Foreword

Thank you for purchasing the YOKOGAWA µR10000/µR20000 Recorder. This user's manual describes the functions of the Ethernet interface and the RS-422A/485 communication interface. To ensure correct use, please read this manual thoroughly before beginning operation. After reading the manual, keep it in a convenient location for quick reference whenever a question arises during operation. The following five manuals, including this one, are provided as manuals for the µR10000/µR20000 Recorder. Please read all of them. The figures used in this manual are mostly of the µR10000. If you are using the µR20000, refer to the figures for reference.

• Paper Manual

<table>
<thead>
<tr>
<th>Manual Title</th>
<th>Manual No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>µR10000 Recorder Operation Guide</td>
<td>IM 04P01B01-02E</td>
<td>Explains the basic operations of the µR10000 recorder.</td>
</tr>
<tr>
<td>µR20000 Recorder Operation Guide</td>
<td>IM 04P02B01-02E</td>
<td>Explains the basic operations of the µR20000 recorder.</td>
</tr>
</tbody>
</table>

• Electronic Manuals Provided on the Accompanying CD-ROM

<table>
<thead>
<tr>
<th>Manual Title</th>
<th>Manual No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>µR10000 Recorder User’s Manual</td>
<td>IM 04P01B01-01E</td>
<td>Explains all the functions and procedures of the µR10000 recorder excluding the communication functions.</td>
</tr>
<tr>
<td>µR20000 Recorder User’s Manual</td>
<td>IM 04P02B01-01E</td>
<td>Explains all the functions and procedures of the µR20000 recorder excluding the communication functions.</td>
</tr>
<tr>
<td>µR10000/µR20000 Communication Interface User’s Manual</td>
<td>IM 04P01B01-17E</td>
<td>This manual. Explains the functions of the Ethernet interface and the RS-422A/485 communication interface.</td>
</tr>
</tbody>
</table>

Notes

• The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument’s performance and functions. The figures given in this manual may differ from those that actually appear on your 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 your nearest YOKOGAWA dealer as listed on the back cover of this manual.

• Copying or reproducing all or any part of the contents of this manual without the permission of Yokogawa Electric Corporation is strictly prohibited.

• The TCP/IP software of this product and the document concerning the TCP/IP software have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the University of California.

Revisions

• 1st Edition December 2004
• 2nd Edition March 2005
• 3rd Edition August 2005
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Functional Enhancement of the Recorder

The functions of the recorder have been added or changed as shown in the figure below. You can check the system version on the system display. For details, see the µR10000 User’s Manual (IM 04P01B01-01E) or the µR20000 User’s Manual (IM 04P02B01-01E).

<table>
<thead>
<tr>
<th>Version</th>
<th>Suffix Code</th>
<th>Added or Modified Functions</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.11</td>
<td></td>
<td>(Changed) Expanded the selectable range of alarm values during linear scaling (including 1-5V and SQRT) to –5% to 105% of the scale.</td>
<td>Sec. 4.4: SA command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Changed) The procedure to set the start/end date and time of Daylight Saving Time (DST) has been changed. The TD command can be used on the µR20000 and the µR10000 with system version 1.11. The SS command can be used on the µR10000 with system version 1.02 or earlier.</td>
<td>Sec. 4.4: TD command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Added) The print/display format of the date can be changed.</td>
<td>Sec. 4.5: XN command</td>
</tr>
<tr>
<td>/C3</td>
<td></td>
<td>(Changed) Modbus slave protocol can be used. Two-wire system.</td>
<td>Sec. 4.5: YS command Sec. 3.2</td>
</tr>
<tr>
<td>/C7</td>
<td></td>
<td>(Changed) Users with the same user name cannot be registered.</td>
<td>Sec. 2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Added) The print/display format of the date can be changed.</td>
<td>Sec. 4.5: XN command</td>
</tr>
</tbody>
</table>

Common to µR10000 and µR20000

<table>
<thead>
<tr>
<th>Version</th>
<th>Suffix Code</th>
<th>Added or Modified Functions</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.21</td>
<td>-2</td>
<td>(Added) Language support (German and French).</td>
<td>Sec. 4.5: UL command</td>
</tr>
<tr>
<td>/CC1</td>
<td></td>
<td>(Added) Calibration Correction.</td>
<td>Sec. 4.4: VL commands Sec. 4.5: UQ and UF commands</td>
</tr>
<tr>
<td>1.31</td>
<td></td>
<td>(Added) Customized menu.</td>
<td>Sec. 4.5: UG and UH commands</td>
</tr>
<tr>
<td>/BT1</td>
<td></td>
<td>(Added) Header printout.</td>
<td>Sec. 4.4: VH, VC, VP, VA, VM, and VD commands Sec. 4.5: UE and XR commands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Added) Hold registers 40301 to 40348 (floating type register for communication input data) for Modbus communication.</td>
<td>Sec. 3.4</td>
</tr>
</tbody>
</table>
# How to Use This Manual

## Structure of the Manual

This user’s manual consists of the following sections.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overview of the Communication Functions</td>
<td>Gives an overview of the communication functions.</td>
</tr>
<tr>
<td>2</td>
<td>Using the Ethernet Interface (/C7 Option)</td>
<td>Explains the specifications of the Ethernet interface and how to use the interface.</td>
</tr>
<tr>
<td>3</td>
<td>Using the RS-422A/485 Communication Interface (/C3 Option)</td>
<td>Explains the specifications of the RS-422A/485 communication interface and how to use the interface.</td>
</tr>
<tr>
<td>4</td>
<td>Commands</td>
<td>Explains each command that is available.</td>
</tr>
<tr>
<td>5</td>
<td>Responses</td>
<td>Explains the responses that the recorder returns and the output format of the setup data and measured/computed data.</td>
</tr>
<tr>
<td>6</td>
<td>Status Information</td>
<td>Explains the registers that indicate the recorder statuses.</td>
</tr>
<tr>
<td>Appendix</td>
<td></td>
<td>Provides an ASCII character code table, flow charts for outputting data from the recorder, login procedure, and a list of error messages.</td>
</tr>
<tr>
<td>Index</td>
<td></td>
<td>Index of contents.</td>
</tr>
</tbody>
</table>
How to Use This Manual

Conventions Used in This Manual

- **Unit**
  - k: Denotes 1000. Example: 5 kg, 100 kHz
  - K: Denotes 1024. Example: 640 KB

- **Note**
  The following markings are used in this manual.

  ![Warning Symbol]
  Im proper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user’s manual for special instructions. The same symbol appears in the corresponding place in the user’s manual to identify those instructions. In the manual, the symbol is used in conjunction with the word “WARNING” or “CAUTION.”

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

  **CAUTION** Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user’s data, and precautions that can be taken to prevent such occurrences.

- **Note**
  Calls attention to information that is important for proper operation of the instrument.

- **Bold Characters**
  Bold characters are mainly characters and numbers that appear on the display.

- **Subheadings**
  On pages that describe the operating procedures in Chapter 2 and 3, the following symbols are used to distinguish the procedures from their explanations.

  **Explanation**
  This subsection describes the setup parameters and the limitations on the procedures.

  **Procedure**
  Follow the numbered steps. All procedures are written with inexperienced users in mind; depending on the operation, not all steps need to be taken.
Names of Parts and Basic Key Operations

Display and Keys

You use the panel keys and the display to configure the communication functions. For a description of other parts of the recorder, see section 3.1 in the Recorder User’s Manual. (The figure below is of the µR10000 Recorder.)

![Diagram of µR10000 Recorder](link)

**Keys**

<While setting functions, when the FUNC key/DISP MENU key is pressed>

**CHARACTER Key:** Changes the character type when entering a character. Press this key while holding down the SHIFT key to switch the character type in reverse order.

**UP/DOWN Key:** Switches the setup item or the value. Press this key while holding down the SHIFT key to switch the setup item or the value in reverse order.

**LEFT/RIGHT Key:** Moves the cursor to the right when entering a value or character. Press this key while holding down the SHIFT key to move the cursor to the left.

**ESC Key:** Cancels the operation. When pressed with the SHIFT key, the display of the comment on the setting turns ON/OFF.

**SHIFT Key:** Used with the ▲ key, ▼ key, or the CHARACTER key.

**ENTER Key:** Confirms the setup item or value.

<During normal operation>

**CH UP key**
Switches the displayed channel.
(when manual switching is specified)

**FEED key**
Feeds the chart paper.

**DISP MENU key**
Hold this key down for 3 seconds to switch to the data display setup screen. Hold this key down for 3 seconds also to exit from the data display setup screen.

**FUNC key**
Used when executing manual printout, message printout, etc.

**DISP key**
Switches the screen in the main display.

**MENU key**
Hold this key down for 3 seconds to enter Setting mode. Hold this key down for 3 seconds also to exit from Setting mode.

**RCD key**
Starts/stops recording.
Basic Key Operations

This section describes basic operations on the front panel keys to change various settings.

• Execution Modes

The recorder has the following execution modes.

• Operation mode: A mode used to perform recording and monitoring.
• Setting mode: A mode used to set the input range, alarms, chart speed, and other parameters.
• Basic Setting mode: A mode used to set the basic specifications of functions with the recording operation stopped.

* In the explanation of commands in chapter 4, Run mode collectively refers to Operation mode and Setting mode.

Settings related to communications are configured in Basic Setting mode. You cannot enter Basic Setting mode while the recorder is recording or while computation is in progress on the computation function (M1 option).

• Entering Basic Setting Mode

Hold down the \( \text{MENU} \) key for 3 seconds.

The Setting mode display appears.

The panel keys are set to the functions marked above the keys as shown below.

Hold down both the \( \text{DISP} \) key and the \( \text{FUNC} \) key for 3 seconds.

The Basic Setting mode display appears. The top and bottom lines are the setup item and comment, respectively. The section that is blinking in the setup item that you change. In this manual, the section that you change appears shaded.

The comment line shows useful information such as a description of the setup item and the range of selectable values. Read the comment and change the items as necessary.

The item to be controlled blinks.

• Selecting the Setup Item and Value

The selected item change each time you press the \( \text{DISP} \) key. The selected item change in reverse order if you press the \( \text{DISP} \) while holding down the \( \text{SHIFT} \) \( \text{FEED} \) key.

Selections

This manual denotes the operation of pressing a key while holding down the \( \text{SHIFT} \) \( \text{FEED} \) key as \( \text{SHIFT} + \text{other key} \) (for example: \( \text{SHIFT} + \text{DISP} \) key).

After you make a selection, press the \( \text{CH UP} \) key. The next screen appears. When the Setting Complete screen appears, the changed item is applied.

• Using the ESC Key

If you press the \( \text{MENU} \) key, the operation is cancelled, and the display returns to a higher level menu. If you do not show the Setting Complete screen, the changes you made up to that point are discarded.

You can show and hide the comment on the bottom line by pressing the \( \text{ESC} \) \( \text{MENU} \) key while holding down the \( \text{SHIFT} \) \( \text{FEED} \) key.
• **Entering Values**

Use the \(<\) \(>)\) key or \(\text{SHIFT} + \(<\) \(>)\) key to move the cursor. Use the \(\uparrow\) \(\downarrow\) key or \(\text{SHIFT} + \uparrow\) \(\downarrow\) key to change a digit value. You repeat these steps to enter the value.

When you press the \(\uparrow\) \(\downarrow\) key, the change is applied and the next setup item is displayed.

• **Entering Characters**

Use the \(\uparrow\) \(\downarrow\) key or \(\text{SHIFT} + \uparrow\) \(\downarrow\) key to move the cursor.

Use the CHARACTER key or \(\text{SHIFT} + \text{CHARACTER}\) key to select the character type.

The character type changes in the following order: uppercase alphabet (\(A-Z\)), lowercase alphabet (\(a-z\)), numbers (\(0-9\)), and symbols (\(\%,\ ,\ .\ ,\ \), and space).

Use the \(\uparrow\) \(\downarrow\) key or \(\text{SHIFT} + \uparrow\) \(\downarrow\) key to select a character.

You repeat these steps to set the character string.

When you press the \(\uparrow\) \(\downarrow\) key, the change is applied and the next screen is displayed.

**Inserting Characters**

Press the \(\uparrow\) \(\downarrow\) key or \(\text{SHIFT} + \uparrow\) \(\downarrow\) key to move the cursor to the position where the character is to be inserted.

Press the CHARACTER key or \(\text{SHIFT} + \text{CHARACTER}\) key to show \(\text{Ins DISP}\) and then press the \(\uparrow\) \(\downarrow\) key. A space for one character is inserted. Enter the character.

When you press the \(\uparrow\) \(\downarrow\) key, the change is applied and the next screen is displayed.

**Deleting a Character**

Use the \(\uparrow\) \(\downarrow\) key or \(\text{SHIFT} + \uparrow\) \(\downarrow\) key to move the cursor to the character to be deleted.

Press the CHARACTER key or \(\text{SHIFT} + \text{CHARACTER}\) key to show \(\text{Del DISP}\) and then press the \(\uparrow\) \(\downarrow\) key. The character is deleted.
Deleting an Entire Character String
Press the CHARACTER key or SHIFT + CHARACTER key to show Clear DISP and then press the ↘key. The entire character string is deleted.

Copying & Pasting a Character String
Show the copy source character string.
Press the CHARACTER key or SHIFT + CHARACTER key to show Copy DISP and then press the ↘key. The character string is saved to the memory.
Show the copy destination.
Press the CHARACTER key or SHIFT + CHARACTER key to show Paste DISP and then press the ↘key. The character string is pasted.

• Exiting from Basic Setting Mode
Press the ESC key several times to return to the Basic= screen.
Press the ↘key or SHIFT + ↘key to select End and then press the ↵key. The setup save screen appears.

Basic=End
Save Setting

Press the ↘key to select Store and then press the ↵key.
The setting is applied and the Operation mode screen appears.
If you select Abort and press the ↵key, the setting is discarded and the Operation mode screen appears.

End=Store
Save settings and
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1.1 Communication Functions Using the Ethernet Interface (/C7 Option)

The recorder can be equipped with an optional Ethernet interface. For details on how to use the Ethernet interface, see chapter 2.

Functional Construction

The following figure shows the relationship between the communication function of the recorder and the Ethernet interface. Perform communication according to the respective protocol.

- Protocol is a set of rules that two computers use to communicate via a communication line (or network).

<table>
<thead>
<tr>
<th>Application</th>
<th>Setting/Measurement Server</th>
<th>Maintenance/Test Server</th>
<th>Instrument Information Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper layer protocol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower layer protocol</td>
<td>TCP</td>
<td>UDP</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Ethernet (10BASE-T)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TCP (Transmission Control Protocol)
UDP (User Datagram Protocol)
IP (Internet Protocol)

Setting/Measurement Server

- You can specify settings that are approximately equivalent to those specified by front panel key operations. However, you cannot turn the power ON/OFF, set the user name and password for communications, nor set the key lock.
- The data below can be output.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Output Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured/computed data</td>
<td>BINARY/ASCII</td>
</tr>
<tr>
<td>Setup data</td>
<td>ASCII</td>
</tr>
<tr>
<td>Periodic printout and the most recent TLOG computation data</td>
<td>ASCII</td>
</tr>
<tr>
<td>Status information</td>
<td>ASCII</td>
</tr>
<tr>
<td>Information on connected users</td>
<td>ASCII</td>
</tr>
</tbody>
</table>

- The commands that can be used are Setting commands, Basic Setting commands, Control commands, and Output commands.

<Related Topics>

- Ethernet interface settings: Section 2.3
- Commands: Section 4.2
- Data output format: Chapter 5
1.1 Communication Functions Using the Ethernet Interface (/C7 Option)

**Maintenance/Test Server**
- Outputs Ethernet communication information such as connection information and network statistics from the recorder.
- The commands that can be used Maintenance/Test commands.

<Related Topics>
- Ethernet interface settings: Section 2.3
- Commands: Section 4.2

**Instrument Information Server**
- Outputs the serial number, model name, and other information about the recorder connected via the Ethernet network.
- The commands that can be used Instrument Information Output commands.

<Related Topics>
- Ethernet interface settings: Section 2.3
- Commands: Section 4.2
1.1 Communication Functions Using the Ethernet Interface (/C7 Option)

Other Functions

- **Login Function**
  Only users that are registered in advance can access the Setting/Measurement and Maintenance/Test servers.
  - Users are identified by their user name and password.
  - You can register one administrator and six users.

Administrator privileges
  The administrator can use all the functions on the Setting/Measurement and Maintenance/Test servers
  User Privileges
  - Setting/Measurement server
    Users can output measured data, setup data, scheduled printing, and the most recent TLOG computation data. Users cannot control the recorder.
  - Maintenance/Test server
    Users cannot disconnect communications between the recorder and other PCs. All other operations are allowed.
  - There is a maximum number of simultaneous connections that can be established with the recorder.

<Related Topics>
- Login function settings: Section 2.5
- Maximum number of simultaneous connections: Section 2.1
- Commands available to the administrator and users: Section 4.2

- **Communication Timeout**
  This function drops the connection with the PC if there is no data transmission for a given time at the application level (see “Functional Construction”). For example, this function prevents a PC from being connected to the recorder indefinitely which would prohibit other users from making new connections for data transfer.

<Related Topics>
- Communication timeout setting: Section 2.6

- **Keepalive**
  This function drops the connection if there is no response to the inspection packet that is periodically transmitted at the TCP level.

<Related Topics>
- Keepalive setting: Section 2.6
1.2 Communication Functions Using the RS-422A/485 Communication Interface (/C3 Option)

The recorder can be equipped with an optional RS-422A/485 communication interface. For details on how to use the RS-422A/485 communication interface, see chapter 3.

Functional Construction

The following figure shows the relationship between the communication function of the recorder and the RS-422A/485 communication interface. Perform communication according to the respective protocol.

* Protocol is a set of rules that two computers use to communicate via a communication line (or network).

<table>
<thead>
<tr>
<th>Communication functions of the recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
</tr>
<tr>
<td>Protocol</td>
</tr>
<tr>
<td>Interface</td>
</tr>
</tbody>
</table>

Connect the recorder and the PC using a serial cable.

Setting/Measurement Server

The functions are the same as those of the Setting/Measurement server of the Ethernet interface. See page 1-1.

**Related Topics**
- RS-422A/485 communication interface settings: Section 3.5
- Commands: Section 4.2
- RS-422A/485 dedicated commands: Section 4.8
- Data output format: Chapter 5

Modbus Slave

- The Modbus protocol can be used to read the measured/computed data on your PC by reading the input registers of the recorder. The communication input data can be written or read by writing/reading the hold register of the recorder.
- For details on the Modbus function codes that the recorder supports, see section 3.4.
- This function can be used only when communicating via the serial interface (option).
- For a description on the settings required in using this function, see section 3.5.
Chapter 2 Using the Ethernet Interface (/C7 Option)

2.1 Ethernet Interface Specifications

Basic Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical and mechanical specifications</td>
<td>Conforms to IEEE 802.3 (Ethernet frames are of DIX specification)</td>
</tr>
<tr>
<td>Transmission medium type</td>
<td>10BASE-T</td>
</tr>
<tr>
<td>Protocol</td>
<td>TCP, IP, UDP, ICMP, and ARP</td>
</tr>
</tbody>
</table>

The Maximum Number of Simultaneous Connections and the Number of Simultaneous Use

The following table shows the maximum number of simultaneous connections, the number of simultaneous users, and the port numbers of the recorder.

<table>
<thead>
<tr>
<th>Function</th>
<th>Maximum Number of Connections</th>
<th>Number of Simultaneous Users</th>
<th>Port Number†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting/Measurement server</td>
<td>3</td>
<td>1</td>
<td>2†† 34260/tcp</td>
</tr>
<tr>
<td>Maintenance/Test server</td>
<td>1</td>
<td>1</td>
<td>1†† 34261/tcp</td>
</tr>
<tr>
<td>Instrument Information server</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

† The port numbers are fixed.

†† For details on administrator and user privileges, see “Login Function” in section 1.1.
2.2 Connecting the Ethernet Interface

When Connecting Only the Recorder and a PC
Connect the recorder 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 a recorder and a PC are connected to the network. When connecting the recorder 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

Set the host name and IP address of the recorder. You do not have to set the DNS (domain name system).

Setup Items

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Host</th>
<th>Host name</th>
<th>Domain</th>
<th>Domain name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local IP</td>
<td>A IP address</td>
<td>M Subnet mask</td>
<td>G Default gateway</td>
<td></td>
</tr>
<tr>
<td>DNS</td>
<td>DNS On/Off</td>
<td>P Server (primary)</td>
<td>S Server (secondary)</td>
<td></td>
</tr>
<tr>
<td>End</td>
<td>Suffix P Domain suffix (primary)</td>
<td>Suffix S Domain suffix (secondary)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**

For a description of the basic setup operations, see “Basic Key Operations” on page vi.

**Entering Basic Setting Mode**

Hold down the **MENU** key for 3 seconds to display the Setting mode screen.

Next, hold down both the **DISP** key and the **FUNC** key for 3 seconds to display the Basic Setting mode screen.

**Note**

To cancel an operation, press the **ESC** key.

**Host Name and Domain Name**

1. Press the **key** to select **Ethernet** and then press the **key**.

2. Press the **key** to select **Host** and then press the **key**.

3. Set the host name of the recorder and then press the **key**.

   - Use the **key** to select the digit for entering a character.
   - Use the **key** to select the character type.
   - Use the **key** to select the character you wish to enter.

4. Set the domain name and press the **key** in the same fashion as in step 3.

   The setting complete screen appears.

5. Press the **ESC** key to return to the higher level menu. To save the settings and exit from Basic Setting mode, proceed to “Saving the Settings.”

* When the **key**, **key**, or **key** is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.
2.3 Configuring the Ethernet Interface

IP Address, Subnet Mask, and Default Gateway

1. Press the \( \triangleleft \) key to select Ethernet and then press the \( \text{SEL} \) key.

2. Press the \( \triangleleft \) key to select Local IP and then press the \( \text{SEL} \) key.

3. Set the IP address of the recorder and then press the \( \text{SEL} \) key.
   Key operations
   - Use the \( \leftarrow \rightarrow \) key to select the digit for entering a value.
   - Use the \( \uparrow \downarrow \) key to select the value you wish to enter.

4. Set the IP address of the subnet mask and then press the \( \text{SEL} \) key in the same fashion as in step 3.

5. Set the IP address of the default gateway and then press the \( \text{SEL} \) key in the same fashion as in step 3.
   The local IP setting complete screen appears.

6. Press the ESC key to return to the higher level menu. To save the settings and exit from Basic Setting mode, proceed to “Saving the Settings.”

DNS (Domain Name System)

1. Press the \( \triangleleft \) key to select Ethernet and then press the \( \text{SEL} \) key.

2. Press the \( \triangleleft \) key to select DNS and then press the \( \text{SEL} \) key.

3. Press the \( \triangleleft \) key to select On and then press the \( \text{SEL} \) key.

4. Set the IP address of the primary DNS server and then press the \( \text{SEL} \) key.
   Key operations
   - Use the \( \leftarrow \rightarrow \) key to select the digit for entering a value.
   - Use the \( \uparrow \downarrow \) key to select the value you wish to enter.

5. Set the IP address of the secondary DNS server and then press the \( \text{SEL} \) key in the same fashion as in step 4.

* When the \( \leftarrow \rightarrow \) key, \( \uparrow \downarrow \) key, or CHARACTER key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.
6. Set the primary domain suffix and then press the $<$-$>$ key.
   Key operations
   • Use the $<$-$>$ key to select the digit for entering a character.
   • Use the CHARACTER key to select the character type.
   • Use the $\n$ key to select the character you wish to enter.

7. Set the secondary domain suffix and then press the $<$-$>$ key in the same fashion as in step 6.
The DNS setting complete screen appears.

8. Press the ESC key to return to the higher level menu. To save the settings and exit from Basic Setting mode, proceed to “Saving the Settings.”

### Saving the Settings

1. Press the ESC key to return to the Basic= screen.
2. Press the $\n$ key to select End and then press the $<$-$>$ key.
3. Press the $\n$ key to select Store and then press the $<$-$>$ key.
The settings are activated, and the Operation mode screen appears.

**Explanation**

For details on the settings, consult your system or network administrator.

- **Host Name**
  Set the recorder’s host name and the domain name of the network to which the recorder belongs. Be sure to set these items when using the DNS.

- **Host**
  Set the recorder’s host name using up to 64 alphanumeric characters.

- **Domain**
  Set the network domain name to which the recorder belongs using up to 64 alphanumeric characters.

- **IP Address, Subnet Mask, and Default Gateway**
  - **IP address**
    - Set the IP address to assign to the recorder. The default value 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.
  - **M (Subnet Mask)**
    - Specify the mask that is used to determine the network address from the IP address. The default value is 0.0.0.0.
    - Set this value according to the system or the network to which the recorder belongs. In some cases, this setting may not be necessary.

