Thank you for purchasing the DX1000/DX2000. This Communication Interface User’s Manual contains information about the Ethernet/serial interface communication functions. To ensure correct use, please read this manual thoroughly before operation.

Keep this manual in a safe place for quick reference in the event a question arises. The following manuals, including this one, are provided as manuals for the DX.

- **Paper manual**

<table>
<thead>
<tr>
<th>Manual Name</th>
<th>Manual No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX1000/DX1000N Operation Guide</td>
<td>IM 04L41B01-02E</td>
<td>Explains concisely the operating procedure of the DX1000 and DX1000N.</td>
</tr>
<tr>
<td>DX1000/DX1000N/DX2000 Control of Pollution Caused by the Product</td>
<td>IM 04L41B01-91C</td>
<td>Gives a description of pollution control.</td>
</tr>
</tbody>
</table>

- **Electronic manuals provided on the accompanying CD-ROM**

<table>
<thead>
<tr>
<th>Manual Name</th>
<th>Manual No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX1000/DX1000N Operation Guide</td>
<td>IM 04L41B01-02E</td>
<td>This is the electronic version of the paper manual.</td>
</tr>
<tr>
<td>DX2000 Operation Guide</td>
<td>IM 04L42B01-02E</td>
<td>Describes how to use the application functions. The communication and network functions, custom display functions, and some of the options are excluded.</td>
</tr>
<tr>
<td>DX1000/DX1000N User’s Manual</td>
<td>IM 04L41B01-01E</td>
<td>Describes how to use the multi batch function (/BT2 option).</td>
</tr>
<tr>
<td>DX2000 User’s Manual</td>
<td>IM 04L42B01-01E</td>
<td>Describes how to use the custom display function.</td>
</tr>
<tr>
<td>DX1000/DX1000N/DX2000 Multi Batch (/BT2) User’s Manual</td>
<td>IM 04L41B01-03E</td>
<td>Describes how to use the advanced security function (/AS1 option).</td>
</tr>
<tr>
<td>DX1000/DX1000N/DX2000 Communication Interface User’s Manual</td>
<td>IM 04L41B01-17E</td>
<td>Describes how to use communication functions through the EtherNet/IP interface.</td>
</tr>
<tr>
<td>DX1000/DX1000N/DX2000 EtherNet/IP Communication Interface User’s Manual</td>
<td>IM 04L41B01-18E</td>
<td>Describes how to use communication functions through the PROFIBUS-DP interface (/CP1 option).</td>
</tr>
<tr>
<td>DX1000/DX1000N/DX2000 PROFIBUS-DP (/CP1) Communication Interface User’s Manual</td>
<td>IM 04L41B01-19E</td>
<td>Describes how to use communication functions through the PROFIBUS-DP interface (/CP1 option).</td>
</tr>
</tbody>
</table>

- **DAQSTANDARD Manuals**

All manuals other than IM 04L41B01-66EN are contained in the DAQSTANDARD CD. All manuals other than IM 04L41B01-66EN are contained in the DAQSTANDARD CD.

<table>
<thead>
<tr>
<th>Manual Title</th>
<th>Manual No.</th>
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<tbody>
<tr>
<td>DAQSTANDARD Viewer User’s Manual</td>
<td>IM 04L41B01-63EN</td>
</tr>
<tr>
<td>DAQSTANDARD Hardware Setup User’s Manual</td>
<td>IM 04L41B01-64EN</td>
</tr>
<tr>
<td>DAQSTANDARD DX100P/DX200P Hardware Configurator User’s Manual</td>
<td>IM 04L41B01-65EN</td>
</tr>
<tr>
<td>Installing DAQSTANDARD</td>
<td>IM 04L41B01-66EN</td>
</tr>
</tbody>
</table>
How to Use This Manual

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.
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- 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 Regents of the University of California.
- This manual follows the guidelines of Microsoft Corporation for displaying screen captures.

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- The company and product names used in this manual are not accompanied by the registered trademark or trademark symbols (® and ™).

Revisions

- 1st edition: December 2005
- 2nd edition: October 2006
- 3rd edition: April 2007
- 5th edition: November 2008
- 6th edition: March 2010
DX’s version and functions described in this manual

The contents of this manual cover DXs with hardware style number 3 and firmware release number 4. For details on the functions that have been added or changed, see “DX’s Version and Functions Described in This Manual” in the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E).

<table>
<thead>
<tr>
<th>Edition</th>
<th>DX</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Version 1.11</td>
<td>Additions and improvements to functionality.</td>
</tr>
<tr>
<td></td>
<td>Version 1.21</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Release number 2 (Version 2.0x)</td>
<td>Additions and improvements to functionality.</td>
</tr>
<tr>
<td></td>
<td>Style number 2</td>
<td>NEMA4 compliance.</td>
</tr>
<tr>
<td>4</td>
<td>Same as edition 3.</td>
<td>Additions and improvements to functionality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changed the direction of the clamp input terminal (‘H2 option).</td>
</tr>
<tr>
<td>5</td>
<td>Release number 3 (Version 3.0x)</td>
<td>Additions and improvements to functionality.</td>
</tr>
<tr>
<td></td>
<td>Style number 3</td>
<td>Changed the boot ROM.</td>
</tr>
<tr>
<td>6</td>
<td>Release number 4 (Version 4.0x)</td>
<td>Additions and improvements to functionality.</td>
</tr>
<tr>
<td></td>
<td>Style number 3</td>
<td>Added models with 400 MB of internal memory (internal memory suffix code -3).</td>
</tr>
</tbody>
</table>
Conventions Used in This Manual

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

• **Markings**
  The following markings are used in this manual.

  - **WARNING**
    Calls attention to actions or conditions that could cause serious injury or death 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. The ◊ symbol indicates key and menu operations.

Models Covered in This Manual

This manual mainly describes the operating procedures on the DX1000. When the procedures differ between the DX2000 and the DX1000, the procedures (including the menu operation) on the DX2000 are also given.

High-Speed and Medium-Speed Model Groupings

This manual uses the terms high-speed input model and medium-speed input model to distinguish between DX models as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>Type Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed input model</td>
<td>DX1002, DX1004, DX1002N, DX1004N, DX2004, and MV2008</td>
</tr>
<tr>
<td>Medium-speed input model</td>
<td>DX1006, DX1012, DX1006N, DX1012N, DX2010, DX2020, DX2030, DX2040, and DX2048</td>
</tr>
</tbody>
</table>
Names and Uses of Parts and the Setup Procedures
Using the Operation Keys

Front Panel

**DX1000**

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

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

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

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

- **MENU and FUNC keys**
  Press the MENU key and then hold down the FUNC key for approximately 3 s. The basic setting menu is displayed from which you can to enter the communication setup menus.

Rear Panel

**DX1000**

- **Ethernet interface connector**
  A connector used for standard equipped Ethernet communications.

- **RS-232 interface connector (option)**
  A serial communication connector that comes with the /C2 option.

- **RS-422/485 interface terminal (option)**
  A serial communication terminal that comes with the /C3 option.

- **RS-232 interface connector (option)**
  A serial communication connector that comes with the /C2 option.

- **PROFIBUS-DP port (release number 3 or later)**
  A PROFIBUS connector that is provided on modes with the /CP1 option.
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1.1 DX1000/DX2000 Features

This section gives an overview of the communication functions that the DX can control when it is connected to a network via the Ethernet interface.

Modbus Client

- The DX acting as a Modbus client device can connect to a Modbus server device and read or write to the internal register. The read data can be used as communication input data of the computation function* on a computation channel. The data can also be handled on the external input channel**. The data that can be written to the internal register is measured data and computed data.
  * /M1 and /PM1 options
  ** DX2000 with /MC1 option
- For details on the Modbus function codes that the DX supports, see section 6.3.
- For a description of the settings required to use this function, see section 1.10.
### Modbus Server

- A Modbus client device can carry out the following operations on the DX that is operating as a Modbus server device.
  - Load data from measurement, computed,* and external input channels** (using the input register)
  - Load communication input data* (using the hold register)
  - Write communication input data* (using the hold register)
  - Write to external input channels* (using the hold register)
  - Start and stop recording, write messages, and perform other similar operations (using the hold register; models with release number 3 or later)
  - Load the recording start/stop condition, message strings, and other types of data (using the hold register; models with release number 3 or later)
* /M1 and /PM1 options

For details on the Modbus function codes that the DX supports, see section 6.3.

For a description of the settings required to use this function, see section 1.9.
Setting/Measurement Server

- This function can be used to set almost all of the settings that can be configured using the front panel keys. However, you cannot turn the power on and off or configure the following settings:
  - User registration*1, the root password and authentication key of the password management function*2, the key lock password, the connection destination of the FTP client function, SMTP authentication, and POP3 settings.
  - *1 Can be configured on DXs with the /AS1 option.
  - *2 /AS1 option

- The following types of data can be output.
  - Measured, computed*3, and external input*4 data.
  - Files in the internal memory or files on the external storage medium.
  - Setup information and status byte.
  - A log of operation errors and communications.
  - Alarm summary and message summary.
  - Relay status information.

  The measured, computed*3, and external input*4 data can be output to a PC in BINARY or ASCII format. Other types of data are output in ASCII format. For a description of the data output format, see chapter 4.
  - *3 /M1 option
  - *4 DX2000 with /MC1 option

- For details on how to use this function, see section 1.12.
- The commands that can be used with this function are setting commands (see sections 3.4 and 3.5), basic setting commands (see section 3.6), and output commands (see sections 3.7 and 3.8).
- This function can be used when communicating via the Ethernet interface or the serial interface (option).
- For information about the settings and operations for using this function through serial commands, see chapter 2.

Application timeout

This function closes the connection with the PC if there is no data transfer for a given time. For example, this function prevents a PC from being connected to the DX indefinitely without transferring data and prohibiting other users from making new connections for data transfer.
FTP Server

- You can use a PC to access the DX via FTP. You can perform operations such as retrieving directory and file lists from the external storage medium of the DX and transferring and deleting files. In addition, you can also retrieve the directory or file list and transfer files in the internal memory.
- On DXs with the /AS1 advanced security option, you cannot create or delete files on the external storage media connected to the DX.
- For a description of the settings required to use this function, see section 1.6.
FTP Client

Automatic transferring of files

- The display data file, event data file, report data file, snapshot data file, setup file*1, and change settings log file*1 that are created in the internal memory of the DX can be automatically transferred to a remote FTP server. The result of the transfer is recorded in the FTP log. The FTP log can be shown on the DX's display (see “Log Display” described later) or output to a PC using commands.

*1 /AS1 option

You can specify two destination FTP servers, primary and secondary. If the primary server is down, the file is transferred to the secondary server.
- For a description of the settings required to use this function, see section 1.7.

- FTP test
  - You can test whether files can be transferred by transferring a test file from the DX to a remote FTP server.
  - The result of the FTP test can be confirmed on the FTP log display.
  - For the procedure to use this function, see section 1.7.

Maintenance/Test Server

- This function can be used to output connection information, network information, and other information regarding Ethernet communications.
- The commands that can be used with this function are maintenance/test commands (see section 3.10).
- The close command cannot be used on DXs with the /AS1 advanced security option. The close command closes the connection between a DX (other than the DX that you are operating) and a PC.

Instrument Information Server

- This function can be used to output the serial number, model name, and other information about the DX connected via the Ethernet network.
- The commands that can be used with this function are instrument information output commands (see section 3.12).
Login (On DXs without the /AS1 advanced security option)

- This function can be used only when using the setting/measurement server, maintenance/test server, and the FTP server functions.
- For a description of the settings required to use this function, see the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E).
- For a description of the login process of the setting/measurement server and maintenance/test server, see appendix 2.

User registration
Users are registered using the login function of the DX. There are two user levels: administrator and user.

- **Administrator**
  An administrator has privileges to use all the functions of the setting/measurement server, maintenance/test server, and FTP server. An administrator can access the operator and monitor pages through the Web server function.

- **User**
  A user has limited privileges to use the setting/measurement server, maintenance/test server, and FTP server. For the limitation on the commands, see section 3.2.
  - Limitations on the use of the setting/measurement server
    A user is not authorized to change the settings that would change the operation of the DX. However, a user can output measured and setting data.
  - Limitations on the use of the maintenance/test server
    A user cannot disconnect a connection between another PC and the DX. A user can disconnect the connection between the PC that the user is using and the DX.
  - Limitations on the use of the FTP server
    A user cannot save files to the external storage medium of the DX or delete files on it. A user can load files.

A user can access the monitor page through the Web server function.
Login (On DXs with the /AS1 advanced security option)

- You have to log in to use the setting/measurement server and Web server functions.
- For a description of the settings required to use this function, see the Advanced Security Function (/AS1) User’s Manual (IM 04L41B01-05EN).
- For a description of the login process of the setting/measurement server, see appendix 2.

Setting/Measurement Server

- User Registration
  You can use the DX login function to register users. There are two user levels: administrator and user.

  **Administrator**
  There are two types of connections that can be made to the DX setting/measurement server: connections to the setting function (setting connection) and connections to the monitoring function (monitoring connections). When you connect to the setting function as an administrator, you can perform all the commands. When you connect to the monitoring function, you can only produce measurement and setup data and execute input commands for communication input data and external input channels. For information about what commands can be sent, see section 3.2.

  **User**
  If you log in to the monitoring function as a user, you can perform the same commands that you can perform when you log in as an administrator. When you connect to the setting function, in addition to the monitoring function commands, you can also perform some control commands. The commands that you can perform are those that have been enabled by the user privileges. See section 3.2.

Web Server

- User Registration
  You can use the DX login function to register Web server users. There are two user levels: administrator and user.

  **Administrator**
  An administrator can access the operator and monitor pages through the Web server function. See section 1.5.

  **User**
  A user can access the monitor page through the Web server function.

**Note**

- Accessing the Maintenance/Test Server
  Log in with the user name “admin” or “user.”

- Accessing the FTP Server
  Log in with the user name “admin,” “user,” or “anonymous.”
1.1 DX1000/DX2000 Features

Web Server

Microsoft Internet Explorer can be used to display the DX screen on the PC.

- The following two pages are available.
  - Monitor page: Screen dedicated for monitoring.
  - Operator page: You can switch the DX screen. You can also modify and write messages.
  - You can set access control (user name and password specified with the login function) on each page.
  - The screen can be updated at a constant period (approximately 10 s).

For the procedure to set the Web server function, see section 1.5.
For operations on the monitor page and operator page, see section 1.5.
E-mail Transmission

Transmitting e-mail messages
The available types of e-mails are listed below. E-mail can be automatically transmitted for each item. You can specify two groups of destinations and specify the destination for each item. In addition, you can set a header string for each item.

- **Alarm mail**
  Reports alarm information when an alarm occurs or clears. Alternatively, reports alarm information only when an alarm occurs.

- **System mail**
  Notifies the time of the power failure and the time of recovery when the DX recovers from a power failure.
  Notifies the detection of memory end when it is detected.
  Notifies the error code and message when a media-related error occurs (an error on the external storage medium or when the data cannot be stored due to insufficient free space on the external storage medium).
  Notifies the error code and message when an error related to FTP client (when a data transfer fails using the FTP client function) occurs.
  On DXs with the /AS1 advanced security option, this type of e-mail indicates that a user has been locked (“Invalid user”).

- **Scheduled mail**
  Transmits an e-mail message when the specified time is reached. This can be used to confirm that the e-mail transmission function including the network is working properly. You can specify the reference time and the e-mail transmission interval for each destination.

- **Report mail (only on models with the computation function (/M1 option))**
  Notifies the report results.

For the procedure to set the e-mail transmission function, see section 1.4.
For the e-mail transmission format, see section 1.4.
For the procedure to start/stop e-mail transmission, see section 1.4.

Example of an e-mail sent at a scheduled time

| From: DX1000@daqstation.com | Subject: Periodic_data |
| Date: Sun, 5 Oct 2003 08:00:45 +0900 (JST) | |
| To: user1@daqstation.com, user2@daq.co.jp | Header 1 |
| LOOP1 TEMPERATURE | Header 2 |
| Time | Time of transmission |
| Host name | 10/05 08:00:01 |

E-mail test

- You can send a test message from the DX to the destination to check e-mail transmissions.
- You can confirm the result of the e-mail test on the e-mail log screen.
- For the procedure to use this function, see section 1.4.
SNTP Server/Client
The client function retrieves time information from a specified SNTP server such as at the specified interval.
The server function provides time information to DXs connected to the same network.

DHCP Client
This function can be used to automatically retrieve IP addresses from a DHCP server. You can also manually request or release network information.

EtherNet/IP Server (Release number 3 or later)
The DX supports the following features.
• Loads data for measurement, computed, and external input channels.
• Writes to communication input data and external input channels.
For operating instructions, see the EtherNet/IP Communication Interface User’s Manual (IM04L41B01-18E).

Other Functions
Checking the connection status of the Ethernet interface
You can check the connection status of the Ethernet interface on the rear panel or on the display of the DX.
For a description on the location and meaning of the connection status indicator, see section 1.3.

Keepalive (extension function of TCP)
This function drops the connection if there is no response to the inspection packet that is periodically transmitted at the TCP level.
For a description of the settings required to use this function, see section 1.3.

Log display
You can display operation logs on the log display. The log can also be confirmed using a communication command. In addition, the Web screen can show the log display (excluding the communication log and DHCP log).
• Error log screen: Log of operation errors
• Communication log screen: Log of communication input/output to the setting measurement server
• FTP log screen: Log of file transfers carried out using the FTP client function.
• WEB log screen: Log of operations using the Web server function
• Mail log screen: Log of E-mail transmissions
• Login log screen*: Log of login, logout, items related to time adjustment, and calibration management operations.
• SNTP log screen: Log of access to the SNTP server
• DHCP log screen: Log of access to the DHCP server
• Modbus log screen: Log of Modbus status (access to the master or client)
• Operation log screen*: Log of operations
• Change settings log screen*: Log of setting changes
  *1 Only on DXs without the /AS1 advanced security option
  *2 Only on DXs with the /AS1 advanced security option
For the operating procedure of the log screen and the details on the displayed contents, see the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E). For details on the Modbus status log, see section 1.10.
For details on the log output using communication commands, see section 4.2. For a description of the log display on the Web screen, see section 1.5.
1.2 Flow of Operation When Using the Ethernet Interface

Follow the flowchart below to set the Ethernet communications.

