrary times.

MS Writes the message (display and save)

Syntax
```
MS p1<terminator>
p1  Message number (1 to 8)
```
Example
```
Write the message of message number 8.
MS 8
```
Description This command displays the message to the screen and writes the message into the display data and event data.

TL Starts/stops/resets computation (MATH)/Clears the computation dropout status display

Syntax
```
TL p1<terminator>
p1  Operation type
    0   Start computation
    1   Stop computation
    2   Reset computation
    3   Clear the computation dropout
        status display
```
Example
```
Start computation.
TL 0
```
Description
- This command cannot be executed while setup data are being saved or loaded.
- This command can be used on models with the computation function option /M1.

DS Switches execution modes (operation/basic setting)

Syntax
```
DS p1<terminator>
p1  Execution modes
    0   Operation mode
    1   Basic setting mode
```
Example
```
Set the mode to basic setting mode.
DS 1
```
Description
- The setting p1 to 1 cannot be specified while measurement/computation is in progress, while the external storage medium is being formatted, or while data are being saved to the external storage medium.
- The setting p1 to 0 cannot be specified while the external storage medium is being formatted or while data are being saved to the external storage medium.
- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.

LO Loads the setting data for setting commands

Syntax
```
LO p1<terminator>
p1  File name (Up to 8 characters)
```
Example
```
Load the setting data of setting commands
from the setup file SETFILE1 (.PNL
extension).
LO SETFILE1
```
Description
- This command cannot be used to load the setting data of the basic setting commands. In order to load the setting data of both setting and basic setting commands, use the YO command.
- This command cannot be specified on models that do not have an external storage device or when a medium is not inserted into the drive.

LI Saves the setting data

Syntax
```
LI p1<terminator>
p1  File name (Up to 8 characters)
```
Example
```
Save the setting data of both setting and
basic setting commands to the file
SETFILE2.
LI SETFILE2
```
Description
- A file extension ".PNL" is attached to the saved file. This command is equivalent to the YI command.

- This command cannot be specified on models that do not have an external storage device or when a medium is not inserted into the drive.

CM Sets the communication input data

Syntax CM p1,p2<terminator>
p1 Communication input data number (RD-MV100: C01 to C12, RD-MV200: C01 to C30)
p2 Communication input data
The range is −9.9999E+29 to −1.0000E −30, 0, and 1.0000E −30 to 9.9999E+29.
(The + sign of "E+" can be omitted.)

Example Set the communication input data 1.0000E−10 in the communication input data number C01.
CM C01,10.0000E02

Description This command can be used on models with the computation function option /M1.

5.6 Basic Setting Commands

- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.
- The settings that are returned in response to a query in the basic setting mode will contain the new settings even if they are not saved with the XE command. However, the new settings will not be activated until they are saved. In order to activate the new settings, the XE command must be issued as described earlier. If the settings are not saved or cleared using the XE command and the execution mode is changed from the basic setting mode to the operation mode, the settings that are returned in response to a query will contain the settings that existed before they were changed.

Note

The settings that are changed using the YA/YK/YN/YQ/YS/YT command are activated after saving the new settings using the XE command and rebooting the RD-MV.

XA Sets alarm related settings

Syntax XA p1,p2,p3,p4,p5,p6,p7,p8<terminator>
p1 Turn ON/OFF reflash (ON, OFF)
p2 Relay number set to AND logic (NONE, I01, I01-Ixx)
Ixx: I02 to I06
I11 to I16 (only for RD-MV200)
I21 to I26 (only for RD-MV200)
I31 to I26 (only for RD-MV200)
p3 Energize/De-energize the relay (ENERGIZE, DE_ENERGIZE)
p4 Hold/Not hold the relay (HOLD, NONHOLD)
p5 Hold/Not hold the alarm status display (HOLD, NONHOLD)
p6 Interval for the upper limit on the rate-of-change (1 to 15)
p7 Interval for the lower limit on the rate-of-change (1 to 15)
p8 Turn ON/OFF the alarm hysteresis (ON, OFF).

Query XA?

Example Set relay numbers I01 to I12 to AND logic. Enable reflash. Set the alarm to energizing and hold. Set the alarm status display to hold. Set the interval for the upper limit on the rate-of-change to 10 and the interval for the lower limit on the rate-of-change to 12. Enable alarm hysteresis.
XA ON,I01-I12,ENERGIZE,HOLD,HOLD,10,12,ON

Description
- The interval is set in units of the scan interval. The XV command is used to set the scan interval.
- The hysteresis setting does not apply to computation channels.

XI Sets the A/D integral time

Syntax XI p1<terminator>
p1 A/D integral time (AUTO, 50HZ, 60HZ, 100MS)

Query XI?

Example Set the A/D integral time to 50 Hz.
XI 50HZ

Description 100 MS is available only on models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230.

XB Sets the burn out

Syntax XB p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Burn out procedure (OFF, UP, DOWN)

Query XB[p1]?

Example Set to UP (+ overflow) when channel 01 burns out.
XB 01,UP

XJ Sets the RJC

When using the internal compensation circuit

Syntax XJ p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12, MV200: 01 to 30)
p2 Reference junction compensation selection (INTERNAL)

Query XJ[p1]?

Example Set the RJC of channel 01 to the internal compensation circuit.
XJ 01,INTERNAL

When using an external RJC

Syntax XJ p1,p2,p3<terminator>
p1 Channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Reference junction compensation selection (EXTERNAL)
p3 External RJC value (–20000 to 20000)

Query XJ[p1]?

Example Set the reference junction compensation of channel 02 to external and set the compensation value to 0 μV.
XJ 02,EXTERNAL,0

Description The unit of p3 is μV.

XV Sets the scan interval

Syntax XV p1<terminator>
p1 Scan interval
Select from 125MS or 250MS on models RD-MV102, RD-MV104, RD-MV204, and RD-MV208.
Select from 1S or 2S on models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230.

Query XV?

Example Set the scan interval to 1s.
XV 1S

Description When the A/D integration time (p1 of XI command) is set to 100 MS on models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230, the scan interval can only be set to 2 s.

XT Selects the temperature unit

Syntax XT p1<terminator>
p1 Temperature unit
C Celsius (°C)
F Fahrenheit (°F)

Query XT?

Example Set the temperature unit to Fahrenheit.
XT F

Description This command can be used on models with the display language code “-2”.

XS Sets the channels to display the trend and acquire the data

Syntax XS p1,p2<terminator>
p1 Channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 60)
p2 Enable/disable (ON, OFF) displaying the trend and acquiring the data

Query XS[p1]?

Example Enable displaying the trend and acquiring the data on channel 01.
XS 01,ON

Description Computation channels (RD-MV100: 31 to 42, RD-MV200: 31 to 60) can be configured on products with the computation function option / M1.

XM Sets the conditions used to acquire display/event data to the internal memory or save the data to the external storage medium

Syntax XM p1,p2,p3,p4,p5,p6,p7,p8,p9,
p10<terminator>
p1 Saving method to the external storage medium (AUTO, MANUAL)
p2 Data type (DISPLAY, EVENT, E+D)
p3 Sample rate of event data (125MS, 250MS, 500MS, 1S, 2S, 10S, 30S, 60S, 120S)
p4 Event mode (FREE, TRIGGER, ROTATE)
p5 Number of block
When p2 is set to EVENT 1, 2, 4, 8, 16
When p2 is set to E+D 1, 2, 4
p6 Event data length (3MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 10DAY, 14DAY, 31DAY)
p7 Pretrigger(0, 5, 25, 50, 75, 95, 100) [%]
p8 Turn ON/OFF manual trigger (ON, OFF)
p9 Turn ON/OFF external trigger (ON, OFF)
p10 Turn ON/OFF alarm trigger (ON, OFF)

Query XM?

Example Set the saving method to the external storage medium to auto, the data types to both display data and event data, the sample rate to 10 s, the event mode to TRIGGER, the number of blocks to 1, the event data length to 30 minutes, the pretrigger to 50%, the manual trigger to ON, the external trigger to ON, and the alarm trigger to ON.
XM AUTO,E+D,10S,TRIGGER,1,30MIN,50,ON,ON,ON

Description
- The setting of p6 is valid when p1 is AUTO and p4 is FREE.
- Parameters p3 through p10 are valid when p2 is set to EVENT or E+D.
- When p2 is set to E+D, p4 cannot be set to FREE.
- Parameter p3 can be set to 125MS, 250MS, or 500MS on models RD-MV102, RD-MV104, RD-MV204, or RD-MV208.
- The settings of p5 to p10 are valid when p4 is TRIGGER or ROTATE.
- The event data length selection (p5) varies depending on the p3 setting and the number of channels that are measuring and computing. For details, see the RD-MV100/RD-MV200 User's Manual.

XU Sets the channel identification display, memory alarm time, language, and whether or not to use the partial expanded display function.

Syntax XU p1,p2,p3,p4,p5<terminator>
p1 The display used to identify the measurement/computation channels (TAG, CHANNEL)
p2 Memory alarm time (1H, 2H, 5H, 10H, 20H, 50H, 100H)
p3 Language (ENGLISH, JAPANESE, GERMAN, FRENCH)
p4 Use/Not use partial expanded display function (USE, NOT)
p5 Use/Not use batch function (USE, NOT)

Query XU?

Example Set the display used to identify the measurement/computation channels to channel numbers, the memory alarm length to 1 hour, the language to English, use the partial expansion function and the batch function.
XU CHANNEL,1H,ENGLISH,USE,USE

Description
- The memory alarm time (p2) is valid on models with the FAIL/Memory End output relay option /F1.
- The SP command cannot be specified unless the partial expanded display function (p4) of the XU command is set to USE.
- Parameter p5 (use/not use the batch function) is valid on models with the optional /BT1 batch function.

XR Sets the remote action

Syntax XR p1,p2<terminator>
p1 Remote number (1 to 8)
p2 Remote action
NONE No action
ALARM ACK Alarm acknowledge
MEMORY START/STOP
Start/stop measurement
MANUAL SAMPLE
Manual sampling
TRIGGER External trigger input (event data)
MESSAGE1 Write message 1
MESSAGE2 Write message 2
MESSAGE3 Write message 3
MESSAGE4 Write message 4
MESSAGE5 Write message 5
MESSAGE6 Write message 6
MESSAGE7 Write message 7
MESSAGE8 Write message 8
PANEL1 LOAD
Load setting 1
PANEL2 LOAD
Load setting 2
PANEL3 LOAD
Load setting 3
MATH START/STOP
Start/Stop MATH

```
                MATH RESET Reset MATH
                TIME ADJUST
                          Adjust time
Query       XR[ p1]?
Example     Set the remote action of remote number 1
            to writing message 1.
            XR 1,MESSAGE1
```

XQ Sets the timer.

When not using the timer

```
Syntax      XQ p1,p2<terminator>
            p1  Timer number (1 to 3)
            p2  Timer type (OFF)
Query       XQ[ p1]?
Example     Turn the number 1 timer OFF.
            XQ 1,OFF
Description This command can be used on models with the
            computation function option /M1.
```

When using the absolute timer

```
Syntax      XQ p1,p2,p3,p4,p5,p6<terminator>
            p1  Timer number (1 to 3)
            p2  Timer type (ABSOLUTE)
            p3  Interval (1MIN, 2MIN, 3MIN, 4MIN,
                5MIN, 6MIN, 10MIN, 12MIN, 15MIN,
                20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H,
                12H, 24H)
            p4  Reference Time (hh fixed form)
                hh    Hour (00 to 23)
            p5  Reset/not reset the integrated value
                when the timer expires. (ON/OFF)
            p6  Action to take when the timer expires
                (OFF, DATA SAVE)
Query       XQ[ p1]?
Example     Set an absolute timer to timer number 1.
            Set the sampling interval to 30 minutes,
            the reference time to 7 O'clock, reset
            the integrated value when the timer
            expires, and set no action when the timer
            expires.
            XQ 1,ABSOLUTE,30MIN,07,ON,NONE
Description • This command can be used on models with
              the computation function option /M1.
            • The timer expires at the interval specified by
              parameter 3 from the time specified by p4,
              and performs the operation set with
              parameters p5 and p6.
```

When using the relative timer

```
Syntax      XQ p1,p2,p3,p4,p5<terminator>
            p1  Timer number (1 to 3)
            p2  Timer type (RELATIVE)
            p3  Interval (hh:mm fixed form)
                hh    Hour (00 to 24)
                mm    Minute (00 to 59)
                Set in the range 00:01 to 24:00
            p4  Reset/not reset the integrated value
                when the timer expires. (ON/OFF)
            p5  Action to take when the timer expires
                (OFF, DATA SAVE)
Query       XQ[ p1]?
Example     Set a relative timer to timer number 1.
            Set the sampling interval to 1 hour 15
            minutes, reset the integrated value when
            the timer expires, and set no action when
            the timer expires.
            XQ 1,RELATIVE,01:15,ON,NONE
Description • This command can be used on models with
              the computation function option /M1.
            • The timer expires at the interval specified by
              parameter p3 from the time the instrument is
              turned ON, the timer is reset, and when the
              timer setting is OFF, and performs the
              operation set with parameters p4 and p5.
```

RO Sets the report type and generation time.