* When the $<$-$>$ key, $\n$ key, or CHARACTER key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.
2.3 Configuring the Ethernet Interface

- **G (Default Gateway)**
  - Set the IP address of the gateway (router, etc.) used to communicate with other networks. The default value is 0.0.0.0.
  - Set this value according to the system or the network to which the recorder belongs. In some cases, this setting may not be necessary.

- **Setting the 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.
  - **On/Off**
    Select On when using the DNS.
  - **P (Primary DNS Server)**
    Set the IP address of the primary DNS server. The default value is 0.0.0.0.
  - **S (Secondary DNS Server)**
    Set the IP address of the secondary DNS server. The default value is 0.0.0.0. If the primary DNS server is down, the secondary server is used to search the host name and IP address correlation.
  - **Suffix_P (Primary Domain Suffix), Suffix_S (Secondary Domain Suffix)**
    When the recorder searches another server using the DNS server, the domain name of the recorder is appended to the host name as a possible domain name if it is omitted. If the IP address corresponding to the server name is not found on the DNS server, then it may be that the system is configured to use another domain name for searching. This alternate domain name is specified as the domain suffix.
    - Set the domain suffix using up to 64 alphanumeric characters.
    - Up to two domain suffixes can be specified (primary and secondary).

- **Saving the Settings**
  To activate the settings made in the Basic Setting mode, the settings must be saved.
2.4 Checking the Connection Status

The connection status of the Ethernet interface can be confirmed with the indicator that is located to the left of the Ethernet port on the recorder.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Connection Status of the Ethernet Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON (Green)</td>
<td>The Ethernet interface is electrically connected.</td>
</tr>
<tr>
<td>Blinking (Green)</td>
<td>Transmitting data.</td>
</tr>
<tr>
<td>OFF</td>
<td>The Ethernet interface is not electrically connected.</td>
</tr>
</tbody>
</table>

![Diagram of Ethernet port and indicator]
2.5 Registering Users

Users that can access the recorder via the Ethernet network must be registered. This function is called login function.

**Setup Items**

<table>
<thead>
<tr>
<th>Setup Items</th>
<th>Login</th>
<th>Login</th>
<th>Use/Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LoginSet</td>
<td>Level</td>
<td>Register</td>
<td>User</td>
</tr>
<tr>
<td>Admin/User On/Off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use/Not</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**

For a description of the basic operations, see “Basic Key Operations” on page vi.

**Entering Basic Setting Mode**

Hold down the **MENU** key for 3 seconds to display the Setting mode screen. Next, hold down both the **DISP** key and the **FUNC** key for 3 seconds to display the Basic Setting mode screen.

**Note**

To cancel an operation, press the **ESC** key.

**Enabling/Disabling the Login Function**

1. Press the **▲▼** key to select Ethernet and then press the **◄►** key.

   
   2. Press the **▲▼** key to select Login and then press the **◄►** key.

   
   3. Press the **▲▼** key to select Use and then press the **◄►** key. The setting complete screen appears.

   
   4. Press the **ESC** key to return to the Ethernet menu.

**Registering Users**

5. Press the **▲▼** key to select LoginSet and then press the **◄►** key.

   
   6. Press the **▲▼** key to select Admin (administrator) or User1 to User6, and then press the **◄►** key.

   
   7. Press the **▲▼** key to select On and then press the **◄►** key.

**Procedure**

* When the **◄►** key, **▲▼** key, or CHARACTER key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.
8. Set the user name and then press the \(<\rightarrow\) key.
   Key operations
   - Use the \(<\rightarrow\) key to select the digit for entering a character.
   - Use the CHARACTER key to select the character type.
   - Use the \(<\uparrow\downarrow\) key to select the character you wish to enter.

   User=

9. Set the password and then press the \(<\rightarrow\) key in the same fashion as in step 8.
   The setting complete screen appears.

   Password=

   Ethernet login
   Setting complete

   To register other users, press the \(<\rightarrow\) key to return to step 6 and repeat steps 8, 8, and 9.

Saving the Settings
1. Press the ESC key to return to the Basic= screen.
2. Press the \(<\uparrow\downarrow\) key to select End and then press the \(<\rightarrow\) key.
3. Press the \(<\uparrow\downarrow\) key to select Store and then press the \(<\rightarrow\) key.
   The settings are activated, and the Operation mode screen appears.

Explanation

You can limit the users that can access the Setting/Measurement and Maintenance/Test servers on the recorder via the Ethernet interface.

- Enabling/Disabling the Login Function
  Set whether to use the login function.

- Registering Users
  - User level
    Select either of the user levels, administrator or user.
  - Administrator
    One administrator can be registered. An administrator has the authority to use all Setting/Measurement server and Maintenance/Test server commands.
  - User
    Six users can be registered. A user has limited authority to use the commands. See section 4.2.
  - Selecting Whether to Register (On/Off) the User
    If On is selected, set the user name and password.
  - Setting the User Name
    - Set the user name using up to 16 alphanumeric characters.
    - The same user name can not be registered.
    - Since the word “quit” is reserved as a command on the recorder, the user name “quit” is not allowed.
  - Setting the Password
    Set the password using up to 4 alphanumeric characters and spaces.

* When the \(<\rightarrow\) key, \(<\uparrow\downarrow\) key, or CHARACTER key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.
Note

- The relationship between the login function and the user name that is used when accessing the recorder is as follows:
  - When the login function is set to “Use”
    - The registered user name and password can be used to login to the recorder.
    - The user level is the level that was specified when the user name was registered.
  - When the login function is set to “Not”
    - The user name “admin” can be used to login to the recorder as an administrator. Password is not necessary.
    - The user name “user” can be used to access the recorder as a user. Password is not necessary.
- There are limitations on the number of simultaneous connections or simultaneous uses of the recorder from the PC (see section 2.1).
- For a description of the login process of the Setting/Measurement server and Maintenance/Test server, see appendix 3.

- Saving the Settings
  To activate the settings made in the Basic Setting mode, the settings must be saved.
2.6 Setting the Communication Timeout and Keepalive

The communication timeout function and the keepalive function can be configured.

**Setup Items**

<table>
<thead>
<tr>
<th>Setup Items</th>
<th>Timeout</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>On/Off</td>
<td>Duration</td>
</tr>
<tr>
<td>End</td>
<td>K.Alive</td>
<td>Keep alive</td>
</tr>
<tr>
<td></td>
<td>On/Off</td>
<td>Duration</td>
</tr>
</tbody>
</table>

**Procedure**

For a description of the basic operations, see “Basic Key Operations” on page vi.

**Entering Basic Setting Mode**

Hold down the **MENU** key for 3 seconds to display the Setting mode screen. Next, hold down both the **△** (DISP) key and the **▼** (FUCN) key for 3 seconds to display the Basic Setting mode screen.

**Note**

To cancel an operation, press the **ESC** key.

**Communication Timeout**

1. Press the **△** key to select **Ethernet** and then press the **▼** key.

2. Press the **△** key to select **Timeout** and then press the **▼** key.

3. Press the **△** key to select **On** and then press the **▼** key.

4. Set the timeout time and then press the **▼** key.

The setting complete screen appears.

Key operations

- Use the **△ ▽** key to select the digit for entering a value.
- Use the **△ ▽** key to select the value you wish to enter.

5. Press the **ESC** key to return to the higher level menu. To save the settings and exit from Basic Setting mode, proceed to “Saving the Settings.”

---

* When the **△ ▽** key, **△ ▽** key, or **CHARACTER** key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.
2.6 Setting the Communication Timeout and Keepalive

Keepalive

1. Press the \( \uparrow \downarrow \) key to select Ethernet and then press the \( \leftarrow \rightarrow \) key.

   \[
   \text{Basic=Ethernet}
   \]

2. Press the \( \uparrow \downarrow \) key to select K.Alive and then press the \( \leftarrow \rightarrow \) key.

   \[
   \text{Ethernet=K. Alive}
   \]

3. Press the \( \uparrow \downarrow \) key to select On and then press the \( \leftarrow \rightarrow \) key.

   The setting complete screen appears.

   \[
   \text{Keep alive=On}
   \]

   \[
   \text{Keep alive Setting complete}
   \]

4. Press the ESC key to return to the higher level menu. To save the settings and exit from Basic Setting mode, proceed to “Saving the Settings.”

Saving the Settings

1. Press the ESC key to return to the Basic= screen.

2. Press the \( \uparrow \downarrow \) key to select End and then press the \( \leftarrow \rightarrow \) key.

3. Press the \( \uparrow \downarrow \) key to select Store and then press the \( \leftarrow \rightarrow \) key.

   The settings are activated, and the Operation mode screen appears.

Explanation

The communication timeout function and the keepalive function can be configured.

- Communication Timeout
  - Selecting On or Off
    If On is selected, set the timeout time.
  - Timeout Time
    If communication timeout is enabled, the connection is dropped if no data transfer is detected over a time period specified here.
    Selectable range: 1 to 120 minutes

- Enabling (On)/Disabling (Off) Keepalive
  Select On to enable the keepalive function.

- Saving the Settings
  To activate the settings made in the Basic Setting mode, the settings must be saved.

<Related Topics>

Keepalive: Section 1.1

* When the \( \leftarrow \rightarrow \) key, \( \uparrow \downarrow \) key, or CHARACTER key is pressed while holding down the SHIFT key, the operation is reversed as when the respective key is pressed by itself.
This section describes the RS-422A/485 communication interface specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block type</td>
<td>Number of terminals: 6, terminal attachment screws: ISO M4/nominal length of 6 mm</td>
</tr>
<tr>
<td>Electrical and mechanical specifications</td>
<td>Complies with the EIA-422A(RS-422A) and EIA-485(RS-485) standards</td>
</tr>
<tr>
<td>Connection</td>
<td>Multidrop Four-wire system 1:32 Two-wire system 1:31 (Modbus slave protocol)</td>
</tr>
<tr>
<td>Transmission mode</td>
<td>Half-duplex</td>
</tr>
<tr>
<td>Synchronization</td>
<td>Start-stop synchronization</td>
</tr>
<tr>
<td>Baud rate</td>
<td>Select from 1200, 2400, 4800, 9600, 19200, and 38400 [bps]</td>
</tr>
<tr>
<td>Start bit</td>
<td>Fixed to 1 bit</td>
</tr>
<tr>
<td>Data length</td>
<td>Select 7 or 8 bits</td>
</tr>
<tr>
<td>Parity</td>
<td>Select Odd, Even, or None (no parity)</td>
</tr>
<tr>
<td>Stop bit</td>
<td>Fixed to 1 bit</td>
</tr>
<tr>
<td>Received buffer length</td>
<td>2047 bytes</td>
</tr>
<tr>
<td>Escape sequence</td>
<td>Open and close</td>
</tr>
<tr>
<td>Electrical characteristics</td>
<td>6 points consisting of FG, SG, SDB, SDA, RDB, and RDA. The SG, SDB, SDA, RDB, and RDA terminals and the internal circuitry of the recorder are functionally isolated. The FG terminal is the frame ground.</td>
</tr>
<tr>
<td>Communication distance</td>
<td>Up to 1.2 km</td>
</tr>
<tr>
<td>Terminal resistance</td>
<td>120 Ω, 1/2 W</td>
</tr>
</tbody>
</table>
3.2 Terminal Arrangement and Signal Names and the Connection Procedure of the RS-422A/485 Communication Interface

Terminal Arrangement and Signal Names

<table>
<thead>
<tr>
<th>Terminal Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG (Frame Ground)</td>
<td>Case ground of the recorder.</td>
</tr>
<tr>
<td>SG (Signal Ground)</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>SDB (Send Data B)</td>
<td>Send data B (+).</td>
</tr>
<tr>
<td>SDA (Send Data A)</td>
<td>Send data A (–).</td>
</tr>
<tr>
<td>RDB (Received Data B)</td>
<td>Receive data B (+).</td>
</tr>
<tr>
<td>RDA (Received Data A)</td>
<td>Receive data A (–).</td>
</tr>
</tbody>
</table>

Connection Procedure

- **Cable**
  Use the cable that meets the conditions below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>Shielded twisted pair cable</td>
</tr>
<tr>
<td></td>
<td>3 pairs AWG24-14 (Four-wire system),</td>
</tr>
<tr>
<td></td>
<td>2 pairs 24 AWG or more (Two-wire system)</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>100 Ω</td>
</tr>
<tr>
<td>Capacitance</td>
<td>50 pF/m</td>
</tr>
<tr>
<td>Cable length</td>
<td>Up to 1.2 km*</td>
</tr>
</tbody>
</table>

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

- **Connecting the Cable**
  As shown in the following figure, attach a crimp-on lug with isolation sleeves for 4 mm screws to the end of the cable. Keep the exposed section from the end of the shield within 5 cm.

Four-wire system

Two-wire system
3.2 Terminal Arrangement and Signal Names and the Connection Procedure of the RS-422A/485 Communication Interface

**WARNING**
To prevent the possibility of electric shock, connect the cables with the power turned OFF.

**Note**
- Connect the RD pin to the SD (TD) pin on the PC (converter) end and the SD pin to the RD pin on the PC end.
- The two-wire system can be used only when using the Modbus protocol.

**Connection Example with a Host Computer**
A connection can be made with a host computer having a RS-232, RS-422A, or RS-485 port.
- In the case of RS-232, a converter is used.
- For recommended converters, see “Serial Interface Converter” on the next page.
- The two-wire system can be used only when using the Modbus protocol. For the configuration procedure, see section 3.5

- **Four-Wire System**
Generally, a four-wire system is used to connect to a host computer. In the case of a four-wire system, the transmission and reception lines need to be crossed over.

---

**Diagram:**
- Host computer
- Terminator (external) 120 Ω 1/2W or greater
- RS-422A/485 terminal on the recorder
- Terminator (external)

Do not connect terminators to #1 through #n-1.
3.2 Terminal Arrangement and Signal Names and the Connection Procedure of the RS-422A/485 Communication Interface

(The following figure illustrates the case when the host computer’s interface is RS-232.)

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

Do not connect terminators to #1 through #n-1.
3.2 Terminal Arrangement and Signal Names and the Connection Procedure of the RS-422A/485 Communication Interface

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

![Diagram of RS-422A/485 interface connection](image)

**Note**

- The method used to eliminate noise varies depending on the situation. In the connection example, the shield of the cable is connected only to the recorder’s ground (one-sided grounding). This is effective when there is a difference in the electric potential between the computer’s ground and the recorder’s ground. This may be the case for long distance communications. If there is no difference in the electric potential between the computer’s ground and the recorder’s ground, the method of connecting the shield also to the computer’s ground may be effective (two-sided grounding). In addition, in some cases, using two-sided grounding with a capacitor connected in series on one side is 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.

---

**CAUTION**

Some converters not recommended by Yokogawa have FG and SG pins that are not isolated. In this case, do not connect anything to the converter’s FG and SG pins (unlike the figure on the previous page). Especially in the case of long distance communications, the potential difference that appears may damage the recorder or cause communication errors. 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 Instruments That Support Only the RS-422A Interface Exist in the System**
  When using the four-wire system, up to 32 recorders can be connected to a single host computer. However, this may not be true if instruments that support only the RS-422A interface exist in the system.

  **When the instrument that support only the RS-422A interface exist in the system**
  The maximum number of connection is 16. Some of YOKOGAWA’s conventional recorder only support the RS-422A driver. In this case, only up to 16 units can be connected.

**Note**

In the RS-422A 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 terminator only to the recorder on the end 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. The terminator must be attached externally to the recommended converters.
3.3 The Bit Structure of One Character and the Operation of the Receive Buffer

The Bit Structure of One Character

The serial interface on the recorder communicates using start-stop synchronization. In 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 PC is first placed in the receive buffer of the recorder. When the received buffer becomes full, all of the data that overflow are discarded.
3.4 Modbus Slave Protocol Specifications

The Modbus slave protocol specifications of the recorder are as follows:

### Serial Interface

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission medium</td>
<td>RS-422A/485</td>
</tr>
<tr>
<td>Flow control</td>
<td>None only</td>
</tr>
<tr>
<td>Baud rate</td>
<td>Select from 1200, 2400, 4800, 9600, 19200, or 38400 [bps]</td>
</tr>
<tr>
<td>Start bit</td>
<td>Fixed to 1 bit</td>
</tr>
<tr>
<td>Stop bit</td>
<td>Fixed to 1 bit</td>
</tr>
<tr>
<td>Parity check</td>
<td>Select odd, even, or none (no parity).</td>
</tr>
<tr>
<td>Transmission mode</td>
<td>RTU (Remote Terminal Unit) mode only</td>
</tr>
<tr>
<td></td>
<td>• Data length: 8 bits</td>
</tr>
<tr>
<td></td>
<td>• Data interval: 24 bits or less</td>
</tr>
<tr>
<td></td>
<td>• Error detection: Uses CRC-16</td>
</tr>
<tr>
<td></td>
<td>* Determines message termination with a time interval to 3.5 characters or more.</td>
</tr>
<tr>
<td>Maximum number of</td>
<td>Four-wire system: 32 slave devices</td>
</tr>
<tr>
<td>connected units</td>
<td>Two-wire system: 31 slave devices</td>
</tr>
</tbody>
</table>

### Slave Address

Address that can be set 1 to 32

### Supported Functions

The function codes of the Modbus slave protocol that the recorder supports are shown below. The recorder does not support broadcast commands.

<table>
<thead>
<tr>
<th>Function Code</th>
<th>Specifications</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Read the hold register (4xxxx)</td>
<td>The master device reads the communication input data written using function codes 6 and 16.</td>
</tr>
<tr>
<td>4</td>
<td>Read the input register (3xxxx)</td>
<td>The master device loads the computed, measured, alarm, and time data of the recorder.</td>
</tr>
<tr>
<td>6</td>
<td>Single write to hold register (4xxxx)</td>
<td>The master device writes to the communication input data of the recorder.</td>
</tr>
<tr>
<td>8</td>
<td>Loopback test</td>
<td>The master device performs a loopback test of the recorder. The recorder only supports message return (test code 0x00(^*))</td>
</tr>
<tr>
<td>16</td>
<td>Write to the hold register (4xxxx)</td>
<td>The master device writes to the communication input data of the recorder.</td>
</tr>
</tbody>
</table>

\(^*\) Hexadecimal "00"

### Communication Input Data

You can use the communication input data by describing it in the computing equations for the computation channels.
3.4 Modbus Slave Specifications

Registers

The registers for using the Modbus slave protocol are listed below. Binary values are stored to the register in order from the highest byte.

<table>
<thead>
<tr>
<th>Input Register</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>30001</td>
<td>Measured data of CH01</td>
</tr>
<tr>
<td>30002</td>
<td>Measured data of CH02</td>
</tr>
<tr>
<td>30003</td>
<td>Measured data of CH03</td>
</tr>
<tr>
<td>30004</td>
<td>Measured data of CH04</td>
</tr>
<tr>
<td>30005</td>
<td>Measured data of CH05</td>
</tr>
<tr>
<td>30006</td>
<td>Measured data of CH06</td>
</tr>
<tr>
<td>30007</td>
<td>Measured data of CH07</td>
</tr>
<tr>
<td>30008</td>
<td>Measured data of CH08</td>
</tr>
<tr>
<td>30009</td>
<td>Measured data of CH09</td>
</tr>
<tr>
<td>30010</td>
<td>Measured data of CH10</td>
</tr>
<tr>
<td>30011</td>
<td>Measured data of CH11</td>
</tr>
<tr>
<td>30012</td>
<td>Measured data of CH12</td>
</tr>
<tr>
<td>30013</td>
<td>Measured data of CH13</td>
</tr>
<tr>
<td>30014</td>
<td>Measured data of CH14</td>
</tr>
<tr>
<td>30015</td>
<td>Measured data of CH15</td>
</tr>
<tr>
<td>30016</td>
<td>Measured data of CH16</td>
</tr>
<tr>
<td>30017</td>
<td>Measured data of CH17</td>
</tr>
<tr>
<td>30018</td>
<td>Measured data of CH18</td>
</tr>
<tr>
<td>30019</td>
<td>Measured data of CH19</td>
</tr>
<tr>
<td>30020</td>
<td>Measured data of CH20</td>
</tr>
<tr>
<td>30021</td>
<td>Measured data of CH21</td>
</tr>
<tr>
<td>30022</td>
<td>Measured data of CH22</td>
</tr>
<tr>
<td>30023</td>
<td>Measured data of CH23</td>
</tr>
<tr>
<td>30024</td>
<td>Measured data of CH24</td>
</tr>
</tbody>
</table>

- The data is a 16-bit signed integer. The value is the same as the measured data in binary output format (see page 5-14).
- The decimal point and unit information are not included. Set them on the Modbus master.
- Valid channels vary depending on the device. An error response (code 2) occurs when an invalid channel is read.

<table>
<thead>
<tr>
<th>Input Register</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>31001</td>
<td>Alarm status of the measured data of CH01</td>
</tr>
<tr>
<td>31002</td>
<td>Alarm status of the measured data of CH02</td>
</tr>
<tr>
<td>31003</td>
<td>Alarm status of the measured data of CH03</td>
</tr>
<tr>
<td>31004</td>
<td>Alarm status of the measured data of CH04</td>
</tr>
<tr>
<td>31005</td>
<td>Alarm status of the measured data of CH05</td>
</tr>
<tr>
<td>31006</td>
<td>Alarm status of the measured data of CH06</td>
</tr>
<tr>
<td>31007</td>
<td>Alarm status of the measured data of CH07</td>
</tr>
<tr>
<td>31008</td>
<td>Alarm status of the measured data of CH08</td>
</tr>
<tr>
<td>31009</td>
<td>Alarm status of the measured data of CH09</td>
</tr>
<tr>
<td>31010</td>
<td>Alarm status of the measured data of CH10</td>
</tr>
<tr>
<td>31011</td>
<td>Alarm status of the measured data of CH11</td>
</tr>
<tr>
<td>31012</td>
<td>Alarm status of the measured data of CH12</td>
</tr>
<tr>
<td>31013</td>
<td>Alarm status of the measured data of CH13</td>
</tr>
<tr>
<td>31014</td>
<td>Alarm status of the measured data of CH14</td>
</tr>
<tr>
<td>31015</td>
<td>Alarm status of the measured data of CH15</td>
</tr>
<tr>
<td>31016</td>
<td>Alarm status of the measured data of CH16</td>
</tr>
<tr>
<td>31017</td>
<td>Alarm status of the measured data of CH17</td>
</tr>
<tr>
<td>31018</td>
<td>Alarm status of the measured data of CH18</td>
</tr>
<tr>
<td>31019</td>
<td>Alarm status of the measured data of CH19</td>
</tr>
<tr>
<td>31020</td>
<td>Alarm status of the measured data of CH20</td>
</tr>
<tr>
<td>31021</td>
<td>Alarm status of the measured data of CH21</td>
</tr>
<tr>
<td>31022</td>
<td>Alarm status of the measured data of CH22</td>
</tr>
<tr>
<td>31023</td>
<td>Alarm status of the measured data of CH23</td>
</tr>
<tr>
<td>31024</td>
<td>Alarm status of the measured data of CH24</td>
</tr>
</tbody>
</table>

- The value is the same as the alarm status in binary output format (see page 5-14). The data is entered in the “A2A1A4A3” order in the register.
- Valid channels vary depending on the device. An error response (code 2) occurs when an invalid channel is read.
### Input Register Data