Start of setting

Connect the connector

IP address assignment method

Fixed IP address

Automatic retrieval of the IP address (DHCP)

Set the IP address

Set the subnet mask

Set the default gateway

Set the host name (optional)

Set the domain name (optional)

Set the DNS server search order

Set the domain suffix search order

End of setting

Set the auto retrieval of the DNS

Automatically register the host name

Set the host name

Set the domain name

Set the DNS server search order

Not specified when the DNS auto setting is enabled.

Not specified when the DNS auto setting is enabled.
1.3 Connecting the DX

Connecting to the Port

**Connector**
Connect an Ethernet cable to the Ethernet port on the DX rear panel.

![Diagram showing Ethernet cable connection](image)

**CAUTION**
Do not connect an Ethernet cable whose plug does not comply with FCC specifications. If you do, the DX may malfunction.

Connecting to the PC

Make the connection via a hub. For a one-to-one connection with a PC, make the connection as shown in the figure below. Multiple DXs can be connected to a single PC in a similar manner.

![Diagram showing PC connection](image)
### Setting the IP Address and Host Information

- **DX1000**
  - Press `MENU` (to switch to setting mode), hold down `FUNC` for 3 s (to switch to basic setting mode), and select the `Menu` tab > `Communication (Ethernet) > IP address`.
  - Press `MENU` (to switch to setting mode), hold down `FUNC` for 3 s (to switch to basic setting mode), and select the `Menu` tab > `Communication (Ethernet) > Host settings`.
  - Press `MENU` (to switch to setting mode), hold down `FUNC` for 3 s (to switch to basic setting mode), and select the `Menu` tab > `Communication (Ethernet) > DNS settings`.

- **DX2000**
  - Press `MENU` (to switch to setting mode), hold down `FUNC` for 3 s (to switch to basic setting mode), and select the `Menu` tab > `Communication (Ethernet) > IP Address, Host settings`.
  - Press `MENU` (to switch to setting mode), hold down `FUNC` for 3 s (to switch to basic setting mode), and select the `Menu` tab > `Communication (Ethernet) > DNS settings`.

#### IP address setting

<table>
<thead>
<tr>
<th>Setting Mode</th>
<th>IP-address</th>
<th>DHCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed IP-address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP-address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subnet mask</td>
<td>10.0.23.0</td>
<td></td>
</tr>
<tr>
<td>Default gateway</td>
<td>10.0.23.1</td>
<td></td>
</tr>
</tbody>
</table>

#### Host name setting

<table>
<thead>
<tr>
<th>Setting Mode</th>
<th>Host name</th>
<th>Domain name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host settings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### DNS setting

<table>
<thead>
<tr>
<th>Setting Mode</th>
<th>Server search order</th>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain suffix search order</td>
<td>Primary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set the IP address to a fixed IP address or obtain it automatically (DHCP). Consult with your network administrator for the network parameters such as the IP address, subnet mask, default gateway, and DNS.
1.3 Connecting the DX

When using a fixed IP address

- **DHCP**
  Set DHCP to **Not**.

- **IP address**
  Set the IP address to assign to the DX.

- **Subnet mask**
  Set the subnet mask according to the system or network to which the DX belongs.

- **Default gateway**
  Set the IP address of the gateway.

- **Host name**
  Set the DX’s host name using up to 64 alphanumeric characters. You do not have to set this parameter.

- **Domain name**
  Set the network domain name that the DX belongs to using up to 64 characters. You do not have to set this parameter.

- **Server search order**
  Register up to two IP addresses for the primary and secondary DNS servers.

- **Domain suffix search order**
  Set up to two domain suffixes: primary and secondary.

When obtaining the IP address from DHCP

- **DHCP**
  Set DHCP to **Use**.

- **DNS accession**
  To automatically obtain the DNS server address, select **Use**. Otherwise, select **Not**. If you select **Not**, you must set the server search order.

- **Host-name register**
  To automatically register the host name to the DNS server, select **Use**.

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

- **Domain name**
  Set the network domain name that the DX belongs to using up to 64 characters.

- **Server search order (not necessary when DNS accession is enabled)**
  Register up to two IP addresses for the primary and secondary DNS servers.

- **Domain suffix search order**
  Set up to two domain suffixes: primary and secondary.
Requesting/Releasing Network Information from DHCP

You can manually request or release network information such as the IP address. This operation applies when DHCP is set to Use. Perform the request or release after displaying the network information screen.

**Requesting Network Information**

1. Display the network information screen.
   ◦ Press FUNC and select *Network info*.

   ![Network Information Screen]

2. Execute the network information request.
   ◦ Press FUNC and select *Network info > Request*

   ![Network Information Request]

   ![Network Information Request Response]

The network information is displayed.
1.3 Connecting the DX

Releasing Network Information

1. Display the network information screen.
   ◆ Press FUNC and select Network info.

2. Execute the network information release.
   ◆ Press FUNC and select Network info > Release

   The network information is released.
Setting the Communication Status

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Keep alive, Timeout

```
<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th>Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep alive</td>
<td>On</td>
</tr>
<tr>
<td>Application timeout</td>
<td>On/off</td>
</tr>
<tr>
<td>Time</td>
<td>1 min</td>
</tr>
</tbody>
</table>
```

Setting the keepalive
To disconnect when there is no response to the test packets that are periodically sent, select On. Otherwise, select Off.

Setting the application timeout
• Selecting On/Off
  To use the application timeout function, select On. Otherwise, select Off. If you select On, a timeout item is displayed.
• Time
  Set the timeout value between 1 and 120 (minutes).

Checking the communication status
The Ethernet communication status can be confirmed with the LED lamp that is provided on the Ethernet connector on the DX rear panel or the Ethernet link that is shown at the upper right of the basic setting screen.
### 1.4 Sending E-mail Messages

**Settings for Sending E-mail**

Set the server configuration and the contents of the e-mail transmission.

- Press **MENU** (to switch to setting mode), hold down **FUNC** for 3 s (to switch to basic setting mode), and select the **Menu tab > Communication (Ethernet) > E-Mail**

#### Basic settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMTP server name</td>
<td>254</td>
</tr>
<tr>
<td>Port number</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>Auth</td>
</tr>
<tr>
<td>SMTP authentication</td>
<td></td>
</tr>
<tr>
<td>User name</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
</tbody>
</table>

#### Recipients

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient 1</td>
<td></td>
</tr>
<tr>
<td>Recipient 2</td>
<td></td>
</tr>
<tr>
<td>Sender</td>
<td></td>
</tr>
</tbody>
</table>

#### POP3 Settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>POP3 server name</td>
<td>110</td>
</tr>
<tr>
<td>Port number</td>
<td></td>
</tr>
<tr>
<td>Login name</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
</tbody>
</table>

#### Alarm settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient 1</td>
<td>On</td>
</tr>
<tr>
<td>Recipient 2</td>
<td>Off</td>
</tr>
<tr>
<td>Active Alarms</td>
<td>Off</td>
</tr>
<tr>
<td>Include INST</td>
<td>Off</td>
</tr>
<tr>
<td>Include source URL</td>
<td>Off</td>
</tr>
<tr>
<td>Subject</td>
<td>Alarm_summary</td>
</tr>
<tr>
<td>Header 1</td>
<td></td>
</tr>
<tr>
<td>Header 2</td>
<td></td>
</tr>
<tr>
<td>Send e-mail</td>
<td>On</td>
</tr>
<tr>
<td>Include text in Subject</td>
<td>On</td>
</tr>
</tbody>
</table>

#### Scheduled settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient 1</td>
<td>Off</td>
</tr>
<tr>
<td>Recipient 2</td>
<td>Off</td>
</tr>
<tr>
<td>Interval</td>
<td></td>
</tr>
<tr>
<td>Ref. time</td>
<td></td>
</tr>
<tr>
<td>Include INST</td>
<td>Off</td>
</tr>
<tr>
<td>Include source URL</td>
<td>Off</td>
</tr>
<tr>
<td>Subject</td>
<td>Periodic_data</td>
</tr>
<tr>
<td>Header 1</td>
<td></td>
</tr>
<tr>
<td>Header 2</td>
<td></td>
</tr>
</tbody>
</table>

#### System settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient 1</td>
<td>Off</td>
</tr>
<tr>
<td>Recipient 2</td>
<td>Off</td>
</tr>
<tr>
<td>Include source URL</td>
<td>Off</td>
</tr>
<tr>
<td>Subject</td>
<td>System_warning</td>
</tr>
<tr>
<td>Header 1</td>
<td></td>
</tr>
<tr>
<td>Header 2</td>
<td></td>
</tr>
</tbody>
</table>

#### Report settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient 1</td>
<td>Off</td>
</tr>
<tr>
<td>Recipient 2</td>
<td>Off</td>
</tr>
<tr>
<td>Include source URL</td>
<td>Off</td>
</tr>
<tr>
<td>Subject</td>
<td>Report_data</td>
</tr>
<tr>
<td>Header 1</td>
<td></td>
</tr>
<tr>
<td>Header 2</td>
<td></td>
</tr>
</tbody>
</table>

---

**Input**  | **Clear**  | **Copy**
---|---|---
**Input**  | **Clear**  | **Copy**
**Input**  | **Clear**  | **Copy**
**Input**  | **Clear**  | **Copy**
**Input**  | **Clear**  | **Copy**
**Input**  | **Clear**  | **Copy**
Basic Settings
Set the SMTP server and mail address.

- **SMTP server name**
  Enter the host name or IP address of the SMTP server.

- **Port number**
  Unless specified otherwise, set the number to the default value. The default value is 25.

- **Security (release number 3 or later)**
  Select **PbS** if you want to enable POP before SMTP. To enable authenticated e-mail transmission (Authentication SMTP), select **Auth** (release numbers 4 and later). When you select **Auth**, the SMTP authorization items appear.

SMTP authorization (Release numbers 4 and later)
To enable support for authenticated e-mail transmission (Authentication SMTP), set a user name and password to use for authentication.

- **User name**
  Enter the user name. You can enter up to 32 characters.

- **Password**
  Enter the password. You can enter up to 32 characters.

Recipients

- **Recipient1 and Recipient2**
  Enter the e-mail address. Multiple e-mail addresses can be entered in the box of one recipient. When entering multiple addresses, delimit each address with a space. Up to 150 characters can be entered.

- **Sender**
  Enter the sender e-mail address. You can enter up to 64 characters.

POP3 Settings (release number 3 or later)
If you need to use POP before SMTP, specify the POP3 server that will be used for authentication.

For instructions on how to set the POP3 login method, see “Configuring the POP3 Server Connection” later in this section.

- **POP3 Server name**
  Enter the POP3 server host name or IP address.

- **Port number**
  Use the default setting unless you need to change it. The default value is 110.

- **Login name**
  Enter the POP3 server login name.

- **Password**
  Enter the POP3 server login password using up to 32 characters.

Alarm Settings
Specify the settings for sending e-mail when alarms occur or release.

- **Recipient1 and Recipient2**
  Set the e-mail recipients. For Recipient1 and Recipient2, select **On** to send e-mail or **Off** to not send e-mail.

- **Active alarms**
  Sends an e-mail when an alarm occurs or releases. You can select **On** (send e-mail) or **Off** (not send e-mail) for alarms 1 to 4.

- **Include instantaneous value**
  Select **On** to attach instantaneous value data. The data that is attached is the instantaneous value that is measured at the time the e-mail is transmitted.
1.4 Sending E-mail Messages

- **Include source URL**
  Select On to attach the source URL. Attach the URL when the Web server is enabled.

- **Subject**
  Enter the subject of the e-mail using up to 32 alphanumeric characters. The default setting is Alarm_summary.

- **Header1 and Header2**
  Enter header 1 and header 2 using up to 64 characters.

- **Send alarm action (Release number 3 or later)**
  To send e-mail when an alarm occurs and when it is cleared, select On+Off. To only send e-mail when an alarm occurs, select On.

- **Include tag/ch in Subject (Release number 3 or later)**
  Select On to include a tag number in the subject. If the tag number is not set, the corresponding channel number is included.

### Scheduled Settings
Specify the settings for sending e-mail at scheduled times.

- **Recipient1 and Recipient2**
  Set the e-mail recipients. For Recipient1 and Recipient2, select On to send e-mail or Off to not send e-mail.

- **Interval**
  Select the interval for sending e-mail to Recipient1 and Recipient2 from 1, 2, 3, 4, 6, 8, 12, and 24 hours.

- **Ref. time**
  Enter the time used as a reference for sending the e-mail at the specified interval to Recipient1 and Recipient2.

- **Include instantaneous value, Include source URL, Subject, and Header**
  These items are the same as the e-mail that is sent when an alarm occurs. The default subject is Periodic_data.

### System Settings
Specify the settings for sending e-mail when the DX recovers from a power failure, at memory end, and when an error occurs.

- **Recipient1 and Recipient2**
  Set the e-mail recipients. For Recipient1 and Recipient2, select On to send e-mail or Off to not send e-mail.

- **Include source URL, Subject, and Header**
  These items are the same as the e-mail that is sent when an alarm occurs. The default subject is System_warning.

### Report Settings
Specify the settings for sending e-mail when reports are created.

- **Recipient1 and Recipient2**
  Set the recipients. For Recipient1 and Recipient2, select On to send e-mail or Off to not send e-mail.

- **Include source URL, Subject, and Header**
  These items are the same as the e-mail that is sent when an alarm occurs. The default subject is Report_data.
Configuring the POP3 Server Connection (Release number 3 or later)

Specify how the DX operates when it connects to a POP server.

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode) and select the Environment tab > Communication > POP3 Details

Send delay [seconds]
Enter the delay between a POP3 server authentication and the transmission in the range of 0 to 10 seconds.

POP3 Login
To encrypt the password when logging into the POP3 server, select APOP. To send it in plain text, select PLAIN.

E-mail Test

◊ Press FUNC and select E-mail test > Recipient1 or Recipient2
You can send a test e-mail to check the e-mail settings.

Starting/Stopping the E-mail Transmission

Starting the e-mail transmission
◊ Press FUNC and select E-Mail START
The e-mail transmission function is enabled.

Stopping the e-mail transmission
◊ Press FUNC and select E-Mail STOP
The e-mail transmission function is disabled. Unsent e-mail messages are cleared.

E-mail retransmission
If the e-mail transmission fails, the message is retransmitted up to three times at 30-s, 1-minute, or 3-minute intervals. If retransmission fails, the e-mail message is discarded.
1.4 Sending E-mail Messages

E-mail Format

The formats of alarm e-mails, scheduled e-mails, system e-mails, invalid user mails (/AS1 advanced security option), report e-mails, and test e-mails are given below. For details on the common display items, see “Common Display Items for All Formats” in this section.

Alarm Notification E-mail Format

- **Subject**
  
  Subject: Alarm Summary(-[tag number or channel number])

  The tag number or channel number enclosed in parentheses is used only when they are configured to be included in the subject (on models with release number 3 or later).

- **Syntax**

  
  header1CRLF
  header2CRLF
  CRLF
  Alarm_summary.CRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  <CH>ccc・・・cCRLF
  <Type>1qCRLF
  <aaa>mo/dd_hh:mm:ssCRLF
  CRLF
  <Inst._value>CRLF
  mo/dd_hh:mm:ssCRLF
  ccc・・・c=ddd・・・dCRLF
  ・・・・・・・・・・・・・・・・・・・・・・・・・・CRLF
  CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/CRLF
  CRLF

  ccc・・・c  Channel number, tag comment, or tag number
  (Up to 16 characters. Channels set to Skip or Off are not output. (For the channel number, see section 3.3.)

  l  Alarm level (1 to 4)

  q  Alarm type (H, L, h, l, R, or r)

  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)

  aaa  Alarm status (off or on)

  ddd・・・d  Measured/Computed value (up to 10 digits including the sign and decimal point) + unit (up to 6 characters)

  +OVER:  Positive overrange

  -OVER:  Negative overrange

  Burnout:  Burnout data

  *****:  Error data

The DX transmits channel numbers, alarm types, and alarm statuses for up to 10 events in a single e-mail. If the DX is configured to include a tag number or a channel number in the e-mail subject, one e-mail is sent for each event.
Scheduled E-mail Format

- **Subject**
  Subject: Periodic_Data

- **Syntax**
  
  ```
  
  header1
  CRLF
  header2
  CRLF
  CRLF
  Periodic_data.CRLF
  <Host_name>CRLF
  host
  CRLF
  <Time>CRLF
  mo/dd_hh:mi:ss
  CRLF
  E-mail_message(s)_did_not_reach_intended_recipient(s).CRLF
  ttt...t
  Count=nn.CRLF
  mo/dd_hh:mi:ss
  CRLF
  CRLF
  <Time>CRLF
  mo/dd_hh:mi:ss
  cccc..c=ddd..d
  CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/
  CRLF
  ```

  **ccc***c**  Channel number, tag comment, or tag number  
  (Up to 16 characters. Channels set to Skip or Off are not output.  (For the channel number, see section 3.3.)