When report type is set to none

```
Syntax      RO p1<terminator>
            p1  Report type (OFF)
Query       RO?
Example     Set report to none.
            RO OFF
Description This command can be used on models with the
            computation function option /M1.
```

For hourly, daily, and daily + monthly reports

```
Syntax      RO p1,p2,p3<terminator>
            p1  Report type (HOUR, DAY, DAY+MONTH)
            p2  Date of creation (dd fixed form)
                dd    Day (01 to 28)
            p3  Time of creation (h h fixed form)
                hh    hour (00 to 23)
Query       RO?
Example     Create a daily report at 9 o'clock
            everyday (Parameter p2 is invalid in this
            example).
            RO DAY,05,09
Description This command can be used on models with the
            computation function option /M1.
```

For daily+weekly reports

```
Syntax      RO p1,p2,p3<terminator>
            p1  Report type (DAY+WEEK)
            p2  Day of creation (SUN, MON, TUE, WED,
                THU, FRI, SAT)
            p3  Time of creation (hh fixed form)
                hh    hour (00 to 23)
Query       RO?
```

Example Create a daily report at 9 o'clock everyday, and a weekly report every Tuesday.
RO DAY+WEEK,TUE,09
Description This command can be used on models with the computation function option /M1.

RM Sets the report channel

When not using the report channel

Syntax RM p1,p2<terminator>
p1 Report channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Use/Not use the report channel (OFF)
Query RM[p1]?
Example Set the report channel of number 1 to unused.
RM 01,OFF
Description This command can be used on models with the computation function option /M1.

When using the report channel

Syntax RM p1,p2,p3,p4<terminator>
p1 Report channel number (RD-MV100: 01 to 12, RD-MV200: 01 to 30)
p2 Use/Not use the report channel (ON)
p3 The measurement/computation channel number for which to create reports (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p4 Summation conversion of the waveform on which integration is to be performed.
OFF no conversion
/S Convert as though the physical values are integrated in units of seconds.
/MIN Convert as though the physical values are integrated in units of minutes.
/H Convert as though the physical values are integrated in units of hours.
/DAY Convert as though the physical values are integrated in units of days.
Query RM[p1]?
Example Use the report channel number 1. Set the measurement/computation channel number for which to create reports to 01, and the summation conversion of the waveform on which integration is to be performed to 1 s.
RM 01,ON,01,/S
Description
- This command can be used on models with the computation function option /M1.
- About p4

Because the sampled data are integrated over each scan interval, the physical value integrated over a given period of time may be different from the actual integrated value. This occurs if the given period is not equal to the scan interval. In these cases, set p4 to the unit of the integration time desired. The integrated value is found according to the following conversion equations that depend on the p4 parameter.

OFF	Σ(Measured value)
/S	Σ(Measured value) × scan interval
/MIN	Σ(Measured value) × scan interval/60
/HOUR	Σ(Measured value) × scan interval/3600
/DAY	Σ(Measured value) × scan interval/86400

The unit of the scan interval is seconds.

XO Selects the communication interface used to output data residing in the internal memory (display, event, TLOG, manual sampled, and report data) and files on the external storage medium using output commands (ME/MI/MO commands)

Syntax XO p1<terminator>
p1 Communication type
ETHERNET
SERIAL
Query XO?
Example Set the communication interface to Ethernet (the communication interface is used to output data in the internal memory and files on the external storage medium using the ME/MI/MO commands).
XO ETHERNET
Description The p1 parameter can be set on models with the serial interface option /C2 or /C3.

XH Sets whether or not to use the key login, auto logout, and user ID functions

Syntax XH p1,p2,p3<terminator>
p1 Use/not use the key login function (USE, NOT)
p2 Use/not use the auto logout function (ON, OFF)
p3 Use/not use the User ID function (USE, NOT)
Query XH?
Example Use the key login, auto logout, and user ID functions.

XH USE,ON,USE

XE Sets whether or not to store the basic settings

Syntax XE p1<terminator>
p1 Store or discard the settings (STORE, ABORT)
Example Store the basic settings.
XE STORE
Description In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.

YA Sets the IP address, subnet mask, and default gateway

Syntax YA p1,p2,p3<terminator>
p1 IP address (0.0.0.0 to 255.255.255.255)
p2 Subnet mask (0.0.0.0 to 255.255.255.255)
p3 Default gateway (0.0.0.0 to 255.255.255.255)
Query YA?
Example Set the IP address to 192.168.111.24, subnet mask to 255.255.255.0, and default gateway to 0.0.0.0.
YA 192.168.111.24,255.255.255.0,0.0.0.0
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

YK Sets keepalive

Syntax YK p1<terminator>
p1 Enable/Disable keepalive (ON, OFF)
Query YK?
Example Disable keepalive
YK OFF
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

YN Sets the DNS.

When not using the DNS

Syntax YN p1<terminator>
p1 Use/Not use the DNS (OFF)
Query YN?
Example Do not use the DNS.
YN OFF
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

When using the DNS

Syntax YN p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Use/Not use the DNS (ON)
p2 Address of the primary DNS server (0.0.0.0 to 255.255.255.255)
p3 Address of the secondary DNS server (0.0.0.0 to 255.255.255.255)
p4 Host name (Up to 64 characters)
p5 Domain name (Up to 64 characters)
p6 Domain suffix 1 (Up to 64 characters)
p7 Domain suffix 2 (Up to 64 characters)
Query YN?
Example Use the DNS server at 192.168.0.1.
YN 192.168.0.1
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

YQ Sets the communication timeout

When not using the timeout

Syntax YQ p1<terminator>
p1 Enable/Disable communication timeout (OFF)
Query YQ?
Example Disable timeout.
YQ OFF
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

When using the timeout

Syntax YQ p1,p2<terminator>
p1 Enable/Disable communication timeout (ON)
p2 Timeout time (1 to 120) [minutes]
Query YQ?
Example Enable communication timeout and set the timeout period to 3 min.
YQ ON,3
Description The settings specified by this command take effect the next time the RD-MV is turned ON.

YS Sets the serial interface

Syntax YS p1,p2,p3,p4,p5,p6<terminator>
p1 Baud rate (1200, 2400, 4800, 9600, 19200, 38400)
p2 Data length (7, 8)
p3 Parity check (NONE, ODD, EVEN)
p4 Handshaking (OFF:OFF, XON:XON, XON:RS, CS:RS)
p5 RS-422-A/485 address (01 to 32)
p6 Protocol (NORMAL, MODBUS)
Query YS?

Example Set the baud rate to 9600, the data length to 8, the parity check to ODD, handshaking to OFF:OFF, the RS-422-A/485 address to 02, and the protocol to NORMAL.
YS 9600,8,ODD,OFF:OFF,02,NORMAL

Description
- The settings specified by this command take effect the next time the RD-MV is turned ON.
- This command can be used on models with the serial interface option /C2 or /C3.

YO Loads setting data

Syntax YO p1<terminator>
p1 Name of the source file (Up to 8 characters)

Example Load the setting data of both setting and basic setting commands from the setup file SETFILE1 (.PNL extension).
YO SETFILE1

Description
- This command loads the setting data of both setting and basic setting commands. To load only the setting data of setting commands, use the LO command.
- This command cannot be specified on models that do not have an external storage device or when a medium is not inserted into the drive.
- When executing this command, the communication is disconnected.

YI Saves setting data

Syntax YO p1<terminator>
p1 Name of the destination file (Up to 8 characters)

Example Save the setting data of both setting and basic setting commands to the file SETFILE2.
YI SETFILE2

Description
- A file extension ".PNL" is attached to the saved file. This command is equivalent to the LI command.
- This command cannot be specified on models that do not have an external storage device or when a medium is not inserted into the drive.

YC Clears the measured/computed data, initializes setup data

Syntax YC p1<terminator>
p1 Type of data to be cleared or initialized
0 Clear all measured/computed data and initialize the setup data of the setting mode and basic setting mode.
1 Clear all measured/computed data and initialize the setup data of the setting mode.
2 Clear all measured/computed data.

Example Clear all measured/computed data.
YC 2

Description
- The measured/computed data indicates the data residing in the internal memory of the RD-MV.
- This command cannot be specified while the external storage medium is being formatted.

YT Sets the FTP transfer timing

Syntax YT p1,p2<terminator>
p1 Auto transfer when display and event data files are created (ON, OFF)
p2 Auto transfer when report data files are created (ON, OFF)

Query YT?

Example Auto transfer the display and event data files. Do not transfer the report data file.
YT ON,OFF

Description
- When the method to save the data to the external storage medium is set to "Auto," the data files are automatically transferred when they are created. For the methods to save the data to the external storage medium, see the RD-MV100/RD-MV200 User's Manual.

5.7 Output Commands (Control)

BO Sets the output byte order

Syntax BO p1<terminator>
p1 Byte order
0 Sends MSB first.
1 Sends LSB first.
Query BO?
Example Output MSB first
BO 0
Description This command is used to specify the byte order for the numerical data during binary output.

CS Sets the checksum

Syntax CS p1<terminator>
p1 Use/not use checksum
0 Not use
1 Use
Query CS?
Example Use the checksum.
CS 1
Description This command can be used only during serial communications.

IF Sets the status filter

Syntax IF p1<terminator>
p1 Status filter value
(0.0.0.0 to 255.255.255.255)
Query IF?
Example Set the status value to 1.0.4.0.
IF 1.0.4.0
Description For details, see chapter 7.

CC Disconnects an Ethernet connection

Syntax CC p1<terminator>
p1 Disconnect the connection (0)
Example Disconnect the connection.
CC 0
Description This command can be used only during Ethernet communications.

5.8 Output Commands (Setup, measured, and computed data output)

FC Outputs screen image data

Syntax FC p1<terminator>
p1 Outputs screen image data (GET)
Example Outputs screen image data from the RD-MV.
FC GET
Description Obtains the screen image data of the current screen and outputs the data in PNG format.

FE Outputs setup data

Syntax FE p1,p2,p3<terminator>
p1 Output data type
0 Setup data of the setting commands
1 Decimal position and unit information
2 Setup data of the basic setting commands
3 Decimal and unit information of the most recent TLOG value
4 Setting data file
p2 First channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
p3 Last channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)
Example Output the setup data of the setting commands of channel 1 through 5 from the instrument.
FE 0,01,05
Description
- Set the parameters for the first and last channel numbers so that the last channel number is greater than or equal to the first channel number.
- The settings of p2 and p3 are valid when p1 = 0, 1, 2, and 3.