<table>
<thead>
<tr>
<th>Input Register</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>32001</td>
<td>Computed data of CH0A (lower word)</td>
</tr>
<tr>
<td>32002</td>
<td>Computed data of CH0A (upper word)</td>
</tr>
<tr>
<td>32003</td>
<td>Computed data of CH0B (lower word)</td>
</tr>
<tr>
<td>32004</td>
<td>Computed data of CH0B (upper word)</td>
</tr>
<tr>
<td>32005</td>
<td>Computed data of CH0C (lower word)</td>
</tr>
<tr>
<td>32006</td>
<td>Computed data of CH0C (upper word)</td>
</tr>
<tr>
<td>32007</td>
<td>Computed data of CH0D (lower word)</td>
</tr>
<tr>
<td>32008</td>
<td>Computed data of CH0D (upper word)</td>
</tr>
<tr>
<td>32009</td>
<td>Computed data of CH0E (lower word)</td>
</tr>
<tr>
<td>32010</td>
<td>Computed data of CH0E (upper word)</td>
</tr>
<tr>
<td>32011</td>
<td>Computed data of CH0F (lower word)</td>
</tr>
<tr>
<td>32012</td>
<td>Computed data of CH0F (upper word)</td>
</tr>
<tr>
<td>32013</td>
<td>Computed data of CH0G (lower word)</td>
</tr>
<tr>
<td>32014</td>
<td>Computed data of CH0G (upper word)</td>
</tr>
<tr>
<td>32015</td>
<td>Computed data of CH0J (lower word)</td>
</tr>
<tr>
<td>32016</td>
<td>Computed data of CH0J (upper word)</td>
</tr>
<tr>
<td>32017</td>
<td>Computed data of CH0K (lower word)</td>
</tr>
<tr>
<td>32018</td>
<td>Computed data of CH0K (upper word)</td>
</tr>
<tr>
<td>32019</td>
<td>Computed data of CH0M (lower word)</td>
</tr>
<tr>
<td>32020</td>
<td>Computed data of CH0M (upper word)</td>
</tr>
<tr>
<td>32021</td>
<td>Computed data of CH0N (lower word)</td>
</tr>
<tr>
<td>32022</td>
<td>Computed data of CH0N (upper word)</td>
</tr>
<tr>
<td>32023</td>
<td>Computed data of CH0P (lower word)</td>
</tr>
<tr>
<td>32024</td>
<td>Computed data of CH0P (upper word)</td>
</tr>
<tr>
<td>32025</td>
<td>Computed data of CH1A (lower word)</td>
</tr>
<tr>
<td>32026</td>
<td>Computed data of CH1A (upper word)</td>
</tr>
<tr>
<td>32027</td>
<td>Computed data of CH1B (lower word)</td>
</tr>
<tr>
<td>32028</td>
<td>Computed data of CH1B (upper word)</td>
</tr>
<tr>
<td>32029</td>
<td>Computed data of CH1C (lower word)</td>
</tr>
<tr>
<td>32030</td>
<td>Computed data of CH1C (upper word)</td>
</tr>
<tr>
<td>32031</td>
<td>Computed data of CH1D (lower word)</td>
</tr>
<tr>
<td>32032</td>
<td>Computed data of CH1D (upper word)</td>
</tr>
<tr>
<td>32033</td>
<td>Computed data of CH1E (lower word)</td>
</tr>
<tr>
<td>32034</td>
<td>Computed data of CH1E (upper word)</td>
</tr>
<tr>
<td>32035</td>
<td>Computed data of CH1F (lower word)</td>
</tr>
<tr>
<td>32036</td>
<td>Computed data of CH1F (upper word)</td>
</tr>
<tr>
<td>32037</td>
<td>Computed data of CH1G (lower word)</td>
</tr>
<tr>
<td>32038</td>
<td>Computed data of CH1G (upper word)</td>
</tr>
<tr>
<td>32039</td>
<td>Computed data of CH1J (lower word)</td>
</tr>
<tr>
<td>32040</td>
<td>Computed data of CH1J (upper word)</td>
</tr>
<tr>
<td>32041</td>
<td>Computed data of CH1K (lower word)</td>
</tr>
<tr>
<td>32042</td>
<td>Computed data of CH1K (upper word)</td>
</tr>
<tr>
<td>32043</td>
<td>Computed data of CH1M (lower word)</td>
</tr>
<tr>
<td>32044</td>
<td>Computed data of CH1M (upper word)</td>
</tr>
<tr>
<td>32045</td>
<td>Computed data of CH1N (lower word)</td>
</tr>
<tr>
<td>32046</td>
<td>Computed data of CH1N (upper word)</td>
</tr>
<tr>
<td>32047</td>
<td>Computed data of CH1P (lower word)</td>
</tr>
<tr>
<td>32048</td>
<td>Computed data of CH1P (upper word)</td>
</tr>
</tbody>
</table>

- Registers corresponding to models with the \( \text{M1} \) computation function option.
- The data is a 32-bit signed integer. Two registers are assigned for each data point.
- The value is the same as the computed data in binary output format (see page 5-14).
- The decimal point and unit information are not included. Set them on the Modbus master.
- Valid channels vary depending on the device. An error response (code 2) occurs when an invalid channel is read.
### Input Register Data

<table>
<thead>
<tr>
<th>Register</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33001</td>
<td>Alarm status of the computed data of CH0A</td>
</tr>
<tr>
<td>33002</td>
<td>Alarm status of the computed data of CH0B</td>
</tr>
<tr>
<td>33003</td>
<td>Alarm status of the computed data of CH0C</td>
</tr>
<tr>
<td>33004</td>
<td>Alarm status of the computed data of CH0D</td>
</tr>
<tr>
<td>33005</td>
<td>Alarm status of the computed data of CH0E</td>
</tr>
<tr>
<td>33006</td>
<td>Alarm status of the computed data of CH0F</td>
</tr>
<tr>
<td>33007</td>
<td>Alarm status of the computed data of CH0G</td>
</tr>
<tr>
<td>33008</td>
<td>Alarm status of the computed data of CH0J</td>
</tr>
<tr>
<td>33009</td>
<td>Alarm status of the computed data of CH0K</td>
</tr>
<tr>
<td>33010</td>
<td>Alarm status of the computed data of CH0M</td>
</tr>
<tr>
<td>33011</td>
<td>Alarm status of the computed data of CH0N</td>
</tr>
<tr>
<td>33012</td>
<td>Alarm status of the computed data of CH0P</td>
</tr>
<tr>
<td>33013</td>
<td>Alarm status of the computed data of CH1A</td>
</tr>
<tr>
<td>33014</td>
<td>Alarm status of the computed data of CH1B</td>
</tr>
<tr>
<td>33015</td>
<td>Alarm status of the computed data of CH1C</td>
</tr>
<tr>
<td>33016</td>
<td>Alarm status of the computed data of CH1D</td>
</tr>
<tr>
<td>33017</td>
<td>Alarm status of the computed data of CH1E</td>
</tr>
<tr>
<td>33018</td>
<td>Alarm status of the computed data of CH1F</td>
</tr>
<tr>
<td>33019</td>
<td>Alarm status of the computed data of CH1G</td>
</tr>
<tr>
<td>33020</td>
<td>Alarm status of the computed data of CH1J</td>
</tr>
<tr>
<td>33021</td>
<td>Alarm status of the computed data of CH1K</td>
</tr>
<tr>
<td>33022</td>
<td>Alarm status of the computed data of CH1M</td>
</tr>
<tr>
<td>33023</td>
<td>Alarm status of the computed data of CH1N</td>
</tr>
<tr>
<td>33024</td>
<td>Alarm status of the computed data of CH1P</td>
</tr>
</tbody>
</table>

- Registers corresponding to models with the /M1 computation function option.
- The values are the same as those of the alarm status of the measured data.
- Valid channels vary depending on the device. An error response (code 2) occurs when an invalid channel is read.

### Input Register Data

<table>
<thead>
<tr>
<th>Register</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>36001</td>
<td>List of alarms of the measured data of CH01 to CH04</td>
</tr>
<tr>
<td>36002</td>
<td>List of alarms of the measured data of CH05 to CH08</td>
</tr>
<tr>
<td>36003</td>
<td>List of alarms of the measured data of CH09 to CH12</td>
</tr>
<tr>
<td>36004</td>
<td>List of alarms of the measured data of CH13 to CH16</td>
</tr>
<tr>
<td>36005</td>
<td>List of alarms of the measured data of CH17 to CH20</td>
</tr>
<tr>
<td>36006</td>
<td>List of alarms of the measured data of CH21 to CH24</td>
</tr>
<tr>
<td>36007 to 36020</td>
<td>Always 0</td>
</tr>
<tr>
<td>36021</td>
<td>List of alarms of the computed data of CH0A to CH0D</td>
</tr>
<tr>
<td>36022</td>
<td>List of alarms of the computed data of CH0E to CH0J</td>
</tr>
<tr>
<td>36023</td>
<td>List of alarms of the computed data of CH0K to CH0P</td>
</tr>
<tr>
<td>36024</td>
<td>List of alarms of the computed data of CH1A to CH1D</td>
</tr>
<tr>
<td>36025</td>
<td>List of alarms of the computed data of CH1E to CH1J</td>
</tr>
<tr>
<td>36026</td>
<td>List of alarms of the computed data of CH1K to CH1P</td>
</tr>
</tbody>
</table>

#### Example of Register 36001

1 register (1 word)

The bit is set to 1 when an alarm occurs.

- Registers 36001 to 36026 can be read with a single command.
- Bits corresponding to invalid channels are fixed to "0."

### Input Register Data

<table>
<thead>
<tr>
<th>Register</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>39001</td>
<td>Year (4 digits)</td>
</tr>
<tr>
<td>39002</td>
<td>Month</td>
</tr>
<tr>
<td>39003</td>
<td>Day</td>
</tr>
<tr>
<td>39004</td>
<td>Hour</td>
</tr>
<tr>
<td>39005</td>
<td>Minute</td>
</tr>
<tr>
<td>39006</td>
<td>Second</td>
</tr>
<tr>
<td>39007</td>
<td>Millisecond</td>
</tr>
<tr>
<td>39008</td>
<td>Summer/Winter time</td>
</tr>
</tbody>
</table>

- The data is a 16-bit signed integer.
### 3.4 Modbus Slave Protocol Specifications

<table>
<thead>
<tr>
<th>Hold register</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>40001</td>
<td>Communication input data of C01</td>
</tr>
<tr>
<td>40002</td>
<td>Communication input data of C02</td>
</tr>
<tr>
<td>40003</td>
<td>Communication input data of C03</td>
</tr>
<tr>
<td>40004</td>
<td>Communication input data of C04</td>
</tr>
<tr>
<td>40005</td>
<td>Communication input data of C05</td>
</tr>
<tr>
<td>40006</td>
<td>Communication input data of C06</td>
</tr>
<tr>
<td>40007</td>
<td>Communication input data of C07</td>
</tr>
<tr>
<td>40008</td>
<td>Communication input data of C08</td>
</tr>
<tr>
<td>40009</td>
<td>Communication input data of C09</td>
</tr>
<tr>
<td>40010</td>
<td>Communication input data of C10</td>
</tr>
<tr>
<td>40011</td>
<td>Communication input data of C11</td>
</tr>
<tr>
<td>40012</td>
<td>Communication input data of C12</td>
</tr>
<tr>
<td>40013</td>
<td>Communication input data of C13</td>
</tr>
<tr>
<td>40014</td>
<td>Communication input data of C14</td>
</tr>
<tr>
<td>40015</td>
<td>Communication input data of C15</td>
</tr>
<tr>
<td>40016</td>
<td>Communication input data of C16</td>
</tr>
<tr>
<td>40017</td>
<td>Communication input data of C17</td>
</tr>
<tr>
<td>40018</td>
<td>Communication input data of C18</td>
</tr>
<tr>
<td>40019</td>
<td>Communication input data of C19</td>
</tr>
<tr>
<td>40020</td>
<td>Communication input data of C20</td>
</tr>
<tr>
<td>40021</td>
<td>Communication input data of C21</td>
</tr>
<tr>
<td>40022</td>
<td>Communication input data of C22</td>
</tr>
<tr>
<td>40023</td>
<td>Communication input data of C23</td>
</tr>
<tr>
<td>40024</td>
<td>Communication input data of C24</td>
</tr>
</tbody>
</table>

- Registers corresponding to models with the /M1 computation function option.
- Pen model: C01 to C08, dot model: C01 to C12 (μR10000), C01 to C24 (μR20000)
- The data is a 16-bit signed integer.
- When writing to the register: A 16-bit signed integer only can be input.
- When reading from the register: The communication input data, a floating point, is converted to a 16-bit signed integer and output.

<table>
<thead>
<tr>
<th>Hold register</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>40301</td>
<td>Communication input data of C01 (lower word)</td>
</tr>
<tr>
<td>40302</td>
<td>Communication input data of C01 (upper word)</td>
</tr>
<tr>
<td>40303</td>
<td>Communication input data of C02 (lower word)</td>
</tr>
<tr>
<td>40304</td>
<td>Communication input data of C02 (upper word)</td>
</tr>
<tr>
<td>40305</td>
<td>Communication input data of C03 (lower word)</td>
</tr>
<tr>
<td>40306</td>
<td>Communication input data of C03 (upper word)</td>
</tr>
<tr>
<td>40307</td>
<td>Communication input data of C04 (lower word)</td>
</tr>
<tr>
<td>40308</td>
<td>Communication input data of C04 (upper word)</td>
</tr>
<tr>
<td>40309</td>
<td>Communication input data of C05 (lower word)</td>
</tr>
<tr>
<td>40310</td>
<td>Communication input data of C05 (upper word)</td>
</tr>
<tr>
<td>40311</td>
<td>Communication input data of C06 (lower word)</td>
</tr>
<tr>
<td>40312</td>
<td>Communication input data of C06 (upper word)</td>
</tr>
<tr>
<td>40313</td>
<td>Communication input data of C07 (lower word)</td>
</tr>
<tr>
<td>40314</td>
<td>Communication input data of C07 (upper word)</td>
</tr>
<tr>
<td>40315</td>
<td>Communication input data of C08 (lower word)</td>
</tr>
<tr>
<td>40316</td>
<td>Communication input data of C08 (upper word)</td>
</tr>
<tr>
<td>40317</td>
<td>Communication input data of C09 (lower word)</td>
</tr>
<tr>
<td>40318</td>
<td>Communication input data of C09 (upper word)</td>
</tr>
<tr>
<td>40319</td>
<td>Communication input data of C10 (lower word)</td>
</tr>
<tr>
<td>40320</td>
<td>Communication input data of C10 (upper word)</td>
</tr>
<tr>
<td>40321</td>
<td>Communication input data of C11 (lower word)</td>
</tr>
<tr>
<td>40322</td>
<td>Communication input data of C11 (upper word)</td>
</tr>
<tr>
<td>40323</td>
<td>Communication input data of C12 (lower word)</td>
</tr>
<tr>
<td>40324</td>
<td>Communication input data of C12 (upper word)</td>
</tr>
</tbody>
</table>
Using the RS-422A/485 Communication Interface (/C3 Option)

40325 Communication input data of C13 (lower word)
40326 Communication input data of C13 (upper word)
40327 Communication input data of C14 (lower word)
40328 Communication input data of C14 (upper word)
40329 Communication input data of C15 (lower word)
40330 Communication input data of C15 (upper word)
40331 Communication input data of C16 (lower word)
40332 Communication input data of C16 (upper word)
40333 Communication input data of C17 (lower word)
40334 Communication input data of C17 (upper word)
40335 Communication input data of C18 (lower word)
40336 Communication input data of C18 (upper word)
40337 Communication input data of C19 (lower word)
40338 Communication input data of C19 (upper word)
40339 Communication input data of C20 (lower word)
40340 Communication input data of C20 (upper word)
40341 Communication input data of C21 (lower word)
40342 Communication input data of C21 (upper word)
40343 Communication input data of C22 (lower word)
40344 Communication input data of C22 (upper word)
40345 Communication input data of C23 (lower word)
40346 Communication input data of C23 (upper word)
40347 Communication input data of C24 (lower word)
40348 Communication input data of C24 (upper word)

• Registers corresponding to models with the /M1 computation function option.
• Pen model: C01 to C08; Dot model: C01 to C12 (μR10000), C01 to C24 (μR20000)
• The data is a floating point.
• When writing to the register: The values that can be input are −9.9999E29 to −1E−30, 0, and 1E−30 to 9.9999E29.

If a value exceeding this range is input, a computation error will occur when using the value on computation channels.

Modbus Error Response

The recorder returns the following error codes to the master device. For the error messages related to communications that the recorder displays, see appendix 4.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bad function code</td>
<td>Unsupported function request.</td>
</tr>
<tr>
<td>2</td>
<td>Bad register number</td>
<td>Attempted to read/write to a register that has no corresponding channel.</td>
</tr>
<tr>
<td>3</td>
<td>Bad number of registers</td>
<td>The specified number of registers is less than or equal to 0 or greater than or equal to 126 (when reading)/124 (when writing).</td>
</tr>
</tbody>
</table>

However, no response is returned for the following cases.
• CRC error
• Errors other than those in the table above.
3.5 Setting the Serial Interface

The serial interface must be configured.

Setup Items

<table>
<thead>
<tr>
<th>RS422/485</th>
<th>Address</th>
<th>Baud rate</th>
<th>Data length</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td></td>
<td>Protocol</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**

For a description of the basic operations, see “Basic Key Operations” on page vi.

**Entering Basic Setting Mode**

Hold down the **MENU** key for 3 seconds to display the Setting mode screen.

Next, hold down both the **DISP** key and the **FUNC** key for 3 seconds to display the Basic Setting mode screen.

**Note**

To cancel an operation, press the **ESC** key.

---

1. Press the △ key to select RS422/485 and then press the ▼ key.
   
   Basic=RS422/485

2. Press the △ key to select the recorder’s address and then press the ▼ key.
   
   Address=1

3. Press the △ key to select the Baud rate value and then press the ▼ key.
   
   Baud rate=38400

4. Press the △ key to select the Data length value and then press the ▼ key.
   
   Data length=8

5. Press the △ key to select the Parity value and then press the ▼ key.
   
   Parity=Even

6. Press the △ key to select the NORMAL or MODBUS value and then press the ▼ key.

   The setting complete screen appears.
   
   Protocol=NORMAL

   RS422/485
   Setting complete

**Saving the Settings**

1. Press the **ESC** key to return to the Basic= screen.
2. Press the △ key to select **End** and then press the ▼ key.
3. Press the △ key to select **Store** and then press the ▼ key.

   The settings are activated, and the Operation mode screen appears.

---

* When the ▼ key or △ key is pressed while holding down the **SHIFT** key, the operation is reversed as when the respective key is pressed by itself.
3.5 Setting the Serial Interface

**Explanation**

- **Address**
  Select the address from the following range.
  01 to 32

- **Baud rate**
  Select the baud rate from the following:
  1200, 2400, 4800, 9600, 19200, or 38400

- **Data length**
  Select the data length from below. To output data in BINARY format, be sure to set the data length to 8 bits.
  7 or 8

- **Parity (Parity check method)**
  Select the parity check from the following:
  Odd, Even, or None

- **Protocol**
  Select the protocol when using the Modbus slave protocol.
  NORMAL: Standard protocol
  MODBUS: Modbus slave protocol

- **Saving the Settings**
  To activate the settings made in the Basic Setting mode, the settings must be saved.
Chapter 4 Commands

4.1 Command Syntax

The syntax of the setting/basic setting/output commands (see sections 4.4 to 4.7) of the instrument is given below. ASCII codes (see appendix 1) are used for the character codes. For the Maintenance/Test command syntax, see section 4.9. For the Instrument Information server command syntax, see section 4.10.

Command example

```
SR 02,SKIP;SR 03,VOLT,2V,-1500,1800
```

- **Command Name**
  Defined using two alphabet characters.

- **Parameter**
  - Command parameters.
  - Set using alphabet characters or numerical values.
  - Parameters are separated by delimiters (commas).
  - 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, tag, and message string), 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 parameters below 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 (Example: 01, 0A)
  - Relay number: 3 characters (Example: I01)
  - Communication input data: 3 characters (Example: C02)
  - Constants used in the computation function (/M1 option): 3 characters (Example: K03)
  - Remote control (/R1 option) input terminal status: 3 characters (Example: D04)
4.1 Command Syntax

- **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 4.4 to 4.7.

  **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.

- **SubDelimiter**
  - 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.
    - YE 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**

- The total data length from the first character to the terminator must be less than 2047 bytes. In addition, the character string length of 1 command must be less than 512 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 recorder returns a response (affirmative/negative response) to a command that is separated 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 5.1.

* The exceptions are the RS-422A/485 dedicated commands (see section 4.8).

**Note**

When using the RS-422A/485 interface, allow at least 1 ms before sending the next command after receiving a response. Otherwise, the command may not be processed correctly.
### 4.2 A List of Commands

#### Execution Modes and User Levels

**Execution Modes**

The recorder has two execution modes. Each command is specified to be used in a particular execution mode. 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 appropriate mode, and then execute the command. Query commands can be executed in either mode.

- **Basic Setting mode**
  - Measurement/computation is stopped and settings are changed in this mode.

- **Run mode**
  - Run mode collectively refers to Operation mode and Setting mode of the recorder.

**User Levels**

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 1.1.

#### Setting Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td>Sets the input range.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-10</td>
</tr>
<tr>
<td>VB</td>
<td>Sets the bias.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-11</td>
</tr>
<tr>
<td>VL</td>
<td>Sets the calibration correction (/CC1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-11</td>
</tr>
<tr>
<td>SA</td>
<td>Sets the alarm.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-11</td>
</tr>
<tr>
<td>SN</td>
<td>Sets the unit.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-12</td>
</tr>
<tr>
<td>SC</td>
<td>Sets the chart speed.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-13</td>
</tr>
<tr>
<td>SD</td>
<td>Sets the date and time.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-13</td>
</tr>
<tr>
<td>VT</td>
<td>Sets the dot printing interval (dot model).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-13</td>
</tr>
<tr>
<td>S2</td>
<td>Sets zone recording.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-13</td>
</tr>
<tr>
<td>SP</td>
<td>Sets the partial expanded recording.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-13</td>
</tr>
<tr>
<td>VR</td>
<td>Turns ON/OFF the recording on each channel.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>ST</td>
<td>Sets the tag.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>SG</td>
<td>Sets the message.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>SE</td>
<td>Sets the secondary chart speed (used by the remote control function (/R1 option)).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>SV</td>
<td>Sets the moving average (dot model).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>SF</td>
<td>Sets the input filter (pen model).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>BD</td>
<td>Sets the alarm delay time.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>VF</td>
<td>Sets the brightness of the display (VFD) and internal illumination.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-14</td>
</tr>
<tr>
<td>TD</td>
<td>Sets the DST.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-15</td>
</tr>
<tr>
<td>SS</td>
<td>Sets the DST. (Can be used on the μR10000 with system version 1.02 or earlier)</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-15</td>
</tr>
<tr>
<td>SO</td>
<td>Sets the computing equation (/M1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-15</td>
</tr>
<tr>
<td>SK</td>
<td>Sets the computation constant (/M1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-15</td>
</tr>
<tr>
<td>SJ</td>
<td>Sets the timer used in TLOG computation (/M1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-15</td>
</tr>
<tr>
<td>VD</td>
<td>Sets the data display screen.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-16</td>
</tr>
<tr>
<td>CM</td>
<td>Sets the communication input data (/M1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-18</td>
</tr>
<tr>
<td>FR</td>
<td>Sets the acquiring interval to the FIFO buffer.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-18</td>
</tr>
<tr>
<td>VII</td>
<td>Sets the batch number and lot number (/BT1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-18</td>
</tr>
<tr>
<td>VC</td>
<td>Sets the batch comment (/BT1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-18</td>
</tr>
<tr>
<td>VP</td>
<td>Turns Start printout/End printout ON/OFF (/BT1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-19</td>
</tr>
<tr>
<td>VA</td>
<td>Sets the Start printout/End printout action (/BT1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-19</td>
</tr>
<tr>
<td>VM</td>
<td>Sets the message format (/BT1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-19</td>
</tr>
</tbody>
</table>

| Yes: Command usable |
| No: Command not usable |

---

IM 04P01B01-17E 4-3
Basic Setting Commands

Note

- 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.
- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the YE or XE command.
- If the settings are saved with the XE command, communication is not dropped. If saved with the YE command, the settings that are changed using the YS/YB/YA/YN/YD/YQ/YK command are activated after power-cycling the recorder.
- When the YE command is executed, communication is dropped. The response to the YE command is not returned.
- The following settings cannot be changed.
  Key lock, enabling/disabling of the customized menu function, user registration for Ethernet communication.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>XA</td>
<td>Sets alarm related settings.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-20</td>
</tr>
<tr>
<td>XI</td>
<td>Sets the A/D integral time.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-21</td>
</tr>
<tr>
<td>XB</td>
<td>Sets the burnout detection.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-21</td>
</tr>
<tr>
<td>XJ</td>
<td>Sets the RJC.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-21</td>
</tr>
<tr>
<td>UC</td>
<td>Changes the dot color (dot model).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-21</td>
</tr>
<tr>
<td>UD</td>
<td>Sets the pen offset compensation (pen model).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-22</td>
</tr>
<tr>
<td>UP</td>
<td>Sets the items to be printed.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-22</td>
</tr>
<tr>
<td>UR</td>
<td>Sets the periodic printout interval.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-22</td>
</tr>
<tr>
<td>UM</td>
<td>Sets the types of report data that are output to the periodic printout.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-22</td>
</tr>
<tr>
<td>UB</td>
<td>Sets the display mode of the bar graph.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UI</td>
<td>Sets whether to use moving average (dot model).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UJ</td>
<td>Sets whether to use the input filter (pen model).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UK</td>
<td>Sets whether to use of partial expanded recording.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UL</td>
<td>Selects the display/printout language.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>XN</td>
<td>Selects the date format.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>XT</td>
<td>Selects the temperature unit.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UF</td>
<td>Sets whether to use the extended functions.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-23</td>
</tr>
<tr>
<td>UT</td>
<td>Selects the time printout format.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-24</td>
</tr>
<tr>
<td>XR</td>
<td>Sets the remote control input (/R1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-24</td>
</tr>
<tr>
<td>YS</td>
<td>Sets the RS-422A/485 interface (/C3 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-24</td>
</tr>
<tr>
<td>XQ</td>
<td>Sets the TLOG timer (/M1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-24</td>
</tr>
<tr>
<td>UN</td>
<td>Changes the assignment of channels to the recording pen (pen model, /M1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-24</td>
</tr>
<tr>
<td>US</td>
<td>Sets the computation error procedure (/M1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-25</td>
</tr>
<tr>
<td>YB</td>
<td>Sets the host name and domain name (/C7 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-25</td>
</tr>
<tr>
<td>YA</td>
<td>Sets the IP address (/C7 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-25</td>
</tr>
<tr>
<td>YN</td>
<td>Sets the DNS (/C7 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-25</td>
</tr>
<tr>
<td>YD</td>
<td>Sets whether to use the login function via communication (/C7 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-26</td>
</tr>
<tr>
<td>YQ</td>
<td>Sets the communication timeout (/C7 option)</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-26</td>
</tr>
<tr>
<td>YK</td>
<td>Sets keepalive (/C7 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-26</td>
</tr>
<tr>
<td>UQ</td>
<td>Sets the calibration correction mode and the number of set points (/CC1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-26</td>
</tr>
<tr>
<td>UA</td>
<td>Sets the record position.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-26</td>
</tr>
<tr>
<td>UG</td>
<td>Sets the Setting mode menu selection.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-27</td>
</tr>
<tr>
<td>UI</td>
<td>Sets the FUNC key menu selection.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-27</td>
</tr>
<tr>
<td>UE</td>
<td>Selects enable/disable for Start printout/End printout and message format (/BT1 option).</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-27</td>
</tr>
<tr>
<td>YE</td>
<td>Exits from Basic Setting mode.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-27</td>
</tr>
<tr>
<td>XE</td>
<td>Exits from Basic Setting mode.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-27</td>
</tr>
</tbody>
</table>