  **ttt***t**  Type of discarded e-mail

  
  ```
  
  Alarm_summary: Alarm mail
  Periodic_data: Scheduled mail
  System_warning: System mail
  Report_data: Report mail
  ```

  **nn**  Number of discarded e-mails

  **ddd...d**  Measured/Computed value (up to 10 digits including the sign and decimal point) + unit (up to 6 characters)

  +OVER: Positive overrange
  -OVER: Negative overrange
  Burnout: Burnout data
  *****: Error data

  The time that follows the type and count of discarded e-mails is the time when the e-mail is discarded last.
1.4 Sending E-mail Messages

System Mail (Power Failure) Format

- **Subject**
  
  Subject: System_warning

- **Syntax**

  header1CRLF
  header2CRLF
  CRLF
  Power_failure.CRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  <Power_fail>mo/dd_hh:mi:ssCRLF
  <Power_on>mo/dd_hh:mi:ssCRLF
  CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/CRLF
  CRLF

System Mail (Memory Full) Format

- **Subject**

  Subject: System_warning

- **Syntax**

  header1CRLF
  header2CRLF
  CRLF
  Memory_full.CRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  <Memory_remain>ppp···pMbytesCRLF
  <Memory_blocks>bbb/400CRLF
  <Media_remain>rrr···rMbytesCRLF
  CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/CRLF
  CRLF

  ppp···p  Remaining amount of internal memory
  bbb  Number of unsaved blocks (0 to 400)
  rrr···r  Remaining free space on the external storage medium (when an external storage medium is connected)
System Mail (Error) Format

- **Subject**
  Subject: System_warning

- **Syntax**
  header1CRLF
  header2CRLF
  CRLF
  Error.CRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  mo/dd_hh:mi:ssCRLF
  ERROR:fffCRLF
  ···························CRLF
  "Operation_aborted_because_an_error_was_found_in_media."CRLF
  CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/CRLF
  CRLF

  fff Error number (200, 201, 211, 281 to 285)

  For details on the error, see the DX1000/DX2000 User's Manual (IM04L41B01-01E or IM04L42B01-01E).

System Mail (Invalid User) Format

- **Subject**
  Subject: [System_warning]

- **Syntax**
  header1CRLF
  header2CRLF
  CRLF
  User_lockedCRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  mo/dd_hh:mi:ssCRLF
  ERROR:fffCRLF
  <User_name>CRLF
  uuu•••u
  ···························CRLF
  Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
  http://host.domain/CRLF
  CRLF

  mo/dd_hh:mi:ss Time when the e-mail was created
  uuu•••u Name of the invalid user (up to 20 characters)
1.4 Sending E-mail Messages

Report Mail Format

- **Subject**
  Subject: Report_data

- **Syntax**
  
  header1CRLF
  header2CRLF
  CRLF
  ti_report.CRLF
  <Host_name>CRLF
  host.CRLF
  CRLF
  mo/dd_hh:mm:ssCRLF
  <CH>ccc···cCRLF
  <tp>eee···eCRLF
  <tp>eee···eCRLF
  <tp>eee···eCRLF
  <tp>eee···eCRLF
  <Unit>uuu···uCRLF
  CRLF

Access the following URL in order to look at a screen.
http://host.domain/

- **ti** Contents of the report mail (hourly, daily, weekly, or monthly report)
- **ccc···c** Channel number, tag comment, or tag number
  (Up to 16 characters. Channels set to Skip or Off are not output. For the channel number, see section 3.3.)
- **tp** Report content (average, maximum, minimum, instantaneous, and sum.
  Four items among these are output.)
- **eee···e** Measured/Computed value (up to 10 digits including the sign and decimal point). However, for the sum value, the value is output as a combination of the sign, mantissa, E, sign, and exponent such as in -3.8000000E+02.
  +OVER: Positive overrange
  −OVER: Negative overrange
  Burnout: Burnout data
  Empty data: Error data
- **uuu···u** Unit (up to 6 characters)
Test E-mail Format

- **Subject**
  Subject: Test

- **Syntax**
  Test.mail.CRLF
  <Host_name>CRLF
  hostCRLF
  CRLF
  <Time>CRLF
  mo/dd_hh:mi:ssCRLF
  CRLF
  <Message>CRLF
  x:msCRLF
  .................................
  CRLF

  x  Message number (1 to 10)
  ms Message content (only specified messages are output.)

Common Display Items for All Formats

- **Time information**
  mo  Month (01 to 12)
  dd  Day (01 to 31)
  hh  Hour (00 to 23)
  mi  Minute (00 to 59)
  ss  Second (00 to 59)
  The month, day, hour, minute, and second of the time information are output in the order specified by the date format in the basic setting mode.

- **Host name, domain name, and header information**
  header1  Header 1 (displayed only when it is set)
  header2  Header 2 (displayed only when it is set)
  host  Host name or IP address (IP address when the host name is not assigned. In the case of an IP address, the <Host> section is set to <IP address>.)
  domain  Domain name
  _  Space
1.5 Monitoring the DX on a PC Browser

Setting the Web Server Function
From the basic setting mode menu, set the server function and Web page of Communication (Ethernet).

Setting the Web server
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Server modes

- Web
For the Web item under Server, select Use or Not (don’t use). When Use is selected, the Web page item is added to the basic setting mode menu.

Port Number
The default value is 80. To change the setting,
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Environment tab > Communication > Service port
For the selectable range of port numbers, see section 6.1.

Setting the Web page
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Web page

On DXs without the /AS1 advanced security option
On DXs with the /AS1 advanced security option
1.5 Monitoring the DX on a PC Browser

**Page Type**

- **Monitor**
  Configure the monitor page. You can carry out the following operations on the monitor page.
  - Display the alarm summary
  - Display the measured and computed values of all channels
  - Display logs (message summary, error log, etc.)
  - Print the DX screen with an attached title and comment
  - Display and print reports
  - Connect to the DX via FTP and retrieve files
  - Make an alarm sound when an alarm occurs on the DX.
  For screen examples, see “Monitoring with the Browser” in this section.
- **Operator**
  Set the operator page. The following operations can be carried out in addition to the functions available on the monitor page.
  - Switch the operation screen
  - Control the DX’s DISP/ENTER key, arrow keys, and favorite key
  - Write messages (this operation cannot be performed on DXs with the /AS1 advanced security option).
  - Search data by date and time
  For screen examples, see “Monitoring with the Browser” in this section.

**Setting the monitor page**

- **Page type**
  Select **Monitor**.
- **Setting On/Off**
  To display the monitor page on a browser, select **On**; otherwise, select **Off**.
- **Access control**
  To use access control, select **On**.
  On DXs without the /AS1 advanced security option:
  If you set this to On, you must enter a user name and password to display the monitor page. Set the user name and password through the **Login** item. For details, see the **DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E)**.
  On DXs with the /AS1 advanced security option:
  If you set this to On, you must enter a user name and password to display the monitor page. Set the user name and password through the **Login** item. See the **Advanced Security Function (/AS1) User’s Manual (IM04L41B01-05EN)**.

**Setting the operator page**

- **Page type**
  Select **Operator**.
- **On/Off**
  To display the operator page in the browser, select **On**. Otherwise, select **Off**.
- **Access control**
  This is the same as the setting on the monitor page.
- **Command input**
  On DXs without the /AS1 advanced security option:
  To use message write commands, select **On**. Otherwise, select **Off**.
  On DXs with the /AS1 advanced security option:
  You cannot use message write commands. This setting is fixed at **Off**.
1.5 Monitoring the DX on a PC Browser

Monitoring with a Browser

Setting the URL
Set the URL appropriately according to the network environment that you are using. You can access the DX by setting the URL as follows:

http://host name.domain name/file name

http
Protocol used to access the server.

Host name.domain name
Host name and domain name of the DX.
You can also use the IP address in place of the host name and domain name.

File name
File name of the monitor page and operator page of the DX.
File name of the monitor page: monitor.htm
File name of the operator page: operator.htm
Omitting the file name is equivalent to specifying the monitor page. However, if the monitor page is disabled, it is equivalent to specifying the operator page.

Example
To display the operator page on a PC in the same domain as the DX, enter the URL in the Address box of the browser as follows:

http://dx1000.adv.daqstation.com/operator.htm or
http://192.168.1.100/operator.htm

(In the example, the domain name is set to adv.daqstation.com, the host name to dx1000, and the IP address to 192.168.1.100.)

Login (On DXs without the /AS1 advanced security option)
You need to configure the following settings to use the login function.

<table>
<thead>
<tr>
<th>No.</th>
<th>Setting</th>
<th>Description and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication login (Security &gt; Communication)</td>
<td>To access the DX through a communication interface, you must log in. For details, see section 8.2 in the DX1000/DX2000 User’s Manual.</td>
</tr>
<tr>
<td>2</td>
<td>Login</td>
<td>Register the users who can access the Web server. For details, see section 8.2 in the DX1000/DX2000 User’s Manual.</td>
</tr>
<tr>
<td>3</td>
<td>Web page</td>
<td>Set Access control to On in the operator and monitor pages.</td>
</tr>
</tbody>
</table>

Only users whose mode is set to Web, Com, or Key+Com can access the DX Web page. When you access the page, you will be prompted for a user name and password. Enter the user name and password that you set in item 2 in the table.
Login (On DXs with the /AS1 advanced security option)

You need to configure the following settings to use the login function.

<table>
<thead>
<tr>
<th>No.</th>
<th>Setting</th>
<th>Description and Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication login (Security &gt; Communication)</td>
<td>To access the DX through a communication interface, you must log in. See section 1.3 in the Advanced Security Function (/AS1) User's Manual.</td>
</tr>
<tr>
<td>3</td>
<td>Web page</td>
<td>Set Access control to On in the operator and monitor pages.</td>
</tr>
</tbody>
</table>

Only users whose mode is set to Web can access the DX Web page. When you access the page, you will be prompted for a user name and password. Enter the user name and password that you set in item 2 in the table.
1.5 Monitoring the DX on a PC Browser

Contents of the Monitor Page

Note

If the DX is in setting mode or basic setting mode, you cannot display the monitor page or the operator page. If you try to do so, an error message appears. For details on the different modes, see the Operation Guide (IM04L41B01-02E or IM04L42B01-02E).

Refresh the screen

Display the alarm summary
Displays the alarm summary in a separate window.

All channel display
Displays the measured values and alarm statuses of all channels in a separate window.

Alarm sound
Select On to produce an alarm sound when an alarm occurs on the DX.

Log
Displays various logs in a separate window.

Automatically refresh the screen
Turn this ON to automatically refresh the screen.

Report (/M1 and /PM1 options)
Display and prints reports

Zoom
Change the zoom rate of the screen.
DX1000 : 100%, 200%
DX2000 : 50%, 100%

Print page
Print the DX screen by attaching a title and comment.

Data list*
Connect to the DX FTP server and download files from its internal memory and external medium.
* Does not appear when the login function is being used.

DX screen image

Refreshing the page
The monitor page can be refreshed automatically or manually.

• Auto Refresh ON
  Refreshes the monitor page once approximately every 10 seconds.

• Auto Refresh OFF
  Does not automatically refresh the monitor page. If is refreshed when you click Refresh. You cannot refresh the page within approximately 10 seconds of the previous refreshing of the page, even if you click Refresh.

Zoom
Select the zoom factor from the list box to zoom into or out of the DX screen.
Sounding and Stopping Alarm Sounds

When an alarm occurs on the DX, the alarm sound popup window appears, and an alarm is sounded.

The alarm can be sounded on a PC that can produce sound. The popup blocking settings of your browser may prevent the alarm sound window from appearing.

The alarm sound stops when you click Close.

Note

- **Alarm Sound Output**
  - Alarm detection occurs when the screen is refreshed. The screen can be refreshed through manual refreshing, automatic refreshing, menu operations, and screen operations. We recommend that you enable automatic refreshing when you use the alarm sound.
  - An alarm is sounded when the alarm status in the status display section is red, blinking red, or blinking green (for the meanings of the different alarm statuses, see the DX1000/DX2000 User’s Manual).
  - Even if you release the alarm on the DX (so that no alarm status is displayed), the alarm will continue to sound on the PC until you stop it.

- **Alarm Sound Off**
  - The DX is not affected when you stop the alarm sound. Stopping the alarm is not equivalent to performing the alarm ACK operation on the DX.

- **Alarm Sound Specifications**
  - The alarm sound is stored in a WAV file on the DX. It cannot be changed.
  - When the pages of multiple DXs are being displayed:
    - If they are being displayed by the same browser, they all share one alarm sound window.
1.5 Monitoring the DX on a PC Browser

Contents of the Operator Page

When the multi batch function (/BT2 option) is not in use

**Message**
Write a message. Does not appear on DXs with the /AS1 advanced security option.

**Select the trend screen**
Directly select the group you want to display.

**Select the historical screen**
Directly select the group you want to display.

**Search by date and time**
Search data by date and time.

**Select other displays**
You can select the overview display, digital display, bar graph display, or custom display.

**Arrow keys and DISP/ENTER key**
Carry out the same operation as the corresponding keys on the DX.

**Favorite key**
Carry out the same operation as the corresponding key on the DX.
1.5 Monitoring the DX on a PC Browser

When the multi batch function (/BT2 option) is in use

Batch single mode

Batch overview mode
Switching the Screen (Operator page only)

- **Screen Mode (Only when the multi batch function (/BT2 option) is in use)**
  From the Select Screen Mode list box, select Batch Overview (batch overview mode) or Batch Group# (batch single mode).

- **Trend and Historical Trend**
  Using the Select Group list box, you can switch to the trend or historical trend display for the group that you specify.
  If you are using the multi batch function (/BT2 option) and are displaying the batch single mode screen, you can switch between the screens in the displayed batch group.

- **Other Screens**
  From the Select Screen list box, you can switch the screen by specifying digital, bar graph, overview, or custom.
  If you are using the multi batch function (/BT2 option) and are displaying the batch single mode screen, you can switch between the screens in the displayed batch group.

- **DISP/ENTER Key, Arrow Keys, and Favorite Key**
  If the DX is in operation mode, you can click the DISP/ENTER, arrow, and favorite keys to carry out the corresponding operation on the DX.

On DXs with the /AS1 advanced security option, you cannot switch the screen when:

- There is a user who has logged in to the DX through key operations.
- There is a user who is connected to the DX setting function through an Ethernet connection.
- There is a user who is executing the LL command through serial communication.
### 1.5 Monitoring the DX on a PC Browser

#### Alarm Summary

Click **Alarm Summary** to display the alarm summary. Click **Refresh** to update the data.
- You can display information for up to 400 alarms.
- Based on the DX settings, the Channel column displays channel numbers, tag comments, or tag numbers and tag comments.
- Alarms are displayed using the specified alarm colors.
- When individual alarm acknowledgment is enabled, the channels and alarm levels are displayed.

Alarm summary example (when the multi batch function (/BT2 option) is not in use)

<table>
<thead>
<tr>
<th>Status</th>
<th>Channel</th>
<th>Type</th>
<th>Alarm Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ABC-3</td>
<td>1L</td>
<td>2008/12/06 16:50:41</td>
</tr>
<tr>
<td>OFF</td>
<td>ABC-1</td>
<td>1HI</td>
<td>2008/12/06 16:48:42</td>
</tr>
<tr>
<td>OFF</td>
<td>ABC-2</td>
<td>2H</td>
<td>2008/12/06 16:47:43</td>
</tr>
<tr>
<td>ACK</td>
<td>ABC-3</td>
<td>3H</td>
<td>2008/12/06 16:46:14</td>
</tr>
<tr>
<td>ON</td>
<td>ABC-3</td>
<td>3H</td>
<td>2008/12/06 16:45:48</td>
</tr>
<tr>
<td>ON</td>
<td>ABC-4</td>
<td>1HI</td>
<td>2008/12/06 16:36:38</td>
</tr>
</tbody>
</table>

Alarm summary example (when the multi batch function (/BT2 option) is in use; release number 3 or later)

Select the batch group from the list box. If you select **All**, the alarm information for every batch group is displayed.

All channel display example

### All Channel Display

Click **All Channels** to display the measured values and alarm status of all channels. Click **Refresh** to update the data.
- Based on the DX settings, the Channel column displays channel numbers, tag comments, or tag numbers and tag comments.
- Alarms are displayed using the specified alarm colors.
- If you are using the annunciator function, the alarm display is based on the annunciator sequence. However, the indicators do not blink.
- Channels are not displayed in batch groups even if you are using the multi batch function (/BT2 option).

All channel display example
1.5 Monitoring the DX on a PC Browser

Log
Displays the message summary\(^1\), error log, FTP log, login log\(^2\), Web operation log, e-mail log, SNTP log, Modbus log, operation log\(^3\), and change settings log\(^3\) in a separate window. From the **Log** list box, select the log you want to display. Click **Refresh** to update the data.

- \(^1\) You can display up to 100 messages and up to 50 added messages.
- \(^2\) Only on DXs without the /AS1 advanced security option
- \(^3\) Only on DXs with the /AS1 advanced security option. Up to 100 operation log items can be displayed.

Message summary example (when the multi batch function (/BT2 option) is not in use)

<table>
<thead>
<tr>
<th>Time</th>
<th>Message</th>
<th>Group</th>
<th>User Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008/12/02</td>
<td>hold</td>
<td>ALL</td>
<td>[Communication]</td>
</tr>
<tr>
<td>13:54:29</td>
<td>hold</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>2008/12/02</td>
<td>start</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>13:33:15</td>
<td>start</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>2008/12/02</td>
<td>hold</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>13:33:09</td>
<td>start</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>2008/12/02</td>
<td>stop</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>13:32:56</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Message summary example (when the multi batch function (/BT2 option) is in use; release number 3 or later)
Displays the batch group that messages were written to.

<table>
<thead>
<tr>
<th>Time</th>
<th>Message</th>
<th>Batch Group</th>
<th>Group</th>
<th>User Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008/12/02</td>
<td>start</td>
<td>2</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>14:30:33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008/12/02</td>
<td>start</td>
<td>1</td>
<td>ALL</td>
<td>[Key]</td>
</tr>
<tr>
<td>14:38:49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Creation date: 2008/12/02 13:54:41

Creation date: 2008/12/02 14:30:35
Displaying and Printing Report Data (/M1 and /PM1 options; release number 3 or later)
You can display report data in the specified format (layout) and print it.

- **Procedure**
  - Set the report display layout before you carry out this operation. In the layout, set the report title, the report channels to display, and the item names.
  - From the operator or monitor page, open the create web report window, and select the report file and the layout to use.