FD Outputs the most recent measured/computed data

Syntax FD p1,p2,p3<terminator>
p1 Output data type
0 Output the most recent measured/computed data in ASCII format
1 Output the most recent measured/computed data in binary format.
4 Output the most recent TLOG data in ASCII format.
5 Output the most recent TLOG data in binary format.
p2 First channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)

p3 last channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)

Example Output the most recent measured/computed data from channel 1 to 5 in ASCII format.
FD 0,01,05

Description
- The most recent measured/computed data indicates the most recent measured/computed data residing in the internal memory when the RD-MV receives the FD command.
- Set the parameters for the first and last channel numbers so that the last channel number is greater than or equal to the first channel number.

FF Outputs FIFO data

Syntax FF p1,p2,p3,p4<terminator>

p1 Operation type
- GET Output the data starting from the next to the previous read position
- RESEND Retransmit the previous output
- RESET Set the read position to the most recent acquire position
- GETNEW Output the newest data

p2 First channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)

p3 last channel number (RD-MV100: 01 to 12 or 31 to 42, RD-MV200: 01 to 30)

p4 The upper limit of number of blocks that are to be loaded (1 to 120)
1 to 240 for models RD-MV102, RD-MV104, RD-MV204 and RD-MV208
1 to 60 for models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230
If the measured/computed data is less than the specified number of blocks, only the available data are transmitted.

Example Output two blocks of FIFO data from channels 1 to 10.
FF GET,01,10,2

Description
- The FIFO buffer is of a circular type which overacquires from the oldest data when it is full. The FR command is used to set the acquiring interval.
- There are two types of output method, GET and GETNEW.

GET
Output the specified number of blocks (p4) of FIFO data starting from the next to the previous read position (block). Make sure to read the data within the following buffer period to prevent data dropouts.
- For models RD-MV102, RD-MV104, RD-MV204, and RD-MV208
  FIFO buffer length: 240 intervals (scan interval)
  Maximum buffer period: 240 x (acquiring period)
- For models RD-MV106, RD-MV112, RD-MV210, RD-MV220, and RD-MV230
  FIFO buffer length: 60 intervals (scan interval)
  Maximum buffer period: 60 x (acquiring period)

GETNEW
Output the specified number of blocks (p4) of FIFO data back starting from the recent acquire position (block).
- Parameters p2 and p4 are valid when p1 is set to GET or GETNEW.
- If p4 is omitted, all the data of all blocks acquired in the FIFO buffer are output.
- Set the parameters for the first and last channel numbers so that the last channel number is greater than or equal to the first channel number.
- For the output flow of FIFO data, see appendix 4.

FL Outputs communication log

Syntax FL p1,p2<terminator>

p1 Log type
- COM Communication
- FTPC FTP client
- ERR Operation error
- KEY Key login

p2 Maximum read length of the log
When p1 is COM: 1 to 200
When p1 is some type other than COM: 1 to 50

Example Output the ten most recent operation error logs.
FL ERR,10

Description
- Outputs the log that is saved in the RD-MV.
- If p2 is omitted, all written logs are output.

IS Outputs status information

Syntax IS p1<terminator>

p1 Output status information (0)

Example Output status information.
IS 0

Description The output status can be masked using the status filter (IF command).

FU Outputs user level

Syntax FU p1<terminator>

p1 Output user information (0)

Example Output user information.
FU 0

Description Outputs the information of the user currently connected to the MV.

ME Outputs data saved in the external storage medium

Syntax `ME p1,p2,p3<terminator>`

p1 Operation type

DIR	Output the file list
GET	Output (first time)
NEXT	Output (succeeding times), this parameter is used to output the remaining data when the first output operation is not adequate.
RESEND	Retransmit the previous output
DEL	Delete
DIRNEXT:	Outputs the succeeding file list after the file list is output using the DIR command. The number of output lists is the p3 value specified with the DIR command. If this command is executed after all lists have been output, only the free space of the storage medium is output.

p2 File name (Up to 26 characters)
Specify with a full path.

p3 The maximum number of file lists to be output (1 to 100). All file lists in the specified directory are output when p3 is omitted.

Example
- Output the list of all files in the root directory.
  `ME DIR,/`
- Output 10 files of the file list of the root directory.
  `ME DIR,/,10`
- Output the list of all files in the DATA0 directory.
  `ME DIR,/DATA0/*.*`
- Output the list of all display data files in the DATA0 directory.
  `ME DIR,/DATA0/*.DDS`
- Output the data in the file 72615100.DDS in the DATA0 directory.
  `ME GET,/DATA0/72615100.DDS`

Description
- Parameter p2 is valid when p1 is set to DIR, GET, or DEL.
- Parameter p3 is valid when p1 is set to DIR.
- This command can be used to output data over the communication interface (Ethernet or serial) that was selected with the XO command.
- If an error occurs during data transmission, (p1=) RESEND can be used to retransmit the data.

MI Outputs display data and event data acquired in the internal memory

Syntax `MI p1,p2,p3,p4<terminator>`

p1 Operation type

DIR	Put the data on standby for communication output and output data list
GET	Output (first time)
NEXT	Output (succeeding times), This parameter is used to output the remaining data when first output operation is not adequate.
RESEND	Retransmit the previous output
SIZE	Output the data size (capacity)

p2 Output data type

DISPLAY	Display data
EVENT	Event data

p3 Block number (1 to 16)

p4 Output format (FILE, DATA)

Example Output the data in block number 1 containing display data using the file output format.
`MI GET,DISPLAY,1,FILE`

Description
- Parameter p2 is valid when p1 is set to DIR, GET, or SIZE.
- Parameters p3 and p4 are valid when p1 is set to GET or SIZE.
- This command can be used to output data over the communication interface (Ethernet or serial) that was selected with the XO command.
- This command outputs the data that have been put on standby using (p1=) DIR using (p1=) GET. Make sure to put the data on standby using DIR before outputting the data using GET.

MO Outputs TLOG data, manual sampled data, and report data acquired in the internal memory

Syntax MO p1,p2,p3<terminator>

p1 Operation type

DIR	Put the data on standby for communication output and output data list
GET	Output (first time)
NEXT	Output (succeeding times), This parameter is used to output the remaining data when first output operation is not adequate.
RESEND	Retransmit the previous output
SIZE	Output the data size (capacity)

p2 Output data type

TLOG	TLOG data
MANUAL	Manual sampling data
REPORT	Report

p3 Block number

When p2 is TLOG	1 to 16
When p2 is MANUAL	1 to 50
When p2 is REPORT	1 to 40

Example Output the data in block number 1 containing TLOG data from the instrument.
MO GET,TLOG,1

Description
- Parameter p2 is valid when p1 is set to DIR, GET, or SIZE.
- Parameter p3 is valid when p1 is set to GET or SIZE.
- This command can be used to output data over the communication interface (Ethernet or serial) that was selected with the XO command.
- This command outputs the data that have been put on standby using (p1=) DIR using (p1=) GET. Make sure to put the data on standby using DIR before outputting the data using GET.

5.9 Output Commands (RS-422-A/485 Dedicated Commands)

ESC O Opens the instrument

Syntax ESC O p1<terminator>
p1 Instrument's address (01 to 32)

Example Open the instrument at address 01, and enable all commands.
ESC O 01

Description
- Specifies the address of the device with which to communicate.
- Only one instrument can be opened at any given time.
- When an instrument is opened with the ESC O command, any other instrument that is currently open is automatically closed.
- When this command is received correctly, the RD-MV transmits the data "ESC O □□."
- Normally, either CR+LF or LF can be used as terminators for communication commands. However, the terminator for this command must be CR+LF.

ESC C Closes the instrument

Syntax ESC C p1<terminator>
p1 Instrument's address (01 to 32)

Example Close the instrument with the address 01.
ESC C 01

Description
- Clears the current connection with the instrument.
- When this command is received correctly, the RD-MV transmits the data "ESC C □□."
- Normally, either CR+LF or LF can be used as terminators for communication commands. However, the terminator for this command must be CR+LF.

5.10 Maintenance/Test Commands (Available when using the maintenance/test server function via Ethernet communications)

close Disconnects the connection between other devices

Syntax close,p1,p2:p3<terminator>
p1 Port on the RD-MV side (0 to 65535)
p2 IP address on the PC side
(0.0.0.0 to 255.255.255.255)
p3 Port on the PC side (0 to 65535)
Example close,34159,192.168.111.24:1054
E0
Description This command cannot be used to disconnect a server port. Also, it cannot disconnect the RD-MV being operated. Use the quit command for this purpose.

con Outputs connection information

Syntax con<terminator>
Example

```
con
EA
00/00/00 12:34:56

Active connections

Proto Local Address      Foreign Address    State
TCP  192.168.111. 24:34159  192. 168.111. 24:1053 ESTABLISHED
TCP    0.  0.  0.  0:34155    0.  0.  0.  0:   0 LISTEN
TCP    0.  0.  0.  0:34159    0.  0.  0.  0:   0 LISTEN
TCP    0.  0.  0.  0:34150    0.  0.  0.  0:   0 LISTEN
EN
```

TCP
Protocol used.
Local Address
The RD-MV's socket address.
Displays “IP address : port number.”
Foreign Address
The destination socket address.
Displays “IP address : port number.”
State
Connection status
ESTABLISHED
Connection established

eth Outputs Ethernet statistical information

Syntax eth<terminator>
Example

```
eth
EA
00/00/00 12:34:56

Ethernet Statistics

Name     In Pkt  In Err  Out Pkt   Out Err  16 Coll
lo0      0       0       0         0        0
mb0      74      0       64        0        0
EN
```

help Outputs help

Syntax help [,p1]<terminator>
p1 Command name
(close, con, eth, help, net, quit)
Example

```
help
EA
con    - echo connection information
eth    - echo Ethernet information
help   - echo help
net    - echo network status
quit   - close this connection
EN
```

net Outputs network information

Syntax net<terminator>
Example

```
net
EA
00/00/00 12:34:56

Network Status

APP: power on time = 00/00/00 12:34:56
APP: applalive     = disable
APP: genedrops     = 0
APP: diagdrops     = 0
APP: ftpsdrops     = 0
TCP: keepalive     = 30 s
TCP: connects      = 14
TCP: closed        = 0
TCP: timeoutdrop   = 0
TCP: keepdrops     = 0
TCP: sndtotal      = 53
TCP: sndbyte       = 0
TCP: sndrexmitpack = 0
TCP: sndrexmitbyte = 1
TCP: rcvtotal      = 0
TCP: rcvbyte       = 0
DLC: 16 collisions = 0
EN
```

TCP: keepalive
    Keepalive check cycle
TCP: connects
    Total number of established connections.
TCP: closed
    Total number of dropped connections.
TCP: timeoutdrop
    Total number of dropped connections due to TCP retransmission timeout. When the transmitted packet (the unit of transmitted data) is not received, the packet is automatically retransmitted at a predetermined time interval. If the packet is not received after 14 retransmissions, timeout occurs and the connection is dropped.
TCP: keepdrops
    Total number of dropped connections due to TCP keepalive timeout.
TCP: sndtotal
    Total number of transmitted packets.
TCP: sndbyte
    Total number of transmitted bytes.
TCP: sndrexmitpack
    Total number of retransmitted packets.
TCP: sndrexmitbyte
    Total number of retransmitted bytes.
TCP: rcvtotal
    Total number of received packets.
TCP: rcvbyte
    Total number of received bytes.
DLC: 16 collisions
    Number of collision incidents. A collision occurs when two or more devices on the network attempt to transmit simultaneously. The tendency for collisions to occur increases when the network is congested. 16 collisions would mean 16 consecutive collision incidents.

quit Disconnects the connection of the device being operated

Syntax quit<terminator>

6.1 Response Syntax

The following table shows the types of responses for the various commands described in the previous chapter.
The RD-MV returns a response (affirmative/negative response) to a command that is separated by a single delimiter. The controller should follow the one command to one response format. When the command-response rule is not followed, the operation is not guaranteed.

Function	Command		Response	
		Command Type	Affirmation	Negation
Setting/ Measurement server	Setting command	Setting	Affirmative response	Single negative response or Multiple negative responses
		Control		
	Basic setting command			
	Output command	Control		
		Setup, measured, and computed data output	ASCII output	
			BINARY output	
		RS422-A/485 dedicated	Dedicated response	No response

* For the responses to the instrument information server function, see section 6.4.