Yes: Command usable
No: Command not usable
### Control Commands

<table>
<thead>
<tr>
<th>Key</th>
<th>Command</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>DS</td>
<td>Switches the execution mode.</td>
<td>All modes</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>RCD</td>
<td>FS</td>
<td>Starts/ Stops recording.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>DISP</td>
<td>UD</td>
<td>Switches the screen/switches the channel.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>AK</td>
<td>Executes alarm acknowledge (AlarmACK)</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>TL</td>
<td>Starts/stops/resets computation (/M1 option).</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>MP</td>
<td>Starts/ Stops manual print.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>LS</td>
<td>Starts/Stops the list (setting information) printout.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>SU</td>
<td>Starts/Stops the setup list (basic setting information) printout.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>NS</td>
<td>Executes the message printout.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>AC</td>
<td>Clears the alarm printout buffer.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-28</td>
</tr>
<tr>
<td>FUNC</td>
<td>MC</td>
<td>Clears the message printout buffer.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-29</td>
</tr>
<tr>
<td>FUNC</td>
<td>VG</td>
<td>Resets the report data of the periodic printout.</td>
<td>Run mode</td>
<td>Yes</td>
<td>No</td>
<td>4-29</td>
</tr>
<tr>
<td>-</td>
<td>YC</td>
<td>Initializes the settings.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-29</td>
</tr>
<tr>
<td>-</td>
<td>UY</td>
<td>Stops the record position adjustment.</td>
<td>Basic Setting mode</td>
<td>Yes</td>
<td>No</td>
<td>4-29</td>
</tr>
</tbody>
</table>

Yes: Command usable  
No: Command not usable

### Output Commands

<table>
<thead>
<tr>
<th>Command Type</th>
<th>Command</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>BO</td>
<td>Sets the byte output order.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-29</td>
</tr>
<tr>
<td></td>
<td>CS</td>
<td>Sets the check sum</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-29</td>
</tr>
<tr>
<td></td>
<td>IF</td>
<td>Sets the status filter</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-29</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>Disconnects an Ethernet connection</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-30</td>
</tr>
<tr>
<td>Setup, measurement, and computation data output</td>
<td>FE</td>
<td>Outputs decimal point position, unit information, and setup data.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-30</td>
</tr>
<tr>
<td></td>
<td>FD</td>
<td>Outputs the most recent measured/computed data.</td>
<td>Run mode</td>
<td>Yes</td>
<td>Yes</td>
<td>4-30</td>
</tr>
<tr>
<td></td>
<td>FY</td>
<td>Outputs the statistical computation results.</td>
<td>Run mode</td>
<td>Yes</td>
<td>Yes</td>
<td>4-30</td>
</tr>
<tr>
<td></td>
<td>FF</td>
<td>Outputs FIFO data.</td>
<td>Run mode</td>
<td>Yes</td>
<td>Yes</td>
<td>4-30</td>
</tr>
<tr>
<td></td>
<td>IS</td>
<td>Outputs status information.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-31</td>
</tr>
<tr>
<td></td>
<td>FU</td>
<td>Outputs user information.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-31</td>
</tr>
</tbody>
</table>

Yes: Command usable  
No: Command not usable

### RS-422A/485 Dedicated Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esc O</td>
<td>Opens the instrument.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-31</td>
</tr>
<tr>
<td>Esc C</td>
<td>Closes the instrument.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>4-31</td>
</tr>
</tbody>
</table>

Yes: Command usable  
No: Command not usable
4.2 A List of Commands

**Maintenance/Test Commands**

These commands can be used only when using Ethernet communications.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>close</td>
<td>Disconnects the connection between other instruments.</td>
<td>All modes</td>
<td>Yes</td>
<td>No 4-32</td>
<td></td>
</tr>
<tr>
<td>con</td>
<td>Outputs connection information.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes 4-32</td>
<td></td>
</tr>
<tr>
<td>eth</td>
<td>Output Ethernet statistical information.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes 4-32</td>
<td></td>
</tr>
<tr>
<td>help</td>
<td>Outputs help.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes 4-32</td>
<td></td>
</tr>
<tr>
<td>net</td>
<td>Outputs network statistical information.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes 4-32</td>
<td></td>
</tr>
<tr>
<td>quit</td>
<td>Disconnects the connection of the instrument being operated.</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes 4-33</td>
<td></td>
</tr>
</tbody>
</table>

Yes: Command usable
No: Command not usable

**Instrument Information Output Commands**

These commands can be used only when using Ethernet communications.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Function</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>serial</td>
<td>Outputs the serial number.</td>
<td>4-33</td>
</tr>
<tr>
<td>host</td>
<td>Outputs the host name.</td>
<td>4-33</td>
</tr>
<tr>
<td>ip</td>
<td>Outputs the IP address.</td>
<td>4-33</td>
</tr>
</tbody>
</table>
## 4.3 Parameter Values

This section explains frequently used parameters.

### Input Range

The following tables show the input types (VOLT, TC, RTD, DI, and 1-5V), range types, and the ranges for the leftmost and rightmost values of the span.

- **DC Voltage (VOLT), Square Root (SQRT), Difference between Channels (DELTA)**

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>Range of Leftmost and Rightmost Values of Span</th>
<th>Range of Leftmost and Rightmost Values of Span of the SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mV</td>
<td>20 mV</td>
<td>–20.00 to 20.00 mV</td>
<td>–2000 to 2000</td>
</tr>
<tr>
<td>60 mV</td>
<td>60 mV</td>
<td>–60.00 to 60.00 mV</td>
<td>–6000 to 6000</td>
</tr>
<tr>
<td>200 mV</td>
<td>200 mV</td>
<td>–200.00 to 200.00 mV</td>
<td>–2000 to 2000</td>
</tr>
<tr>
<td>2 V</td>
<td>2 V</td>
<td>–2.000 to 2.000 V</td>
<td>–2000 to 2000</td>
</tr>
<tr>
<td>6 V</td>
<td>6 V</td>
<td>–6.000 to 6.000 V</td>
<td>–6000 to 6000</td>
</tr>
<tr>
<td>20 V</td>
<td>20 V</td>
<td>–20.00 to 20.00 V</td>
<td>–2000 to 2000</td>
</tr>
<tr>
<td>50 V</td>
<td>50 V</td>
<td>–50.00 to 50.00 V</td>
<td>–5000 to 5000</td>
</tr>
</tbody>
</table>

- **1-5V**

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>Range of Leftmost and Rightmost Values of Span</th>
<th>Range of Leftmost and Rightmost Values of Span of the SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5V</td>
<td>1-5V</td>
<td>Leftmost value: 800 to 1200</td>
<td>0.8000 to 1.200 V</td>
</tr>
<tr>
<td>Rightmost value: 4800 to 5200</td>
<td>4.8000 to 5.200 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Thermocouple (TC)**

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>°C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>R</td>
<td>0.0 to 1760.0°C</td>
<td>0 to 17600</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>0.0 to 1760.0°C</td>
<td>0 to 17600</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>0.0 to 1820.0°C</td>
<td>0 to 18200</td>
</tr>
<tr>
<td>K</td>
<td>K</td>
<td>–200.0 to 1370.0°C</td>
<td>–2000 to 13700</td>
</tr>
<tr>
<td>E</td>
<td>E</td>
<td>–200.0 to 800.0°C</td>
<td>–2000 to 8000</td>
</tr>
<tr>
<td>J</td>
<td>J</td>
<td>–200.0 to 1100.0°C</td>
<td>–2000 to 11000</td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>–200.0 to 400.0°C</td>
<td>–2000 to 4000</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>0.0 to 1300.0°C</td>
<td>0 to 13000</td>
</tr>
<tr>
<td>W</td>
<td>W</td>
<td>0.0 to 2315.0°C</td>
<td>0 to 23150</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>–200.0 to 900.0°C</td>
<td>–2000 to 9000</td>
</tr>
<tr>
<td>U</td>
<td>U</td>
<td>–200.0 to 400.0°C</td>
<td>–2000 to 4000</td>
</tr>
<tr>
<td>WRe</td>
<td>WRe</td>
<td>0.0 to 2400.0°C</td>
<td>0 to 24000</td>
</tr>
</tbody>
</table>

Difference between channels (DELTA)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>°C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-</td>
<td>–1760.0 to 1760.0°C</td>
<td>–17600 to 17600</td>
</tr>
<tr>
<td>S</td>
<td>-</td>
<td>–1760.0 to 1760.0°C</td>
<td>–17600 to 17600</td>
</tr>
<tr>
<td>B</td>
<td>-</td>
<td>–1820.0 to 1820.0°C</td>
<td>–18200 to 18200</td>
</tr>
<tr>
<td>K</td>
<td>-</td>
<td>–1570.0 to 1570.0°C</td>
<td>–15700 to 15700</td>
</tr>
<tr>
<td>E</td>
<td>-</td>
<td>–1000.0 to 1000.0°C</td>
<td>–10000 to 10000</td>
</tr>
<tr>
<td>J</td>
<td>-</td>
<td>–1300.0 to 1300.0°C</td>
<td>–13000 to 13000</td>
</tr>
<tr>
<td>T</td>
<td>-</td>
<td>–600.0 to 600.0°C</td>
<td>–6000 to 6000</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>–1300.0 to 1300.0°C</td>
<td>–13000 to 13000</td>
</tr>
<tr>
<td>W</td>
<td>-</td>
<td>–1999.9 to 2315.0°C</td>
<td>–19999 to 23150</td>
</tr>
<tr>
<td>L</td>
<td>-</td>
<td>–1100.0 to 1100.0°C</td>
<td>–11000 to 11000</td>
</tr>
<tr>
<td>U</td>
<td>-</td>
<td>–600.0 to 600.0°C</td>
<td>–6000 to 6000</td>
</tr>
<tr>
<td>WRe</td>
<td>-</td>
<td>–1999.9 to 2400.0°C</td>
<td>–19999 to 24000</td>
</tr>
</tbody>
</table>
### 4.3 Parameter Values

#### Resistance Temperature Detector (RTD)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>PT</td>
<td>–200.0 to 600.0°C</td>
<td>–328.0 to 1112.0°F</td>
<td>–3280 to 11120</td>
<td></td>
</tr>
<tr>
<td>JPt100</td>
<td>JPT</td>
<td>–200.0 to 550.0°C</td>
<td>–328.0 to 1022.0°F</td>
<td>–3280 to 10220</td>
<td></td>
</tr>
</tbody>
</table>

#### Difference between channels (DELTA)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>–800.0 to 800.0°C</td>
<td>–1440.0 to 1440.0°F</td>
<td>–8000 to 8000</td>
<td>–14400 to 14400</td>
</tr>
<tr>
<td>JPt100</td>
<td>–750.0 to 750.0°C</td>
<td>–1350.0 to 1350.0°F</td>
<td>–7500 to 7500</td>
<td>–13500 to 13500</td>
</tr>
</tbody>
</table>

#### ON/OFF input (DI)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
<th>°C SR Command</th>
<th>°F SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>LEVEL</td>
<td>0 to 1†</td>
<td>0 to 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>CONT</td>
<td>0 to 1††</td>
<td>0 to 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

#### Cu10, Cu25 RTD input (/N1 Option)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu10(GE)</td>
<td>CU1</td>
</tr>
<tr>
<td>Cu10(L&amp;N)</td>
<td>CU2</td>
</tr>
<tr>
<td>Cu10(WEED)</td>
<td>CU3</td>
</tr>
<tr>
<td>Cu10(BAILEY)</td>
<td>CU4</td>
</tr>
<tr>
<td>Cu10: α=0.00392 at 20°C</td>
<td>CU5</td>
</tr>
<tr>
<td>Cu10: α=0.00393 at 20°C</td>
<td>CU6</td>
</tr>
<tr>
<td>Cu25: α=0.00425 at 0°C</td>
<td>CU25</td>
</tr>
</tbody>
</table>

#### Expansion inputs (/N3 Option)

<table>
<thead>
<tr>
<th>Range Type</th>
<th>Parameter for the SR Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kp vs Au7Fe</td>
<td>Kp</td>
</tr>
<tr>
<td>PLATINEL</td>
<td>PLATI</td>
</tr>
<tr>
<td>PR40 - 20</td>
<td>PR</td>
</tr>
<tr>
<td>NiNiMo</td>
<td>NiMo</td>
</tr>
<tr>
<td>WWRe26</td>
<td>WWRe</td>
</tr>
<tr>
<td>Type N(AWG14)</td>
<td>N2</td>
</tr>
<tr>
<td>Pt50</td>
<td>PT3</td>
</tr>
<tr>
<td>Ni100(SAMA)</td>
<td>Ni1</td>
</tr>
<tr>
<td>Ni100(DIN)</td>
<td>Ni2</td>
</tr>
<tr>
<td>Ni120</td>
<td>Ni3</td>
</tr>
<tr>
<td>J263*18</td>
<td>J263</td>
</tr>
<tr>
<td>Cu53</td>
<td>CU8</td>
</tr>
<tr>
<td>Cu100</td>
<td>CU9</td>
</tr>
<tr>
<td>Pt25</td>
<td>PT4</td>
</tr>
</tbody>
</table>
Miscellaneous

Channel Number
- **Pen model**
  Measurement channel: 01 to 04
  Computation channel: 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0J
- **Dot model**
  Measurement channel:
  \( \mu R10000: 01 \text{ to } 06 \)
  \( \mu R20000: 01 \text{ to } 24 \)
  Computation channel:
  \( \mu R10000: 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0J, 0K, 0M, 0N, 0P \)
  \( \mu R20000: 0A, 0B, 0C, 0D, 0E, 0F, 0G, 0J, 0K, 0M, 0N, 0P, 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1J, 1K, 1M, 1N, 1P \)

Relay Number (/A1, /A2, /A3, /A4, and /A5 Options)
- Models with the /A1 option: I01, I02
- Models with the /A2 option: I01 to I04
- Models with the /A3 option: I01 to I06
- Models with the /A4 option: I01 to I06, I11 to I16 (\( \mu R20000 \))
- Models with the /A5 option: I01 to I06, I11 to I16, I21 to I26, I31 to I36 (\( \mu R20000 \))

Communication Input Data
- \( \mu R10000 \) Pen model: C01 to C08, dot model: C01 to C12
- \( \mu R20000 \) Pen model: C01 to C08, dot model: C01 to C24

Computation Constant (/M1 option).
- K01 to K30

Remote Control Input Terminal (/R1 Option)
- D01 to D05

Chart Speed on the Pen Model

<table>
<thead>
<tr>
<th>mm/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 6 8 9 10 12 15 16 18 20</td>
</tr>
<tr>
<td>24 25 30 32 36 40 45 48 50 54</td>
</tr>
<tr>
<td>60 64 72 75 80 90 96 100 120 125</td>
</tr>
<tr>
<td>135 150 160 180 200 225 240 250 270 300</td>
</tr>
<tr>
<td>320 360 375 400 450 480 500 540 600 675</td>
</tr>
<tr>
<td>720 750 800 900 960 1000 1080 1200 1350 1440</td>
</tr>
<tr>
<td>1500 1600 1800 2000 2160 2250 2400 2700 2880 3000</td>
</tr>
<tr>
<td>3600 4000 4320 4500 4800 5400 6000 7200 8000 9000</td>
</tr>
<tr>
<td>10800 12000</td>
</tr>
</tbody>
</table>
### 4.4 Setting Commands

**SR** Sets the input range.

#### When setting channels to skip

**Syntax**
```
SR p1, p2<terminator>
p1 Channel number
p2 Measurement mode (SKIP)
```

**Query**
```
SR[p1]?
```

**Example**
Set channel 01 to skip.
```
SR 01, SKIP
```

**Description**
- This command cannot be specified while computation is in progress.
- Measurements are not made on channels that are set to SKIP.

#### When setting channels to voltage, TC, RTD, or ON/OFF input

**Syntax**
```
SR p1, p2, p3, p4, p5<terminator>
p1 Channel number
p2 Measurement mode (Input type)
  VOLT DC voltage
  TC Thermocouple
  RTD Resistance temperature detector
  DI ON/OFF input
p3 Range type
p4 Leftmost value of span
p5 Rightmost value of span
```

**Query**
```
SR[p1]?
```

**Example**
Measure 0°C to 1760.0°C on channel 01 using thermocouple type R.
```
SR 01, TC, R, 0, 17600
```

**Description**
- This command cannot be specified while computation is in progress.
- Set p3 according to the table in section 4.3.
- For p4 and p5, enter an integer value of 5 digits or less according to the table in section 4.3. The decimal position is fixed to the position indicated in the table in section 4.3.

#### When setting channels to 1-5V range

**Syntax**
```
SR p1, p2, p3, p4, p5, p6, p7, p8<terminator>
p1 Channel number
p2 Measurement mode (Input type) (1-5V)
p3 Leftmost value of span
p4 Rightmost value of span
p5 Leftmost value of scaling (−20000 to 30000)
p6 Rightmost value of scaling (−20000 to 30000)
p7 Scale decimal point position (0 to 4)
p8 Whether to use 1-5V low-cut function (ON, OFF)
```

**Query**
```
SR[p1]?
```

**Example**
Set channel 03 to 1-5V range and scale the input value in the range 0.0 to 1200.0. Do not use the low-cut function.
```
SR 03, 1-5V, 0, 12000, 0, 12000, 1, OFF
```

**Description**
- This command cannot be specified while computation is in progress.
- For p3 and p4, enter an integer value of 5 digits or less according to the table in section 4.3. The decimal position is fixed to the position indicated in the table in section 4.3.
- Be sure that p6 is greater than p5.
- Parameter p8 is valid only when the low-cut function is enabled (see the UF command).

#### When computing the difference between channels

**Syntax**
```
SR p1, p2, p3, p4, p5<terminator>
p1 Channel number
p2 Measurement mode (DELTA)
p3 Reference channel
p4 Leftmost value of span
p5 Rightmost value of span
```

**Query**
```
SR[p1]?
```

**Example**
Set channel 03 to channel difference computation with respect to channel 01 (reference channel). Set the leftmost and rightmost values of span to −200.0 and 200.0, respectively.
```
SR 03, DELTA, 01, −2000, 2000
```

**Description**
- This command cannot be specified while computation is in progress.
- The reference channel must be a channel that is smaller in channel number than itself.
- The range type is the same as that of the reference channel.
- For p4 and p5, enter an integer value of 5 digits or less according to the table in section 4.3. The decimal position is fixed to the position indicated in the table in section 4.3.

#### When setting the linear scaling

**Syntax**
```
SR p1, p2, p3, p4, p5, p6, p7, p8, p9<terminator>
p1 Channel number
p2 Measurement mode (SCALE)
p3 Input type
  VOLT DC voltage
  TC Thermocouple
  RTD Resistance temperature detector
  DI ON/OFF input
p4 Range type
p5 Leftmost value of span
p6 Rightmost value of span
p7 Leftmost value of scaling (−20000 to 30000)
p8 Rightmost value of scaling (−20000 to 30000)
p9 Scaling decimal point position (0 to 4)
```

**Query**
```
SR[p1]?
```

**Example**
Scale channel 02 whose input range is 0 to 10 V to −100.0 to 500.0.
```
SR 02, SCALE, VOLT, 20V, 0, 1000, −100, 5000, 1
```
4.4 Setting Commands

**Description**
- This command cannot be specified while computation is in progress.
- Set p4 according to the table in section 4.3.
- For p5 and p6, enter an integer value of 5 digits or less according to the table in section 4.3. The decimal position is fixed to the position indicated in the table in section 4.3.
- Be sure that p8 is greater than p7.

**When setting the square root**

**Syntax**
```
SR p1,p2,p3,p4,p5,p6,p7,p8,p9,p10
```

**p1** Channel number
**p2** Measurement mode (SQRT)
**p3** Range type
**p4** Leftmost value of span
**p5** Rightmost value of span
**p6** Leftmost value of scaling (−20000 to 30000)
**p7** Rightmost value of scaling (−20000 to 30000)
**p8** Scaling decimal point position (0 to 4)
**p9** Low-cut function (ON, OFF)
**p10** Low-cut value

**Query**
```
SR[p1]?
```

**Example**
Given channel 01 whose input range is 0 to 10 V, take the square root of the input value and scale the result in the range 0.00 (m3/s) to 100.00 (m3/s). When the input value is less than or equal to 5.0% of the recording span, use the low-cut function.
```
SR 01,SQRT,20V,0,1000,0,10000,2,ON,50
```

**VL** Sets the calibration correction (/CC1 option).

**Syntax**
```
VL,p1,p2,p3,p4,...,p33,p34
```

**p1** Channel number
**p2** Calibration correction function (ON, OFF)
**p3** correction point
**p4** Correction value
...  
**p33** Set point
**p34** Correction value

**Query**
```
VL[p1]?
```

**Example**
Set three sets of correction point and correction values when channel 02 is set to 2 V range (measurable range: −2.000 V to 2.000 V) and the calibration correction mode is set to revise value. (0.000 and 0.001), (1.000 and −0.002), and (2.000 and 0.001)
```
VL 02,ON,0,1,1000,-2,2000,1
```
Set three sets of correction point and correction values when channel 02 is set to 2 V range (measurable range: −2.000 V to 2.000 V) and the calibration correction mode is set to Abs. Value.
```
VL 02,ON,0,1,1000,998,2000,2001
```

**Description**
- The number of parameters p3 to p34 varies depending on the number of points specified by the basic setting command UQ.
- If the input type of the source channel is VOLT, TC, or RTD, the range of the correction point and correction values is the same as the range of the range type (see section 4.3).
- If the measurement mode of the source channel is SCALE or 1-5V, the range of the correction point and correction values is –5% to 105% of the scaling range or –20000 to 30000.
- The following limitations exist.
  - p3 < p5 ≤ ... ≤ p31 ≤ p33
  - During revise value mode p3+p4 < p5+p6 < ... < p33+p34
  - During absolute value mode p4 < p6 < ... < p32 < p34

**SA** Sets the alarm.

**When not using the alarm**

**Syntax**
```
SA p1,p2,p3
```

**p1** Channel number
**p2** Alarm number (1 to 4)
**p3** Alarm ON/OFF state (OFF)

**Query**
```
SA[p1,[p2]]?
```

**Example**
Do not use alarm number 4 of channel 01.
```
SA 01,4,OFF
```

**When using the alarm**

**Syntax**
```
SA p1,p2,p3,p4,p5,p6,p7
```

**p1** Channel number
**p2** Alarm number (1 to 4)
4.4 Setting Commands

| p3 | Alarm ON/OFF state (ON) |
| p4 | Alarm type |
| H | High limit alarm |
| L | Low limit alarm |
| h | Difference high limit alarm |
| l | Difference low limit alarm |
| R | High limit on rate-of-change alarm |
| r | Low limit on rate-of-change alarm |
| T | Delay high limit alarm |
| t | Delay low limit alarm |

(Characters are case-sensitive.)

| p5 | Alarm value |
| p6 | Relay output |
| ON | Relay ON |
| OFF | Relay OFF |

| p7 | Relay number (μR10000: I01 to I06, μR20000: I01 to I06, I11 to I16, I21 to I26, I31 to I36) |

Query SA[ p1[,p2]]?

Example Set a high limit alarm (alarm value = 1000) on alarm number 1 of channel 02 and output to relay I01.