**Report layout example**

**Daily report**

<table>
<thead>
<tr>
<th>Date</th>
<th>Minimum pump volume [k]</th>
<th>Maximum pump volume [k]</th>
<th>Average pump volume [k]</th>
<th>Integrated pump volume [k]</th>
<th>Flow rate [m³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/02 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/03 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/04 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/05 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/06 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/07 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/08 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/09 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/10 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/11 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/12 1:00:00</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/13 1:00:00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/14 1:00:00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/15 1:00:00</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/16 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/17 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/18 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/19 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/20 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/21 1:00:00</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/22 1:00:00</td>
<td></td>
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</tr>
<tr>
<td>03/23 1:00:00</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/24 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/25 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/26 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/27 1:00:00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/28 1:00:00</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>03/29 1:00:00</td>
<td></td>
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<tr>
<td>03/30 1:00:00</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03/31 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04/01 1:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please enter comments.
Daily and monthly reports

<table>
<thead>
<tr>
<th>Plant Section 50  Industrial water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daily report</strong> Start time: 2007/03/01 01:00:00</td>
</tr>
<tr>
<td><strong>Timeout time</strong></td>
</tr>
<tr>
<td>03/02 1:00:00</td>
</tr>
<tr>
<td>03/03 1:00:00</td>
</tr>
<tr>
<td>03/31 1:00:00</td>
</tr>
<tr>
<td>04/01 1:00:00</td>
</tr>
</tbody>
</table>

**Monthly report** Start time: 2007/03/01 01:00:00

<table>
<thead>
<tr>
<th><strong>Timeout time</strong></th>
<th><strong>Minimum pump volume [k]</strong></th>
<th><strong>Maximum pump volume [k]</strong></th>
<th><strong>Average pump volume [k]</strong></th>
<th><strong>Integrated pump volume [k]</strong></th>
<th><strong>Flow rate [m3]</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>04/01 1:00:00</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Please enter comments.

- **Setting the Report Layout**
  This item only appears on models with the computation function (/M1 or /PM1 option) when the basic setting items are set as follows:
  - The type of report to create is specified (Report > Basic settings).
  - Web server is set to Use (Communication (Ethernet) > Server > Server modes)
  - The operator or monitor page is set to On (Communication (Ethernet) > Web page)

  ◊ Press **MENU** (to switch to setting mode), and select the **Menu** tab > **Web Report**

**Web Report No**
You can configure 10 different report layouts. Set the number in the range of 1 to 10.

**On/Off**
Select **On** to use the layout.

**Title**
The report title. This title is used to select the layout when displaying reports on the Web browser. Enter the title using up to 64 alphanumeric characters and symbols.

**Item No (DX1000 and DX1000N only)**
You can set up to 10 items. Select 1-5 or 6-10.

**Item, Channel, Value, and Name**
For each item number, set the report channel, computation type, and name to assign to the item.
Enter the name using up to 16 alphanumeric characters and symbols.
For the procedure to configure the report, see section 9.5 in the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E).
• Displaying a Report
  1. Click Report to open the Create Web Report window.

  ![Create Web Report Window]

  2. Select the layout and report data.
     Select Layout
     Select the layout title from the list box.

     Select Report Data
     Select the report data from the list box. The report data is the data in the DX internal memory. The report data is displayed using the date when the report was created and the report value.

     Status
     To display the report data status, select On.

     | Status Indication | Description |
     |------------------|-------------|
     | ![Burnout Icon]  | A burnout occurred during the reporting period. |
     | ![Error Icon]    | A measurement or computation error occurred during the reporting period. |
     | ![Overflow Icon] | Over range or computation overflow occurred during the reporting period. |
     | ![Power Failure Icon] | A power failure occurred during the reporting period. |
     | ![Time Change Icon] | The time was changed during the reporting period. |

     Font Size
     Select a display font size from 6 points to 12 points.
3. Click **Create**.
   The report data appears in a separate window.

### Printing a Report

**Title**
You can edit the report title. Click within the report title box, and edit the text using up to 64 characters. The title that you enter here does not affect the DX setting.

**Comment**
You can enter two lines of comments in the comment text field. Click within the comment text field, and enter text.

**Print**
Print the report from the browser.

### Data list (Release number 3 or later)
You can easily retrieve files via FTP using the data list link, without having to specify the URL.

For operating instructions, see section 1.6.

<table>
<thead>
<tr>
<th>Time</th>
<th>FCMP 1(V)</th>
<th>FCMP 2(V)</th>
<th>FCMP 3(V)</th>
<th>FCMP 4(V)</th>
<th>FCMP 5(V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00:00</td>
<td>6.31100E+01</td>
<td>2.14750E+01</td>
<td>1.1930</td>
<td>4.35170E+01</td>
<td>3.32390E+01</td>
</tr>
<tr>
<td>12:01:00</td>
<td>9.85640E+00</td>
<td>2.89540E+01</td>
<td>1.5660</td>
<td>3.73930E+01</td>
<td>4.30620E+01</td>
</tr>
<tr>
<td>12:02:00</td>
<td>2.46720E+02</td>
<td>3.40130E+02</td>
<td>1.9270</td>
<td>4.04990E+02</td>
<td>3.94300E+02</td>
</tr>
<tr>
<td>12:03:00</td>
<td>3.77900E+01</td>
<td>3.98820E+01</td>
<td>1.3630</td>
<td>3.99710E+01</td>
<td>3.62250E+01</td>
</tr>
</tbody>
</table>
Printing the Screen (Release number 3 or later)
You can print a screen capture with an optional title and comment attached.

- **Title box**
The default title is the IP address or host name.
You can overwrite the default title with your own title.

   *ld001.0m8055*

   Please enter comments.

- **Comment input box**
Enter comments. You can enter more than five lines of comments, but only the first five lines will be printed.

- **Print button**
Opens the print window.

Click **Print** to open the Print window.
Writing Messages (Operator page only)
You can assign a text string to one of the DX messages 1 through 10 and write the message to a specified group at the same time. The maximum message length is 32 alphanumeric characters. The current message setting is overwritten. This operation is not available on DXs with the /AS1 advanced security option.

Example of Writing a Message (when the multi batch function (/BT2 option) is not in use)
Use message number 9 and write the message “ALARM” to all groups. Successful completion of the writing operation is indicated in the Command Response box.

Example of Writing a Message (when the multi batch function (/BT2 option) is in use)
Use message number 1 and write the message “start” to all display groups in batch group 1. Successful completion of the writing operation is indicated in the Command Response box.
Displaying the Measured Data at the Specified Date and Time (Operator page only; release number 3 or later)
You can search for measured data at the specified date and time and display the results.
You can search the display data or event data in the DX internal memory.

**Note**
- This function uses the DX function that displays the measured data at the specified date and time.
- You can search the last 10 years of data excluding the data before year 2000.
- For details on the display conditions, see section 4.3 in the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E).

1. Click **Data Range Search** to open the ENTER DATE & TIME RANGE window.
2. Set the date and time of the data recording and the data type.

3. Click **Historical Display**.
   The DX screen switches and the data at the specified date and time appears.
1.6 Accessing the Measurement Data File on the DX from a PC

You can access data files stored on the external storage medium.

Setting the FTP Server

Server Function
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Server modes

- FTP
  For the FTP item under Server, select Use or Not (don't use).

FTP Server Directory Output Format (Release number 3 or later)
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Environment tab > Communication > FTP Server Details

- Directory Output Format
  Set the directory output format to MS-DOS or UNIX.

When Not Using the Login Function

You can connect to the server using the user name “admin,” “user,” or “anonymous.” You can use a PC to access the DX via FTP. You can perform operations such as retrieving directory and file lists from the external storage medium of the DX and transferring and deleting files. In addition, you can also retrieve the directory or file list and transfer files in the internal memory.

Accessing Data Files from the Web Browser
1. Click Data list.
2. Click Memory or Media.
3. From the file list, select the files you want to retrieve.
1.6 Accessing the Measurement Data File on the DX from a PC

**Note**
- You can view the files by installing the provided DAQSTANDARD software on the PC and by associating DAQSTANDARD with the files you want it to receive.
- Memory is linked to ftp://hostname/MEM0/DATA.
- Media is linked to ftp://hostname/DRV0/. The external storage medium is the CF card.
- You cannot retrieve data files that are being created.

**Connecting from a PC via the FTP**

An example of retrieving files using a browser is described below. In the Address box, enter the following:

ftp://hostname.domain name/file name

Drag the data you want to retrieve from the /MEMO/DATA0 folder in the case of internal memory data or the /DRV0 folder in the case of data on the external storage medium to the PC. You can also use the IP address in place of the “hostname.domain name.”

**When Using the Login Function (Standard)**

You will be prompted for a user name and password when you access the server. Enter a user name and password that are registered on the DX to connect to it. For information about the operations that can be executed, see the explanation in section 1.1, “Login (On DXs without the /AS1 advanced security option).” You cannot perform the operations described under “Accessing Data Files from the Web Browser” or “Connecting from a PC via the FTP.”

**When Using the Login Function on a DX With the /AS1 Advanced Security Option**

You can connect to the server using the user name “admin,” “user,” or “anonymous.” The password is optional. You can only perform the operations that can be performed when you log into a DX as “anonymous.” You cannot delete or change the names of files on the server (the DX), nor can you transfer files to the server.

**Port Number**

The default value is 21. To change the setting,
- Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Environment tab > Communication > Service port
For the selectable range of port numbers, see section 6.1.
1.7 Transferring Data Files from the DX

The display and event data files, report data files, snapshot data files, setup files, and change settings log files created in the internal memory of the DX can be automatically transferred using FTP at the time the files are created.

Files to Be Transferred via FTP

The display or event data files are automatically transferred to the FTP destination described in the next section at appropriate times.

<table>
<thead>
<tr>
<th>File Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display data file</td>
<td>Data files are automatically transferred at each file save interval.</td>
</tr>
<tr>
<td>Event data file</td>
<td>Files are automatically transferred when the data length of data is recorded.</td>
</tr>
<tr>
<td>Report data file</td>
<td>When the file division mode is Combine(^1) or Separate,(^1) data files are automatically transferred when a report file is closed (or divided). For example, data files are transferred once per month when generating only daily reports. When the mode is Seprt2,(^1) an individual report file is output for each event. (^1) See section 9.5 in the DX1000/DX2000 User’s Manual.</td>
</tr>
<tr>
<td>Snapshot data file</td>
<td>The files are automatically transferred when a snapshot is executed. They are transferred regardless of the media storage setting. * Indicates snapshot using the FUNC key, communication command (EV2 command), USER key, or remote control function.</td>
</tr>
</tbody>
</table>
| Setup file and change     | The DX automatically transfers the setup file and change settings log file that are automatically saved to the CF card when the settings have changed. \(^2\)  
| settings log file when the | when the settings have changed \(^2\)  
| settings have changed \(^2\) | * Indicates snapshot using the FUNC key, communication command (EV2 command), USER key, or remote control function. |

\(^1\) When "FTP transfer at signing" is enabled on a DX with the /AS1 advanced security option, this file is automatically transferred after you sign in. See section 2.1 in the Advanced Security Function (/AS1) User’s Manual.

\(^2\) Only on DXs with the /AS1 advanced security option

Shifting the Transfer Time (Release number 3 or later)

There may be cases when data cannot be transferred from the DX to the FTP server due to too many simultaneous connections to the FTP server. An example is when multiple files are created and need to be transferred at the same time from multiple DXs. By shifting the transfer time, you can avoid having too many simultaneous connections to the FTP server. The time that display data files, event data files, and report files are transferred can be shifted.

- Even if a new event that requires an FTP transfer occurs while the DX is waiting to transfer the data of the previous event, it does not affect the transfer wait time of the previous event. When the transfer shift time passes, all data files of the same type that have been created (all of the files that have not been transferred) are transferred via FTP. The following figure is an example for display data.

- To avoid accumulating too many files that have not been transferred, we recommend that you set the transfer wait time shorter than the interval at which events that require FTP transfers occur.
1.7 Transferring Data Files from the DX

- Even if you turn the power off during FTP transfer wait time, the elapsed time is recorded.
- If you change the FTP transfer time settings during FTP transfer wait time, the data files that are being held are transferred using the previous setting. Subsequent data files are sent according to the new setting.
- If you initialize the DX during FTP transfer wait time (using Clear1, Clear2, or Clear3, Clear 4), the elapsed time is cleared.
- When "FTP transfer at signing" is enabled,*1 changes to the FTP transfer time settings for measured data are invalid.


Setting the FTP Client

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > FTP client > FTP transfer file

FTP transfer file settings

<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th>Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTP transfer file</td>
<td></td>
</tr>
<tr>
<td>Disp&amp;Event data</td>
<td>Off</td>
</tr>
<tr>
<td>Report</td>
<td>Off</td>
</tr>
<tr>
<td>Snapshot</td>
<td>Off</td>
</tr>
<tr>
<td>Setting</td>
<td></td>
</tr>
<tr>
<td>Transfer wait time</td>
<td></td>
</tr>
<tr>
<td>Disp&amp;Event data</td>
<td>0 min</td>
</tr>
<tr>
<td>Report</td>
<td>0 min</td>
</tr>
</tbody>
</table>

FTP connection destination settings

<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th>Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus client con</td>
<td></td>
</tr>
<tr>
<td>nected limits</td>
<td></td>
</tr>
<tr>
<td>Use/Not</td>
<td></td>
</tr>
<tr>
<td>Client number</td>
<td>1</td>
</tr>
<tr>
<td>On/Off</td>
<td>On</td>
</tr>
<tr>
<td>Allowed IP Address</td>
<td>0.0.0.0</td>
</tr>
</tbody>
</table>

Setting the FTP transfer files

- **Display and Event Data**
  Select **On** when automatically transferring display and event data files.

- **Report**
  Select **On** when automatically transferring report data files (including template-based report files).

- **Snapshot**
  Select **On** when automatically transferring snapshot data files.

- **Setting**
  This item is only available on DXs with the /AS1 advanced security option. Select **On** when automatically transferring the setup file and change settings log file that are saved when the settings have changed.

Transfer wait time

- **Disp&Event data**
  Set the time to delay the data transfer to the FTP server in the range of 0 to 120 minutes.
  When "FTP transfer at signing" is enabled on a DX with the /AS1 advanced security option, changes to the FTP transfer time settings are invalid. See section 2.1 in the Advanced Security Function (/AS1) User’s Manual.

- **Report**
  Set the time to delay the data transfer to the FTP server in the range of 0 to 120 minutes.
1.7 Transferring Data Files from the DX

Setting the FTP connection destination
Consult your network administrator when setting parameters such as the primary/secondary FTP servers, port number, login name, password, account, and availability of the PASV mode.

- FTP connection
  You can specify two destination FTP servers, Primary and Secondary. If the primary FTP server is down, the file is transferred to the secondary FTP server.

- FTP server name
  Enter the name of the file transfer destination FTP server using up to 64 alphanumeric characters.
  - If the DNS is used, you can set the host name as a server name. For details on setting the DNS, see section 1.3.
  - You can also set the IP address. In this case, the DNS is not required.

- Port number
  Enter the port number of the file transfer destination FTP server in the range of 1 to 65535. The default value is 21.

- Login name
  Enter the login name for accessing the FTP server using up to 32 alphanumeric characters.

- Password
  Enter the password for accessing the FTP server using up to 32 alphanumeric characters.

- Account
  Enter the account (ID) for accessing the FTP server using up to 32 alphanumeric characters.

- PASV mode
  Select On when using the DX behind a firewall that requires the passive mode. The default setting is Off.

- Initial path
  Enter the directory of the file transfer destination using up to 64 alphanumeric characters. The delimiter for directories varies depending on the implementation of the destination FTP server.
  Example) When transferring files to the “data” directory in the “home” directory of an FTP server on a UNIX file system.
  `/home/data`

When There Is a File with the Same Name at the Transfer Destination
Under all circumstances, when there is a file with the same name at the transfer destination, it is overwritten.

Operation When the Data Transfer Fails
If the DX fails to transfer files to both the primary and secondary FTP servers, the DX aborts the file transfer operation. If the connection to the destination recovers, the DX transfers new data files along with the files that the DX failed to transfer. Note that because the DX transfers data from its internal memory, if the data that the DX failed to transfer is overwritten, it is lost.
1.7 Transferring Data Files from the DX

Testing the FTP Transfer

You can test whether a test file can be transferred from the DX to an FTP server.

◊ Press FUNC and select FTPtest

Items to check before performing this test

• Connect the Ethernet cable correctly. For the connection procedure, see section 1.3.
• Check that the Ethernet interface settings are correct. For the procedure, see section 1.3.

Checking the results of the FTP test

• When an FTP test is executed, a test file named FTP_TEST.TXT is transferred to the directory indicated by the initial path at the FTP destination specified in this section.
• The result of the FTP test can be confirmed by displaying the FTP log (displayed on the DX (see the DX1000/DX2000 User’s Manual)) or Web screen (see section 1.5) or by outputting the result using the FL command (see section 3.4).
1.8 Synchronizing the Time

The DX time can be synchronized to the time on an SNTP server. The DX can also function as an SNTP server.

Setting the SNTP Client

Synchronize the DX time to the time on an SNTP server.
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > SNTP client

- **Use/Not**
  Select Use to use the SNTP client function; Otherwise, select Not. If you select Use, the SNTP client settings are displayed.

- **SNTP server name**
  Set the SNTP server name using up to 64 alphanumeric characters.
  - If the DNS is used, you can set the host name as a server name. For details on setting the DNS, see section 1.3.
  - You can also set the IP address. In this case, the DNS is not required.

- **Port number**
  Enter the port number of the SNTP server in the range of 1 to 65535. The default value is 123.

- **Access interval**
  Set the time interval for synchronizing the time with the server to OFF, 1, 8, 12, or 24h. If you select OFF, you can synchronize the time manually by operating soft keys. The time is not synchronized if the difference in the time between the DX and the server is greater than or equal to 10 minutes.

- **Access reference time**
  Set the reference time for making queries.

- **Access timeout**
  Set the time to wait for the response from the SNTP server when querying the time to 10, 30, 90s.

- **Time adjust on Start action**
  Select On to synchronize the time using SNTP when memory start is executed; Otherwise, select Off.

Manually Synchronizing the Time

You can synchronize the time at any time by operating the FUNC key. The SNTP client setting must be enabled.
◊ Press FUNC and select SNTP
Setting the SNTP Server

Carry out the steps below to run the DX as an SNTP server.