Note

The "CRLF" used in this section denotes carriage return line feed.

Affirmative Response

When the command is processed correctly, an affirmative response is returned.

Syntax

```
E0CRLF
```

Example

```
E0
```

Single Negative Response

When the command is not processed correctly, a single negative response is returned.

Syntax

```
E1_nnn_mmm···mCRLF
   nnn      Error number (001 to 999)
   mmm···m  Message (Variable length, one line)
   _        Space
```

Example

```
E1 001 "Syntax error"
```

Multiple Negative Responses

- If there is an error in any one of the multiple commands that are separated by sub delimiters, multiple negative response are returned.
- The response is generated for each erroneous command.
- If there are multiple commands that have errors, the negative responses are separated by commas.
- The error position number is assigned to the series of commands in order starting with "1" assigned to the first command.

Syntax

```
E2_ee:nnnCRLF                    (When there is only one error)
E2_ee:nnn,ee:nnn,···,ee:nnnCRLF  (When there are multiple errors)
   ee       Error position (01 to 10)
   nnn      Error number (001 to 999)
   _        Space
```

Example

```
E2 02:001
```

ASCII Output

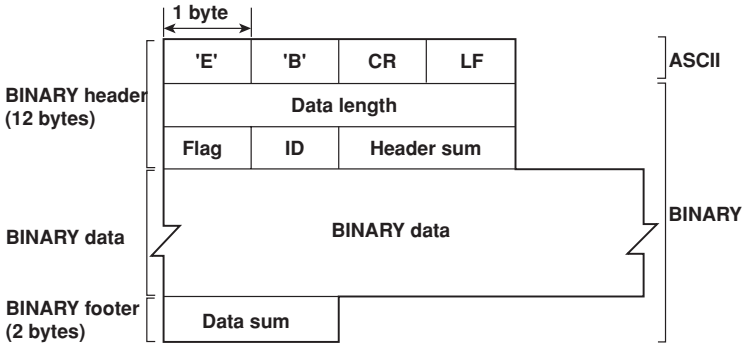
The following types of ASCII data are available. For the data formats, see section 6.2.
Setting data, basic setting data, decimal position/unit information, measured/computed data, communication log, FTP log, operation error log, key login log, status information, file list, data list, and user level

Syntax

EA<u>CRLF</u>
·····<u>CRLF</u>
:
·····<u>CRLF</u>
·····<u>CRLF</u>
EN<u>CRLF</u>

BINARY Output

Conceptual diagram



EB*CRLF*

Indicates that the data are BINARY.

Data length

The byte value of “flag + identifier + header sum + BINARY data + data sum.”

Header sum

The sum value of “data length + flag + identifier.”

BINARY data

For the output format of various data types, see section 6.3.

Data sum

The sum value of “BINARY data.”

Note

The data length of the BINARY header section is output according to the byte order specified with the BO command.

Flag

Bit	Name (abbreviation)	Flag 0	1	Meaning of the flag
7	BO	MSB	LSB	Output byte order
6	CS	No	Yes	Existence of a check sum
5	–	–	–	
4	–	–	–	
3	–	–	–	
2	–	–	–	
1	–	–	–	
0	END	Middle	End	In the middle or at the end of the continuous data

- When the BO flag is "0," the MSB is output first. When the BO flag is "1," the LSB is output first.
- If the check sum is enabled (parameter = 1) using the CS command parameter, each sum value is inserted in the header sum and data sum sections in the "Conceptual diagram" on the previous page. If the check sum is disabled (parameter = 0), a zero is inserted in the header sum and data sum sections. For a sample program that calculates the sum value, see "Calculating the sum value" on the next page.
- When the amount of data output in response to a ME, MI, or MO command is large, all of the data may not be able to be returned in one output request (parameter GET). In this case the END flag becomes "0." You must send output requests (parameter NEXT) to receive the rest of the data until the END flag becomes "1."
- The bits that have "–" for the name and flag are not used. The value is undefined.

Identifier

ID number	BINARY data type	Type	Format
0	Undefined file	file (*.*)	–
1	Measured/computed data	data	Yes
1	FIFO data	data	Yes
2	Display data file	file (*.DDS)	No
3	Event data file	file (*.DEV)	No
4	Manual sampled data file	file (*.DMN)	Yes
5	Hourly report data file	file (*.DHR)	Yes
6	Daily report data file	file (*.DDR)	Yes
7	Weekly report data file	file (*.DWR)	Yes
8	Monthly report data file	file (*.DMR)	Yes
9	TLOG data file	file (*.DTG)	No
10	Setup data file	file (*.PNL)	No
11	Display data	data	Yes
12	Event data	data	Yes
13	Screen image data	file (*.PNG)	–

Yes: disclosed, No: undisclosed, –: common format

- The table above shows the different types of BINARY Data.
- BINARY data come in two types, data and file.
  - Data
    - Measured/computed data can be output using the FD command.
    - FIFO data can be output using the FF command.
    - Display data or event data can be output using the MI command.
    - The data format is disclosed. See section 6.3.
  - File
    - Display data, event data, TLOG data, and setup data files can be used on the standard software that came with the package. For details, see the DAQSTANDARD Software Manual (M-3644).
    - Files that are in common formats can be opened using software programs that are sold commercially.
    - Other formats are written in ASCII code. A text editor can be used to open these types of files.
- The identifier section in the "Conceptual diagram" on the previous page contains the ID number that indicates the BINARY Data type.

Note

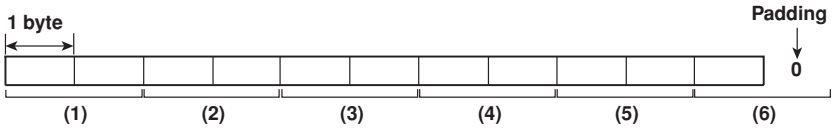
BINARY data that are not indicated in the above table are considered undefined files.

Calculating the sum value

When the CS command parameter is set to “1,” check sum values are output only during serial communications. The check sum is the same as that used in the TCP/IP and is derived according to the following algorithm.

Buffer on which the sum value is calculated

- For the header sum, it is calculated from “data length + flag + identifier” (fixed to 6 bytes).
- For the data sum, it is calculated from “BINARY data.”



If the data length of the buffer is odd, a “0” is padded so that it is even. (1) through (6) are summed as unsigned two-byte integers (unsigned short). When the digit overflows a “1” is added. Finally, the result is bit-wise inverted.

Sample program

The sum value is determined using the following sample program, and the calculated result is returned. The sum determined by the sample program can be compared with the header sum of the output BINARY header section and the data sum of the output BINARY footer section.

```
/*
 * Sum Calculation Function (for a 32-bit CPU)
 *
 * Parameter  buff   : Pointer to the top of the data on which the sum is calculated
 *            len    : Length of the data on which the sum is calculated
 * Returned value    : Calculated sum
 */

int    cksum(unsigned char *buff, int len)
{
   unsigned short *p;      /* Pointer to the next two-byte data word in the buffer that is to be summed. */
   unsigned int  csum;     /* Checksum value */
   int    i;
   int    odd;
   csum = 0;               /* Initialize. */
   odd = len%2;            /* Check whether or not the number of data points is even. */
   len >>= 1;              /* Determine the number of data points using a "short" data type. */
   p = (unsigned short *)buff;

   for(i=0;i<len;i++)      /* Sum using an unsigned short data type. */
      csum += *p++;

   if(odd){                /* When the data length is odd */
      union tmp{           /* Pad with a 0, and add to the unsigned short data. */
      unsigned short s;
      unsigned char c[2];
      }tmp;
      tmp.c[1] = 0;
      tmp.c[0] = *((unsigned char *)p);
      csum += tmp.s;
   }

   if((csum = (csum & 0xffff) + ((csum>>16) & 0xffff)) > 0xffff)
                           /* Add the overflowed digits */
      csum = csum - 0xffff;   /* If the digit overflows again, add a 1. */

   return((~csum) &  0xffff); /* bit inversion */
}
```

RS-422-A/485 Dedicated Response

The following table shows dedicated commands for the RS-422-A/485 interface and their responses.

Command syntax	Meaning	Response
ESC 0_xx CRLF	Open the instrument	• Response from the instrument with the specified address ESC_0_xx_CRLF
(_ Space)		• Response when the instrument with the specified address does not exist* None
ESC C_xx CRLF	Close the instrument	• Response from the instrument with the specified address ESC_C_xx_CRLF
(_ Space)		• Response when the instrument with the specified address does not exist* None

* The causes that the condition become “The instrument with the specified address does not exist” is such as a command error, the address not matching that of the instrument, the instrument is not being turned ON, and the instrument not being connected via the serial interface.

- The “xx” in the table indicates the instrument's address. Specify the address that is assigned to the instrument from 01 to 32.
- Only one instrument can be opened at any one time.
- When an instrument is opened with the ESC O command, all commands on the instrument become active.
- When an instrument is opened with the ESC O command, any other instrument that is open is automatically closed.
- Normally, either CR+LF or LF can be used as terminators. However, the terminator for this command must be CR+LF.

Note

For the ASCII codes of ESC, CR, and LF, see appendix 1.

6.2 Output Format of ASCII Data

The following types of ASCII data are available. The format for each type is described in this section.

- Setting data/basic setting data
- Decimal position/unit information
- Measured/computed data
- Communication log
- FTP log
- Operation error log
- Key login log
- Status information
- File list
- Data list
- User level

Note

The "CRLF" used in this section denotes carriage return line feed.

Setting data/basic setting data

- The FE command is used to output the data.
- The setting/basic setting data are output in the order of the listed commands in the table in section 5.2, "A List of Commands." However, the setting information for the following commands is not output.
  - Setting command (Setting)
    SD/FR command
  - Setting command (control)
    All commands from UD to CM
  - Basic setting command
    XE, YO, YI, and YC commands
- The output format of the setting/basic setting data conforms to the syntax of each command.
- Some commands are output in multiple lines. (Example: Commands that are specified for each channel.)

Syntax

The two-character command name and the succeeding parameters are output in the following syntax.

```
EACRLF
ttsss···sCRLF
..............
ENCRLF
```

```
tt       Command name (SR, SA···, XA, XI···)
sss···s  Setting, basic setting data (variable length, one line)
```

Example

```
EA
SR01,VOLT,20mV,0,20
SR02,VOLT,20mV,0,20
...................
EN
```

Decimal Position/Unit Information

- The FE command is used to output the data.
- The measured/computed data that are output using the FD command contains only the mantissa. By combining with the BINARY display data or the decimal position information obtained with the FE command, the correct measured/computed data can be derived.

Syntax

The data are output in the following syntax.

```
EACRLF
s_kccuuuuuu,ppCRLF
...................
ENCRLF
```

s	Data status N : Normal D : Differential input S : Skip (When the measurement range is set to SKIP for a measurement channel or when the channel is turned OFF for a computation channel)
k	Channel type 0 : Measurement channel A : Computation channel
cc	Channel number 01 to 60
uuuuuu	Unit information (6 characters, left-justified) mV____ : mV V_____ : V ^C____ : °C xxxxxx : (user-defined character string)
pp	Decimal position (00 to 04) No decimal (00000) for 00. One digit below the decimal (0000.0) for 01. Two digits below the decimal (000.00) for 02. Three digits below the decimal (00.000) for 03. Four digits below the decimal (0.0000) for 04.
_	Space

Example

```
EA
N 001mV    ,01
N 002mV    ,01
EN
```

Measured/Computed Data

- The FD command is used to output the data.
- The measured/computed data that are output using the FD command contains only the mantissa. By combining with the BINARY display data or the decimal position information obtained with the FE command, the correct measured/computed data can be derived.

Syntax

The measured/computed data are output in the following syntax along with the date and time information for each channel.