SA 02,1,ON,H,1000,ON,I01

Description • When the input range is set to SKIP (SR command), p3 cannot be turned ON.
• The alarm settings are all turned OFF for the following cases.
  • When the input type is changed (VOLT, TC, etc).
  • When the range type is changed.
  • When the span and scaling values are changed during linear scaling (includes changing the decimal position).
• The h and l settings of p4 are valid only when the measurement range is set to computation between channels.
• The hysteresis of alarm ON/OFF (valid when p4 is H or L) is set using the XA command.
• If p4 is set to R or r, set the interval for the high/low limit on the rate-of-change using the XA command.
• The T and t settings of p4 can be specified when the alarm delay function is enabled (UF command).
• If p4 is set to T or t, set the alarm delay time for the delay high/low limit alarm using the BD command.
• Parameter p5 for the difference high limit alarm/difference low limit alarm: Values in the measurable range can be specified (example: –1760.0 to 1760.0°C for the TC type R).
• Parameter p5 for the high limit on rate-of-change alarm/low limit on rate-of-change alarm: A value greater than or equal to 1 digit can be specified. For example, 1 digit corresponds 0.001 for the 2 V range (measurable range: –2.000 to 2.000 V). The maximum value that can be specified is the width of the measurable range (4.000 V for 2 V range). For ON/OFF input, only “1” can be specified.
• On models with the computation function (M/M1 option), alarms can be set on computation channels.
  • When the computation equation setting (SO command) is turned OFF, p3 cannot be turned ON.
  • For computation channels, the alarm types that can be specified are H (high limit alarm), L (low limit alarm), T (delay high limit alarm), and t (delay low limit alarm). T and t can be specified when the alarm delay function is enabled (UF command).
  • If p4 is set to T or t, set the alarm delay time for the delay high/low limit alarm using the BD command.
  • Set p5 within the range –9999999 to 99999999 excluding the decimal using an integer.
  • The alarm ON/OFF hysteresis is set using the XA command.
  • If the computation channel ON/OFF state, the computing equation, or the span value is changed, all alarm settings of that channel are turned OFF.

SN Sets the unit.

Syntax SN p1,p2<terminator>

p1 Channel number
p2 Unit string (up to 6 characters)

Query SN[ p1]?

Example Set the unit of channel 02 to M/H.

SN 02, M/H

Description • The unit setting is valid on channels set to 1-5V, scaling, or square root.
  • For the characters that can be used for the units, see appendix 1, “ASCII Character Codes.”
  • On models with the computation function (M/M1 option), unit can be set on computation channels.
4.4 Setting Commands

**SC**  
Sets the chart speed.

**Syntax**  
SC p1<terminator>

**p1**  
Chart speed

**Query**  
SC?

**Example**  
Set the chart speed to 25 mm/h.

**SC 25**

**Description**  
Select the chart speed from the list of choices below.

- **Pen model**  
  5 to 12000 mm/h (82 levels, see section 4.3)
- **Dot model**  
  1 to 1500 mm/h (1 mm steps)

**SD**  
Sets the date and time.

**Syntax**  
SD p1<terminator>

**p1**  
Date and time (fixed to the YY/MM/DD HH:MM:SS format)

- **YY**  
  Year (00 to 99, the lower 2 digits)
- **MM**  
  Month (01 to 12)
- **DD**  
  Day (01 to 31)
- **HH**  
  Hour (00 to 23)
- **MM**  
  Minute (00 to 59)
- **SS**  
  Second (00 to 59)

**Query**  
SD?

**Example**  
Set the recorder clock to 13:00:00, December 1, 2004.

**SD 04/12/01 13:00:00**

**Description**  
- The format of p1 is fixed to 17 characters. An error results if a space is inserted in positions other than the specified positions.
- On the µR10000 with system version 1.02 or earlier, the parameter p2 can be used.
  
  - **p2**  
    Standard time or DST (winter, summer)
    - **Winter**  
      Standard time
    - **Summer**  
      DST

**VT**  
Sets the dot printing interval (dot model).

**Syntax**  
VT p1<terminator>

**p1**  
Dot printing interval setting.

- **AUTO**  
  Automatically adjust the dot printing interval according to the chart speed.
- **FIX**  
  Record at the fastest printing interval.

**Query**  
VT?

**Example**  
Record at the fastest printing interval.

**VT FIX**

**Description**  
When trend recording is performed on 6 channels, the fastest printing interval is 10 seconds.

**SZ**  
Sets zone recording.

**Syntax**  
SZ p1,p2,p3<terminator>

**p1**  
Channel number

**p2**  
Leftmost position of the zone (µR10000: 0 to 95, µR20000: 0 to 175) [mm]

**p3**  
Rightmost position of the zone (µR10000: 5 to 100, µR20000: 0 to 180) [mm]

**Query**  
SZ[ p1]?

**Example**  
Display channel 02 in a zone between 30 and 50 mm.

**SZ 02,30,50**

**Description**  
- Be sure that p3 is greater than p2 and that the zone width (p3 – p2) is greater than or equal to 5 mm.
  
  - On models with the computation function (/M1 option), computation channels can be specified.

**SP**  
Sets the partial expanded recording.

**Syntax**  
SP p1,p2,p3,p4<terminator>

**p1**  
Channel number

**p2**  
Partial expanded recording ON/OFF (ON, OFF)

**p3**  
Boundary position (1 to 99) [%]

**p4**  
Boundary value

**Query**  
SP[ p1]?

**Example**  
Set the 25% position of channel 01 to 1.000 V.

**SP 01,ON,25,1000**

**Description**  
- When the input range is set to SKIP (SR command), p2 cannot be turned ON.
  
  - Set p3 as a percentage where 100 mm is assumed to be 100%.
  
  - **Parameter p4 can be set in the range** (leftmost value of span + 1) to (rightmost value of span – 1). If scaling is enabled, the range is (leftmost value of scaling – 1) to (rightmost value of scaling + 1). Set the parameter using an integer.
  
  - This setting is possible when partial expanded recording is enabled (UK command).
  
  - This command cannot be used if the partial expanded recording range does not exist (when the span width is set to 1, for example).
  
  - On models with the computation function (/M1 option), computation channels can be specified.
  
  - When the computation equation setting (SO command) is turned OFF, p2 cannot be turned ON.
4.4 Setting Commands

**VR** Turns ON/OFF the recording on each channel.

**Dot model**
- **Syntax:** VR p1,p2,p3<terminator>
  - p1 Channel number
  - p2 Trend recording ON/OFF (ON, OFF)
  - p3 Periodic printout ON/OFF (ON, OFF)
- **Query:** VR[ p1]?
- **Example:** Turn trend recording ON and turn periodic printout OFF on channel 06.
  - **VR 06,ON,OFF**
- **Description:** On models with the computation function (/M1 option), computation channels can be specified.

**Pen model**
- **Syntax:** VR p1,p2<terminator>
  - p1 Channel number
  - p2 Periodic printout ON/OFF (ON, OFF)
- **Query:** VR[ p1]?
- **Example:** Turn periodic printing ON on channel 01.
  - **VR 01,ON**
- **Description:** On models with the computation function (/M1 option), computation channels can be specified.

**ST** Sets the tag.

- **Syntax:** ST p1,p2<terminator>
  - p1 Channel number
  - p2 Tag string (up to 7 characters)
- **Query:** ST[ p1]?
- **Example:** Set the tag of channel 02 to TI-2.
  - **ST 02,TI-2**
- **Description:**
  - For the characters that can be used for the tags, see appendix 1, "ASCII Character Codes."
  - On models with the computation function (/M1 option), computation channels can be specified.

**SG** Sets the message.

- **Syntax:** SG p1,p2<terminator>
  - p1 Message number (1 to 5)
  - p2 Message string (up to 16 characters)
- **Query:** SG[ p1]?
- **Example:** Set character string “START” in message number 1.
  - **SG 1,START**
- **Description:**
  - For the characters that can be used for the messages, see appendix 1, "ASCII Character Codes."

**SE** Sets the secondary chart speed (used by the remote control function (/R1 option)).

- **Syntax:** SE p1<terminator>
  - p1 Secondary chart speed
- **Query:** SE?
- **Example:** Set the chart speed to 50 mm/h.
  - **SE 50**
- **Description:**
  - Select the chart speed from the list of choices below.
  - **Pen model**
    - 5 to 12000 mm/h (82 levels, see section 4.3)
  - **Dot model**
    - 1 to 1500 mm/h (1 mm steps)

**SV** Sets the moving average (dot model).

- **Syntax:** SV p1,p2<terminator>
  - p1 Channel number
  - p2 Number of samples for computing the moving average (OFF, 2 to 16) [times]
- **Query:** SV[ p1]?
- **Example:** Set the number of samples for computing the moving average of channel 02 to 12.
  - **SV 02,12**
- **Description:**
  - This setting is available on the dot model.
  - This setting is possible when moving average is enabled (UI command).

**SF** Sets the input filter (pen model).

- **Syntax:** SF p1,p2<terminator>
  - p1 Channel number
  - p2 Filter time constant (OFF, 2s, 5s, 10s)
- **Query:** SF[ p1]?
- **Example:** Set the filter of channel 02 to 2 s.
  - **SF 02,2s**
- **Description:** This setting is possible when the input filter is enabled (UF command).

**BD** Sets the alarm delay time.

- **Syntax:** BD p1,p2<terminator>
  - p1 Channel number
  - p2 Alarm delay (1 to 3600) [s]
- **Query:** BD[ p1]?
- **Example:** Set the alarm delay of channel 01 to 120 s.
  - **BD 01,120**
- **Description:**
  - This setting is possible when the alarm delay function is enabled (UF command).
  - On models with the computation function (/M1 option), computation channels can be specified.

**VF** Sets the brightness of the display (VFD) and internal illumination.

- **Syntax:** VF p1,p2<terminator>
  - p1 VFD brightness (1 to 8)
  - p2 Internal illumination (OFF, 1 to 4)
    - OFF Turns OFF the internal illumination.
- **Query:** VF?
Example Set the display (VFD) brightness to 2 and the internal illumination to 1.

VF 2, 1

Description The brightness increases as the value increases.

<table>
<thead>
<tr>
<th>Command</th>
<th>Sets the DST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>TD p1,p2,p3,p4,p5,p6,p7,p8,p9&lt;terminator&gt;</td>
</tr>
<tr>
<td>p1</td>
<td>Use/Not use DST (USE, NOT)</td>
</tr>
<tr>
<td>p2</td>
<td>DST start time: month (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, or Dec)</td>
</tr>
<tr>
<td>p3</td>
<td>DST start time: number of the week in the month (1st, 2nd, 3rd, 4th, or Last)</td>
</tr>
<tr>
<td>p4</td>
<td>DST start time: day of the week (Sun, Mon, Tue, Wed, Thu, Fri, or Sat)</td>
</tr>
<tr>
<td>p5</td>
<td>DST start time: hour (0 to 23)</td>
</tr>
<tr>
<td>p6</td>
<td>DST end time: month (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, or Dec)</td>
</tr>
<tr>
<td>p7</td>
<td>DST end time: number of the week in the month (1st, 2nd, 3rd, 4th, or Last)</td>
</tr>
<tr>
<td>p8</td>
<td>DST end time: day of the week (Sun, Mon, Tue, Wed, Thu, Fri, or Sat)</td>
</tr>
<tr>
<td>p9</td>
<td>DST end time: hour (0 to 23)</td>
</tr>
</tbody>
</table>

Query TD[ p1]?

Example Enable DST and set the DST start time to hour 0 on the 2nd Sunday of June and the DST end time to hour 0 on the 2nd Sunday of December.

TD Use, Jun, 2nd, Sun, 0, Dec, 2nd, Sun, 0

Description • The DST start time and end time cannot be set to the same time.
• The TD command can be used on the µR10000 and µR20000 with system version 1.11 or later. On the µR10000 with system version 1.02 or earlier, use the SS command.

<table>
<thead>
<tr>
<th>Command</th>
<th>Sets the DST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>SS p1,p2,p3&lt;terminator&gt;</td>
</tr>
<tr>
<td>p1</td>
<td>Standard time/DST selection</td>
</tr>
<tr>
<td>p2</td>
<td>Switch time setting ON/OFF (ON, OFF)</td>
</tr>
<tr>
<td>p3</td>
<td>Date and time (fixed to the YY/MM/DD HH format)</td>
</tr>
</tbody>
</table>

YY Year (00 to 99, the lower 2 digits)

MM Month (01 to 12)

DD Day (01 to 31)

HH Hour (00 to 23)

Query SS[ p1]?

Example Switch to DST on 0 hour of June 1st, 2005.

SS Summer, 06, 05/06/01 00

Description • Parameter p3 is not available when p2 is OFF.
• The SS command can be used on the µR10000 with system version 1.02 or earlier.

<table>
<thead>
<tr>
<th>Command</th>
<th>Sets the computing equation (/M1 option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>SO p1,p2,p3,p4,p5,p6&lt;terminator&gt;</td>
</tr>
<tr>
<td>p1</td>
<td>Computation channel number</td>
</tr>
<tr>
<td>p2</td>
<td>Turn ON/OFF the computing equation (ON, OFF)</td>
</tr>
<tr>
<td>p3</td>
<td>Computing equation (up to 120 characters)</td>
</tr>
<tr>
<td>p4</td>
<td>Leftmost value of span (–9999999 to 99999999)</td>
</tr>
<tr>
<td>p5</td>
<td>Rightmost value of span (–99999999 to 99999999)</td>
</tr>
<tr>
<td>p6</td>
<td>Span decimal point position (0 to 4)</td>
</tr>
</tbody>
</table>

Query SO[ p1]?

Example Calculate the sum of channel 01 and 02 on computation channel 0A. Set the leftmost and rightmost values of span to –10.00 and 15.00, respectively.

SO 0A, 0B, 01+02, –1000, 1500, 2

Description • This command cannot be specified while computation is in progress.
• For a description on the computing equations, see the µR10000 Recorder User's Manual or the µR20000 Recorder User's Manual.
• For 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.

<table>
<thead>
<tr>
<th>Command</th>
<th>Sets the computation constant (/M1 option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>SK p1,p2&lt;terminator&gt;</td>
</tr>
<tr>
<td>p1</td>
<td>Constant number (K01 to K30)</td>
</tr>
<tr>
<td>p2</td>
<td>Constant (up to 11 characters)</td>
</tr>
</tbody>
</table>

The range is –9.9999E+29 to –1.0000E–30, 0, 1.0000E–30 to 9.9999E+29. (The + sign of “E+” can be omitted.)

Query SK[ p1]?

Example Set 1.0000E–10 to constant K01.

SK K01, 1.0000E–10

Description This command cannot be specified while computation is in progress.

<table>
<thead>
<tr>
<th>Command</th>
<th>Sets the timer used in TLOG computation (/M1 option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>SJ p1,p2,p3&lt;terminator&gt;</td>
</tr>
<tr>
<td>p1</td>
<td>Computation channel number</td>
</tr>
<tr>
<td>p2</td>
<td>Timer number (Periodic, 1, 2)</td>
</tr>
<tr>
<td>p3</td>
<td>Sum scale (for TLOG.SUM)</td>
</tr>
</tbody>
</table>

OFF Integrates the data per scan interval.
/s Integrates the physical amount that are in unit of /s.
/min Integrates the physical amount that are in unit of /min.
/h Integrates the physical amount that are in unit of /hour.
/day Integrates the physical amount that are in unit of /day.
4.4 Setting Commands

**Query**

SJ[p1]?

**Example**

Enable timer 1 on computation channel 0B. No sum scale designation.

SJ 0B,1,OFF

**Description**

- **About p3**
  - The data for sum computation are sampled every scan interval. For data with units such as /s, /min, /h, and /day as in a flow rate, the data can be summed over the unit time as shown below. Parameter p3 is valid only for sum values.

  - OFF  Σ (measured value)
  - /s  Σ (measured value) × scan interval/60
  - /h  Σ (measured value) × scan interval/3600
  - /day Σ (measured value) × scan interval/(3600×24)

  The unit of the scan interval is seconds.

**VD**

Sets the data display screen.

**On screens without detailed parameters**

**Syntax**

VD p1,p2<terminator>

- **p1** Screen number (01 to 15)
- **p2** Display type
  - 4CH bargraph
  - 6CH bargraph
  - 1CH digital
  - 2CH digital
  - 4CH digital
  - 6CH digital
  - 12CH digital
  - 1CH digital+1CH bargraph
  - 1CH digital+4CH bargraph
  - 2CH digital+2CH bargraph

**On screens with the displayed channel switching interval**

**Syntax**

VD p1,p2,p3<terminator>

- **p1** Screen number (01 to 15)
- **p2** Display type
  - 1CH digital
  - 2CH digital
  - 4CH digital
  - 6CH digital
  - 12CH digital
  - 1CH digital+1CH bargraph
  - 1CH digital+4CH bargraph
  - 2CH digital+2CH bargraph

- **p3** Displayed channel switching interval
  - MANUAL Fixed display channels, data update rate (pen model): 2 s, data update rate (dot model): scan interval
  - AUTO1S Switch the displayed channels and data every second.
  - AUTO2S Switch the displayed channels and data every 2 seconds.
  - AUTO3S Switch the displayed channels and data every 3 seconds.
  - AUTO4S Switch the displayed channels and data every 4 seconds.
  - AUTO5S Switch the displayed channels and data every 5 seconds.

**Query**

VD[p1]?

**Example**

Assign the status display to screen 02.

VD 02,STATUS
Example: Assign the 2-channel digital display to screen 04 and automatically switch the displayed channels every 5 seconds.
VD 04,2CH digital,AUTO5S

For flag display
Syntax: VD p1,p2,p3<terminator>
p1 Screen number (01 to 15)
p2 Display type
   FLAG Flag display (fixed)
p3 Display ON/OFF for each channel
   Specify the ON/OFF state of each channel with 1 or 0 (see the explanation).
Query: VD[p1]?
Example 1: On the 6-dot model, assign the flag display to screen 03 and display the flags of channel 01 and 02.
VD 03,FLAG,110000
Example 2: On the 2-pen model with the computation function (/M1 option), assign the flag display to screen 03 and display the flags of measurement channel 02 and computation channels 0A, 0B, 0E, and 0F.
VD 03,FLAG,01-11001100

Description: Use the format below to specify the display ON/OFF state of each channel.
• List the values one after another for all channels and separate the measurement channels and computation channels with a hyphen.
• Channels cannot be omitted.
• The characters after the hyphen are valid only on models with the computation function (/M1 option).

For multiple display (display in which different screens can be assigned to the top and bottom sections)
Syntax: VD
p1,p2,p3,p4,p5,p6,p7,p8,p9,p10,p11,p12<terminator>
p1 Screen number (01 to 15)
p2 Display type
   Multiple display
   Display in which different screens can be assigned to the top and bottom sections
p3 Top section display type
   1CH digital
   1-channel digital display
   2CH digital
   2-channel digital display
   3CH digital
   3-channel digital display (µR20000)
   TIME
   Date/Time (µR10000)
   Chart speed
   Chart speed (µR10000)

TIME/Chart speed
   Date/Time/Chart speed (µR20000)
Channel alarm status
   Channel alarm status display
STATUS
   Status display
Lights out
   Screen OFF
Tag_1CH digital
   1-channel digital display (tag)

Note: Parameters that become invalid due to p3, p4, p8, or p9 setting are skipped, and the next parameter is brought forward.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| p4 | Displayed channel switching interval
   | Condition: Set this parameter when p3 is 1CH digital or 2CH digital.
| MANUAL  | Fixed display channels, data update rate (pen model): 2 s, data update rate (dot model): scan interval |
| AUTO1S  | Switch the displayed channels and data every 1 second. |
| AUTO2S  | Switch the displayed channels and data every 2 seconds. |
| AUTO3S  | Switch the displayed channels and data every 3 seconds. |
| AUTO4S  | Switch the displayed channels and data every 4 seconds. |
| AUTO5S  | Switch the displayed channels and data every 5 seconds. |
| p5 | Channel number
   | Condition: This parameter can be specified when p3 is 1CH digital, 2CH digital, or Tag_1CH digital and p4 is MANUAL. |
| p6 | 2nd channel number
   | Condition: This parameter is specified when p3 is 2CH digital and p4 is MANUAL. |
| p7 | 3rd channel number
   | Condition: This parameter is specified when p3 is 3CH digital and p4 is MANUAL. |
| p8 | Bottom section display type
   | Same as p3 |
| p9 | Displayed channel switching interval
   | Same as p4 |
| p10 | Channel number
   | Same as p5 |
| p11 | 2nd channel number
   | Same as p6 |
| p12 | 3rd channel number
   | Same as p7 |
4.4 Setting Commands

Query  VD[p1]?
Example  Assign the display in which different screens can be assigned to the top and bottom sections to screen 09. Set the top section to status display and the bottom section to 1-channel digital display. Switch the displayed channel every 3 seconds (parameters p5 to p7, p10, and p12 explained above are omitted).
VD 09,Multiple display,STATUS,ICH digital,AUTO3S

CM  Sets the communication input data (/M1 option).
Syntax  CM p1,p2<terminator>
p1  Communication input data number (see section 4.3)
p2  Communication input data
The selectable range is –9.9999E+29 to –1.0000E–30, 0, 1.0000E–30 to 9.9999E+29.
(The + sign of “E+” can be omitted.)
Query  CM?
Example  Set 1.0000E–10 to communication input data number C01.
CM C01,1.0000E–10

FR  Sets the interval for acquiring data to the FIFO buffer.
Syntax  FR p1<terminator>
p1  Pen model: 125ms, 250ms, 500ms, 1s, 2s, 2.5s, 5s, 10s
      Dot model: 1s, 2s, 2.5s, 5s, 10s
Query  FR?
Example  Set the acquiring interval to the FIFO buffer to 1 s.
FR 1s
Description  • Set the acquiring interval to an integer multiple of the scan interval that is greater than the scan interval.
• The scan interval on the pen model is 125 ms.
• The scan interval on the dot model varies depends on the integration time of the A/D converter as follows:
  When the integration time is 16.7 ms or 20 ms;
  6 channels: 1 s
  12, 18, or 24 channels: 2.5 s
  When the integration time is 100 ms;
  6 channels: 2.5 s
  12 channels: 5 s
  18 and 24 channels: 10 s

VH  Sets the batch number and lot number (/BT1 option).

When setting the batch number
Syntax  VH p1,p2<terminator>
p1  BATCH
p2  Batch number (up to 26 characters)
Query  VH[p1]?
Example  Set character string Product as a batch number.
VH BATCH,Product
Description  Valid with the header printout (/BT1 option) when set to use Start printout/End printout (see the UE command).

When setting lot number for the 4 digits
Syntax  VH p1,p2<terminator>
p1  LOT
p2  0000-9999
Query  VH[p1]?
Example  Set 0001 as the lot number.
VH LOT,0001
Description  Valid with the header printout (/BT1 option) when lot number is set to 4 digits (see the UE command).

When setting lot number for the 6 digits
Syntax  VH p1,p2<terminator>
p1  LOT
p2  000000-999999
Query  VH[p1]?
Example  Set 000001 as the lot number.
VH LOT,000001
Description  Valid with the header printout (/BT1 option) when lot number is set to 6 digits (see the UE command).

VC  Sets the batch comment (/BT1 option).
Syntax  VC p1,p2,p3<terminator>
p1  Mode selection
      START  Start printout
      END  End printout
      START2  Start printout 2
      END2  End printout 2
p2  line number (up to 5)
p3  Batch comment
      (µR10000: up to 32 chars., µR20000: up to 64 chars.)
Query  VC[p1,[p2]]?
Example  Set the string Batch start to the first line of the Start printout batch comment.
VC START,1,Batch start
Description  • Valid with the header printout (/BT1 option) when set to use Start printout/End printout (see the UE command).
• Start printout 2 and End printout 2 valid when set to use Start printout 2 and End printout 2 (see the UE command).
### VP

**Turns Start printout/End printout ON/OFF (/BT1 option).**

**Syntax**  
VP p1,p2,p3,p4<terminator>

- **p1** Mode selection  
  - START  Start printout
  - END  End printout
  - START2  Start printout 2
  - END2  End printout 2

- **p2** Batch name printout ON/OFF (ON, OFF)

- **p3** Chart speed printout ON/OFF (ON, OFF)

- **p4** Date/time printout ON/OFF (ON, OFF)

**Query**  
VP[ p1]?

**Example**  
Turn the Start printout batch name (batch number and lot number) ON, chart speed OFF, and date/time ON.

VP START,ON,OFF,ON

**Description**
- Valid with the header printout (/BT1 option) when set to use Start printout/End printout (see the UE command).
- Start printout 2 and End printout 2 valid when set to use Start printout 2 and End printout 2 (see the UE command).

### VA

**Sets the Start printout/End printout action (/BT1 option).**

**When setting Start printout**

**Syntax**  
VA p1,p2<terminator>

- **p1** Mode selection  
  - START  Start printout
  - START2  Start printout 2

- **p2** Feed amount before Start printout (0-50) [mm]

**Query**  
VA[ p1]?

**Example**  
Set feed amount before Start printout to 10 mm.

VA START,10

**Description**
- Valid with the header printout (/BT1 option) when set to use Start printout/End printout (see the UE command).
- Start printout 2 valid when set to use Start printout 2 and End printout 2 (see the UE command).