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Server modes

- SNTP
  For the SNTP item under Server, select Use or Not (don't use).
  When an SNTP client on the network queries the time information to the DX, the DX sends the time information.

Port Number
The default value is 123. To change the setting,
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Environment tab > Communication > Service port
For the selectable range of port numbers, see section 6.1.
1.9 Using the Modbus Server Function

The DX is used as a Modbus server. For the Modbus specifications, see section 6.3.

Setting the Modbus Server

Carry out the steps below to enable another device to read the DX data or write data to the DX using Modbus.

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Server modes

- **Modbus**
  For the Modbus item under Server, select Use or Not (don’t use).

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Allowed Modbus clients

- **Use/Not**
  To place a limitation on the IP addresses that can connect to the DX Modbus server, select Use. Only the IP addresses specified here can connect to the DX Modbus server. To not place a limitation, select Not.

- **Client number**
  You can register up to 10 IP addresses. Select the client number from 1 to 10.

- **On/Off**
  To allow connections, select On.

- **Allowed IP Address**
  Enter the IP address in the range of 0.0.0.0 to 255.255.255.255. You cannot enter a host name.
Port Number
The default value is 502. To change the setting,
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Environment tab > Communication > Service port
For the selectable range of port numbers, see section 6.1.

Reading/Writing the DX Data on Another Device
Another device (client device) sends commands to the DX to read the DX data or write data to the DX. You can perform some operations, such as memory start, by writing in the registers.
For the function codes that the DX supports and the DX registers that the client device can access, see "Modbus Server Function" in section 6.3.

Specifying the Register Number
Specify the DX register on the client device according to the instructions below.
• If you are using a commercial SCADA system or something similar, specify the register number (a number such as 400001; referred to as the “reference number”) listed under Modbus Server Function in section 6.3, “Modbus Protocol Specifications.”
• If you are using a custom communication program, specify the “relative number” in relation to the reference number. Compute the relative number in the manner indicated in the examples below.

Examples
The relative number for input register 300100 is 99, which is the difference between 300100 and 300001.
300100 – 300001 = 99
The relative number for input register 400011 is 10, which is the difference between 400011 and 400001.
400011 – 400001 = 10
1.10 Using the Modbus Client Function

The DX is used as a Modbus client.
For the Modbus specifications, see section 6.3.

Setting the Modbus Client
Carry out the steps below to enable the DX to read the data of another device or write data to another device using Modbus.

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Modbus client

Basic settings
• Read cycle
Set the read cycle to 125m, 250m, 500m, 1, 2, 5, or 10s.

• Retry interval
Set the interval for retrying the connection when the connection is interrupted for some reason. Select Off, 10, 20, or 30 s, 1, 2, 5, 10, 20, or 30 min, or 1 h. When Off is selected, the connection is not retried. The communication stops if the communication fails.

Destination server settings
• Server number
Select 1 to 16 for the server registration numbers to be configured.

• Port
Enter the port number in the range of 0 to 65535 for the selected server. The default value is 502.

• Modbus server name
Set the destination Modbus server name using up to 64 alphanumeric characters.
  • If the DNS is used, you can set the host name as a server name.
  • You can also set the IP address. In this case, the DNS is not required.
• **Unit**
  Select **Auto** if the unit number of the destination server is not required; Otherwise, select **Fixed**. If you select **Fixed**, the unit number item is displayed.

• **No.**
  Enter a fixed unit number in the range of 0 to 255.

### Setting the transmitted commands

#### Client command number
Select 1 to 16 for the transmitted command numbers to be configured.

#### Command type
Set the command type to Off, R, R-M, W, W-M, or E-M. If you select a command type other than Off, the client channel, server number, register, and data type items are displayed.

- **R**: Read to the external input channel (16-bit signed integer type) from the server.
- **R-M**: Read to the communication input data (32-bit floating point type) from the server.
- **W**: Write the measurement channel (16-bit signed integer type) to the server.
- **W-M**: Write the measurement channel (32-bit signed integer type) to the server.
- **E-M**: Read to the communication input data (32-bit floating point type) from the server/write the custom display value to the server (release numbers 4 and later).

  - **R** can be selected on DX2000s with the external input channel (/MC1 option) installed.
  - **R-M**, **W-M**, and **E-M** can be selected on models with the computation function (/M1 option) installed.

- **First/Last (client channels)**
  Enter the first and last channel numbers of input/output. The range of channels that you can enter varies depending on the command type as follows:
  - **R**: 201 to 440, **R-M**: C01 to C60, **W**: 1 to 48, **W-M**: 101 to 160
  - Only specify one communication input data item in the E-M command. An error will occur if you specify multiple items (e.g., [C01]-[C03]).

- **Server (server number)**
  Select the server number from 1 to 16.

- **Regi. (registers on the server)**
  Set the register number of the server.

  For an input register, select in the range of 30001 to 39999 and 300001 to 365536.
  For a hold register, select in the range of 40001 to 49999 and 400001 to 465536.

  The register numbers you can specify vary depending on the command type. See section 6.3.

#### Specifying the Register Number
Specify the register number on the DX by using the “reference number” (such as the number 40001 written above). For example on the Yokogawa UT351 Digital Indicating Controller, the corresponding D-register numbers and reference numbers are listed; use the reference number.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D0001</td>
<td>40001</td>
</tr>
</tbody>
</table>

For a server device that calls the register using a “relative number,” add 30001, 300001, 40001, 400001 or a similar number to obtain a reference number.

<table>
<thead>
<tr>
<th>Register Type</th>
<th>Relative Number</th>
<th>Reference Number</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold register</td>
<td>1004</td>
<td>40005</td>
<td>1004 + 40001</td>
</tr>
<tr>
<td></td>
<td>14567</td>
<td>414568</td>
<td>14567 + 40001</td>
</tr>
<tr>
<td>Input register</td>
<td>0000</td>
<td>30001</td>
<td>0000 + 30001</td>
</tr>
</tbody>
</table>
1.10 Using the Modbus Client Function

- **Type**
  
  Data type. Select INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, FLOAT_B, or FLOAT_L.
  
  The data type you can specify vary depending on the command type. See section 6.3.
1.10 Using the Modbus Client Function

Examples of Setting Commands

The following are examples of setting commands for the Modbus Client function. For the Modbus Master function, substitute “master” for “client,” and “slave” for “server.”

<table>
<thead>
<tr>
<th>Connection example</th>
<th>DXAdvanced (Modbus client)</th>
<th>Instrument A (Modbus server 1)</th>
<th>Instrument B (Modbus server 2)</th>
<th>Instrument C (Modbus server 3)</th>
</tr>
</thead>
</table>

Loading to Communication Input Data

The DX inputs data loaded from the server to communication input data as floating point type data.

- **Example 1**
  Load the value of the 16-bit signed integer assigned to register 30001 of instrument A to C01.

  Communication input data: C01
  Register of instrument A: 30001 (16-bit signed integer)

  Command setting:
  
  R-M C01 - C01 1 30001 INT16

- **Example 2**
  Load the value of the 32-bit signed integer assigned to registers 30003 and 30004 of instrument B to C03. Only the smallest register number need be specified in commands.

  Communication input data: C03
  Register of instrument B: 30003 (lower bytes) and 30004 (higher bytes) (32-bit signed integer)

  Command setting:
  
  R-M C03 - C03 2 30003 INT32_L

- **Example 3**
  Load the values of the 16-bit signed integers assigned to registers 30001 and 30002 of instrument B to C01 and C02. Only the smallest register number need be specified in commands.

  Communication input data: C01 and C02
  Register of instrument B: 30001 (16-bit signed integer) and 30002 (16-bit signed integer)

  Command setting:
  
  R-M C01 - C02 2 30001 INT16

- **Example 4**
  Load the values of the 32-bit floating point assigned to registers 30005 and 30006 of instrument B to C04. Only the smallest register number need be specified in commands.

  Communication input data: C04
  Register of instrument B: 30005 (lower bytes) and 30006 (higher bytes) (32-bit floating point)

  Command setting:
  
  R-M C04 - C04 2 30005 FLOAT_L
1.10 Using the Modbus Client Function

Loading to External Input Channels (DX2000 Only)
The DX inputs the data loaded from the server to the external input channel as a 16-bit signed integer type.

- **Example 1**
  Load the values of the 16-bit unsigned integers assigned to register 30001 of instrument C to external input channel 201.

<table>
<thead>
<tr>
<th>External input channel</th>
<th>Register of instrument C</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>30001</td>
</tr>
</tbody>
</table>

  Command setting
  
  R 201 - 201 ↔ 3 30001 UINT16

- **Example 2**
  Load the values of the 32-bit unsigned integers assigned to registers 32001 and 32002 of instrument C to external input channel 202. Only the smallest register number need be specified in commands.

<table>
<thead>
<tr>
<th>External input channel</th>
<th>Register of instrument C</th>
</tr>
</thead>
<tbody>
<tr>
<td>202</td>
<td>32001 32002</td>
</tr>
</tbody>
</table>

  Command setting
  
  R 202 - 202 ↔ 3 32001 UINT32 B

Writing Measured Values to the Server

- **Example**
  Write the measured value (16-bit signed integer) from channel 1 to register 40001 of instrument A.

<table>
<thead>
<tr>
<th>Measurement channel</th>
<th>Register of instrument A</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>40001</td>
</tr>
</tbody>
</table>

  Command setting
  
  W 001 - 001 ↔ 1 40001 INT16

Writing Computed Values to the Server

- **Example**
  Write the computed values (32-bit signed integers) from channel 101 to registers 40001 and 40002 of instrument A, in the order lower 16 bits/higher 16 bits. Only the smallest register number need be specified in commands.

<table>
<thead>
<tr>
<th>Computation channel</th>
<th>Register of instrument A</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>40001 40002</td>
</tr>
</tbody>
</table>

  Command setting
  
  W-R 101 - 101 ↔ 1 40001 INT32 L
Loading to Communication Input Data and Direct Writing of Values to the Server

• Example

Load the value of the signed 16-bit integer assigned to the hold register (400001) of instrument A to C05. The value of C05 is only written to the hold register (400001) of instrument A when a value write operation is performed from the custom display.

Normal

<table>
<thead>
<tr>
<th>Communication input data</th>
<th>Register of instrument A</th>
</tr>
</thead>
<tbody>
<tr>
<td>C05</td>
<td>400001 16-bit signed integer</td>
</tr>
</tbody>
</table>

When a value write operation is performed from the custom display

<table>
<thead>
<tr>
<th>Communication input data</th>
<th>Register of instrument A</th>
</tr>
</thead>
<tbody>
<tr>
<td>C05</td>
<td>400001 16-bit signed integer</td>
</tr>
</tbody>
</table>

Command setting

```
E-M C05 - C05  1 400001 INT16
```
1.10 Using the Modbus Client Function

Checking the Modbus Operating Status

Displaying the Modbus Operating Status

◊ Press DISP/ENTER and select INFORMATION > MODBUS CLIENT

Note

To display MODBUS CLIENT on the screen selection menu, you need to change the setting using the menu customize function. The operation is as follows:

◊ Press MENU (to switch to setting mode), and select the Menu tab > Menu customize >
  Display menu
  1. Select INFORMATION > MODBUS CLIENT
  2. Press the View soft key.

Communication condition

- Communication Conditions
  The Read cycle and Connect.retry settings are displayed.

- Communication Status
  The communication status is displayed using the status lamp and the detail code.

<table>
<thead>
<tr>
<th>Status Lamp</th>
<th>Detail Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Good</td>
<td>Communication is operating normally.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Command is readying.</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>Trying to establish a TCP connection.</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>Communication is stopped.</td>
<td></td>
</tr>
<tr>
<td>Common to yellow, orange, and red</td>
<td>None</td>
<td>No response from the server device.</td>
</tr>
<tr>
<td></td>
<td>Func</td>
<td>The server device cannot execute the command from the DX.</td>
</tr>
<tr>
<td></td>
<td>Regi</td>
<td>The server device does not have the specified register.</td>
</tr>
<tr>
<td></td>
<td>Err</td>
<td>There is an error in the response data from the server device.</td>
</tr>
<tr>
<td></td>
<td>Link</td>
<td>Ethernet cable is disconnected.</td>
</tr>
<tr>
<td></td>
<td>Host</td>
<td>Unable to resolve the IP address from the host name.</td>
</tr>
<tr>
<td></td>
<td>Cnct</td>
<td>Failed to connect to the server.</td>
</tr>
<tr>
<td></td>
<td>Send</td>
<td>Failed to transmit the command.</td>
</tr>
<tr>
<td></td>
<td>BRKN</td>
<td>Failed to received the response data or detected a disconnection.</td>
</tr>
<tr>
<td></td>
<td>(Space)</td>
<td>The detail code is not displayed until the status is confirmed when communication is started.</td>
</tr>
</tbody>
</table>
**1.10 Using the Modbus Client Function**

**Resuming Command Transmission**
You can use the front panel keys to resume command transmission to a server device to which communication is stopped (red status) lamp

1. Using the up and down arrow keys, select the command corresponding to the server device to which transmission will be resumed. The message "Push [right arrow] key to refresh" appears.
2. Press the right arrow key. The DX starts command transmission to the specified server.

**Data When Communication Is Stopped and during Connection Retrials**
If the command transmission stops such as due to a connection drop, the status turns orange or red, and the communication input data and external input channel data are error data. On communication channels, "+OVER" or–OVER is displayed according to the DX settings. "*****" is displayed on external input channels.

**Data Dropout**
Data drop occurs when the commands from 1 to 16 do not complete within the read cycle (see appendix 1). When a data dropout occurs, the communication input data is held at the previous value. A message indicating the data dropout is also displayed on the Modbus operating status display. If this happens, take measures such as making the read cycle longer or reducing the number of commands. Confirm that no data dropout occurs on the modbus status log screen.
Function for Automatically Assigning MW100s to the Modbus Client (DX2000 Only)

The following setup is carried out from the DX using YOKOGAWA’s MW100 Data Acquisition Unit as a Modbus server. If the DX2000 is a Modbus client, MW100s, Modbus servers on the network, can be automatically assigned to the DX2000. This function can be used only on DX2000s with the external input channel function (/MC1 option).

Setup Preparation
Set the MW100s so that measurements can be started (IP address, system construction, range setting, and the like of the MW100s to be automatically assigned). For details, see the user’s manual of the MW100.

Setup Procedure
If the IP address of the DX is not set, set it before carrying out the procedure below.

1. Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Modbus client > Auto setting
2. Carefully read the displayed precautions. Select Yes to execute the auto setting. Select No to return to the screen operation.
3. From the list of MW100s that is displayed, select the MW100s to be connected using the up and down arrow keys, and press DISP/ENTER. The selected MW100s are assigned to the external input channel of the DX.

Pressing the Call soft key causes “--” to blink on the 7-segment LED display of the selected MW100 for 2 seconds. This allows you to check which MW100 is selected if multiple MW100s are connected.

* For the corrective action, see the DX1000 or DX2000 User’s Manual.
### Setup Items

The MW100 channels are assigned to the external input channels of the DX as follows:

- **Channel Number**

  The channels of the MW100 selected first are assigned consecutively from external input channel 201. The channels of the MW100 selected next are assigned to the available external input channels from the smallest number. You cannot select the external input channels to be assigned.

- **Range Settings**

  The range settings of the MW100 (including the span and unit) are set automatically to the external input channels.

  If the span setting of the MW100 range exceeds the span setting range of the DX external input channel (−30000 to 30000), it is set to the span upper limit (30000) or lower limit (−30000).

  Specify the settings such as the alarm, tag, and the area display of the color scale band of each channel after the auto setting is complete.

### Note

**Precautions When Assigning Channels to the External Input Channels**

- The MW100 channels are assigned in unit of 10 channels to the external input channels. If the MW100 measurement module consists of less than 10 channels, “OFF” is assigned to the external input channels for the section without channels.

- An error occurs if the number of MW100 channels to be automatically set is greater than the number of available external input channels.

- If the range setting of a MW100 channel is set to “SKIP,” the external input channel of the DX is set to “OFF.”

- If a MW100 unit contains a module that cannot be set automatically, only the channels that can be assigned are assigned to the external input channels of the DX.

- If a new MW100 is added, auto setting is executed again. At this point, all the settings are cleared. Therefore, you must execute the auto setting again for all MW100s.

- If you are connecting MW100s that can be automatically set and MW100s that cannot be automatically set or other Modbus devices, automatically set the MW100s that can be automatically set first and then manually set the connection of the remaining devices.
1.10 Using the Modbus Client Function

**Note**

About the MW100

- MW100s that support auto setting are those with firmware version R2.22 or later.
- MW100 modules that can be automatically set are the following input modules. The installable input modules vary depending on the MW100 firmware version.
  - 4-CH, High-Speed Universal Input Module
  - 10-CH, Medium-Speed Universal Input Module
  - 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module
  - 10-CH, High-speed Input Module
  - 30-CH, Medium-Speed DCV/TC/DI Input Module
  - 10-CH, Medium-Speed Pulse Input Module

- If there are no channels to be assigned or the Modbus server setting is OFF, auto setting fails with an error. Check the settings.
- MW100s that are connected through auto setting automatically switches to the measurement mode.
- Port number 34324 of the MW100 is used to perform auto setting.
- For details on the MW100 settings, see the user's manual of the MW100.

The first channel information of the MW100 that is automatically set to the external input channel can be displayed when the cursor is on the first or last channel.

In addition, the status of the connected MW100 can be confirmed on the Modbus status display screen.

![Modbus Client Function](image)
1.11 Usage Example of the Modbus Function

Explains the setting example for both Modbus client and server on DX1000s connected via the Ethernet. This section refers to the DX1000 set to be a Modbus server as DX1000 server and the DX1000 set to be a Modbus client as DX1000 client.

System Configuration and Actions
Uses the measurement channel, computation channel, and communication input data as described in the figure below. Assumes other conditions are set properly.