EACRLF
DATE_yy/mo/ddCRLF
TIME_hh:mi:ss.mmmtCRLF
s_kcc$a_1a_2a_3a_4$uuuuuufdddddE-ppCRLF
.....
ENCRLF

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 59)
mi	Minute (00 to 59)
ss	Second (00 to 59)
mmm	Millisecond (000 to 999. A period is placed between seconds and milli-seconds.)
t	Summer time or winter time S: summer time (Space): winter time
s	Data status N : Normal D : Differential input S : Skip O : Over E : Error
k	Channel type 0 : Measurement channel A : Computation channel
cc	Channel number 01 to 60
$a_1a_2a_3a_4$	a_1 Alarm status (level 1) a_2 Alarm status (level 2) a_3 Alarm status (level 3) a_4 Alarm status (level 4) (Each status is set to H, L, h, l, R, r, T, t, or space.) (H : upper limit alarm, L : lower limit alarm, h : difference upper-limit alarm, l : difference lower-limit alarm, R : upper limit on rate-of-change alarm, r : lower limit on rate-of-change alarm, T : delay upper limit alarm, t : delay lower limit alarm, space : no alarm)
uuuuuu	Unit information (6 characters, left-justified) mV____: mV V_____: V ^C____: °C xxxxxx: (user-defined character string)

f	Sign (+, -)
ddddd	Mantissa (00000 to 99999, 5 digits) • 8 digits for computed data. • For abnormal data (data status is E) or data of which the mantissa or the exponent exceeds the range (data status is O), the mantissa is set to 99999 (99999999 for computed data).
pp	Exponent (00 to 04)
_	Space

Example

```
EA
DATE 99/02/23
TIME 19:56:32.500
N 001h   mV    +12345E-03
N 002    mV    -67890E-01
S 003
EN
```

Note

- Data for non-existing channels are not output (not even the channel number).
- For channels set to skip, output values from alarm status to exponent are spaces.

Communication Log

- The FL command is used to output the data.
- A log of setting/basic setting/output commands and responses is output. Up to 200 logs are retained. Logs that exceed 200 are cleared from the oldest data.

Syntax

```
EACRLF
yy/mo/dd_hh:mi:ss_n_uuu···ufd_mmm···mCRLF
.....................................
ENCRLF
```

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Time (00 to 23)
mi	Minute (00 to 59)
ss	Second (00 to 59)
n	Connection ID. A number used to identify the user that is connected. 0 : serial 1 to 3 : Ethernet
uuu···u	ser name (16 characters)
f	Multiple command flag (Space) : single * : multiple If multiple commands are separated by sub delimiters and output at once, “*” is displayed. The multiple commands are divided at each sub delimiter and stored as

individual logs (1 log for 1 command and 1 log for 1 response).

d	Input/Output > : input < : output
mmm···m	Message (up to 20 characters) • The communication log contains only the error number and not the error message section.. • Normally, the transfer data are transmitted as they are, but in some cases, a special message is output. The special messages are shown below. Reception (Over length) : Command length exceeded. (Over number) : Number of commands exceeded (Serial error) : Received an error character through serial communications. Transmission (ddd byte) : data output (ddd is the number of data points) (Login) : login (Logout) : logout (Disconnected) : Forced disconnection (occurs when the connection was disconnected when transmitting data using Ethernet) (Time out) : Timeout, keepalive, TCP retransmission, etc.) E1 nnn : single negative response. nnn is the error number. E2 ee:nnn : multiple negative response.ee is the error position, nnn is the error number.
_	Space

Example

The following example shows the log when multiple commands separated by sub delimiters, "B01;???;CS1," are transmitted. The commands are separated and output in order with the multiple command flags "*."

```
EA
99/05/11 12:31:11 1 user            *> BO1
99/05/11 12:31:11 1 user            *< E0
99/05/11 12:31:11 1 user            *> ???
99/05/11 12:31:11 1 user            *< E2 01:124
99/05/11 12:31:11 1 user            *> CS1
99/05/11 12:31:11 1 user            *< E0
EN
```

FTP Log

- The FL command is used to output the data.
- The FTP client log is output. Up to 50 file transfer logs are retained. Logs that exceed 50 are cleared from the oldest log.
- For the meanings of the error codes, see the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

Syntax

```
EACRLF
yy/mo/dd_hh:mi:ss_nnn_xxxxxxxxx_k_ffffffff_eeeCRLF
.................................
ENCRLF
```

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Second (00 to 59)
nnn	Error number (__0 to 999)
xxxxxxxxx	Detailed code (9 characters)
k	Server type (FTP destination) P : Primary S : Secondary
ffffffff	File name (8 characters)
eee	Extension (3 characters)
_	Space

Example

```
EA
99/07/26 10:00:00              P 72610000 DDR
99/07/27 10:00:00              P 72710000 DDR
99/07/28 10:00:00 123 HOSTADDR P 72810000 DDR
99/07/29 10:00:00 123 HOSTADDR P 72910000 DDR
EN
```

Operation Error Log

- The FL command is used to output the data.
- The operation error log is output. Up to 50 operation error logs are retained. Logs that exceed 50 are cleared from the oldest log.
- Other communication messages (400 to 999) and status messages (500 to 599) are not output.
- For the meanings of the error codes, see the RD-MV100/RD-MV200 User's Manual (M3641/M-3642).

Syntax

```
EACRLF
yy/mo/dd_hh:mi:ss_nnn_uuu···uCRLF
.............................
ENCRLF
```

```
yy       Year (00 to 99)
mo       Month (01 to 12)
dd       Day (01 to 31)
hh       Hour (00 to 23)
mi       Minute (00 to 59)
ss       Second (00 to 59)
nnn      Error code (001 to 999)
uuu···u  Error message (Up to 80 characters)
_        Space
```

Example

```
EA
99/05/11 12:20:00 212 "Format error."
99/05/11 12:30:00 217 "Unknown file type."
EN
```

Key Login Log

- The FL command is used to output the data.
- A log of users that have logged in and logged out is output. Up to 50 login/logout logs are retained. Logs that exceed 50 are cleared from the oldest log.
- If the power goes down while logged in, you will be logged out. However, it will not be recorded as a logout.
- User number and user name are not output at the time of the logout.

Syntax

```
EACRLF
yy/mo/dd_hh:mi:ss_xxx_nn_uuu···uCRLF
.............................
ENCRLF
```

```
yy       Year (00 to 99)
mo       Month (01 to 12)
dd       Day (01 to 31)
hh       Hour (00 to 23)
mi       Minute (00 to 59)
ss       Second (00 to 59)
xxx      Login or logout (In_, Out), left-justified
nn       User number (01 to 07)
uuu···u  User name (16 characters)
_        Space
```

Example

```
EA
99/05/11 12:20:00 In  01 administrator
99/05/11 12:30:00 Out
99/05/11 12:20:00 In  03 user
99/05/11 12:30:00 Out
EN
```

Status Information

- The IS command is used to output the data.
- The operation status of the RD-MV is output.
- For details related to the status information, see section 7.2, “The Bit Structure of the Status Information.”

Syntax

EACRLF
*ddd.ccc.bbb.aaa*CRLF
ENCRLF

aaa	Status information 1 (000 to 255)
bbb	Status information 2 (000 to 255)
ccc	Status information 3 (000 to 255)
ddd	Status information 4 (000 to 255)

Example

```
EA
000.000.032.000
EN
```

File List

- The ME command is used to output the data.
- The file list and the file data sizes of the specified directory on the RD-MV's external storage medium are output.

Syntax

```
EACRLF
ffffffff_eee_ssssssss_yy/mo/dd_hh:mi:ss_llllllllllCRLF
.....................................................
zzzzzzz_Kbyte_freeCRLF
ENCRLF
```

ffffffff	File name (8 characters) When this is a directory, the characters <DIR> is shown at the position displaying the file data size.
eee	Extension (3 characters)
ssssssss	Data size of the file (_______0 to 99999999) [byte]
yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Second (00 to 59)
zzzzzzz	Free space on the medium (______0 to 9999999)
lllllllllll	ID number(_________0 to 9999999999) • This becomes a numerical value only when the file extension is DEV or DDS. This value is specific to the file and is the same as the ID number of the block in the internal memory from which the file originates. • This becomes a space when the file extension is not DEV or DDS. • This becomes a "0" if the file was saved using another instrument.
_	Space

Example

```
EA
XV1      DEV      124 99/02/24 20:07:12      12310
XV1      PNL     1204 99/01/19 01:52:37
DATA             <DIR> 99/01/19 01:23:64
    523 Kbytes free
EN
```

Data List

- The MI/MO command is used to output the data.
- The number of blocks and file names of the specified data in the internal memory are output.
- When the first parameter of the MI/MO command is DIR, the data in the internal memory is put on a standby and the list is output.

Syntax

```
EACRLF
aaCRLF
bb_ffffffff_eee_ssssss_yy/mo/dd_hh:mi:sskllllllllllCRLF
.....................................................
ENCRLF
```

aa	Number of valid blocks (00 to 99)
bb	Block number (00 to 99)
ffffffff	File name (8 characters)
eee	Extension (3 characters)
ssssss	Number of collections (_____1 to 999999)
yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Second (00 to 59) The year/month/day/hour/minute/second will contain the time at which the last data of the block were acquired.
k	Data attributes * : Internal memory block being sampled + : Internal memory block being overacquired (Space) : Fixed block If the data of the original block are changing when the data are put on standby, * or + is output.
lllllllll	ID number (_________0 to 9999999999) • This becomes a numerical value only when the file extension is DEV or DDS. This value is specific to the data. • This parameter will be space if the file extension is not DEV or DDS.
_	Space

Example

```
EA
02
01 DATA0001 DHR    128 99/02/24 20:10:00
02 DATA0002 DHR    128 99/02/24 20:11:00
EN
```

User Level

- The FU command is used to output the data.
- User name, user level, and other information are output.

Syntax

EACRLF
p_l_uuu···uCRLF
ENCRLF

p	Physical layer E : Ethernet S : RS-232 or RS-422-A/485
l	User level A : Administrator U : User
uuu···u	User name (up to 16 characters)
_	Space

Example

EA
E A admin
EN

6.3 Output Format of BINARY Data

This section describes the output format of the BINARY data that is disclosed. For other BINARY data, see “Identifier” on page 6-3.

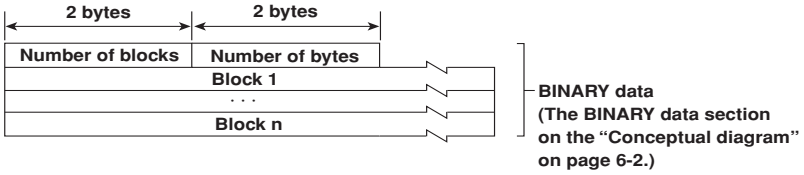
- Measured/computed data and FIFO data
- Display data
- Event data

Note

The “CRLF” used in this section denotes carriage return line feed.

Measured/computed data and FIFO data

- The FD command is used to output the measured/computed data.
- The FF command is used to output the FIFO data.
- The ID number of the output format is “1.” See “Identifier” on page 6-3.



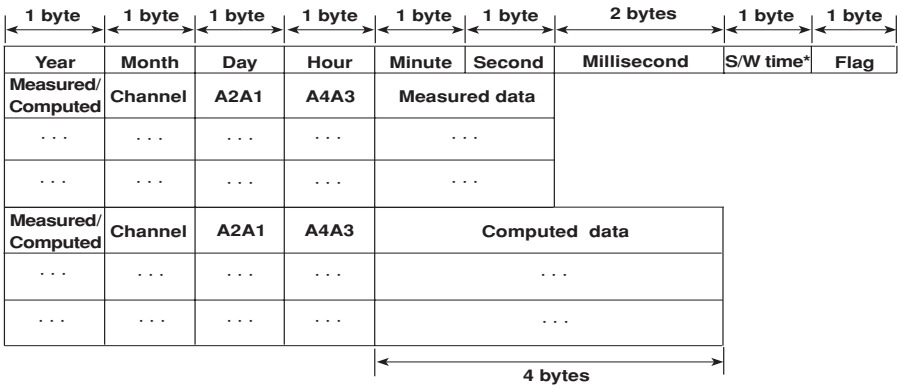
Number of blocks

This is the number of blocks.