**When setting End printout**

**Syntax**  
VA p1,p2,p3,p4,p5<terminator>

- **p1** Mode selection  
  - END  End printout
  - END2  End printout 2

- **p2** Feed amount after End printout (0-50) [mm]

- **p3** Lot number automatic updating ON/OFF (ON, OFF)

- **p4** Pen offset compensating recording ejection ON/OFF (ON, OFF)

- **p5** Select chart speed when ejecting pen offset compensating record.
  - C.SPEED  Chart speed setting
    - 450mm/h  Fixed to 450 mm/h

**Query**  
VA[ p1]?

**Example**  
Set feed amount after End printout to 10 mm.

VA END,10

**Description**
- Valid with the header printout (/BT1 option) when set to use Start printout/End printout (see the UE command).
- End printout 2 valid when set to use Start printout 2 and End printout 2 (see the UE command).
- P3 valid when lot number is set to 4 or 6 digits (see the UE command).
- P4 valid when POC is set to ON with the pen model (see the UE command).
- P5 is valid when p4 is ON.

### VM

**Sets the message format (/BT1 option).**

**Syntax**  
VM p1,p2<terminator>

- **p1** Message number (1-5)

- **p2** Message format setting  
  - µR10000: up to 35 chars., µR20000: up to 69 chars.
  - H:M  Hours:minutes (5 characters)
  - H:M:S  Hours:minutes:seconds (8 characters)
  - M/D H:M  Month/day hours:minutes (11 characters)
  - M/D H:M:S  Month/day hours:minutes:seconds (14 characters)
  - D/M H:M  Day/month hours:minutes (11 characters)
  - D/M H:M:S  Day/month hours:minutes:seconds (14 characters)
  - D.M H:M  Day.month hours:minutes (11 characters)
  - D.M H:M:S  Day.month hours:minutes:seconds (14 characters)
  - M.D H:M  Month.day hours:minutes (12 characters)
  - M.D H:M:S  Month.day hours:minutes:seconds (15 characters)
  - Y/M/D H:M:S  Year/month/day hours:minutes:seconds (19 characters)
  - M/D/Y H:M:S  Month/day/year hours:minutes:seconds (19 characters)
  - D/M/Y H:M:S  Day/month/year hours:minutes:seconds (19 characters)
  - D.M.Y H:M:S  Day.month.year hours:minutes:seconds (19 characters)
  - M.D.Y H:M:S  Month/day/year hours:minutes:seconds (20 characters)

**Example**  
Set message format to H:M:S.

VM H:M:S
### 4.4 Setting Commands/4.5 Basic Setting Commands

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Measured value of CH01 (7 characters)</td>
</tr>
<tr>
<td>02</td>
<td>Measured value of CH02 (7 characters)</td>
</tr>
<tr>
<td>24</td>
<td>Measured value of CH24 (7 characters)</td>
</tr>
<tr>
<td>0A</td>
<td>Computation channel 0A (9 characters)</td>
</tr>
<tr>
<td>0B</td>
<td>Computation channel 0B (9 characters)</td>
</tr>
<tr>
<td>1P</td>
<td>Computation channel 1P (9 characters)</td>
</tr>
</tbody>
</table>

(The valid range from 01-24 depends on the model.

| L01 | Message 1 character (1 character)                |
| L02 | Message 2 characters (2 characters)              |
| L16 | Message 16 characters (16 characters)            |
|     | Space (1 character)                              |

#### Query

Query: VM[p1]?

Example: Process-1 °C

Message 1 string: Process-1 °C

Message 1 printout result:

| L01 | Message 1 character (1 character)                |
| L02 | Message 2 characters (2 characters)              |
|     | Message 16 characters (16 characters)            |
|     | Space (1 character)                              |

#### Description

- Valid with the header printout (/BT1 option)
- Prints out in the order for parameters specified by the message format.
- The specified number of characters specified for standard function messages is used, then if a subsequent character string has been set, it is used next. Also, it can only be used once for the message format.
- The parentheses ( ) indicate the number of characters used. Set the message format so that the total number of characters does not exceed the maximum number allowed.

### 4.5 Basic Setting Commands

- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the YE or XE command.
- 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.

#### Note

- The settings that are changed using the YS/YB/YA/YN/YD/YQ/YK command and saved using the XE command are activated after power-cycling the recorder.
- When the YE command is executed, communication is dropped.

#### XA Sets alarm related settings.

**Syntax**

```plaintext
XA p1,p2,p3,p4,p5,p6,p7,p8,p9,p10 <terminator>
```

- **p1** Fault diagnosis output ON/OFF (ON, OFF)
- **p2** Reflash operation ON/OFF (ON, OFF)
- **p3** Relays that are to operate ON/OFF (ON, OFF)

**Syntax Example**

```plaintext
XA ON,OFF,ON,OFF,OFF,OFF,OFF,OFF,OFF,OFF
```

**Description**

- Energize/De-energize the relay
- Energize the relay when an alarm is detected
- De-energize the relay when an alarm is detected
4.5 Basic Setting Commands

**XH**
Sets the burnout detection.

**Syntax**
XH \( p_1, p_2 \) <terminator>

- **p1** Channel number
- **p2** The procedure taken when a sensor burnout is detected
  - OFF Disable the burnout detection.
  - UP Set the recording off the scale to the right when a burnout is detected.
  - DOWN Set the recording off the scale to the left when a burnout is detected.

**Query**
XH[ p1 ]?

**Example**
Set the recording off the scale to the right when a sensor burnout is detected on channel 01.

**XB**
Sets the burnout detection.

**Syntax**
XB \( p_1, p_2 \) <terminator>

- **p1** Channel number
- **p2** The procedure taken when a sensor burnout is detected
  - OFF Disable the burnout detection.
  - UP Set the recording off the scale to the right when a burnout is detected.
  - DOWN Set the recording off the scale to the left when a burnout is detected.

**Query**
XB[ p1 ]?

**Example**
Set the recording off the scale to the right when a sensor burnout is detected on channel 01.

**XI**
Sets the A/D integral time.

**Syntax**
XI \( p_1 \) <terminator>

- **p1** Integration time of the A/D converter
  - AUTO Automatically set in synch with the power supply frequency.
  - 50HZ 20 ms
  - 60HZ 16.7 ms
  - 100MS 100 ms (dot model)

**Query**
XI[ p1 ]?

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

**UC**
Changes the dot color (dot model).

**Syntax**
UC \( p_1, p_2 \) <terminator>

- **p1** Channel number
- **p2** Dot color
  - PURPLE
  - RED
  - GREEN
  - BLUE
  - BROWN
  - BLACK

**Query**
UC[ p1 ]?
4.5 Basic Setting Commands

Example

Set the dot color of channel 06 to purple.

UC 06,PURPLE

Description

On models with the computation function (/M1 option), the dot color of computation channels can be changed.

Example

Set the dot color of channel 06 to purple.

UC 06,PURPLE

UO

Sets the pen offset compensation (pen model).

Syntax

UO p1<terminator>

p1 Pen offset compensation ON/OFF (ON, OFF)

Query

UO?

Example

Use the pen offset compensation.

UO ON

UP

Sets the items to be printed.

Pen model

Syntax

UP p1,p2,p3,p4,p5,p6<terminator>

p1 Channel number/tag selection

CHANNEL Print the channel number

TAG Print the tag

p2 Alarm printout

ON1 Print at alarm occurrence and release

ON2 Print at alarm occurrence

OFF Do not print

p3 Record start time printout ON/OFF (ON, OFF)

p4 New chart speed printout ON/OFF (ON, OFF)

p5 Scale printout ON/OFF (ON, OFF)

p6 Recording color printout ON/OFF (ON, OFF)

Query

UP?

Example

Print tags. Print all items.

UP TAG,ON1,ON,ON,ON,ON

Dot model

Syntax

UP p1,p2,p3,p4,p5,p6<terminator>

p1 Channel number/tag selection

CHANNEL Print the channel number

TAG Print the tag

p2 Alarm printout

ON1 Print at alarm occurrence and release

ON2 Print at alarm occurrence

OFF Do not print

p3 Record start time printout ON/OFF (ON, OFF)

p4 New chart speed printout ON/OFF (ON, OFF)

p5 Scale printout ON/OFF (ON, OFF)

p6 Recording color printout ON/OFF (ON, OFF)

Query

UP?

Example

Print the channel numbers. Print all items.

UP CHANNEL,ON1,ON,ON,ON,ON,ON

UR

Sets the periodic printout interval.

Syntax

UR p1,p2,p3,p4<terminator>

p1 Print interval mode

Auto Automatically set the interval according to the chart speed

Manual Specify the interval

p2 Reference time (00 to 23 [hour])

p3 Interval (10min, 12min, 15min, 20min, 30min, 1h, 2h, 3h, 4h, 6h, 8h, 12h, 24h) (when p1 is Manual)

p4 Periodic printout mode

OFF Disable periodic printout

INST Print instantaneous values.

REPORT Print the report data over the interval.

Query

UR?

Example

Carry out periodic printout every 2 hours with hour 0 as the reference. Print the measured values (instantaneous values) at each interval.

UR Manual,00,2h,INST

Description

• When p1 is set to Auto, the periodic printout interval synchronizes to the chart speed.

• If p4 is set to REPORT, set the type of report data on each channel using the UM command.

UM

Sets the types of report data that are output to the periodic printout.

Syntax

UM p1,p2,p3<terminator>

p1 Channel number

p2 Type of report data

INST Instantaneous value

AVE Average value

MIN Minimum value

MAX Maximum value

SUM Sum value

MIX Average + minimum + maximum values

p3 Sum scale

OFF Integrates the data per scan interval.

/s Integrates the physical amount that are in unit of /s.

/min Integrates the physical amount that are in unit of /min.

/h Integrates the physical amount that are in unit of /hour.

/day Integrates the physical amount that are in unit of /day.

Query

UM[ p1 ]?

Example

Print the average values of channel 03 using periodic printout.

UM 03,AVE

Description

• This setting is possible when printing of report data (p4 is REPORT) is specified using the UR command.

• About p3

The data for sum computation are sampled every scan interval. For data with units such as /s, /min, /h, and /day as in a flow rate, the data can be summed over the unit time.

Parameter p3 is valid only for sum values.
• On models with the computation function (/M1 option), computation channels can be specified.

UB _Sets the display mode of the bar graph._

**Syntax**

\[ UB \ p1,p2<\text{terminator}> \]

- **p1** Channel number
- **p2** Bar graph display mode
  - **NORMAL** The reference position is set to the smaller of the two values, leftmost value and rightmost value.
  - **CENTER** The reference position is set to the 50% position.

**Query**

\[ UB \ p1 \]?

**Example**

Display channel 01 using a bar graph with the reference position set to the 50% position.

\[ UB 01, CENTER \]

**Description**

On models with the computation function (/M1 option), computation channels can be specified.

UI _Sets whether to use moving average (dot model)._

**Syntax**

\[ UI \ p1<\text{terminator}> \]

- **p1** Use/Not use moving average (USE, NOT)

**Query**

\[ UI \]?

**Example**

Use moving average.

\[ UI USE \]

UJ _Sets whether to use the input filter (pen model)._

**Syntax**

\[ UJ \ p1<\text{terminator}> \]

- **p1** Use/Not use the input filter (USE, NOT)

**Query**

\[ UJ \]?

**Example**

Use the input filter.

\[ UJ USE \]

UK _Sets whether to use of partial expanded recording._

**Syntax**

\[ UK \ p1<\text{terminator}> \]

- **p1** Use/Not use partial expanded recording (USE, NOT)

**Query**

\[ UK \]?

**Example**

Use partial expanded recording.

\[ UK USE \]

UL _Selects the display/printout language._

**Syntax**

\[ UL \ p1<\text{terminator}> \]

- **p1** Language (ENGLISH, JAPANESE, GERMAN, FRENCH)

**Query**

\[ UL \]?

**Example**

Use English.

\[ UL ENGLISH \]

---

**XN** _Selects the date format._

**Syntax**

\[ XN \ p1<\text{terminator}> \]

- **p1** Date format for displaying and printing
  - Y/M/D: (example) 2005/08/31
  - M/D/Y: (example) 08/31/2005
  - D/M/Y: (example) 31/08/2005
  - D.M.Y: (example) Aug.31.2005

**Query**

\[ XN \]?

**Example**

Set to the "2005/08/31" format.

\[ XN Y/M/D \]

**Description**

This setting applies to the format of the date shown on the display and the date printed on the periodic printout, manual printout, alarm printout, message printout, recording start printout, new chart speed printout, and start printout and end printout (header printout (/BT1 option)).

**Note**

How this setting applies to the time printout format of the alarm printout, message printout, recording start printout, and new chart speed printout: The setting specifies the format of the "M/D" and "Y/M/D" section when the time printout format is set to "M/D H:M," "M/D H:M:S," or "Y/M D H:M:S."

**XT** _Selects the temperature unit._

**Syntax**

\[ XT \ p1<\text{terminator}> \]

- **p1** Temperature unit
  - °C
  - °F

**Query**

\[ XT \]?

**Example**

Use °F.

\[ XT F \]

UF _Sets whether to use the extended functions._

**Syntax**

\[ UF \ p1,p2,p3,p4,p5<\text{terminator}> \]

- **p1** Bias function (USE, NOT)
- **p2** Square root low-cut function (USE, NOT)
- **p3** 1-5V input low-cut function (USE, NOT)
- **p4** Alarm delay function (USE, NOT)
- **p5** Calibration correction function (USE, NOT) (/CC1 option). This cannot be used with the bias.

**Query**

\[ UF \]?

**Example**

Use the calibration correction extended function.

The bias function is not used.

\[ UF NOT, USE, USE, USE, USE \]

**Description**

- The input offset is set using the VB command.
  - The low-cut function is set using the SR command.
  - The delay alarm is set using the SA and BD commands.
4.5 Basic Setting Commands

- Parameter p5 can be specified on models with the calibration correction (/CC1 option). Use the UQ and VL commands to set the correction values.

**UT** Selects the time printout format.

Syntax

```plaintext
UT p1,p2,p3,p4<terminator>
```

- `p1` Time printout format of the alarm printout
  - The available selections are the same as those of p2. None is not available.
- `p2` Time printout format of the message printout
  - HH:MM:SS Hour:Minute:Second
  - Month Day Hour:Minute:Second
  - Month Day Year Hour:Minute:Second
  - None No time printout
- `p3` Time printout format of the record start time printout
  - The available selections are the same as those of p2. None is not available.
- `p4` Time printout format of the new chart speed printout
  - The available selections are the same as those of p2. None is not available.

Query

```plaintext
UT?
```

Example

Set the all time printouts to Hour:Minute format.

```plaintext
```

**XR** Sets the remote control input (/R1 option).

Syntax

```plaintext
XR p1,p2<terminator>
```

- `p1` Remote control input terminal number (1 to 5)
- `p2` Action
  - NONE No action
  - Record On/Off Start/Stop recording.
  - Chart speed Change the chart speed.
  - Time adjust Reset the internal clock to the nearest hour.
  - Math start/stop Start/Stop computation.
  - Math reset Reset computation.
  - Alarm Ack Execute alarm acknowledge.
  - Message1 Print message 1
  - Message2 Print message 2
  - Message3 Print message 3
  - Message4 Print message 4
  - Message5 Print message 5

Query

```plaintext
XR[ p1]?
```

Example

Assign the printout of message 2 to the remote control input of terminal number 1.

```plaintext
XR 1,Message2
```

Description

- Math start/stop and Math reset can be specified on models with the computation function (/M1 option).
- "Priority R_RCD" and "BatchCMT switch" can be set on products with header printout (/BT1 option).

**YS** Sets the RS-422A/485 interface (/C3 option).

Syntax

```plaintext
YS p1,p2,p3,p4,p5<terminator>
```

- `p1` Address (1 to 32)
- `p2` Baud rate (1200, 2400, 4800, 9600, 19200, 38400)
- `p3` Data length (7, 8)
- `p4` Parity check (ODD, EVEN, NONE)
- `p5` Protocol (NORMAL, MODBUS)

Query

```plaintext
YS?
```

Example

Set the address to 2, the baud rate to 9600, the data length to 8, the parity check to ODD, and the NORMAL protocol.

```plaintext
YS 2,9600,8,ODD,NORMAL
```

Description

- The settings specified by this command and saved using the XE command take effect after the recorder is power cycled.
- If p5 is set to MODBUS, Modbus slave is selected.

**XQ** Sets the TLOG timer (/M1 option).

When not using the timer

Syntax

```plaintext
XQ p1,p2<terminator>
```

- `p1` Timer number (1 or 2)
- `p2` Timer type (OFF)

Query

```plaintext
XQ[ p1]?
```

Example

Disable the number 1 timer.

```plaintext
XQ 1,OFF
```

When using an absolute timer

Syntax

```plaintext
XQ p1,p2,p3,p4,p5,p6<terminator>
```

- `p1` Timer number (1 or 2)
- `p2` Timer type (OFF)
- `p3` Interval (10min, 12min, 15min, 20min, 30min, 1h, 2h, 3h, 4h, 6h, 8h, 12h, 24h)
- `p4` Reference time (fixed to HH format)
  - HH Hour (00 to 23)
- `p5` Reset/not reset the data when the timer expires (ON/OFF)
4.5 Basic Setting Commands

**Commands**

**Query**

\[ xq[p1]? \]

**Example**

Set an absolute timer to timer number 1. Set the interval to 30 minutes, the reference time to hour 7, reset the data when the timer expires, and disable printout.

\[ xq 1, \text{ABSOLUTE}, 30 \text{min}, 07, \text{ON}, \text{OFF} \]

**Description**

Each time the interval specified by p3 elapses from the time specified by p4, the operations set with p5 and p6 are performed.

**When using the relative timer**

**Syntax**

\[ xq p1, p2, p3, p4, p5<\text{terminator}> \]

- **p1** Timer number (1 or 2)
- **p2** Timer type (RELATIVE)
- **p3** Interval (fixed to HH:MM format)
  - **HH** Hour (00 to 24)
  - **MM** Minute (00 to 59)
- **p4** Reset/not reset the data when the timer expires (ON/OFF)
- **p5** Printout ON/OFF (ON, OFF)

**Example**

Set a relative timer to timer number 1. Set the interval to 1 hour 15 minutes, reset the data when the timer expires, and disable printout.

\[ xq 1, \text{RELATIVE}, 01:15, \text{ON}, \text{OFF} \]

**Description**

Each time the interval specified by p3 elapses from the time the computation is started, the operations set with p4 and p5 are performed.

**UN** Changes the assignment of channels to the recording pen (pen model, /M1 option).

**Syntax**

\[ un p1, p2<\text{terminator}> \]

- **p1** Pen number (1 to 4)
- **p2** Channel number

**Query**

\[ un[p1]? \]

**Example**

Assign computation channel 0A to pen number 4.

\[ un 4, 0A \]

**Description**

The settings specified by this command and saved using the XE command take effect after the recorder is power cycled.

**YA** Sets the IP address (/C7 option).

**Syntax**

\[ ya p1, p2, p3<\text{terminator}> \]

- **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, the subnet mask to 255.255.255.0, and the 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 and saved using the XE command take effect after the recorder is power cycled.

**YN** Sets the DNS (/C7 option).

**When not using the DNS**

**Syntax**

\[ yn p1<\text{terminator}> \]

- **p1** Use/Not use the DNS (OFF)

**Query**

\[ yn? \]

**Example**

Do not use the DNS.

\[ yn \text{OFF} \]

**When using the DNS**

**Syntax**

\[ yn p1, p2, p3, p4, p5<\text{terminator}> \]

- **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** Domain suffix 1 (up to 64 characters)
- **p5** Domain suffix 2 (up to 64 characters)

**Query**

\[ yn? \]

**Example**

Use the DNS server at 192.168.0.1.

\[ yn \text{ON}, 192.168.0.1 \]
### 4.5 Basic Setting Commands

**YD**  Sets whether to use the login function via communication (/C7 option).

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>YD p1&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Use/Not use the login function via communication (USE, NOT)</td>
</tr>
</tbody>
</table>

**Query**  `YD?`

**Example**  Use the login function via communication.

**YD USE**

**Description**  The settings specified by this command and saved using the XE command take effect after the recorder is power cycled.

**YQ**  Sets the communication timeout (/C7 option).

**When not using the timeout**

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>YQ p1&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Enable/Disable communication timeout (OFF)</td>
</tr>
</tbody>
</table>

**Query**  `YQ?`

**Example**  Disable timeout.

**YQ OFF**

**When using the timeout**

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>YQ p1,p2&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Enable/Disable communication timeout (ON)</td>
</tr>
<tr>
<td><strong>p2</strong></td>
<td>Timeout time (1 to 120) [minutes]</td>
</tr>
</tbody>
</table>

**Query**  `YQ?`

**Example**  Enable communication timeout and set the timeout period to 3 min.

**YQ ON,3**

**Description**  The settings specified by this command and saved using the XE command take effect after the recorder is power cycled.

**YK**  Sets keepalive (/C7 option).

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>YK p1&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Enable/Disable keepalive (ON, OFF)</td>
</tr>
</tbody>
</table>

**Query**  `YK?`

**Example**  Disable keepalive.

**YK OFF**

**UQ**  Sets the calibration correction mode and the number of calibration set points (/CC1 option).

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>UQ p1,p2,p3&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Channel number</td>
</tr>
<tr>
<td><strong>p2</strong></td>
<td>Setting mode</td>
</tr>
<tr>
<td><strong>p3</strong></td>
<td>Number of calibration set points (2 to 16)</td>
</tr>
</tbody>
</table>

**Query**  `UQ[ p1]?`

**Example**  Set the setting mode to Abs.Value and the number of calibration set points to 2 on channel 01.

**UQ 01,ABS.VALUE,2**

**Description**
- This setting is valid when the calibration correction function is enabled (see the **UF** command).
- Use the **VL** command to set the correction points and correction values.

**UA**  Sets the record position.

**Pen model**

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>UA p1,p2,p3&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Record position selection</td>
</tr>
<tr>
<td><strong>p2</strong></td>
<td>Pen number (1 to 4)</td>
</tr>
<tr>
<td><strong>p3</strong></td>
<td>Record position adjustment value</td>
</tr>
</tbody>
</table>

**Example**  Adjust the 0% position of pen 1. Set the record position adjustment value to 20.

**UA ZERO,1,20**

**Dot model**

<table>
<thead>
<tr>
<th>Syntax</th>
<th><code>UA p1,p2&lt;terminator&gt;</code></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p1</strong></td>
<td>Record position selection</td>
</tr>
<tr>
<td><strong>p2</strong></td>
<td>Record position adjustment value</td>
</tr>
</tbody>
</table>

**Example**  Adjust the 0% position of pen 1. Set the record position adjustment value to 20.

**UA ZERO,1,20**

**Description**
- Check the recorded result and correct the record position adjustment value.
- To end the adjustment, execute the **UY0** command. If you do not end the adjustment, you cannot change the execution mode.
- The unit for **p3** is 1/30 mm.

**Hysteresis**

The difference in the record position according to the operating direction of the printer carriage

<table>
<thead>
<tr>
<th><strong>p2</strong></th>
<th>Record position adjustment value</th>
</tr>
</thead>
<tbody>
<tr>
<td>When <strong>p1 = Hysteresis</strong></td>
<td>An integer between −7 to 7</td>
</tr>
<tr>
<td>When <strong>p1 = ZERO</strong></td>
<td>An integer between 0 and 15</td>
</tr>
</tbody>
</table>

**Example**  Adjust the 0% position of pen 1. Set the record position adjustment value to 20.

**UA ZERO,1,20**
When $p1 = \text{FULL}$

- $\mu R10000$: An integer between $-30$ to $30$
  (reference value: $1000$)
- $\mu R20000$: An integer between $-50$ to $50$
  (reference value: $1800$)

**Example**

Adjust the 100% position. Set the record position adjustment value to 25.

`UA FULL,25`

**Description**

- Carry out the adjustment in the following order: $P1 =$ Hysteresis, ZERO, and then $\text{FULL}$.
- Check the recorded result and correct the record position adjustment value.
- To end the adjustment, execute the $\text{UY0}$ command. If you do not end the adjustment, you cannot change the execution mode.
- The unit for $p2$ is dot (0.1 mm).

### UG

**Sets the Setting mode menu selection.**

**Syntax**

```
UG p1, p2, p3, p4, p5, p6, p7, p8, p9, p10 <terminator>
```

- $p1$: Range (ON, OFF)
- $p2$: Bias (ON, OFF)
- $p3$: Alarm (ON, OFF)
- $p4$: Units (ON, OFF)
- $p5$: Chart speed (ON, OFF)
- $p6$: Other (ON, OFF)
- $p7$: Calibration correction (ON, OFF) (/CC1 option)
- $p8$: Computation (ON, OFF) (/M1 option)
- $p9$: Batch name (ON, OFF) (/BT1 option)
- $p10$: Batch details (ON, OFF) (/BT1 option)

**Query**

```
UG?
```

**Example**

Display all menus.