Action
- The DX1000 client reads the measured value of channel 1 on the DX1000 server into the communication input data C01. C01 is displayed on a computation channel 101 by including the data in the equation. The computation channel 101 is assigned to Group1.
- The measured value of channel 1 on the DX1000 server is transferred to the DX1000 client as an integer in the range of –20000 to 20000.
- The DX1000 client displays the read data as –2.0000 to 2.0000 V using the computation channel 101. The following conversion is applied.

\[
\text{Value on the computation channel 101 of the DX1000 client} = \text{Communication input data C01} \times 0.0001
\]
Settings on the DX1000 Server (Modbus Server)

Setting the Modbus Server Function
◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Server > Server modes

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus</td>
<td>Use</td>
</tr>
</tbody>
</table>

About the Port Number
The port number is 502 by default.

Setting the Measurement Channel
◊ Press MENU (to switch to setting mode), and select the Menu tab > Meas channel > Range, Alarm

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-CH, Last-CH</td>
<td>1</td>
</tr>
<tr>
<td>Mode</td>
<td>Volt</td>
</tr>
<tr>
<td>Range</td>
<td>2V</td>
</tr>
<tr>
<td>Span_L</td>
<td>–2.0000</td>
</tr>
<tr>
<td>Span_U</td>
<td>2.0000</td>
</tr>
<tr>
<td>Alarm</td>
<td>OFF</td>
</tr>
<tr>
<td>Off</td>
<td>OFF</td>
</tr>
<tr>
<td>Off</td>
<td>OFF</td>
</tr>
<tr>
<td>Off</td>
<td>OFF</td>
</tr>
<tr>
<td>Input</td>
<td>+1</td>
</tr>
<tr>
<td>Input</td>
<td>–1</td>
</tr>
</tbody>
</table>
Setting the DX1000 Client (Modbus Client)

Assumes the settings other than that for the server and the command are left to default values.

Registering the Destination Server

Register the DX1000 server to number 1.

The IP address of the DX1000 server is “190.168.1.101” as an example.

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Modbus client > Modbus server settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>502</td>
</tr>
<tr>
<td>Modbus server name</td>
<td>192.168.1.101</td>
</tr>
<tr>
<td>Unit</td>
<td>Auto</td>
</tr>
</tbody>
</table>

Setting Command

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Ethernet) > Modbus client > Command settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command type</td>
<td>R-M</td>
</tr>
<tr>
<td>First and Last</td>
<td>C01</td>
</tr>
<tr>
<td>Server</td>
<td>1</td>
</tr>
<tr>
<td>Regi.</td>
<td>30001</td>
</tr>
<tr>
<td>Type</td>
<td>INT16</td>
</tr>
</tbody>
</table>
1.11 Usage Example of the Modbus Function

Setting the Computation Channel

◊ Press MENU (to switch to setting mode), and select the Menu tab > Math channel > Expression, Alarm

![Menu settings for computation channel]

- Item | Settings
- First-CH, Last-CH | 101
- Math | On
- Calculation expression | C01*K01
- Span_L | -2.0000
- Span_U | 2.0000
- Unit | V

◊ Press MENU (to switch to setting mode), and select the Menu tab > Math channel > Constant

![Menu settings for constant]

- Item | Settings
- Number of constant | K01
- Value | 0.0001

Assigning the channel to a Group

◊ Press MENU (to switch to setting mode), and select the Menu tab > Group set, Trip line

![Menu settings for group assignment]

- Item | Settings
- Group number | 1
- On/Off | On
- Group name | GROUP 1
- CH set | 101
Starting the Computation (DX1000 Client)

◊ Press FUNC and select Math start

The computation starts. A computation icon is displayed on the status display section. The value of the computation channel 101 in the GROUP 1 of the DX1000 client varies in conjunction with the measured value of the measurement channel 1 on the DX1000 server.

Confirming the Communication Status (DX1000 Client)

Showing a Menu to Switch to the Modbus Client Screen

This is the operation to show INFORMATION > MODBUS CLIENT on the display selection menu.

◊ Press MENU (to switch to setting mode), and select the Menu tab > Menu customize > Display menu

1. Select INFORMATION > MODBUS CLIENT using the arrow keys.

   * Select INFORMATION > MODBUS MASTER when you use the Modbus master via the serial communication.

2. Press the View soft key.

   The selected item displays in white.

3. Press the ESC key to return to the operation screen.

Displaying the Modbus Client Screen

Press DISP/ENTER and select INFORMATION > MODBUS CLIENT

   * Select INFORMATION > MODBUS MASTER when you use the Modbus master via the serial communication.
1.12 Using the Setting/Measurement Server

This section explains how to use the setting/measurement server. You can use this function to send commands to retrieve data from the DX and to control it. For information about the maximum number of simultaneous connections, see section 6.1.

When Not Using the Login Function
Access the server using the user name “admin” or “user.” Of the commands in chapter 3, you can use either the administrator (admin) or user commands, depending on which name you used to log in.

When Using the Login Function (Standard)
Log in as an administrator or user who has been registered on the DX. Of the commands in chapter 3, you can use either the administrator or user commands, depending on which name you used to log in.

On DXs with the /AS1 Advanced Security Option
When Not Using the Login Function
Access the server using the user name “user.” You can use the monitoring function commands. You cannot access the server using the user name “admin.”

When Using the Login Function
Connect (log in) to the monitoring function or the setting function as an administrator or user who has been registered on the DX.

- Monitoring Function
You can produce measurement and setup data and execute input commands for communication input data and external input channels. Administrators and users can connect to the monitoring function. Users can connect regardless of whether they log in through key operations or serial communication.

- Setting Function
Administrators and users can connect to the setting function. Administrators can execute all the commands. In addition to the monitoring function commands, users can execute some operations, such as the starting and stopping of measurement. However, users cannot perform operations that are forbidden by the user privilege settings. For details, see section 3.2.
When you are using the multi-login function, you can log in to the setting function in the circumstances listed below, but all commands other than the monitoring function commands will result in errors.
- When a user who has logged in through key operations is in setting mode or basic setting mode.
- There is a user who is using serial communication to execute a command to enter setting mode.
When you are not using the multi-login function, you will be unable to log in to the setting function if an administrator or user has logged in to the DX through key operations or if there is a user who is executing the LL command through serial communication.
Logging In
Perform the operations that are appropriate for your PC, software, and network environment.

This section explains the operations that a user performs on the PC before he or she logs in and how the DX responds to those operations. For information about the flow of login processing, see appendix 2.

Note
- Regardless of the connection types—key login, a setting or monitoring connection to the setting/measurement server, or connection through the LL command using serial communication—two users cannot be logged in with the same name.
- If you try to connect to the DX from a PC when no administrators have been registered, the DX returns the following response:
  E1 402 Select username from ‘admin’ or ‘user’
  - Selecting admin is the same as logging in to the setting function at the administrator level.
  - Selecting user is the same as logging in to the monitoring function at the user level except that you can’t use the CM or CE commands.

Logging In Before the Password Has Been Set
Immediately after you register a user on the DX, the default password is used as the login password for that user. When you log in for the first time, you will be prompted to change the password.

1. Specify the host name or IP address of the DX that you want to connect to. Or, specify the port number (34260) of the setting/measurement server.
   The DX returns the following message:
   E1 406 “Select function from ‘setting’ or ‘monitor’.”

2. Enter “setting” to log in to the setting function.
   Enter “monitor” to log in to the monitoring function.
   The DX returns the following message:
   E1 400 “Input username.”

3. Enter the user name.
   The DX returns the following message:
   E1 405 “Input user ID.”

4. Enter the user ID.
   The DX returns the following message:
   E1 401 “Input password.”

5. Enter the default password.
<table>
<thead>
<tr>
<th>User</th>
<th>Default password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator 1 to 5</td>
<td>Admin1 to Admin5</td>
</tr>
<tr>
<td>User 1 to 90</td>
<td>User01 to User90</td>
</tr>
</tbody>
</table>
   The DX returns the following message:
   E1 407 “Password has expired. Please enter a new password.”

6. Enter a new password.

Note
- You cannot use the same combination of user ID and password as another user.
- Enter a password that is between 6 and 20 characters in length.
- You cannot register a character string that contains spaces or the word “quit.”
1.12 Using the Setting/Measurement Server

The DX returns the following message:
E1 408 “Enter password again for confirmation.”

7. Enter the password that you entered in step 6.
The DX returns the following message:
E0
You are now logged in.

Logging In after the Password Has Been Set

1. Specify the host name or IP address of the DX that you want to connect to. Or, specify the port number (34260) of the setting/measurement server.
The DX returns the following message:
E1 406 “Select function from ‘setting’ or ‘monitor’.”

2. Enter “setting” to log in to the setting function.
Enter “monitor” to log in to the monitoring function.
The DX returns the following message:
E1 400 “Input username.”

3. Enter the user name.
The DX returns the following message:
E1 405 “Input user ID.”

4. Enter the user ID.
The DX returns the following message:
E1 401 “Input password.”

5. Enter the password.
The DX returns the following message:
E0
You are now logged in.

You will need to enter a new password after the current one expires. Follow the directions that appear to enter the new password.

Invalid User
If a user tries to log in with the wrong password consecutively for the number of times specified by the password retry frequency setting, that user is made invalid, and he or she will be unable to log in.

• Releasing the Invalid User Status
  The administrator can release the invalid user status. For instructions on how to do this, see the Advanced Security Function (iAS1) User’s Manual (IM04L41B01-05EN).

Error Messages and Dealing with Them
If an error message appears while you are logging in, see chapter 10 in the DX1000/ DX1000N User’s Manual or chapter 11 in the DX2000 User’s Manual.
Sending Commands
Use the dedicated DX commands. The commands that you can use are listed below. For details about the commands, see chapter 3. For information about the responses to the commands, see chapter 4.

<table>
<thead>
<tr>
<th>Connected Function</th>
<th>Administrator</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting function</td>
<td>All the commands are available.</td>
<td>All the output commands except for ME and MO and some of the control commands are available (operations that are forbidden by the user privilege settings are not available).</td>
</tr>
<tr>
<td>Monitoring function</td>
<td>All the output commands except for ME and MO and control commands CM and CE.</td>
<td></td>
</tr>
</tbody>
</table>

Main Functions and Commands

• Outputting the Most Recent Measured and Computed Data

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD</td>
<td>The most recent measured and computed data is output in binary or ASCII format. When the data is output in binary format, only the significands of the measured and computed data are output. To acquire the correct values, you must combine the values output by this command with the decimal place information output by the FE command. Example: A value of 12.345 is output as “12345” in binary format.</td>
</tr>
<tr>
<td>BO</td>
<td>When data is output in binary format, this command specifies whether to output the data from the MSB (most significant bit) or from the LSB (least significant bit).</td>
</tr>
<tr>
<td>FE</td>
<td>Outputs the decimal place and unit information of the measured and computed data. This command can be used when data is output in binary format.</td>
</tr>
</tbody>
</table>

• Outputting Measured and Computed Data at a Specific Interval

The DX outputs the data from a FIFO buffer (First-In First-Out; see appendix 5).

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>Outputs the significands of the measured and computed data in binary format. To acquire the correct values, you must combine the values output by this command with the decimal place information output by the FE command. See appendix 5, &quot;Flow Chart of the FIFO Data Output.&quot;</td>
</tr>
<tr>
<td>BO</td>
<td>See the explanation for &quot;Outputting the Most Recent Measured and Computed Data.&quot;</td>
</tr>
<tr>
<td>FE</td>
<td>See the explanation for &quot;Outputting the Most Recent Measured and Computed Data.&quot;</td>
</tr>
</tbody>
</table>

• Outputting Status Information

For information about status information, see chapter 5.

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS</td>
<td>The status information is output in ASCII format.</td>
</tr>
<tr>
<td>IF</td>
<td>A status filter is set.</td>
</tr>
</tbody>
</table>

• Starting and Stopping Measurement and Computation

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS</td>
<td>PS0: memory start, PS1: memory stop</td>
</tr>
<tr>
<td>TL</td>
<td>TL0: computation start, TL1: computation stop</td>
</tr>
</tbody>
</table>

• Writing Messages

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>Writes a registered character string (message).</td>
</tr>
<tr>
<td>BJ</td>
<td>Writes the specified character string (message).</td>
</tr>
</tbody>
</table>

• Setting the Batch Name

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>Sets the batch and lot numbers.</td>
</tr>
</tbody>
</table>
1.12 Using the Setting/Measurement Server

**Disconnection**

The connection is closed when:

- A command is sent that closes the connection.
  
  - The CC0 command is sent.

- A command that results in the exiting of basic setting mode has been executed.
  
  If you log in to the setting function and initialize the setup data (EC command), load settings (YO command), or close system mode (YE command), the communication connection is closed, along with other connections.

- The DX disconnects according to its automatic logout and communication timeout settings.
  
  When you are logged in, if you do not send commands for the specified time indicated below, the DX will automatically log out and close the connection.

  Specified time: The DX auto logout time (see section 2.1 in the *Advanced Security Function (AS1) User’s Manual*) or the communication timeout time (see section 1.3), whichever is shorter.

- There is a communication error.
  
  The connection is closed when there is a transfer error, a reception error, or when the keepalive function times out (see “Setting/Measurement Server” in section 1.1).

**Note**

When the connection to the setting function is closed, the DX returns to the operation mode screen, and the user is logged out.
1.13 Using the Maintenance/Test Server

When Not Using the Login Function
Access the server using the user name “admin” or “user.” You can use either the administrator (admin) or user commands, depending on which name you used to log in.

When Using the Login Function (Standard)
Log in as an administrator or user who has been registered on the DX. Of the commands in chapter 3, you can use either the administrator or user commands, depending on which name you used to log in.

On DXs with the /AS1 Advanced Security Option
Access the server using the user name “admin” or “user.” You can use either the administrator (admin) or user commands, depending on which name you used to log in.

Telnet Operation Example
The example below shows how to perform operations using Telnet on Windows XP.
The necessary operations vary depending on the operating environment. Perform the operations that are appropriate for your environment.

Connecting
Type “telnet” in the Windows command prompt, and then press ENTER to start Telnet. If you enter “display,” the Telnet settings are displayed. Configure the settings as indicated below.
• Use local echo
  set localecho
• Send CR and LF by pressing ENTER
  set crlf
Connect to the DX using the “open” command.
  open (the DX IP address or host name) 34261
  * Put a space between the DX IP address or host name and “34261.”
  “34261” is the port number of the maintenance/test server.

The DX returns the following message:
E1 402 “Select username from ‘admin’ or ‘user’.”

Access the server using the user name “admin” or “user.”

Sending Commands
For information about commands, see section 3.2.

Disconnection
The connection is closed when:
• A command is sent that closes the connection.
  The quit command is sent.
• A communication timeout occurs.
  The DX automatically closes the connection of clients with whom no communication has taken place for 15 minutes.
• There is a communication error.
  The connection is closed when there is a transfer error, a reception error, or when the keepalive function times out (see “Other Functions” in section 1.1).
1.14 Using the Password Management Function (/AS1 option)

Overview

System Configuration
The following figure shows the configuration of the authentication system.

Terminology
- **KDC Server (Key Distribution Center)**
  Manages the DX account (host account) and the user accounts for operating the DX.

- **Encryption Method**
  The method for encrypting the authentication data.

- **Authentication**
  The process by which the DX determines whether or not a user is qualified to operate it.

- **Host Account**
  The DX user account on the KDC server.

- **Host Principal**
  The DX name used on the application.

- **User Account**
  The account of a user who can operate the DX.

- **Mapping**
  The establishment of an association between the host principal and the host account.

- **Realm Name**
  The name of the domain that contains the KDC server and the DX.
Flow of Operation
To use the password management function, you must configure a KDC server and the DX.
First configure the KDC server, and then configure the DX.

Configuring the KDC Server
An example of how to configure a KDC server is provided in this section.

Configuring the DX
• Set the SNTP Client
  For the password management function to work, the times on the KDC server and the DX must be synchronized. Configure the DX to always synchronize itself with an SNTP server on the network. For the setup procedure, see section 1.8.

  Note
  Be sure to set DST (daylight saving time) and the time zone correctly. For the setup procedures for DST and the time zone, see sections 2.1 and 2.2 in the DX1000/DX2000 User’s Manual.

• Set the IP Address and DNS
  See section 1.3 for information about the IP address and DNS settings.

• Turn the Password Management Function On

• Register Users
  Specify operation modes, user names, and restrictions for each user. See section 2.1 in the Advanced Security Function (/AS1) User’s Manual (IM04L41B01-05EN).

• Set the Root User Password

• Set the KDC Server to Connect to and the Authentication Key
  Set the server information, the encryption method, etc. This section will explain how to do this.
1.14 Using the Password Management Function (/AS1 option)

DX Settings (KDC server to connect to and authentication key)

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication(Ethernet) > Password management > KDC connection, Certification key.

KDC connection

<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th>Certification key</th>
</tr>
</thead>
<tbody>
<tr>
<td>KDC connection</td>
<td></td>
</tr>
<tr>
<td>KDC server name</td>
<td></td>
</tr>
<tr>
<td>Port number</td>
<td></td>
</tr>
</tbody>
</table>

Certification key

<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th>Certification key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host principal</td>
<td></td>
</tr>
<tr>
<td>Realm name</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>Encryption</td>
<td></td>
</tr>
</tbody>
</table>

KDC Connection

You can specify a primary and a secondary KDC server.

• **KDC server name**
  Enter the KDC server name here using up to 64 alphanumeric characters.

• **Port number**
  You can specify a value from 1 to 65535. If you do not specify a port number, the default port number, which is 88, is used.

Certification Key

• **Host principal**
  The DX account name registered on the KDC server. You can enter up to 20 alphanumeric characters.*1
  *1 You cannot use forward slashes or at signs.

• **Realm name**
  The name of the domain that contains the KDC server and the DX. You can enter up to 64 alphanumeric characters.*2
  *2 You cannot use forward slashes or at signs. Characters are case-sensitive.

• **Password**
  Set the password to use to access the KDC server using up to 20 characters. The password is displayed as "**********.

• **Encryption Method**
  Select an encryption method that the server supports from AES128, AES256, and ARC4. ARC4 (ARCFOUR) is an encryption algorithm that is compatible with RC4.