Number of bytes

This is the size of one block in bytes.

Block



* Summer time or Winter time

- **Flag**

  The meaning of the flags are given on the table below. The flags are valid during FIFO data output. The flags are undefined for other cases.

Bit	Flag 0	Flag 1	Meaning of the flag
7	No	Yes	Indicates that the screen snap shot was executed.
6	–	–	
5	–	–	
4	–	–	
3	–	–	
2	No	Yes	Indicates that the decimal position or unit information was changed during measurement.
1	No	Yes	Indicates that the FIFO acquiring interval was changed with the FR command during measurement.
0	No	Yes	Indicates that the internal process took too much time (computation, for example) and that the measurement could not keep up at the specified scan interval.

The flags that have "–" for the flag column are not used. The value is undefined.

- **Block member**

Name	BINARY value
Year	0 to 99
Month	1 to 12
Day	1 to 31
Hour	0 to 23
Minute	0 to 59
Second	0 to 59
Millisecond	0 to 999
Summer, Winter	0, 1
Measurement, Computation	00H : measurement, 80H : computation
Channel	01 to 60
Alarm status* A1 (Bit 0 to 3) A2 (Bit 4 to 7) A3 (Bit 0 to 3) A4 (Bit 4 to 7)	0 to 8

* BINARY value 0 to 8 is entered in the upper and lower 4 bits of a byte (8 bits) for the alarm status. The binary values 0 to 8 correspond to H (upper limit alarm), L (lower limit alarm), h (difference upper-limit alarm), l (difference lower-limit alarm), R (upper limit on rate-of-change alarm), r (lower limit on rate-of-change alarm), T (delay upper limit alarm), and t (delay lower limit alarm) as follows:
0: no alarm, 1: H, 2: L, 3: h, 4: l, 5: R, 6: r, 7: T, and 8: t.

Special data value

The measured/computed data take on the following values under special conditions.

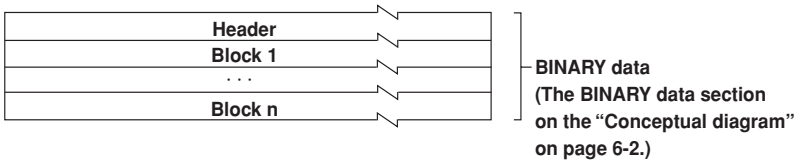
Special data value	Measured data	Computed data
+ over	7FFFH	7FFF7FFFH
– over	8001H	8001H8001H
Skip	8002H	8002H8002H
Error	8004H	8004H8004H
Undefined	8005H	8005H8005H

Note

The number of blocks, number of bytes, and measured/computed data are output according to the byte order specified with the BO command.

Display Data

- The MI command is used to output the FIFO data.
- The ID number of the output format is “11.” See “Identifier” on page 6-3.



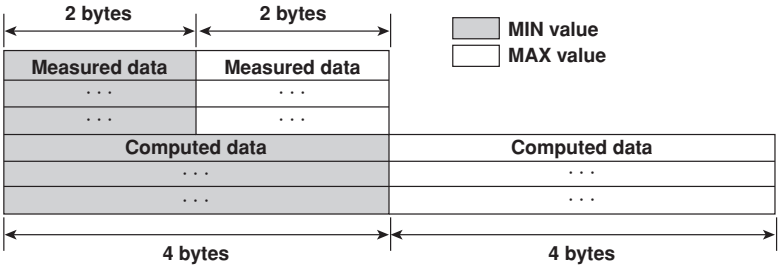
Header

Syntax

```
aaaaaa,ddd,ffffggg,tttttt<CRLF>
DATE_yy/mo/dd<CRLF>
TIME_hh:mi:ss.mmmt<CRLF>
s_kccuuuuuu,pp<CRLF>
.................
s_kccuuuuuu,pp<CRLF>
```

aaaaaa	Number of data points (6 digits), Matches the number of blocks, n, in the above figure.
ddd	Number of channels (3 digits)
ffff	Sampling interval value (4 digits)
ggg	Sampling interval unit (3 characters, left justified)
tttttt	Data number of the trigger position (6 digits, counting starts with 0.) For display data, this value is the number of the last display data.
yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Second (00 to 59)
mmm	Millisecond (000 to 999)
t	Summer time or winter time S : summer time (Space) : winter time
s	Data status N : Normal D : Differential input
k	Channel type 0 : Measurement channel A : Computation channel
cc	Channel number 01 to 60
uuuuuu	Unit information (6 characters, left-justified) mV____ : mV V_____ : V ^C____ : °C xxxxxx : (user-defined character string)
pp	Decimal position (00 to 04) No decimal (00000) for 00. One digit below the decimal (0000.0) for 01. Two digits below the decimal (000.00) for 02. Three digits below the decimal (00.000) for 03. Four digits below the decimal (0.0000) for 04.
_	Space

Block



Special data value

The measured/computed data take on the following values under special conditions.

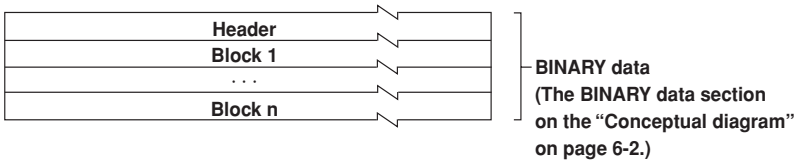
Special data value	Measured data	Computed data
+ over	7FFFH	7FFF7FFFH
– over	8001H	8001H8001H
Skip	8002H	8002H8002H
Error	8004H	8004H8004H
Undefined	8005H	8005H8005H

Note

The measured/computed data are output according to the byte order specified with the BO command.

Event Data

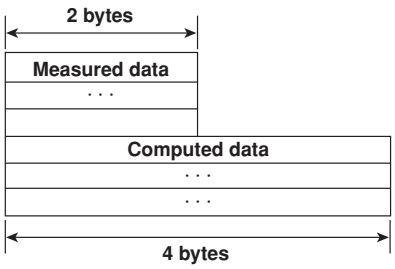
- The MI command is used to output the FIFO data.
- The ID number of the output format is “12.” See “Identifier” on page 6-3.



Header

Same as the “Header” for the display data.

Block



Special data value

The measured/computed data take on the following values under special conditions.

Special data value	Measured data	Computed data
+ over	7FFFH	7FFF7FFFH
– over	8001H	8001H8001H
Skip	8002H	8002H8002H
Error	8004H	8004H8004H
Undefined	8005H	8005H8005H

Note

The measured/computed data are output according to the byte order specified with the BO command.

Manual sampled Data

- The ME or MO command is used to output the data.
- The ID number of the output format is “4.” See “Identifier” on page 6-3.
- For the data format, see the RD-MV100/RD-MV200 User’s Manual (M-3641/M-3642).

Report Data (hourly, daily, weekly, monthly data)

- The ME or MO command is used to output the data.
- The ID number of the output format is “5,” “6,” “7,” and “8” for hourly data, daily data, weekly data, and monthly data, respectively. See “Identifier” on page 6-3.
- For the data format, see the RD-MV100/RD-MV200 User’s Manual (M-3641/M-3642).

6.4 Output Format of Instrument Information

This section describes the instrument information output format of the instrument information server.

Note

The "CRLF" used in this section denotes carriage return line feed.

Response

The parameters of the packet that are returned as a response are lined up according to the following format.

```
EACRLF
(Parameter 1)_=_(value of parameter 1)CRLF
(Parameter 2)_=_(value of parameter 2)CRLF
.....................................
ENCRLF
```

- The parameter values are output in the order specified by the command parameter.
- The output order of the parameters when "all" is specified is not constant.
- Even if the same parameters are specified numerous times, only the first occurrence is output.
- Lower-case characters are used for the parameters.
- "_" indicates a space.

The following table shows the parameter types.

Parameter	Output information
all	All information that are output using the parameters below
serial	Serial number
model	Manufacturer, model, and firmware version
host	Host name
ip	IP address

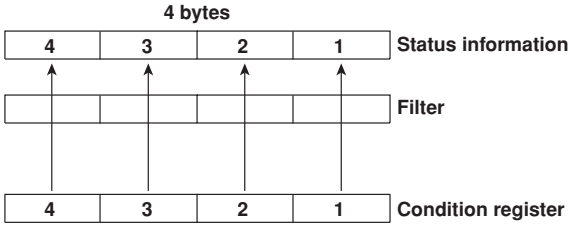
Output Example

Several output examples are indicated below.

Packet Parameter Sent as Commands	Response
The "all" parameter can be used to output all information for parameters serial, model, host, and ip.	
all	EA serial = 12V636848 model = OMEGA,RD-MV200,1.01 host = RD-MV200-1 ip = 192.168.111.24 EN
Parameters are not case sensitive.	
ip HoSt	EA ip = 192.168.111.24 host = RD-MV200-1 EN
Even if the same parameters are specified numerous times, only the first occurrence is output.	
host ip host ip host model	EA host = RD-MV200-1 ip = 192.168.111.24 model = OMEGA,RD-MV200,1.01 EN
Undefined parameters are ignored.	
(Space)	EA EN

7.1 Status Information and Filter

The following figure depicts the status information and filter on this instrument.



- The IF command can be used to set the filter.
- When a status indicated on the following page is entered, the corresponding bit in the condition register is set to “1.” The logical AND of the condition register and the filter becomes the status information.
- The IS command is used to output the status information. Status information 1 to 3 are cleared when they are output. Status information 4 is not cleared when it is output, and remains at “1” while the event is occurring.
- When multiple connections are up, filters can be specified for the individual connection. Therefore, the status information can be held for each connection.

7.2 The Bit Structure of the Status Information

The following four groups of status information are output in response to a status information output request using the IS command. For the output format, see “Status Information” in section 6.2, “Output Format of ASCII Data.”

Status Information 1 (Operation complete)

Bit	Name	Description
0	A/D conversion complete	Set to “1” when the A/D conversion of the measurement is complete.
1	Medium access complete	Set to “1” when the display, event, manual sampled, report, TLOG, or screen image data file are finished being saved to the external storage medium. Set to "1" when setting data is successfully saved or loaded.
2	Report generation complete	Set to “1” when report generation is complete.
3	Timeout	Set to “1” when the timer expires.
4	–	–
5	–	–
6	–	–
7	–	–

Status Information 2 (Abnormal operation)

Bit	Name	Description
0	Measurement drop	Set to “1” when the measurement process could not keep up.
1	Decimal/unit information change	Set to “1” when the decimal/unit information is changed.
2	Command error	Set to “1” when there is a command syntax error.
3	Execution error	Set to “1” when an error occurs during command execution.
4	–	–
5	–	–
6	–	–
7	–	–

Status Information 3 (Event occurrence)

Bit	Name	Description
0	–	–
1	–	–
2	Memory end	Set to “1” when the free space in the internal memory is low.
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–

Status Information 4 (Mode)

Bit	Name	Description
0	Basic setting	Set to “1” during basic setting mode.
1	Memory sampling	Set to “1” while data are being acquired into the internal memory.
2	Computing	Set to "1" only when computation is executed.
3	Alarm generating	Set to “1” while the alarm is occurring.
4	Accessing medium	Set to “1” while the display, event, manual sampled, report, TLOG, or screen image data file are being saved to the external storage medium.
5	–	–
6	–	–
7	–	–