`UG ON, ON, ON, ON, ON, ON, ON, ON, ON, ON`

**Description**

- Parameter $p7$ can be specified on models with the calibration correction (/CC1 option).
- Parameter $p8$ can be specified on models with the computation function (/M1 option).
- Parameters $p9$ and $p10$ can be specified on models with the header printout (/BT1 option).

### Note

Parameters $p7$ and higher are skipped when no options are installed.

### UE

**Selects enable/disable for Start printout/End printout and message format (/BT1 option).**

**When using Start printout/End printout**

**Syntax**

```
UE p1, p2, p3, p4 <terminator>
```

- $p1$: Use of Start printout/End printout (USE)
- $p2$: Number of digits for lot number (4, 6, NOT)
- $p3$: Use/Not use Start printout 2/End printout 2 (USE, NOT)
- $p4$: Use/Not use message format (USE, NOT)

**Query**

```
UE?
```

**Example**

Perform Start printout/End printout, set 6 digits for lot number, use Start printout 2/End printout 2 and message format.

`UE USE, 6, USE, USE`

**Description**

Set the message format using the `VM` command.

### YE

**Exits from Basic Setting mode.**

**Description**

- Set the lot number using the `VH` command.
- Set the message format using the `VM` command.

### XE

**Exits from Basic Setting mode.**

Communication is not dropped when the `XE` command is executed.
4.6 Control Commands

**DS**  Switches the execution mode.

- **Syntax**
  - `DS p1<terminator>`
    - `p1` Mode
      - 0 Run mode
      - 1 Basic Setting mode

- **Example**
  - Switch to Basic Setting mode.
  - `DS 1`

- **Description**
  - The execution mode cannot be changed to Basic Setting Mode while recording or computation is in progress.

**PS**  Starts/Stop recording.

- **Syntax**
  - `PS p1<terminator>`
    - `p1` Start/Stop recording.
      - 0 Start
      - 1 Stop

- **Example**
  - Start recording.
  - `PS 0`

**UD**  Switches the screen/switches the channel.

- **Displaying the specified data display screen**
  - **Syntax**
    - `UD p1,p2<terminator>`
      - `p1` Fixed to 1.
      - `p2` Screen number (1 to 15)

- **Example**
  - Display data display screen 2.
  - `UD 1,2`

- **Switching the display channel (manual switching)**
  - **Syntax**
    - `UD p1<terminator>`
      - `p1` Fixed to 2.

- **Example**
  - Switch the display channel.
  - `UD 2`

- **Description**
  - • An error results if the specified screen is set to SKIP for UD1.
  - • UD2 is valid on screens whose display channel is set to manual swapping.

**AK**  Executes alarm acknowledge (Alarm ACK).

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

- **Example**
  - Execute alarm acknowledge.
  - `AK 0`

**TL**  Starts/stops/resets computation (/M1 option).

- **Syntax**
  - `TL p1<terminator>`
    - `p1` Operation type
      - 0 Computation start
      - 1 Computation stop
      - 2 Computation reset

- **Example**
  - Start the computation.
  - `TL 0`

**MP**  Starts/Stop manual print.

- **Syntax**
  - `MP p1<terminator>`
    - `p1` Operation type
      - 0 Manual print start
      - 1 Manual print stop

- **Example**
  - Start manual print.
  - `MP 0`

**LS**  Starts/Stop the list (setting information) printout.

- **Syntax**
  - `LS p1<terminator>`
    - `p1` Operation type
      - 0 List print start
      - 1 List print stop

- **Example**
  - Start list print.
  - `LS 0`

- **Description**
  - List print refers to printing of settings of Setting mode.

**SU**  Starts/Stop the setup list (basic setting information) printout.

- **Syntax**
  - `SU p1<terminator>`
    - `p1` Operation type
      - 0 Setup list print start
      - 1 Setup list print stop

- **Example**
  - Start setup list print.
  - `SU 0`

- **Description**
  - Setup list print refers to printing of settings of Basic Setting mode.

**MS**  Prints the message.

- **Syntax**
  - `MS p1<terminator>`
    - `p1` Message number (1 to 5)

- **Example**
  - Print the message of message number 3.
  - `MS 3`

- **Description**
  - The message string is set with the SG command.

**AC**  Clears the alarm printout buffer.

- **Syntax**
  - `AC p1<terminator>`
    - `p1` Clear the alarm printout buffer (0)

- **Example**
  - Clear the alarm printout buffer.
  - `AC 0`
MC Clears the message printout buffer.

Syntax

MC p1<terminator>

Example

Clear the message printout buffer.

VG Resets the report data of the periodic printout.

Syntax

VG p1<terminator>

Example

Reset the report data of the periodic printout.

YC Initializes settings.

Syntax

YC p1<terminator>

Example

Initialize the Setting mode and Basic Setting mode settings.

UY Stops the record position adjustment.

Syntax

UY p1<terminator>

Query

UY?

Example

Stop the record position adjustment.

BO Sets the byte output order.

Syntax

BO p1<terminator>

Example

Output the data MSB first.

CS Sets the checksum (/C3 option).

Syntax

CS p1<terminator>

Example

Use the checksum.

IF Sets the status filter.

Syntax

IF p1<terminator>

Example

Set the status filter value to 1.0.4.0.

Note

Initialization of BO/CS/IF Command Settings

- For serial communications

  Settings entered using the BO/CS/IF commands revert to their initial values when the recorder is reset (when the recorder is power cycled, or the user exits the basic setting mode with the YE command).
  - Byte output order, checksum: 0
  - Status filter: 255.255.255.255

- For Ethernet communications

  Settings entered using the BO/IF commands revert to their initial values when the connection to the recorder is cut. After reconnecting the recorder, you must reenter the settings.
4.7 Output Commands

**CC** Disconnects an Ethernet connection (/C7 option).

Syntax: \texttt{CC \textsl{p1}<terminator>}

\textsl{p1} Disconnect the connection (0)

**Example**

CC 0

**FE** Outputs decimal point position, unit information, and setup data.

Syntax: \texttt{FE \textsl{p1,p2,p3}<terminator>}

\textsl{p1} Output data type
- 0 Setup data of Setting mode
- 1 Decimal point position and unit information
- 2 Setup data of Basic Setting mode
- 4 Setting data file

\textsl{p2} First output channel number

\textsl{p3} Last output channel number

**Example**

Output the setup data of the Setting commands of channel 01 through 04.

FE 0,01,04

**Description**
- Be sure to set \textsl{p2} and \textsl{p3} so that \textsl{p3} is greater than or equal to \textsl{p2}.
- The settings of \textsl{p2} and \textsl{p3} are valid when \textsl{p1} = 0, 1, or 2.
- The setting data file can be viewed using the configuration software.

**FD** Outputs the most recent measured/computed data.

Syntax: \texttt{FD \textsl{p1,p2,p3}<terminator>}

\textsl{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

\textsl{p2} First output channel number

\textsl{p3} Last output channel number

**Example**

Output two blocks of FIFO data from channels 01 to 06.

FF GET,01,06,2

**Description**
- The FIFO buffer is of a circular type which overwrites from the oldest data when it is full.
- The FR command is used to set the acquiring interval.
- There are two FIFO data output formats.
- Logging output (GET)
- Output the specified number of blocks (\textsl{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.

\textsl{p2} First output channel number

\textsl{p3} Last output channel number

\textsl{p4} The upper limit of number of blocks that are to be loaded

Pen model
- FIFO buffer length 240 blocks
- Maximum buffer period 240 intervals

Dot model
- FIFO buffer length 60 blocks
- Maximum buffer period 60 intervals

**FY** Outputs the statistical computation results.

Syntax: \texttt{FY \textsl{p1,p2,p3}<terminator>}

\textsl{p1} Output data type
- \textsl{Inst} Output the most recent periodic printout data (instantaneous value)

**Example**

Output the statistical calculation data of periodic printout (report data)

Report

Tlog1 Output the data at the most recent timeout of TLOG timer 1

Tlog2 Output the data at the most recent timeout of TLOG timer 2

\textsl{p2} First output channel number

\textsl{p3} Last output channel number

**Description**
- Tlog1 and Tlog2 are valid on models with the computation function (/M1 option).
4.7 Output Commands/4.8 RS-422A/485 Dedicated Commands

Newest value output (GETNEW)
Output the specified number of blocks (p4) of FIFO data back starting from the recent acquire position (block).

- Parameters p2, p3, 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.
- Be sure to set p2 and p3 so that p3 is greater than or equal to p2.
- For the output flow of FIFO data, see appendix 4.

**IS** Outputs status information.

**Syntax**
\[
\text{IS } p1\text{<terminator>}
\]

**Example**
Output status information.
\[
\text{IS } 0
\]

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

**FU** Outputs user information.

**Syntax**
\[
\text{FU } p1\text{<terminator>}
\]

**Example**
Output user information.
\[
\text{FU } 0
\]

**Description**
Outputs the information of the user currently connected to the recorder.

4.8 RS-422A/485 Dedicated Commands

**ESC O** Opens the instrument.

The ASCII code of ESC is 1BH.

**Syntax**
\[
\text{ESC O } p1\text{<terminator:CR+LF>}
\]

**Example**
Open the instrument at address 01.
\[
\text{ESC O } 01
\]

**Description**
- Specifies the address of the instrument 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 recorder transmits the data “ESC O xx” (xx: Instrument’s address). For the description of the response, see page 5-5.
- Use CR+LF for the terminator. LF cannot be used.

**ESC C** Closes the instrument.

The ASCII code of ESC is 1BH.

**Syntax**
\[
\text{ESC C } p1\text{<terminator:CR+LF>}
\]

**Example**
Close the instrument at address 01.
\[
\text{ESC C } 01
\]

**Description**
- Clears the current connection with the instrument.
- When this command is received correctly, the recorder transmits the data “ESC C xx” (xx: Instrument’s address). For the description of the response, see page 5-5.
- Use CR+LF for the terminator. LF cannot be used.
4.9 Maintenance/Test Commands (Available when using the maintenance/test server function via Ethernet communications)

**close** Disconnects the connection between other instruments.

Syntax: `close, p1, p2:p3<terminator>`
- `p1` Port on the recorder 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`

Description: This command cannot be used to disconnect a server port. Also, it cannot disconnect the recorder being operated. Use the quit command for this purpose.

**con** Outputs connection information.

Syntax: `con<terminator>`

Example: `con`

Example:
```
04/10/01 12:34:56
```

Active connections

<table>
<thead>
<tr>
<th>Proto</th>
<th>Local Address</th>
<th>Foreign Address</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP</td>
<td>192.168.111.24:34159</td>
<td>192.168.111.24:1053</td>
<td>ESTABLISHED</td>
</tr>
<tr>
<td>TCP</td>
<td>0.0.0.0:34155</td>
<td>0.0.0.0:1053</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0.0.0.0:34159</td>
<td>0.0.0.0:1053</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0.0.0.0:34150</td>
<td>0.0.0.0:1053</td>
<td>LISTEN</td>
</tr>
</tbody>
</table>

**eth** Outputs Ethernet statistical information.

Syntax: `eth<terminator>`

Example:
```
eth
```

Example:
```
04/10/01 12:34:56
```

Ethernet Statistics

<table>
<thead>
<tr>
<th>Name</th>
<th>In Pkt</th>
<th>In Err</th>
<th>Out Pkt</th>
<th>Out Err</th>
<th>16 Coll</th>
</tr>
</thead>
<tbody>
<tr>
<td>lo0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>mb0</td>
<td>74</td>
<td>0</td>
<td>64</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**help** Outputs help.

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

Example:
```
help
```

Example:
```
04/10/01 12:34:56
```

**net** Outputs network statistical information.

Syntax: `net<terminator>`

Example:
```
net
```

Example:
```
04/10/01 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: ftpadrops = 0 |
| TCP: keepalive = 30 s |
| TCP: connects = 14 |
| TCP: closed = 0 |
| TCP: timeoutdrop = 0 |
| TCP: keepdrops = 0 |
| TCP: sndtotal = 53 |
| TCP: sndbyte = 0 |
| TCP: sndremitpack = 0 |
| TCP: sndremitbyte = 1 |
| TCP: rcvtotal = 0 |
| TCP: rcvbyte = 0 |
| DLC: 16 collisions = 0 |

**State**
- Connection status.
- ESTABLISHED
- Connection established.
4.9 Maintenance/Test Commands

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

The instrument information server function interprets one UDP packet to be one command and returns a single packet (containing the recorder’s information) in response to the command.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>serial</td>
<td>Outputs the serial number.</td>
</tr>
<tr>
<td>host</td>
<td>Outputs the host name (the host name specified in section 2.3).</td>
</tr>
<tr>
<td>ip</td>
<td>Outputs the IP address (the IP address specified in section 2.3).</td>
</tr>
</tbody>
</table>

Example: Query the IP address and host name. (Of the two frames below, the top frame represents the command packet, the bottom frame represents the response packet.)

```
ip host

EA
ip = 192.168.111.24
host = ABC
EN
```

Description:
- Separate each parameter with one or more blanks (space, tab, carriage return, line feed).
- Parameters are not case sensitive.
- Undefined parameters are ignored.
- Parameters beyond the 32nd parameter are ignored.

TCP: keepalive
Keepalive check cycle.
TCP: connects
Total number of connections established.
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 instruments 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 instrument being operated.

Syntax: `quit<terminator>`
### 5.1 Response Syntax

The following table shows the types of responses for various commands described in the previous chapter.

The recorder returns a response (affirmative/negative response) to a command that is separated by a single terminator. The controller should follow the one command to one response format.

<table>
<thead>
<tr>
<th>Function</th>
<th>Command Type</th>
<th>Response Type</th>
<th>Affirmation</th>
<th>Negation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting/Measurement server</td>
<td>Command</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting command</td>
<td>Basic setting command</td>
<td>Affirmative response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control command</td>
<td>Output command</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setup, measurement, and computation data output</td>
<td>ASCII output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS-422A/485 dedicated</td>
<td>BINARY output</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Note

The "CRLF" used in this section denotes a terminator.

#### Affirmative Response

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

- **Syntax**
  
  \[ \text{E0CRLF} \]

- **Example**
  
  \[ \text{E0} \]

#### Single Negative Response

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

- **Syntax**
  
  \[ \text{E1}_n\text{nn}_\text{mmm} \ldots \text{m}_\text{CRLF} \]

  - \text{nnn} Error number (001 to 999)
  - \text{mmm} \ldots \text{m} Message (variable length, one line)
  - _ Space

- **Example**
  
  \[ \text{E1 001 "System error"} \]

#### Multiple Negative Responses

- If there is an error in any one of the multiple commands that are separated by sub delimiters, multiple negative responses 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**
  
  \[ \text{E2}_\text{ee}:\text{nnn}_\text{CRLF} \]

  - When there is only one error
  
  \[ \text{E2}_\text{ee}:\text{nnn},\text{ee}:\text{nnn},\ldots,\text{ee}::\text{nnn}_\text{CRLF} \]

  - When there are multiple errors

  - \text{ee} Error position (01 to 10)
  - \text{nnn} Error number (001 to 999)
  - _ Space
5.1 Response Syntax

**Example**

E2 02:001

**ASCII Output**

The following types of ASCII data are available. For the data formats, see section 5.2.

- Setting data, basic setting data, decimal position/unit information, measured/computed data, report data generated by the periodic printout, status information, and user information

**Syntax**

EACRLF

: ENCRLF

**BINARY Output**

**Conceptual Diagram**

- **EBCRLF**
  Indicates that the data is 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 5.3.

- **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.
5.1 Response Syntax

- **Flag**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name (Abbreviation)</th>
<th>Flag 0</th>
<th>Flag 1</th>
<th>Meaning of the Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>BO</td>
<td>MSB</td>
<td>LSB</td>
<td>Output byte order</td>
</tr>
<tr>
<td>6</td>
<td>CS</td>
<td>No</td>
<td>Yes</td>
<td>Existence of a checksum</td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>0</td>
<td>Reserved</td>
<td>–</td>
<td>–</td>
<td>Fixed to 1.</td>
</tr>
</tbody>
</table>

- 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.
- The bits that have “–” for the flag and flag are not used. The value is undefined.

- **Identifier**

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Binary Data Type</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Undefined file</td>
<td>–</td>
</tr>
<tr>
<td>1</td>
<td>Measured/computed data</td>
<td>Section 5.3</td>
</tr>
<tr>
<td>10</td>
<td>FIFO data</td>
<td>Section 5.3</td>
</tr>
<tr>
<td>10</td>
<td>Setup data file</td>
<td>Undisclosed</td>
</tr>
</tbody>
</table>

- The table above shows the different types of BINARY Data.
- Measured/computed data can be output using the FD command.
- FIFO data can be output using the FF command.
- The setup data file can be output using the FE command. The setup data file can be loaded in the configuration software.
- The identifier section in the “Conceptual diagram” on the previous page contains the ID number shown above.

**Note**

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

- **Calculating the Sum Value**

If you set the parameter of the CS command to “1 (enabled),” the checksum value is 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). If 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.

```c
/*
 * Sum Calculation Function (for a 32-bit CPU)
 *
 * Parameters 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
 * Return 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.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-422A/485 Dedicated Commands and Responses

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

<table>
<thead>
<tr>
<th>Command Syntax</th>
<th>Meaning</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC O xx CRLF</td>
<td>Open the instrument.</td>
<td>• Response from the instrument with the specified address</td>
</tr>
<tr>
<td>(_ space)</td>
<td></td>
<td>• Response when the instrument with the specified address does not exist*</td>
</tr>
<tr>
<td>ESC C xx CRLF</td>
<td>Close the instrument.</td>
<td>• Response from the instrument with the specified address</td>
</tr>
<tr>
<td>(_ space)</td>
<td></td>
<td>• Response when the instrument with the specified address does not exist*</td>
</tr>
</tbody>
</table>

* 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 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.
- Use CR+LF for the terminator. LF cannot be used.

**Note**

The ASCII code of ESC is 1BH.
5.2 Output Format of ASCII Data

The following types of ASCII data are available.
- Setting data/Basic Setting data
- Decimal point position/unit information
- Measured/computed data
- Report data generated by the periodic printout
- Status information
- User information

Note
The "CRLF" used in this section denotes a terminator.

Setting/Basic Setting data
- The FE command (FE0 or FE2) 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 4.2, "A List of Commands." However, the setting information for the following commands is not output.
  - Setting commands
    SD, CM, and FR
  - Basic Setting commands
    YE and XE
- The output format of the setting/basic setting data is the same as 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
	ttssssssCRLF
................
ENCRLF

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

Example
EA
SR01,VOLT,20mV,0,20
SR02,VOLT,20mV,0,20
................
EN
Decimal Point Position/Unit Information

- The FE command (FE1) is used to output the data.

- Syntax
  The data is output for each channel in the following syntax.

  EACRLF
  s_kccuuuuuu,ppCRLF
  ENCRLF

  s  Data status (N, D, S)
     N: Normal
     D: Differential input
     S: Skip (When the input 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
     µR10000: 01 to 06, 0A to 0P
     µR20000: 01 to 24, 0A to 1P

  uuuuuu Unit information (6 characters, left-justified)
     mV____: mV
     V_____: V
     °C____: °C
     xxxxxx: (User-defined character string)

  pp Decimal point position (00 to 04)
     No decimal (0000) for 00.
     One digit to the right of the decimal (0000.0) for 01.
     Two digits to the right of the decimal (00.00) for 02.
     Three digits to the right of the decimal (0.000) for 03.
     Four digits to the right of the decimal (0.0000) for 04.

- Example

  EA
  N 001mV ,01
  N 002mV ,01
  EN
5.2 Output Format of ASCII Data

Measured/computed Data

- The FD (FD0) or FY (FYInst, FYTlog1, or FYTlog2) command is used to output the data.

- 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.mmmt_S1S2S3S4S5S6CRLF
s_kcca1a2a3a4uuuuuuuf1dddddEf2ppCRLF
```

- ENCRLF

```
yy
  Year (00 to 99)
mo
  Month (01 to 12)
dd
  Day (01 to 31)
hh
  Hour (00 to 23)
m
  Minute (00 to 59)
ss
  Second (00 to 59)
mmm
  Millisecond (000 to 999. A period is placed between seconds and milliseconds.)
t
  ‘S’ (=summer) or ‘ ’ space (=winter)
S1S2S3S4S5S6
  Data status
SlS2S3S4S5S6
  Time change during TLOG computation: T (occurred) or space (not occurred)
S2
  Power OFF and ON during TLOG computation: P (occurred) or space (not occurred)
S3
  Data reset during the TLOG computation: R (occurred) or space (not occurred)
S4S5S6
  All spaces
s
  Channel data status (N, D, S, O, B, E)
  N: Normal
  D: Differential input
  S: Skip
  O: Over
  B: Burnout
  E: Error
k
  Channel type
  0: Measurement channel
  A: Computation channel
cc
  Channel number
  µR10000: 01 to 06, 0A to 0P
  µR20000: 01 to 24, 0A to 1P
a1a2a3a4
  a1: Alarm status (level 1)
a2
  a2: Alarm status (level 2)
a3
  a3: Alarm status (level 3)
a4
  a4: Alarm status (level 4)
5.2 Output Format of ASCII Data

Each status is set to H, L, h, l, R, r, T, t, or space.
H: high limit alarm, L: low limit alarm, h: difference high-limit alarm, l: difference low-limit alarm, R: high limit on rate-of-change alarm, r: low limit on rate-of-change alarm, T: delay high limit alarm, t: delay low limit alarm, space: no alarm.

uuuuuu Unit information (6 characters, left-justified)
mV_____: mV
V_____: V
°C_____: °C
xxxxxx: (User-defined character string)

f1 Sign (+, −) of mantissa
• Positive over data, error data, and the burnout data when "up" is specified are positive.
• Negative over data and the burnout data when "down" is specified are negative.

dddddd Mantissa (00000 to 99999, 5 digits)
• 8 digits for computed data.
• For error data (channel data status is E), over data (channel data status is O), or burnout data (channel status data is B), the mantissa is set to 99999 (99999999 for computed data).

f2 Sign (+, −) of exponent
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 −12345E-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.
5.2 Output Format of ASCII Data

Report Data Generated by the Periodic Printout

- The FY command (FYREPORT) is used to output the data.
- Report data generated by the periodic printout is output.

Syntax

EACRLF

YY/MO/DD_HH:MI:SS.MMT

yy/mo/dd_hh:mi:ss.mmmt_S1S2S3S4S5S6CRLF

s1s2s3s4s5s6kccuuuuuuuf1dddddEf2pp_f1dddddEf2pp_f1dddddEf2pp_f1dddddEf2ppCRLF

....................

ENCRLF

YY/MO/DD HH:MI:SS.MMT .... Report start time information

yy/mo/dd hh:mi:ss.mmmt .... Report end time information

YY, yy Year (00 to 99)

MO, mo Month (01 to 12)

DD, dd Day (01 to 31)

HH, hh Hour (00 to 23)

MI, mi Minute (00 to 59)

SS, ss Second (00 to 59)

MMM, mmm Millisecond (000 to 999)

T, t ‘S’ (=summer) or ‘ ‘ space (=winter)

S1S2S3S4S5S6 Data status

S1 Time change during reporting: T (occurred) or space (not occurred)

S2 Power OFF and ON during reporting: P (occurred) or space (not occurred)

S3 Data clear during reporting: R (occurred) or space (not occurred)

S4S5S6 All spaces

s1s2s3s4s5s6 Channel data status

s1 Channel mode at the end of reporting: S (Skipped) or space (Mode other than skipped)

s2 Range change during reporting: C (occurred) or space (not occurred)

s3 Error data occurrence during reporting: E (yes) or space (no)

s4 Error data occurrence during reporting: O (yes) or space (no)

s5s6 All spaces

cc Channel number

µR10000: 01 to 06, 0A to 0P
µR20000: 01 to 24, 0A to 1P

k Channel type (0, A)

0: Measurement channel
A: Computation channel

uuuuuu Unit information (6 characters)
5.2 Output Format of ASCII Data

The data is output in the following order: most recent value, minimum value, maximum value, average value, and sum value.

- **f₁** : Most recent value, minimum value, maximum value, and average value of the measurement channel
- **f₂** : Sum value of the measurement channel or the most recent value, minimum value, maximum value, average value, and sum value of the computation channel

**Example**

<table>
<thead>
<tr>
<th>EA</th>
<th>04/08/04 10:22:20.500S</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/08/04 19:56:32.500S TP</td>
<td></td>
</tr>
<tr>
<td>001mV</td>
<td>+12345E-03 +12345E-03 +12345E-03 +12345E-03 +12345678E-03</td>
</tr>
<tr>
<td>002mV</td>
<td>-12345E-01 -12345E-01 -12345E-01 -12345E-01 -12345678E-01</td>
</tr>
<tr>
<td>S</td>
<td>003</td>
</tr>
<tr>
<td>S</td>
<td>004</td>
</tr>
<tr>
<td>A0A</td>
<td>+12345678E-03 +12345678E-03 +12345678E-03 +12345678E-03 +12345678E-03</td>
</tr>
<tr>
<td>A0B</td>
<td>-12345678E-01 -12345678E-01 -12345678E-01 -12345678E-01 -12345678E-01</td>
</tr>
<tr>
<td>S</td>
<td>A0C</td>
</tr>
<tr>
<td>S</td>
<td>A0D</td>
</tr>
<tr>
<td>EN</td>
<td></td>
</tr>
</tbody>
</table>
5.2 Output Format of ASCII Data

**Status Information**

- The IS command is used to output the data.
- The operation status of the recorder is output.
- For details on the status information, see section 6.2, “The Bit Structure of the Status Information.”