*Note*

• The host principal is converted within the DX as shown below.
  host/(host principal)@(realm name)

• Cross-realm authentication (authentication of different domain names) is not supported.
KDC Server Configuration Example

The example below shows how to configure a KDC server. In the example, a Windows Server 2008 KDC server that supports Active Directory management is used on an English OS.

Overview

The necessary Active Directory management steps on Windows Server 2008 are the creation of a host account, property changes, mapping of the host principal to the host account*1, and the creation of a key tab file (this step can be omitted). The conditions are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain name</td>
<td>The name of the domain that you are using</td>
</tr>
<tr>
<td>Realm</td>
<td>The name of the realm that you are using*2</td>
</tr>
<tr>
<td>Encryption method</td>
<td>AES256</td>
</tr>
<tr>
<td>Port number</td>
<td>88</td>
</tr>
<tr>
<td>Preauthentication</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Registered name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host name</td>
<td>dxadv</td>
<td>record-1</td>
</tr>
</tbody>
</table>

*1 You need to use mapping to use Active Directory to perform user registration on a non-Windows device.

*2 The realm name is the domain name (all caps).

Creating a DX Host Account

1. Open Server Manager, and select New > User.
1.14 Using the Password Management Function (/AS1 option)

2. Enter dxadv into the First name, Full name, and User logon name boxes.

3. Enter record-1 in the Password box. Select the Password never expires check box.

4. Click Finish to complete the creation of the new account.
Changing the Properties of the New Account
Select the check boxes listed below. Clear all other check boxes.
This account supports Kerberos AES 256 bit encryption
Password never expires
• The “Password never expires” check box was selected previously in step 3, so it will also be selected in this window.
• If you clear all the encryption method check boxes, RC4 will be used.

“host” is not attached before mapping. It is attached after mapping is performed successfully.
1.14 Using the Password Management Function (/AS1 option)

Mapping the host principal to the host account

Open the command prompt, and execute the following command.

```
ktpass -princ host/dxadv@(the name of the realm you are using) -pass record-1 -mapuser dxadv -ptype KRBS_NT_PRINCIPAL -crypto All -out C:\yokogawa\dxadv.keytab
```

The file dxadv.keytab is created in the C:\yokogawa folder.

Create an Active Directory User Account and Change Its Properties

Create an Active Directory DX user account. Change the properties of the account to match those of the host.

In this example, select the following check box:

This account supports Kerberos AES 256 bit encryption

Be sure to select the same encryption method as the one used by the DX host account.
About Mapping

Mapping is the establishment of an association between the host principal and the host account. In the example below, the setting “princ” is associated with the setting “mapuser.” The association is accomplished through the use of the ktpass tool.

- Open the command prompt, and execute the ktpass command.

**ktpass Settings**

<table>
<thead>
<tr>
<th>Setup Item</th>
<th>Windows Server 2003</th>
<th>Windows Server 2008</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>princ</td>
<td>host/(host principal)@(realm name)</td>
<td>host/dxadv@EXAMPLE.COM</td>
<td></td>
</tr>
<tr>
<td>pass</td>
<td>Password</td>
<td>record-1</td>
<td></td>
</tr>
<tr>
<td>crypto</td>
<td>ARC4</td>
<td>RC4-HMAC-NT</td>
<td>RC4-HMAC-NT</td>
</tr>
<tr>
<td></td>
<td>AES128</td>
<td>AES128-SHA1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AES256</td>
<td>AES256-SHA1</td>
<td></td>
</tr>
<tr>
<td>mapuser</td>
<td>Host account</td>
<td>dxadv</td>
<td></td>
</tr>
<tr>
<td>ptype</td>
<td>KRB5_NT_PRINCIPAL</td>
<td>KRB5_NT_PRINCIPAL</td>
<td></td>
</tr>
<tr>
<td>out</td>
<td>(Destination folder name)/(file name).keytab</td>
<td>c:\temp\dxadv.keytab</td>
<td></td>
</tr>
</tbody>
</table>

**Mapping Example**

ktpass -princ host/dxadv@EXAMPLE.COM -pass record-1 -crypto RC4-HMAC-NT -mapuser dxadv -ptype KRB5_NT_PRINCIPAL -out c:\temp\dxadv.keytab

**Note**

- Use the ktpass tool after you install the support tools offered by the server.
- Be sure to make the realm name all caps.
- You can only set crypto to All when using Windows Server 2008.
- Use the same encryption method for the user and host accounts.
- ARC4 (ARCFOUR) is an encryption algorithm that is compatible with RC4.
- The “out” setting can be omitted.

**ktpass Execution Example (Windows Server 2003)**

This execution example is different from the configuration example.
Settings on the DX

Configure the following settings on the DX. For the setup procedure, see page 1-80.

<table>
<thead>
<tr>
<th>Item</th>
<th>Setup Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host principal</td>
<td>dxadv</td>
</tr>
<tr>
<td>Realm name</td>
<td>Specify the realm name.</td>
</tr>
<tr>
<td>Password</td>
<td>record-1</td>
</tr>
<tr>
<td>Encryption method</td>
<td>AES256</td>
</tr>
<tr>
<td>KDC server name</td>
<td>Specify the KDC server name.</td>
</tr>
<tr>
<td>Port number</td>
<td>88</td>
</tr>
</tbody>
</table>

**Note**

The realm name is the domain name in all caps.
2.1 DX1000/DX2000 Features

Serial communication can be performed using RS-232 or RS-422/485. Explains the serial communication functions.

Modbus Master

- The DX can connect to a Modbus slave device and read or write to the internal register. The read data can be used as communication input data of the computation function* on a computation channel. The data can also be handled on the external input channel.** The data that can be written to the internal register is measured data and computed data.
  * /M1 option
  ** DX2000 with /MC1 option
- For a description of the settings required to use this function, see section 2.4. For details on the Modbus function codes that the DX supports, see section 6.3.
- For the setting procedure, see sections 2.4, 2.6, and 2.7.
Modbus Slave

- A Modbus master device can carry out the following operations on the DX that is operating as a Modbus slave device.
  - Load data from measurement, computed*, and external input channels** (using the input register)
  - Load communication input data* (using the hold register)
  - Write communication input data* (using the hold register)
  - Write to external input channels* (using the hold register)
  - Start and stop recording, write messages, and perform other similar operations (using the hold register; models with release number 3 or later)
  - Load the recording start/stop condition, message strings, and other types of data (using the hold register; models with release number 3 or later)

* /M1 and /PM1 options
** DX2000 with /MC1 option

- For details on the settings required to use this function and the Modbus function codes that the DX supports, see section 6.3.
- For the setting procedure, see sections 2.4, 2.5, and 2.7.

Setting/Measurement Function

- This function can be used to set almost all of the settings that can be configured using the front panel keys. For details, see section 1.1.
- For a description of the settings required to use this function, see section 2.4. For information about how to use the function, see section 2.8.

PROFIBUS-DP (/CP1 option; release number 3 or later)

As a PROFIBUS-DP slave device, the DX can:
- Output measured values of measurement channels.
- Output a portion of the computed values of computation channels.
- Enter data to a portion of the communication input data.

For operating instructions, see the PROFIBUS-DP Communication Interface User's Manual (IM04L41B01-19E).
2.2 Flow of Operation When Using the Serial Interface

The flow chart below shows the procedure to set the communication using RS-232 or RS-422/RS-485. The procedure varies for RS-232 and RS-422/RS-485.

- Start of setting
  - Connect the cable
  - Set the baud rate
  - Set the data length
  - Set the parity
  - Communication type
    - RS-232
    - RS-422/485
  - Setting the handshaking
  - Set the address
  - Set the protocol
  - Set the Modbus master
    - Configuration required when Modbus master is selected in the protocol setting.
  - End of setting
2.3 Connecting the DX

Connecting the cable
Connect a cable to the serial port on the DX rear panel.

RS-232 Connection Procedure
Connect a cable to the 9-pin D-sub RS-232 connector.

Connector pin arrangement and signal names

Each pin corresponds to the signal indicated below.
The following table shows the signal name, RS-232 standard, JIS, and ITU-T standard signals.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RD</td>
<td>BB(RXD)</td>
<td>Received data</td>
</tr>
<tr>
<td>3</td>
<td>SD</td>
<td>BA(TXD)</td>
<td>Transmitted data</td>
</tr>
<tr>
<td>5</td>
<td>SG</td>
<td>AB(GND)</td>
<td>Signal ground</td>
</tr>
<tr>
<td>7</td>
<td>RS</td>
<td>CA(RTS)</td>
<td>Request to send</td>
</tr>
<tr>
<td>8</td>
<td>CS</td>
<td>CB(CTS)</td>
<td>Clear to send</td>
</tr>
</tbody>
</table>

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

Connection
• Signal direction
2.3 Connecting the DX

- Connection example

<table>
<thead>
<tr>
<th></th>
<th>Off-Off/XON-XON</th>
<th>CS-RS(CTS-RTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>DX</td>
<td>PC</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
</tr>
<tr>
<td>RS</td>
<td>RS</td>
<td>RS</td>
</tr>
<tr>
<td>CS</td>
<td>CS</td>
<td>CS</td>
</tr>
<tr>
<td>SG</td>
<td>SG</td>
<td>SG</td>
</tr>
</tbody>
</table>

The connection of RS on the PC and CS on the DX is not necessary. However, we recommend that you wire them so that the cable can be used in either direction.

Handshaking
When using the RS-232 interface for transferring data, it is necessary for equipment on both sides to agree on a set of rules to ensure the proper transfer of data. The set of rules is called handshaking. Because there are various handshaking methods that can be used between the DX and the PC, you must make sure that the same method is chosen by both the DX and the PC.

You can choose any of the four methods on the DX in the table below.

<table>
<thead>
<tr>
<th>Handshaking</th>
<th>Data transmission control (Control used when sending data to a computer)</th>
<th>Data Reception Control (Control used when receiving data from a computer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF-OFF</td>
<td>Stops transmission when X-OFF is received. Resume when X-ON is received.</td>
<td>Sends X-OFF when the receive data buffer is 3/4 full. Sends X-ON when the receive data buffer is 1/4 full. Sets RS (RTS) to False when the receive data buffer is 3/4 full. Sets RS (RTS) to True when the receive data buffer becomes 1/4 full.</td>
</tr>
<tr>
<td>XON-XON</td>
<td>Stops sending when CS (CTS) is false. Resumes when it is true.</td>
<td>No handshaking</td>
</tr>
<tr>
<td>XON-RS</td>
<td></td>
<td>No handshaking</td>
</tr>
<tr>
<td>CS-RS</td>
<td></td>
<td>No handshaking</td>
</tr>
</tbody>
</table>

- OFF-OFF
  - Data transmission control
  There is no handshaking between the DX and the PC. The “X-OFF” and “X-ON” signals received from the PC are treated as data, and the CS signal is ignored.
  - Data reception control
  There is no handshaking between the DX and the PC. When the received buffer becomes full, all of the data that overflows are discarded.
  RS = True (fixed).
2.3 Connecting the DX

- **XON-XON**
  - Data transmission control
    Software handshaking is performed between the DX and the PC. When an “X-OFF” code is received while sending data to the PC, the DX stops the data transmission. When the DX receives the next “X-ON” code, the DX resumes the data transmission. The CS signal received from the PC is ignored.
  - Data reception control
    Software handshaking is performed between the DX and the PC. When an “X-OFF” code is received while sending data to the PC, the DX stops the data transmission. When the DX receives the next “X-ON” code, the DX resumes the data transmission. The CS signal received from the PC is ignored.

- **XON-RS**
  - Data transmission control
    The operation is the same as with XON-XON.
  - Data reception control
    Hardware handshaking is performed between the DX and the PC. When the free area of the received buffer decreases to 1537 bytes, the DX sends an “X-OFF” code. When the free area increases to 511 bytes, the DX sends an “X-ON” code. RS = True (fixed).

- **CS-RS**
  - Data transmission control
    Hardware handshaking is performed between the DX and the PC. When the CS signal becomes False while sending data to the PC, the DX stops the data transmission. When the CS signal becomes True, the DX resumes the data transmission. The “X-OFF” and “X-ON” signals are treated as data.
  - Data reception control
    The operation is the same as with XON-RS.

*Note*
- The PC program must be designed so that the received buffers of both the DX and the PC do not become full.
- If you select XON-XON, send the data in ASCII format.
RS-422/485 Connection Procedure

Terminal arrangement and signal names
Connect a cable to the clamp terminal.

Each terminal corresponds to the signal indicated below.

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>Frame ground of the DX.</td>
</tr>
<tr>
<td>SG</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>SDB</td>
<td>Send data B (+).</td>
</tr>
<tr>
<td>SDA</td>
<td>Send data A (–).</td>
</tr>
<tr>
<td>RDB</td>
<td>Receive data B (+).</td>
</tr>
<tr>
<td>RDA</td>
<td>Receive data A (–).</td>
</tr>
</tbody>
</table>

Connection

• Connecting the Cable
As shown in the figure below, remove approximately 5 mm of the covering from the end of the cable to expose the conductor. Keep the exposed section from the end of the shield within 5 cm.

• Connection of a four-wire system

Connecting to the host device
The figure below illustrates the connection of the DX to a host device. If the port on the host device is an RS-232 interface, connect a converter.
Connection example to the host device

A connection can be made with a host device having a RS-232, RS-422, or RS-485 port. In the case of RS-232, a converter is used. See the connection examples below for a typical converter terminal. For details, see the manual that comes with the converter.

<table>
<thead>
<tr>
<th>RS-422/485 Port</th>
<th>Converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDA(–)</td>
<td>TD(–)</td>
</tr>
<tr>
<td>SDB(+ )</td>
<td>TD(+)</td>
</tr>
<tr>
<td>RDA(–)</td>
<td>RD(–)</td>
</tr>
<tr>
<td>RDB(+ )</td>
<td>RD(+)</td>
</tr>
<tr>
<td>SG</td>
<td>SHIELD</td>
</tr>
<tr>
<td>FG</td>
<td>EARTH</td>
</tr>
</tbody>
</table>

There is no problem of connecting a 220-Ω terminator at either end if YOKOGAWA’s PLCs or temperature controllers are also connected to the communication line.

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

- **Two-wire system**
  Connect the transmission and reception signals with the same polarity on the RS-422/485 terminal block. Only two wires are used to connect to the external device.
2.3 Connecting the DX

**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 DX's ground (one-sided grounding). This is effective when there is a difference in the electric potential between the computer’s ground and the DX’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 DX’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 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**

The recommended converter is given below.

SYSMEX RA CO., LTD./MODEL RC-770X, LINE EYE/SI-30FA, YOKOGAWA/ML2

---

**CAUTION**

Some converters not recommended by Yokogawa have FG and SG pins that are not isolated. In this case, do not follow the diagram on the previous page (do not connect anything to the FG and SG pins). Especially in the case of long distance communications, the potential difference that appears may damage the DX 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 comes 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 device 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-422 interface exist in the system**

When using the four-wire system, up to 32 DXs can be connected to a single host device. However, this may not be true if instruments that support only the RS-422 interface exist in the system.

**When YOKOGAWA’s recorders that support only the RS-422 interface exist in the system**

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

**Note**

In the RS-422 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 to the DX if the DX is connected to the end of the chain. Do not connect a terminator to a DX in the middle of the chain. In addition, turn ON the terminator on the host device (see the manual of the host device). If a converter is being used, turn ON its terminator. The recommended converter is a type that has a built-in terminator. Select the appropriate terminator (120 Ω), indicated in the figure, according to the characteristic impedance of the line, the installation conditions of the instruments, and so on.
2.4 Setting the Serial Communication

◊ Press **MENU** (to switch to setting mode), hold down **FUNC** for 3 s (to switch to basic setting mode), and select the **Menu tab** > **Communication (Serial) > Basic settings**

For RS-232
- **Baud rate**
  Select 0, 1200, 2400, 4800, 9600, 19200, or 38400 (bps).
- **Data length**
  Select 7 or 8 (bits). To output the data in binary format, select 8.
- **Parity**
  Set the parity check method to Odd, Even, or None.
- **Handshaking**
  Select Off:Off, XON:XON, XON:RS, or CS:RS.
- **Address**
  For Modbus protocol, enter a value in the range of 1 to 99. For a general purpose communication protocol, this value is not set.
- **Protocol**
  If Modbus master is selected, Modbus master settings must be entered.

For RS-422/485
- **Baud rate**
  Select 0, 1200, 2400, 4800, 9600, 19200, or 38400 (bps).
- **Data length**
  Select 7 or 8 (bits). To output the data in binary format, select 8.
- **Parity**
  Set the parity check method to Odd, Even, or None.
- **Handshaking**
  Not specified.
- **Address**
  Select a number from 1 to 99.
- **Protocol**
  This is the same as with the RS-232.

---

For RS-232

- **Baud rate**
  Select 0, 1200, 2400, 4800, 9600, 19200, or 38400 (bps).
- **Data length**
  Select 7 or 8 (bits). To output the data in binary format, select 8.
- **Parity**
  Set the parity check method to Odd, Even, or None.
- **Handshaking**
  Select Off:Off, XON:XON, XON:RS, or CS:RS.
- **Address**
  For Modbus protocol, enter a value in the range of 1 to 99. For a general purpose communication protocol, this value is not set.
- **Protocol**
  If Modbus master is selected, Modbus master settings must be entered.

For RS-422/485

- **Baud rate**
  Select 0, 1200, 2400, 4800, 9600, 19200, or 38400 (bps).
- **Data length**
  Select 7 or 8 (bits). To output the data in binary format, select 8.
- **Parity**
  Set the parity check method to Odd, Even, or None.
- **Handshaking**
  Not specified.
- **Address**
  Select a number from 1 to 99.
- **Protocol**
  This is the same as with the RS-232.
2.5 Using the Modbus Slave Function

The DX is used as a Modbus slave.
For the Modbus specifications, see section 6.3.

Setting the Serial Communication
Select Modbus as a protocol on the Basic settings. For detail, see section 2.4, “Setting the Serial Communication.”