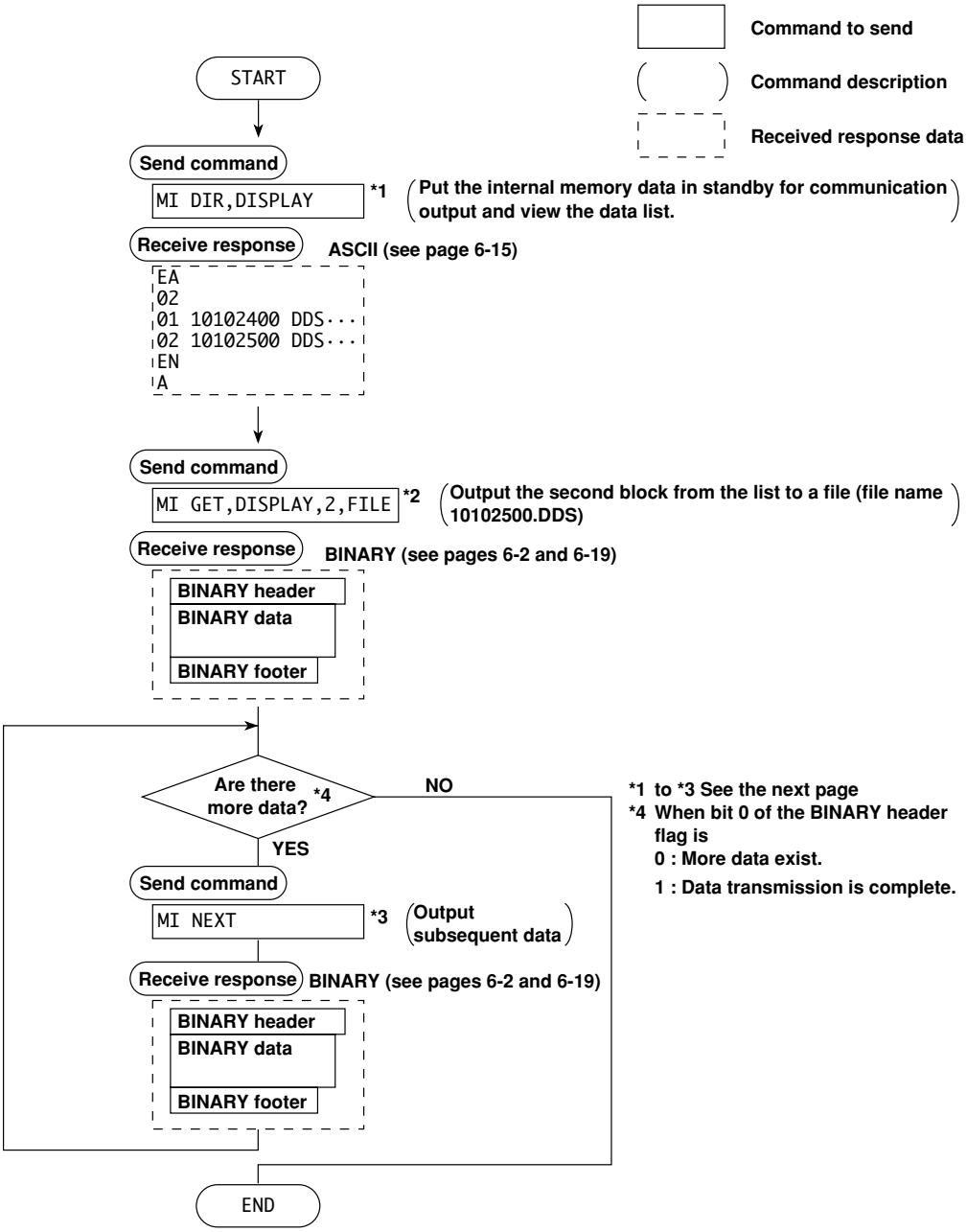
Appendix 1 ASCII Character Codes

Upper 4 bits

Lower 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P		p								
1				1	A	Q	a	q								
2				2	B	R	b	r								
3			#	3	C	S	c	s								
4				4	D	T	d	t								
5			%	5	E	U	e	u								
6			&	6	F	V	f	v								
7				7	G	W	g	w								
8			(	8	H	X	h	x								
9			)	9	I	Y	i	y								
A	LF		*	:	J	Z	j	z								
B		ESC	+		K		k									
C					L		l									
D	CR		–		M		m									
E			.		N	°	n									
F			/		O	_	o									

Appendix 2 Output Flow of Internal Memory Data

Display Data Example



Event data (Set *1, *2, and *3 in the previous figure to the following commands)

*1 : `MI DIR,EVENT` Output the list.
*2 : `MI GET,EVENT,2,FILE` Output the data of the second block to a file.
*3 : `MI NEXT` If there are subsequent data, output the data.

Manual sampled data (Set *1 and *2 in the previous figure to the following commands)

*1 : `MO DIR,MANUAL`
*2 : `MO GET,MANUAL,2`
Since manual sampled data can be transmitted in one session, *3 is not necessary.

Report data (Set *1 and *2 in the previous figure to the following commands)

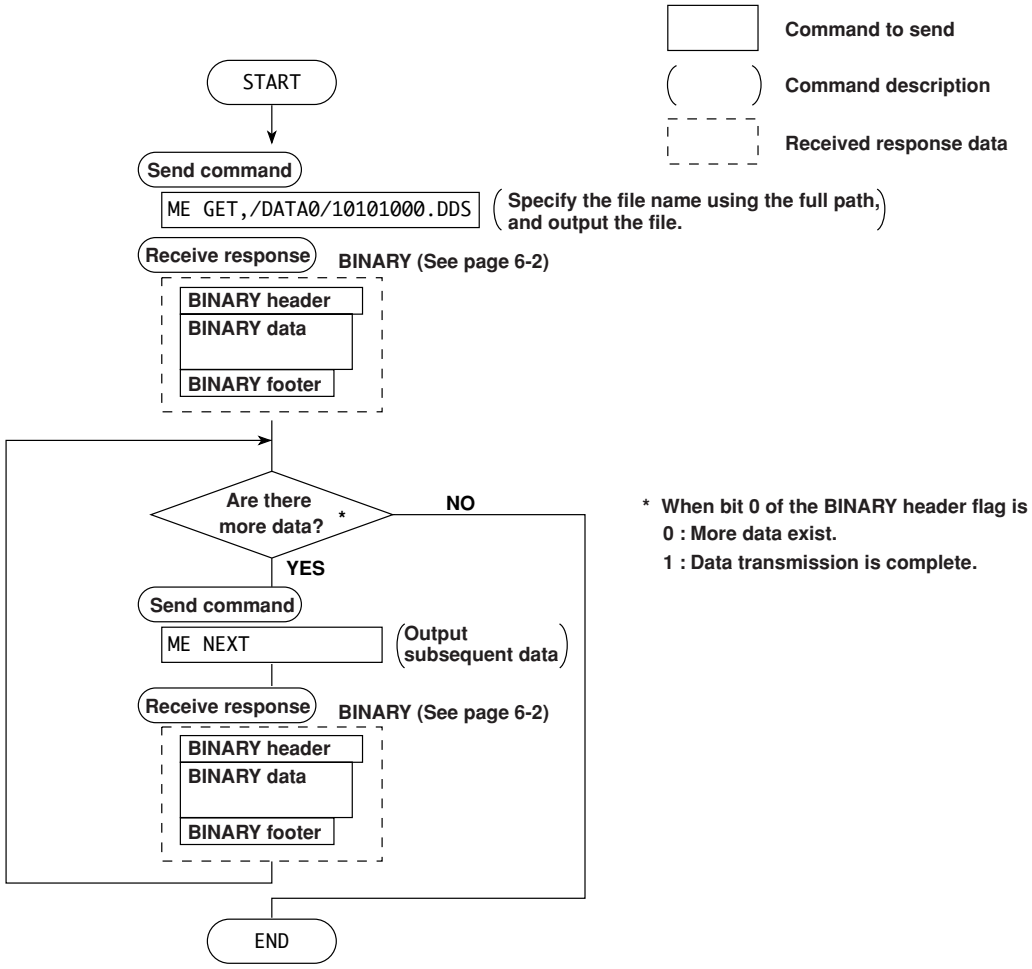
*1 : `MO DIR,REPORT`
*2 : `MO GET,REPORT,2`
Since report data can be transmitted in one session, *3 is not necessary.

TLOG data (Set *1, *2, and *3 in the previous figure to the following commands)

*1 : `MO DIR,TLOG`
*2 : `MO GET,TLOG,2`
*3 : `MO NEXT`

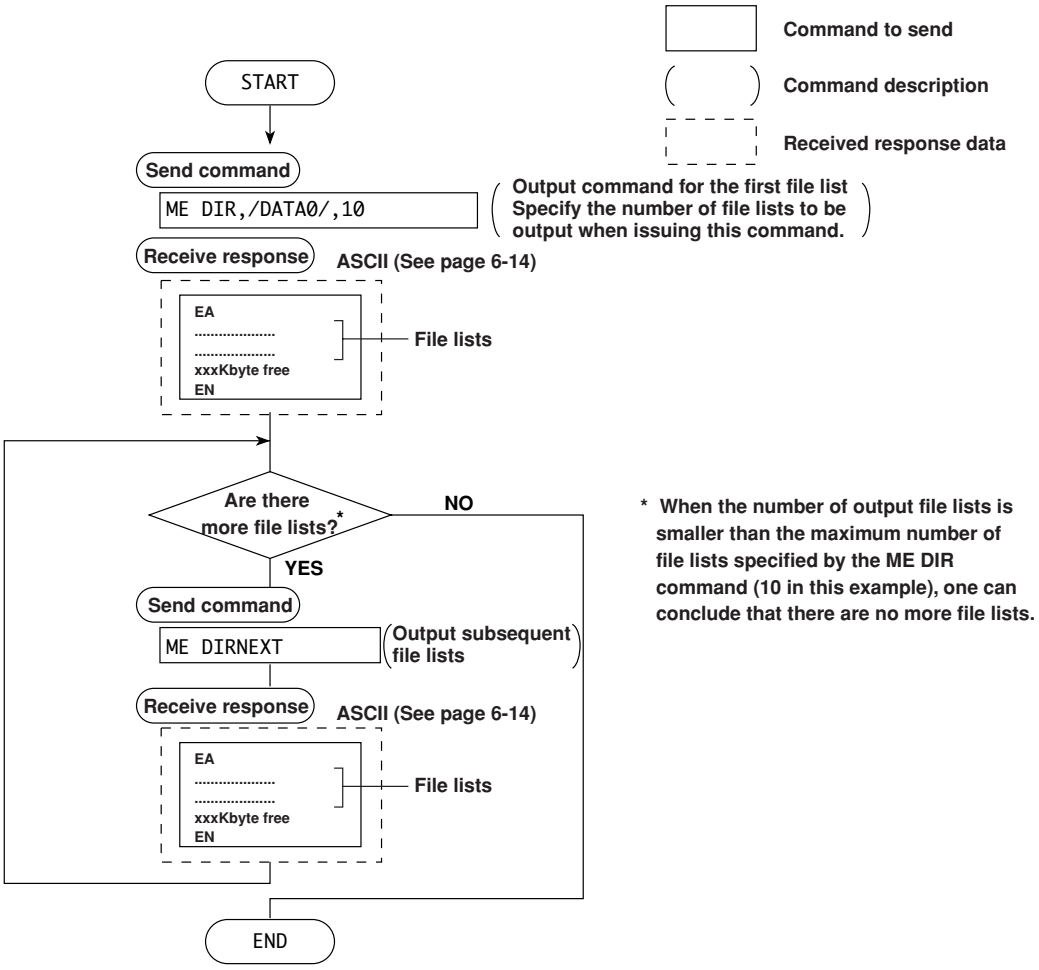
Appendix 3 Output Flow of the File or the File List in the External Storage Medium

Example in which the file 10101000.DDS in the DATA0 directory is output



* When bit 0 of the BINARY header flag is
0 : More data exist.
1 : Data transmission is complete.