- **Syntax**
  
  ```
  EACRLF
  ddd.ccc.bbb.aaaCRLF
  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
  ```

**User Information**

- 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-422A/485
  l  User level
  A: Administrator
  U: User
  uuu•••u  User name (up to 16 characters)
  _  Space
  ```

- **Example**
  
  ```
  EA
  E A admin
  EN
  ```
5.3 Output Format of BINARY Data

This section describes the output format of the BINARY data that is disclosed. For the BINARY output format, see “BINARY Output” on page 5-2. For other BINARY data types, see “Identifier” on page 5-3.

The measured data is output using signed 16-bit integer; the computed data is output using signed 32-bit integer. These integers can be understood as physical values by adding the decimal point and the unit.

Typical Examples to Obtain Physical Values

<table>
<thead>
<tr>
<th>BINARY Value</th>
<th>Decimal Position Code</th>
<th>Physical Value (Measured Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
<td>0</td>
<td>10000</td>
</tr>
<tr>
<td>10000</td>
<td>1</td>
<td>1000.0</td>
</tr>
<tr>
<td>10000</td>
<td>2</td>
<td>100.00</td>
</tr>
<tr>
<td>10000</td>
<td>3</td>
<td>10.000</td>
</tr>
<tr>
<td>10000</td>
<td>4</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Measured/Computed Data and FIFO Data

- The FD (FD1) command is used to output the most recent measured/computed data.
- The FF (FEGET, FERESEND, and FEGETNEW) command is used to output the FIFO data. The decimal point position and unit can be determined using the FE command.
- The ID number of the output format is 1. See “Identifier” on page 5-3.

2 bytes 2 bytes

Number of blocks Number of bytes

<table>
<thead>
<tr>
<th>Block 1</th>
<th>...</th>
<th>Block n</th>
</tr>
</thead>
<tbody>
<tr>
<td>BINARY data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(The BINARY data section on the “Conceptual diagram” on page 5-2.)

- **Number of Blocks**
  This is the number of blocks.

- **Number of Bytes**
  This is the size of one block in bytes.

- **Block**

<table>
<thead>
<tr>
<th>1 byte</th>
<th>1 byte</th>
<th>1 byte</th>
<th>1 byte</th>
<th>1 byte</th>
<th>2 bytes</th>
<th>1 byte</th>
<th>1 byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Hour</td>
<td>Minute</td>
<td>Second</td>
<td>Millisecond</td>
<td>Reserved*</td>
</tr>
<tr>
<td>Measured/Computed</td>
<td>Channel A2A1</td>
<td>A4A3</td>
<td>Measured data</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Measured/Computed</td>
<td>Channel A2A1</td>
<td>A4A3</td>
<td>Computed data</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

4 bytes

* The sections indicated as (Reserved) are not used. The value is undefined.
5.3 Output Format of BINARY Data

- **Flag**
  
The meanings of the flags are given on the table below. The flags are valid during FIFO data output. The flags are undefined for other cases.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Flag 0</th>
<th>Flag 1</th>
<th>Meaning of the Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>–</td>
<td>–</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>–</td>
<td>–</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>No</td>
<td>Yes</td>
<td>6</td>
</tr>
</tbody>
</table>

The bits that have "—" for the flag column are not used. The value is undefined.

- **Block Member**

<table>
<thead>
<tr>
<th>Name</th>
<th>BINARY Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>0 to 99</td>
</tr>
<tr>
<td>Month</td>
<td>1 to 12</td>
</tr>
<tr>
<td>Day</td>
<td>1 to 31</td>
</tr>
<tr>
<td>Hour</td>
<td>0 to 23</td>
</tr>
<tr>
<td>Minute</td>
<td>0 to 59</td>
</tr>
<tr>
<td>Second</td>
<td>0 to 59</td>
</tr>
<tr>
<td>Millisecond</td>
<td>0 to 999</td>
</tr>
<tr>
<td>DST</td>
<td>1 (=summer) or 0 (=winter)</td>
</tr>
<tr>
<td>Measurement, computation</td>
<td>00H: measurement, 80H: computation</td>
</tr>
<tr>
<td>Channel</td>
<td>µR10000: 01 to 06 and 31 to 42</td>
</tr>
<tr>
<td></td>
<td>µR20000: 01 to 24, 31 to 54</td>
</tr>
<tr>
<td>Alarm status*</td>
<td>0 to 8</td>
</tr>
<tr>
<td>A1 (Bit 0 to 3)</td>
<td></td>
</tr>
<tr>
<td>A2 (Bit 4 to 7)</td>
<td>0 to 8</td>
</tr>
<tr>
<td>A3 (Bit 0 to 3)</td>
<td></td>
</tr>
<tr>
<td>A4 (Bit 4 to 7)</td>
<td></td>
</tr>
<tr>
<td>Measured data</td>
<td>0 to FFFFH</td>
</tr>
<tr>
<td>Computed data</td>
<td>0 to FFFFFFFH</td>
</tr>
</tbody>
</table>

* 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 (high limit alarm), L (low limit alarm), h (difference high-limit alarm), l (difference low-limit alarm), R (high limit on rate-of-change alarm), r (low limit on rate-of-change alarm), T (delay high limit alarm), and t (delay low limit alarm) as follows:


- **Special Data Value**
  
The measured/computed data take on the following values under special conditions.

<table>
<thead>
<tr>
<th>Special Data Value</th>
<th>Measured Data</th>
<th>Computed Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Over</td>
<td>7FFFH</td>
<td>7FFF7FFFH</td>
</tr>
<tr>
<td>– Over</td>
<td>8001H</td>
<td>80018001H</td>
</tr>
<tr>
<td>Skip</td>
<td>8002H</td>
<td>80028002H</td>
</tr>
<tr>
<td>Burnout (when &quot;up&quot; is set)</td>
<td>7FFAH</td>
<td>7FFF7FFFH</td>
</tr>
<tr>
<td>Burnout (when &quot;down&quot; is set)</td>
<td>8006H</td>
<td>80018001H</td>
</tr>
<tr>
<td>Error</td>
<td>8004H</td>
<td>80048004H</td>
</tr>
<tr>
<td>Undefined</td>
<td>8005H</td>
<td>80058005H</td>
</tr>
</tbody>
</table>

**Note**

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

The following figure illustrates the status information and filter on the recorder.

![Status Information and Filter Diagram]

- 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 IF command can be used to set the filter.
- The IS command is used to output the status information. Status information 1 and 2 are cleared when they are output. Status information 3 and 4 are 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.
6.2 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 5.2, “Output Format of ASCll Data.”

### Status Information 1

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>A/D conversion complete</td>
<td>Set to “1” when the A/D conversion of the measurement is complete.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Periodic printout timeout</td>
<td>Set to “1” when the periodic printout timer expires.</td>
</tr>
<tr>
<td>3</td>
<td>TLOG timeout</td>
<td>Set to “1” when the TLOG timer expires.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Status Information 2

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Measurement drop</td>
<td>Set to “1” when the measurement process could not keep up.</td>
</tr>
<tr>
<td>1</td>
<td>Decimal point/unit info</td>
<td>Set to “1” when the decimal point/unit information is changed.</td>
</tr>
<tr>
<td>2</td>
<td>Command error</td>
<td>Set to “1” when there is a command syntax error.</td>
</tr>
<tr>
<td>3</td>
<td>Execution error</td>
<td>Set to “1” when an error occurs during command execution.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Status Information 3

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Chart end</td>
<td>Set to “1” while the recorder is out of chart paper.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chart feeding</td>
<td>Set to “1” while the chart is being fed through the panel key.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Status Information 4

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Basic setting</td>
<td>Set to “1” during Basic Setting mode.</td>
</tr>
<tr>
<td>1</td>
<td>Recording</td>
<td>Set to “1” while recording is in progress.</td>
</tr>
<tr>
<td>2</td>
<td>Computing</td>
<td>Set to “1” while computation is in progress.</td>
</tr>
<tr>
<td>3</td>
<td>Alarm generating</td>
<td>Set to “1” while the alarm is occurring.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Header printing out</td>
<td>Set to “1” only between start of Start printout and end of End printout.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix 1 ASCII Character Codes

The table below shows characters each command can use.

<table>
<thead>
<tr>
<th>Command</th>
<th>Used for</th>
<th>Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN</td>
<td>Unit</td>
<td>Alphanumeric characters, signs, and space</td>
</tr>
<tr>
<td>ST</td>
<td>Tag</td>
<td>Alphanumeric characters, signs, and space</td>
</tr>
<tr>
<td>SG</td>
<td>Message</td>
<td>Alphanumeric characters, signs, and space</td>
</tr>
<tr>
<td>YB</td>
<td>Host/Domain name</td>
<td>Alphanumeric characters and signs</td>
</tr>
<tr>
<td>YN</td>
<td>Domain suffix</td>
<td>Alphanumeric characters and signs</td>
</tr>
<tr>
<td>SO</td>
<td>Computing equation</td>
<td>Alphanumeric characters, signs, and space</td>
</tr>
</tbody>
</table>

The table below contains the ASCII character codes of characters that can be used.

### English

*Note*

- "µ", "Ω", "²", "³", and "°" are assigned to character codes as follows:
  - µ: 7BH (()), Ω: 7CH (), ²: 7DH (), ³: 7EH (−), °: 5EH (°)

  Characters in the parentheses are the characters assigned on the keyboard.

<table>
<thead>
<tr>
<th>Lower</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>∗</td>
<td>+</td>
<td>−</td>
<td>.</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### German and French

*Note*

- "Ω" is assigned to character code as follows:
  - Ω: 7CH ()

  The character in the parentheses is the character assigned on the keyboard.

<table>
<thead>
<tr>
<th>Lower</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>∗</td>
<td>+</td>
<td>−</td>
<td>.</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Only German

<table>
<thead>
<tr>
<th>Lower</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
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<th>A</th>
<th>B</th>
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<th>D</th>
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<td>+</td>
<td>−</td>
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<td>Upper</td>
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### Only French

<table>
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<th>9</th>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td>Upper</td>
<td></td>
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<td>∗</td>
<td>+</td>
<td>−</td>
<td>.</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Upper</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>
The recorder 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 buffer capacity 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 is used, logging output)**
  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 is used, output of the most recent value)**
  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 buffer capacity varies depending on the model.
- Pen model: 240 intervals (30 s at an acquiring interval of 125 ms)
- Dot model: 60 intervals (60 s at an acquiring interval of 1 s)
Example in which the FIFO acquiring interval on the recorder is set to 1 s and the measured data from channel 01 to 06 are continuously output (logging function)

Command to send

Command description

Received response data

ff RESET

Move the FIFO read position to the most recent acquire position.

Send command

FF GET, 01, 06

Output the measured/computed data using the FIFO.

Receive response

BINARY header

BINARY data

BINARY footer

Wait for the FIFO acquiring interval (1 s)

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 3 Login Procedure

When using the Setting/Measurement server or the Maintenance/Test server via the Ethernet interface (/C7 option), you must log into the recorder from the PC. If you complete the procedure successfully up to login complete in the following figure, the commands in chapter 4 become functional.

When using the login function

1. **Connect**
   - **E1 421**
     - No
     - **E1 400**
       - No
       - **E1 403**
         - Yes
         - **Increment retry count**
           - No
           - **E1 404**
             - **E1 420**
               - Disconnect
               - Login complete

2. **Disconnect**
   - **E1 422**
     - No
     - **E1 401**
       - No
       - **E1 402**
         - No
         - **E0**
           - Login complete

3. **User name**
   - **E1 400**
     - No
     - **Direction**
       - **Within 2 minutes?**
         - **E1 401**
           - No
           - **Password**
             - **E1 402**
               - No
               - **E1 403**
                 - **Within 3 retries†††**
                   - No
                   - **E1 404**
                     - **E1 420**
                       - Disconnect
                       - Login complete

4. **Within the number of simultaneous uses†††**
   - **Within the number of connections†**
     - **Within 3 retries††**
       - No
       - **Within 2 minutes?**
         - **E1 400**
           - Yes
           - **Upon receiving the µR (message omitted)**
             - Code (for a description of codes and messages, see page App-6)

† Connections cannot exceed the maximum number of connections (see section 2.1).
†† If you attempt to log in using a wrong password four consecutive times, the communication is dropped (the number of retries for login is three).
††† If you attempt to log in causing the number of simultaneous uses at the administrator or user level to be exceeded (see section 2.1) four consecutive times, the communication is dropped (even if the password is correct).
When not using the login function

Login as “admin” or “user.”

- The user name “admin” can be used to login to the recorder as an administrator.
- The user name “user” can be used to access the recorder as a user.
Appendix 4  A List of Error Messages

There are cases in which error codes and messages are displayed on the screen during operation. The error messages and their description are listed below.

**Setting Errors**

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System error.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>2</td>
<td>Incorrect date or time setting.</td>
<td>Check the setting.</td>
</tr>
<tr>
<td>3</td>
<td>A disabled channel is selected.</td>
<td>The channel does not exist.</td>
</tr>
<tr>
<td>4</td>
<td>Incorrect function parameter.</td>
<td>Incorrect communication parameter.</td>
</tr>
<tr>
<td>5</td>
<td>The input numerical value exceeds the set range.</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>Incorrect input character string.</td>
<td>The entered character cannot be used.</td>
</tr>
<tr>
<td>7</td>
<td>Too many characters.</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>Incorrect input mode.</td>
<td>Incorrect range mode (Volt, TC, Scale, etc.) setting.</td>
</tr>
<tr>
<td>9</td>
<td>Incorrect input range code.</td>
<td>Incorrect range type (2 V, R, PT100, etc.) setting.</td>
</tr>
<tr>
<td>10</td>
<td>Format error.</td>
<td>Incorrect character string format.</td>
</tr>
<tr>
<td>11</td>
<td>Range settings are not same within the selected channels.</td>
<td>Channels whose range differs cannot be set simultaneously.</td>
</tr>
<tr>
<td>12</td>
<td>An invalid characters.</td>
<td>Contains an invalid character.</td>
</tr>
<tr>
<td>13</td>
<td>Ref. CH error.</td>
<td>Specify a channel whose range is set to voltage, TC, or RTD for the reference channel.</td>
</tr>
<tr>
<td>15</td>
<td>Too many characters for printout.</td>
<td>Too many characters in the message printout including measured/computed values.</td>
</tr>
<tr>
<td>16</td>
<td>Too many characters for message.</td>
<td>Cannot enter a setting that exceeds the message string (16 characters).</td>
</tr>
<tr>
<td>21</td>
<td>Cannot set an alarm for a SKIPPED channel.</td>
<td>–</td>
</tr>
<tr>
<td>22</td>
<td>The upper and lower span limits are equal.</td>
<td>This is not allowed.</td>
</tr>
<tr>
<td>23</td>
<td>The upper and lower scale limits are equal.</td>
<td>This is not allowed.</td>
</tr>
<tr>
<td>24</td>
<td>The lower span limit is greater than the upper span limit.</td>
<td>–</td>
</tr>
<tr>
<td>25</td>
<td>The lower scale limit is greater than the upper scale limit.</td>
<td>–</td>
</tr>
<tr>
<td>26</td>
<td>Bias cannot be set to the SKIPPED channel.</td>
<td>–</td>
</tr>
<tr>
<td>27</td>
<td>Bias cannot be set to the DI channel.</td>
<td>–</td>
</tr>
<tr>
<td>30</td>
<td>The partial boundary value exceeds the range of the span.</td>
<td>–</td>
</tr>
<tr>
<td>31</td>
<td>Partial is invalid on the SKIPPED channel.</td>
<td>–</td>
</tr>
<tr>
<td>35</td>
<td>The upper and lower limits of the printing zone are equal.</td>
<td>Set the rightmost value of the zone – the leftmost value ≥ 5 mm.</td>
</tr>
<tr>
<td>36</td>
<td>The lower limit of the printing zone is greater than the upper limit.</td>
<td>Set the rightmost value of the zone – the leftmost value ≥ 5 mm.</td>
</tr>
<tr>
<td>37</td>
<td>The printing zone is narrower than the minimum width (5 mm).</td>
<td>Set the rightmost value of the zone – the leftmost value ≥ 5 mm.</td>
</tr>
<tr>
<td>38</td>
<td>Partial is invalid on the DI channel.</td>
<td>–</td>
</tr>
<tr>
<td>39</td>
<td>The bias and the calibration cannot be used simultaneously.</td>
<td>–</td>
</tr>
<tr>
<td>40</td>
<td>Datume value(1 &gt;= 2)</td>
<td>Set the measured value of the first point less than that of the second point in the calibration correction.</td>
</tr>
<tr>
<td>41</td>
<td>Datume value(n-1 &gt; n)</td>
<td>Set the measured value of the n–1th point less than or equal to that of the nth point in the calibration correction.</td>
</tr>
<tr>
<td>42</td>
<td>Revise value(n-1 &gt;= n)</td>
<td>Set the correction value of the n–1th point less than that of the nth point in the calibration correction.</td>
</tr>
</tbody>
</table>
## Appendix 4  A List of Error Messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>All items in DISP menu parameters are set to SKIP.</td>
<td>–</td>
</tr>
<tr>
<td>48</td>
<td>Start = Finish.</td>
<td>The DST start time and end time cannot be set to the same time.</td>
</tr>
<tr>
<td>49</td>
<td>Invalid or missing DST time settings.</td>
<td>Since the time gains one hour when the DST starts, the set-up time does not exist.</td>
</tr>
<tr>
<td>61</td>
<td>There is no channel specified by the MATH expression.</td>
<td>Set a computation channel.</td>
</tr>
<tr>
<td>62</td>
<td>MATH expression grammar is incorrect.</td>
<td>Enter the equation correctly.</td>
</tr>
<tr>
<td>63</td>
<td>MATH expression sequence is incorrect.</td>
<td>Enter the equation correctly.</td>
</tr>
<tr>
<td>64</td>
<td>MATH upper and lower span values are equal.</td>
<td>This is not allowed.</td>
</tr>
<tr>
<td>70</td>
<td>MATH constant description is incorrect.</td>
<td>Incorrect computation constant syntax.</td>
</tr>
<tr>
<td>71</td>
<td>The range of the MATH constant is exceeded.</td>
<td>–</td>
</tr>
<tr>
<td>72</td>
<td>MATH channel is turned off</td>
<td>–</td>
</tr>
<tr>
<td>81</td>
<td>All space or ‘quit’ string cannot be specified.</td>
<td>–</td>
</tr>
<tr>
<td>86</td>
<td>The key-lock release password is incorrect.</td>
<td>Enter the correct password.</td>
</tr>
<tr>
<td>87</td>
<td>This key is locked.</td>
<td>–</td>
</tr>
<tr>
<td>91</td>
<td>Password is incorrect.</td>
<td>Enter the correct password.</td>
</tr>
<tr>
<td>100</td>
<td>IP address doesn’t belong to class A, B, or C.</td>
<td>–</td>
</tr>
<tr>
<td>101</td>
<td>The result of the masked IP address is all 0s or 1s.</td>
<td>–</td>
</tr>
<tr>
<td>102</td>
<td>SUBNET mask is incorrect.</td>
<td>Set a correct subnet mask.</td>
</tr>
<tr>
<td>103</td>
<td>The net part of default gateway is not equal to that of IP address.</td>
<td>Set the correct default gateway.</td>
</tr>
<tr>
<td>151</td>
<td>This action is invalid during calculation.</td>
<td>–</td>
</tr>
<tr>
<td>160</td>
<td>This action is invalid during chart end.</td>
<td>–</td>
</tr>
<tr>
<td>161</td>
<td>This action is invalid during pen hold.</td>
<td>–</td>
</tr>
<tr>
<td>163</td>
<td>This action is invalid during record.</td>
<td>–</td>
</tr>
<tr>
<td>164</td>
<td>This action is invalid during manual printing.</td>
<td>–</td>
</tr>
<tr>
<td>165</td>
<td>This action is invalid during list printing.</td>
<td>–</td>
</tr>
<tr>
<td>166</td>
<td>This action is invalid during setup list printing.</td>
<td>–</td>
</tr>
<tr>
<td>167</td>
<td>This action is invalid during chart feed.</td>
<td>–</td>
</tr>
<tr>
<td>169</td>
<td>This action is invalid during ribbon hold.</td>
<td>–</td>
</tr>
<tr>
<td>170</td>
<td>This action is invalid during priority remote record.</td>
<td>Recording stop via communications or key operation cannot be accepted under the current settings. Perform the Stop using the remote control function.</td>
</tr>
<tr>
<td>171</td>
<td>This action is invalid during batch.</td>
<td>Cannot enter Basic Setting mode during header printout (until End printout is finished).</td>
</tr>
</tbody>
</table>

### Operation Errors

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>232</td>
<td>There is no available data.</td>
<td>There is no data for periodic printout or data for calculating TLOG when the timer expired.</td>
</tr>
</tbody>
</table>

### Communication Errors

The messages from 390 to 422 can only be returned via communication, and are not displayed on the recorder.

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>Command is too long.</td>
<td>–</td>
</tr>
<tr>
<td>301</td>
<td>Too many number of commands delimited with ‘\’</td>
<td>Keep the number of commands separated by sub delimiters under 10.</td>
</tr>
<tr>
<td>302</td>
<td>This command has not been defined.</td>
<td>–</td>
</tr>
</tbody>
</table>
### Appendix 4  A List of Error Messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>303</td>
<td>Data request command can not be enumerated with sub-delimiter.</td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>Command is not permitted to the current user level.</td>
<td></td>
</tr>
<tr>
<td>351</td>
<td>This command cannot be specified in the current mode.</td>
<td></td>
</tr>
<tr>
<td>352</td>
<td>The option is not installed.</td>
<td></td>
</tr>
<tr>
<td>353</td>
<td>This command cannot be specified in the current setting.</td>
<td></td>
</tr>
<tr>
<td>354</td>
<td>This command is not available during calculation.</td>
<td></td>
</tr>
<tr>
<td>390</td>
<td>Command error.</td>
<td></td>
</tr>
<tr>
<td>391</td>
<td>Delimiter error.</td>
<td></td>
</tr>
<tr>
<td>392</td>
<td>Parameter error.</td>
<td></td>
</tr>
<tr>
<td>393</td>
<td>No permission.</td>
<td></td>
</tr>
<tr>
<td>394</td>
<td>No such connection.</td>
<td></td>
</tr>
<tr>
<td>395</td>
<td>Use “quit” to close this connection. Attempted to disconnect its own connection.</td>
<td></td>
</tr>
<tr>
<td>396</td>
<td>Failed to disconnect.</td>
<td></td>
</tr>
<tr>
<td>397</td>
<td>No TCP control block.</td>
<td>The control block of the specified connection cannot be found.</td>
</tr>
<tr>
<td>400</td>
<td>Input username.</td>
<td></td>
</tr>
<tr>
<td>401</td>
<td>Input password.</td>
<td></td>
</tr>
<tr>
<td>402</td>
<td>Select username from ‘admin’ or ‘user’. If the recorder is configured not to use the user name and password, use user names ‘admin’ or ‘user’.</td>
<td></td>
</tr>
<tr>
<td>403</td>
<td>Login incorrect, try again!</td>
<td></td>
</tr>
<tr>
<td>404</td>
<td>No more login at the specified level is acceptable.</td>
<td></td>
</tr>
<tr>
<td>420</td>
<td>Connection has been lost.</td>
<td></td>
</tr>
<tr>
<td>421</td>
<td>The number of simultaneous connection has been exceeded.</td>
<td></td>
</tr>
<tr>
<td>422</td>
<td>Communication has timed-out.</td>
<td></td>
</tr>
</tbody>
</table>

### Warning Messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>Initialize.</td>
<td>Settings and measured data have been initialized.</td>
</tr>
</tbody>
</table>

### System Errors

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Explanation/Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>902</td>
<td>RAM failure.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>910</td>
<td>A/D error.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>921</td>
<td>A/D calibration value error.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>922</td>
<td>A/D calibration is in the wrong order.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>930</td>
<td>Memory acquisition failure.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>940</td>
<td>The ethernet module is down.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>950</td>
<td>A/D number error.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>951</td>
<td>EEPROM write error.</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>960</td>
<td>Ribbon error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>961</td>
<td>Printer error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>962</td>
<td>Plotter error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>963</td>
<td>Pen 1 error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>964</td>
<td>Pen 2 error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>965</td>
<td>Pen 3 error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
<tr>
<td>966</td>
<td>Pen 4 error</td>
<td>Contact your nearest YOKOGAWA dealer.</td>
</tr>
</tbody>
</table>
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A

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