Example in which the file list belonging to directory DATA0 is output 10 files at a time



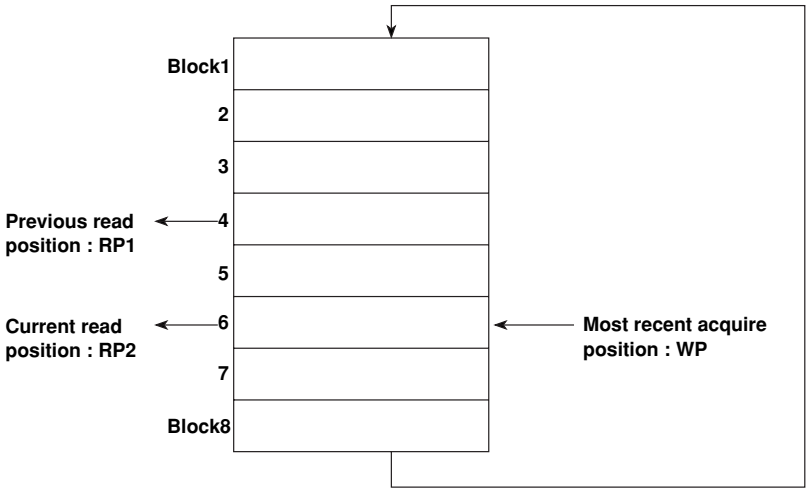
* When the number of output file lists is smaller than the maximum number of file lists specified by the ME DIR command (10 in this example), one can conclude that there are no more file lists.

Appendix 4 Output Flow of FIFO Data

Overview of the FIFO Buffer

The RD-MV has a dedicated internal memory for outputting measured/computed data. This memory is structured as a FIFO (First-In-First-Out). Measured/computed data are constantly acquired to the internal memory at the specified acquiring interval (FIFO acquiring interval, set with the FR command). By using this function, it is possible to read measured/computed data that have been saved at the specified intervals regardless of the frequency at which the PC periodically reads the measured/computed data.

The following example shows the case when the acquiring interval is 1 s and the capacity of the FIFO memory is for 8 intervals.



- Acquiring of the measured/computed data
  - The measured/computed data are acquired to the internal memory at 1 s intervals.
  - Measured/computed data are acquired to blocks 1 through 8 in order. After acquiring to block 8, the next acquiring operation returns to block 1.

- Reading the measured/computed data (FF GET command)
  Outputs the data from the next to the previous read position (RP1) to the most recent acquire position (WP). In this example, more than 2 s has elapsed from the previous read operation. Therefore, data in blocks 5 and 6 are output.

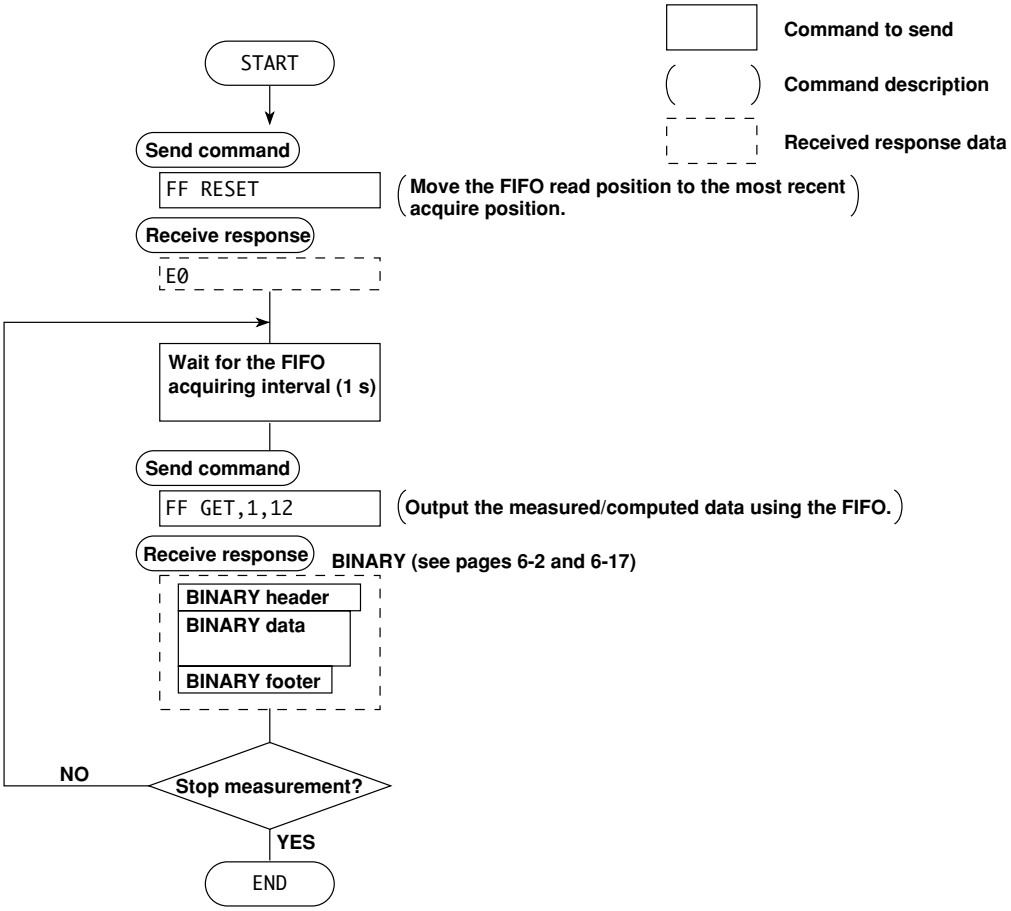
- Reading the measured/computed data (FF GETNEW command)
  Output the specified number of blocks of FIFO data back starting from the recent acquire position (WP). In this example, if you specify the number of blocks to “5,” data in blocks 2 to 6 are output.

The capacity of the FIFO memory (FIFO buffer data length) that is allocated varies depending on the model.

RD-MV102/RD-MV104/RD-MV204/RD-MV208: 240 intervals (30 s at a acquiring interval of 125 ms)

RD-MV106/RD-MV112/RD-MV210/RD-MV220/RD-MV230: 60 intervals (60 s at a acquiring interval of 1 s)

Example in which the FIFO acquiring interval on the RD-MV112 is set to 1 s and the measured/computed data from CH1 to CH12 are continuously output using the FIFO function



Note

- The FIFO acquiring interval must be set using the FR command beforehand.
- The FIFO acquiring interval applies to both serial and Ethernet communications.

Appendix 5 A List of Error Messages

The list of error codes and messages is given below.

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.*1
3	A disabled channel is selected.	See sections 5.4, 5.6, and 5.8.
4	Incorrect function parameter.	See sections 5.4 to 5.11.
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 section 5.4.
9	Incorrect input range code.	See section 5.4.
21	Cannot set an alarm for a skipped channel.	See section 5.4.
22	The upper and lower span limits are equal.	See sections 5.1 to 5.7.*1
23	The upper and lower scale limits are equal.	See sections 5.5 and 5.6.*1
30	The partial boundary value exceeds the range of the span.	See section 7.11.*1
31	Partial expansion display is set ON for a SKIPPED channel.	See section 5.4.
35	The upper and lower limits of the display band are equal.	See section 7.9.*1
36	The lower limit of the display band is greater than the upper limit.	See section 7.9.*1
37	The display band is narrower than 4% of the entire display.	See section 7.9.*1
40	Incorrect group set character string.	See section 7.6.*1
41	There is no specified input channel.	See sections 5.4, 5.6, and 5.8.
42	Exceeded the number of channels which can be set.	See sections 5.4, 5.6, and 5.8.
43	A channel number cannot repeat in a group.	See section 7.6.*1
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.*1
62	MATH expression grammar is incorrect.	See section 11.2.*1
63	MATH expression sequence is incorrect.	See section 11.2.*1
64	MATH upper and lower span values are equal.	See section 11.4.*1
70	The range of the MATH constant is exceeded.	See section 11.4.*1
71	Set range of the MATH constant is exceeded.	See section 11.6.*1
81	All space or ‘quit’ string cannot be specified.	See section 10.6.*1
83	Duplicate used combination of user ID and password.	See section 10.6*1 (when /BT1 is equipped).
85	The login password is incorrect.	See section 10.5.*1
86	The key-lock release password is incorrect.	See section 10.3.*1
87	This key is locked.	See section 10.3.*1
88	This function is locked.	See section 10.3.*1
89	Press [FUNC] key to login.	See section 10.5.*1
90	No permission to enter to the SETUP mode.	See sections 10.5 and 10.6.*1
91	Password is incorrect.	See sections 10.3 and 10.5.*1
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 section 5.6.
101	The result of the masked IP address is all 0s or 1s.	See section 5.6.

Code	Message	Explanation/Countermeasures/Ref. section
102	SUBNET mask is incorrect.	See section 5.6.
103	The net part of default gateway is not equal to that of IP address.	See section 5.6.
104	FTP client failed because the memory mode is 'manual'.	See section 5.6.

*1 See the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

• 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.*1
151	This action is not possible during sampling or calculating.	See sections 8.5, 8.6, and 11.3.*1
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.*1
160	Cannot load the specified data. Change the memory setting.	See sections 4.5, 9.3, and 9.4.*1

*1 See the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

Operation Errors

• Errors related to external storage medium

Code	Message	Explanation/Countermeasures/Ref. section
200	Operation aborted because an error was found in media.	Check the storage medium.
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 section 5.8.
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.*1
217	Unknown file type.	Access to other files.
218	Directory exists. Delete the directory or change directory name.	See section 8.9.*1
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.

*1 See the RD-MV100/RD-MV200 User's Manual (M-3641/M-3642).

• Errors related to historical trend

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.*1
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.*1

• Errors related to FTP client

For information regarding the FTP client function of the RD-MV200, see the RD-MV100/RD-MV200 Communication Interface User's Manual (M-3643).

Code	Message
280	IP address is not set or FTP function is not available. Further details are provided by the character string that appears after error code 280. **Character String and Details** HOSTADDR The RD-MV's IP address has not been specified. Check the IP address. DORMANT Internal processing error.*1 LINK Data link is disconnected. Check the cable connection.
281	FTP mail box operation error. Further details are provided by the character string that appears after error code 281. **Character String and Details** MAIL Internal processing error.*1 STATUS Internal processing error.*1 TIMEOUT Internal processing error.*1 PRIORITY Internal processing error.*1 NVRAM Internal processing error.*1
282	FTP control connection error. Further details are provided by the character string that appears after error code 282. **Character String and Details** HOSTNAME Failed the DNS lookup (search the IP address corresponding to the host name). Check the DNS setting and the destination host name. TCPIP Internal processing error.*1 UNREACH Failed to connect to a control connection server. Check the address setting and that the server is running. OOBINLINE Internal processing error.*1 NAME Internal processing error.*1 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. 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. 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. 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. 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.

Code	Message
283	FTP command was not accepted. Further details are provided by the character string that appears after error code 283.

Character String and Details	
USER	Failed user name verification. Check the user name setting.
PASS	Failed password verification Check the password setting.
ACCT	Failed account verification. Check the account setting.
TYPE	Failed to change the transfer type. Check that the server supports the binary transfer mode.
CWD	Failed to change the directory. Check the initial path setting.
PORT	Failed to set the transfer connection. Check that the security function is disabled.
PASV	Failed to set the transfer connection. Check that the server supports PASV commands.
SCAN	Failed to read the transfer connection settings. Check that proper response to the PASV command is received from the server.

Code	Message
284	FTP transfer setting error. Further details are provided by the character string that appears after error code 284.

Character String and Details	
MODE	Internal processing error.*1
LOCAL	Internal processing error.*1
REMOTE	The destination file name is not correct. Check that you have the authority to create or overwrite files.
ABORT	File transfer abort was requested by the server. Check the server for the reason for the abort request.

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.*2
BIND Failed the transfer connection command.*2
CONNECT Failed the transfer connection.*2
LISTEN Failed the transfer connection reception.*2
ACCEPT Failed to accept the transfer connection.*2
SOCKNAME Internal processing error.*2
RECV Failed to receive data over the transfer connection.*2
SEND Failed to send data over the transfer connection.*2

Code	Message
286	FTP file transfer error.

*1 Contact your nearest YOKOGAWA dealer.
*2 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 RD-MV100/RD-MV200 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 RD-MV100/RD-MV200 overwrites files with the same file names on the server without any warnings, unless the server rejects the request.

Communication Errors

• 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.

- **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.

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