Reading/Writing the DX Data on Another Device
Another device (master device) sends commands to the DX to read the DX data or write data to the DX. You can perform some operations, such as memory start, by writing in the registers.
For the function codes that the DX supports and the DX registers that the master device can access, see “Modbus Server Function” in section 6.3.
2.6 Using the Modbus Master Function

The DX is used as a Modbus master.

For the Modbus specifications, see section 6.3.

Setting the Serial Communication

Select Modbus-M as a protocol on the Basic settings. For detail, see section 2.4, “Setting the Serial Communication.”

Setting the Modbus Master

- Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Serial) > Modbus master > Basic settings or Command settings

Basic settings
- **Read cycle**
  Set the read cycle to 125 ms, 250 ms, 500 ms, 1 s, 2 s, 5 s, or 10 s.
- **Timeout**
  Set the timeout value to 125 ms, 250 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, or 1 min. The timeout value is the maximum amount of time the DX waits for a response from the specified slave after the DX sends a command.
- **Retrials**
  Set the number of retrials when there is no response from the slave. Select Off, 1, 2, 3, 4, 5, 10, or 20.
- **Inter-block delay**
  Set the amount of time the DX waits after receiving a response to send the next command. Set the amount of time to Off, 5 ms, 10 ms, 15 ms, 45 ms, or 100 ms.
- **Auto recovery**
  Set the auto recovery time from communication halt. Select Off, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, or 1 h.

Command settings
- **Master command number**
  Select 1-8 or 9-16 for the command numbers to be configured.
- **Command type**
  Set the transmitted command type to Off, R, R-M, W, W-M, or E-M.
  - R: Read to the external input channel (16-bit signed integer type) from the slave.
  - R-M: Read to the communication input data (32-bit floating point type) from the slave.
  - W: Write the measurement channel (16-bit signed integer type) to the slave.
  - W-M: Write the measurement channel (32-bit signed integer type) to the slave.
Using the Serial Interface

2.6 Using the Modbus Master Function

E-M: Read to the communication input data (32-bit floating point type) from the server/write the custom display value to the server (release numbers 4 and later).

R can be selected on DX2000s with the external input channel (/MC1) installed. R-M, W-M, and E-M can be selected on models with the computation function (/M1) option installed.

- First/Last (DX’s channel numbers)
  Enter the first and last channel numbers of input/output. The range of channels that you can enter varies depending on the command type as follows:
  R: 201 to 440, R-M: C01 to C60, W: 1 to 48, W-M: 101 to 160

- Address
  Enter the address of the slave device in the range of 1 to 247.

- Regi.
  Set the register number of the slave.
  For an input register, select in the range of 30001 to 39999 and 300001 to 365536.
  For a hold register, select in the range of 40001 to 49999 and 400001 to 465536.
  The register numbers you can specify vary depending on the command type. See section 6.3.

- Type
  Select INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, FLOAT_B, or FLOAT_L.
  The register numbers you can specify vary depending on the command type. See section 6.3.

Examples of Setting Commands
See page 1-36.

Checking the Modbus Operating Status
Displaying the Modbus Operating Status

Press DISP/ENTER and select INFORMATION > MODBUS MASTER

Note
To display the MODBUS MASTER on the screen selection menu, you need to change the setting using the menu customize function. Operate as follows:

- Press MENU (to switch to setting mode), and select the Menu tab > Menu customize > Display menu
  1. Select INFORMATION > MODBUS MASTER
  2. Press the View soft key.

- Communication condition
- Register number
- Address for a slave device
- DX channels
- Status lamp
- Detail code
- Cursor to select a command
  (Used when resuming command transmission to a slave device using the front panel keys)
• Communication conditions
The read cycle, Inter-block delay, Time out, Auto recovery, and Retrials settings are displayed.

• Communication Status
The communication status is displayed using the status lamp and the detail code.

<table>
<thead>
<tr>
<th>Status Lamp</th>
<th>Detail Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Good</td>
<td>Communication is operating normally.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Command is readying.</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>Communication is stopped.</td>
<td></td>
</tr>
<tr>
<td>Common to yellow and red</td>
<td>None</td>
<td>No response from the slave device.</td>
</tr>
<tr>
<td>Func</td>
<td>The slave device cannot execute the command from the DX.</td>
<td></td>
</tr>
<tr>
<td>Regi</td>
<td>The slave device does not have the specified register.</td>
<td></td>
</tr>
<tr>
<td>Err</td>
<td>The response data from the slave device is broken (communication error).</td>
<td></td>
</tr>
<tr>
<td>(Space)</td>
<td>The detail code is not displayed until the status is confirmed when communication is started.</td>
<td></td>
</tr>
</tbody>
</table>

Resuming Command Transmission
You can use the front panel keys to resume command transmission to a slave device to which communication is stopped (red status lamp).
1. Using the up and down arrow keys, select the command corresponding to the slave device to which transmission will be resumed. The message “Push [right arrow] key to refresh” appears.
2. Press the right arrow key. The DX starts command transmission to the specified slave.

Data When Communication Is Stopped and during Connection Retrials
For Modbus master, the communication input data and external input channel data are held at the previous values while the command is being retried.
If the command transmission stops such as due to a connection drop, the status turns red, and the communication input data and external input channel data are error data. On communication channels, “*+OVER” or “−OVER” is displayed according to the DX settings. “*****” is displayed on external input channels.

Data Dropout
Data drop occurs when the commands from 1 to 16 do not complete within the read cycle (see appendix 1). When a data dropout occurs, the communication input data is held at the previous value. A message indicating the data dropout is also displayed on the Modbus status display. If this happens, take measures such as making the read cycle longer or reducing the number of commands. Confirm that no data dropout occurs on the modbus status log screen.
2.7 Usage Example of the Modbus Function

Explains the setting example for both Modbus master and slave on DX1000s connected via the serial communication. This section refers to the DX1000 set to be a Modbus master as DX1000 master and the DX1000 set to be a Modbus slave as DX1000 slave.

System Configuration and Actions
Uses the measurement channel, computation channel, and communication input data as described in the figure below. Assumes other conditions are set properly.

- **DX1000 slave (Modbus slave)**
- **DX1000 master (Modbus master)**

- **Measurement channel 1**
  - Input range: -2.0000 to 2.0000 V
- **Communication input data C01**
- **Computation channel 101**
  - -2.0000 to 2.0000V
- **Start the computation**
- **Display the channel on Group 1**

**Action**
- The DX1000 master reads the measured value of channel 1 on the DX1000 slave into the communication input data C01. C01 is displayed on a computation channel 101 by including the data in the equation. The computation channel 101 is assigned to Group1.
- The measured value of channel 1 on the DX1000 slave is transferred to the DX1000 master as an integer in the range of –20000 to 20000.
- The DX1000 master displays the read data as –2.0000 to 2.0000 V on the computation channel 101. The following conversion is applied.

**Value on the computation channel 101 of the DX master**

\[ \text{Value} = \text{Communication input data C01} \times 0.0001 \]
Settings on the DX1000 Slave (Modbus Slave)

Setting the Modbus Slave Function

◊ Press **MENU** (to switch to setting mode), hold down **FUNC** for 3 s (to switch to basic setting mode), and select the **Menu** tab > **Communication (Serial)** > **Basic settings**

<table>
<thead>
<tr>
<th>Basic Setting Mode</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial</td>
<td></td>
</tr>
<tr>
<td>Baud rate</td>
<td></td>
</tr>
<tr>
<td>Data length</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>Handshaking</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Protocol</td>
<td>Modbus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>1</td>
</tr>
<tr>
<td>Protocol</td>
<td>Modbus</td>
</tr>
</tbody>
</table>

Setting the Measurement Channel

◊ Press **MENU** (to switch to setting mode), and select the **Menu** tab > **Meas channel** > **Range, Alarm**

<table>
<thead>
<tr>
<th>Meas channel</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First-CH, Last-CH</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>Volt</td>
</tr>
<tr>
<td>Range</td>
<td>2V</td>
</tr>
<tr>
<td>Span_L</td>
<td>-2.0000</td>
</tr>
<tr>
<td>Span_U</td>
<td>2.0000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-CH, Last-CH</td>
<td>1</td>
</tr>
<tr>
<td>Mode</td>
<td>Volt</td>
</tr>
<tr>
<td>Range</td>
<td>2V</td>
</tr>
<tr>
<td>Span_L</td>
<td>-2.0000</td>
</tr>
<tr>
<td>Span_U</td>
<td>2.0000</td>
</tr>
</tbody>
</table>
Setting the DX1000 Master (Modbus Master)

Assumes the settings other than those below are left to default values.

Setting the Modbus Master Function

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Serial) > Basic settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>2</td>
</tr>
<tr>
<td>Protocol</td>
<td>Modbus-M</td>
</tr>
</tbody>
</table>

Setting Command

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Serial) > Modbus master > Command settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command type</td>
<td>R-M</td>
</tr>
<tr>
<td>First and Last</td>
<td>C01</td>
</tr>
<tr>
<td>Addr.</td>
<td>1</td>
</tr>
<tr>
<td>Regi.</td>
<td>30001</td>
</tr>
<tr>
<td>Type</td>
<td>INT16</td>
</tr>
</tbody>
</table>

Setting the Computation Channel

See “Usage Example of the Modbus Function” in section 1.11.

Assigning the channel to a Group

See “Usage Example of the Modbus Function” in section 1.11.

Starting the Computation

See “Usage Example of the Modbus Function” in section 1.11.

Confirming the Communication Status

See “Usage Example of the Modbus Function” in section 1.11.
2.8 Using the Setting and Measurement Function

This section explains the setting and measurement function. You can use this function to send commands to retrieve data from the DX and to control it.

Connecting to the DX
Perform the operations that are appropriate for your PC, software, and network environment.

RS-232
The DX is ready to receive commands as soon as you connect it to the PC.

RS-422A/485
The DX is ready to receive commands after you connect it to the PC and open it with the open command (ESC o).

RS-422A/485 Disconnection
The connection is closed when:
• A command is sent that closes the connection.
  The close command (ESC c) is sent.
• A connection is opened with another device.
  Example: If you open the DX at address 1 and then open the DX at address 2, the connection with the DX at address 1 is closed automatically.

When the /AS1 Advanced Security Option Is Not in Use
For the commands that you can use, see section 3.2.

When the /AS1 Advanced Security Option Is in Use
You can perform some commands without logging into the DX. There are other commands that you can only use if you are logged into the DX. For details about the commands, see chapter 3.

Commands That You Can Perform without Logging In (Monitoring function commands)
You can execute some output and control commands.

<table>
<thead>
<tr>
<th>Group</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>CM, CE</td>
</tr>
<tr>
<td>Output commands (control)</td>
<td>BO, CS, IF, CB</td>
</tr>
<tr>
<td>Output commands (setting, measured, and computed data output)</td>
<td>FC, FE, FD, FF, FL, FI, IS, FU, FA</td>
</tr>
<tr>
<td>Dedicated commands for RS-422A/485</td>
<td>Esc O, Esc C</td>
</tr>
<tr>
<td>Login commands</td>
<td>LL</td>
</tr>
</tbody>
</table>
2.8 Using the Setting and Measurement Function

Commands That You Can Perform after Logging In

To log in, a user must be registered on the DX and have permission to log in through communication commands. The commands that administrators and users can execute are listed in the table below. For details about the commands, see chapter 3. For information about the responses to the commands, see chapter 4.

<table>
<thead>
<tr>
<th>Group</th>
<th>Command</th>
<th>Administrator</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting commands</td>
<td>SY</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Control</td>
<td>PS</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>EV</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>MS</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>TL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>IR</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>AK</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>CV</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>EM</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>CU</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>BJ</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>EJ</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>BT</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>BU</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>MH</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>CL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>LO</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>MA</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>UD</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>BQ</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>CW</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Users cannot execute operations (commands) that are not allowed under their user privileges. The correspondence between the commands that can be used and the user privilege settings are indicated in the table below. For information about how to configure the settings using key operations, see section 2.1 in the Advanced Security Function (/AS1) User's Manual (IM 04L41B01-05EN).

<table>
<thead>
<tr>
<th>User Privilege Settings</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key operations</td>
<td></td>
</tr>
<tr>
<td>START</td>
<td>PS0 Memory start</td>
</tr>
<tr>
<td>STOP</td>
<td>PS1 Memory stop</td>
</tr>
<tr>
<td>External storage</td>
<td></td>
</tr>
<tr>
<td>operations</td>
<td></td>
</tr>
<tr>
<td>Setup loading</td>
<td>LO Loads a setup file</td>
</tr>
<tr>
<td>Function</td>
<td></td>
</tr>
<tr>
<td>Alarm ACK</td>
<td>AK Alarm acknowledge</td>
</tr>
<tr>
<td>Message and batch</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Writes a message</td>
</tr>
<tr>
<td>BJ</td>
<td>Writes a free message</td>
</tr>
<tr>
<td>BT</td>
<td>Sets a batch name</td>
</tr>
<tr>
<td>BU</td>
<td>Sets a batch comment</td>
</tr>
<tr>
<td>MH</td>
<td>Sets a batch text field</td>
</tr>
<tr>
<td>Math</td>
<td></td>
</tr>
<tr>
<td>TL</td>
<td>Starts or stops computation</td>
</tr>
<tr>
<td>Data save</td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>Executes manual sampling or causes a timeout</td>
</tr>
<tr>
<td>IR</td>
<td>Resets a relative timer</td>
</tr>
<tr>
<td>MA</td>
<td>Resets a match time timer</td>
</tr>
<tr>
<td>LI</td>
<td>Saves a setup file</td>
</tr>
<tr>
<td>E-mail/FTP</td>
<td></td>
</tr>
<tr>
<td>EM</td>
<td>Starts or stops e-mail</td>
</tr>
<tr>
<td>CU</td>
<td>Recovers Modbus manually</td>
</tr>
<tr>
<td>Time settings</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>Executes manual SNTP</td>
</tr>
<tr>
<td>Screen operations</td>
<td></td>
</tr>
<tr>
<td>SY</td>
<td>Sets a four panel display</td>
</tr>
<tr>
<td>CV</td>
<td>Switches between normal and secondary trend interval</td>
</tr>
</tbody>
</table>

**LL Command**

Use the LL command to log in. In the LL command, specify the user name, user ID, and password. After the LL command, use sub delimiters to make a list of commands. You log into the DX when you execute the command, and you are automatically logged out after the command is executed.

**Example**

Log in as user a (whose user ID is “aaaa” and whose password is “aaaaaa”), start computation, and execute memory start.

```
LLa,aaaa, aaaaaa;TL0;PS0
```

**Login Limitations**

Depending on the key and Ethernet login conditions, there may be limitations when you log into the setting and measurement function using the LL command. You can execute the monitoring function commands regardless of other login conditions. For details, see section 1.3 in the Advanced Security Function (/AS1) User's Manual (IM 04L41B01-05EN).
Using Barcode Input (/AS1 option)

You can use barcode input to supplement the key input. You can only use barcode input on models with the /AS1 advanced security option.

Settings on the DX

◊ Press MENU (to switch to setting mode), hold down FUNC for 3 s (to switch to basic setting mode), and select the Menu tab > Communication (Serial) > Basic settings. See section 2.4.

Protocol
Select [Barcode] to use the barcode protocol.

Connecting to the DX

Follow the standard operating procedure for the barcode reader that you are using.

1. Turn off the DX, and connect the barcode reader to the RS-232 interface connector.
2. Turn on the DX.
The DX is ready to receive commands.

Commands That You Can Use

The commands that you can enter using barcodes are listed in the table below. Users cannot execute operations (commands) that are not allowed under their user privileges. For details about the commands, see chapter 3.

<table>
<thead>
<tr>
<th>Type</th>
<th>Command</th>
<th>Administrator</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated barcode commands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KE</td>
<td>Key operations</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BV</td>
<td>Enters a string</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BP</td>
<td>Supports login</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Control commands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>Starts or stops measurement</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EV</td>
<td>Executes manual sample, takes a snapshot, or causes a timeout</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MS</td>
<td>Writes a message</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>TL</td>
<td>Starts, stops, resets computation (MATH) or clears the computation dropout status display</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>IR</td>
<td>Resets a relative timer</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AK</td>
<td>Clears alarm output</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CV</td>
<td>Switches between normal and secondary trend interval</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EM</td>
<td>Starts or stops the e-mail transmission function</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CU</td>
<td>Recovers Modbus manually</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BJ</td>
<td>Writes a free message</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EJ</td>
<td>Changes the login password</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BT</td>
<td>Sets a batch name</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BU</td>
<td>Sets a batch comment</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MH</td>
<td>Sets a batch text field</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CL</td>
<td>Executes manual SNTP</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LO</td>
<td>Loads setup data for setting mode</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LI</td>
<td>Saves setup data</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MA</td>
<td>Resets a match time timer</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>UD</td>
<td>Switches the screen</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BQ</td>
<td>Locked ACK</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CM</td>
<td>Sets communication input data</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### 2.9 Using Barcode Input (/AS1 option)

<table>
<thead>
<tr>
<th>Type</th>
<th>Command</th>
<th>Administrator</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>Sets communication input of an external input channel</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EC</td>
<td>Clears setup data</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>YO</td>
<td>Loads a setup file for basic setting mode</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Output commands (control)**

| BO | Sets the byte output order | Yes | Yes |
| CS | Sets the checksum | Yes | Yes |
| IF | Sets status filters | Yes | Yes |
| CB | Sets the data output format | Yes | Yes |

**Output commands (setting, measured, and computed data output)**

| FC | Outputs screen image data | Yes | Yes |
| FE | Outputs setup data | Yes | Yes |
| FD | Outputs the most recent measured and computed data | Yes | Yes |
| FF | Outputs FIFO data | Yes | Yes |
| FL | Outputs a log, alarm summary, or message summary | Yes | Yes |
| FI | Outputs an operation log | Yes | Yes |
| IS | Outputs status information | Yes | Yes |
| FU | Outputs user levels | Yes | Yes |
| FA | Outputs internal DX information | Yes | Yes |

**Dedicated commands for RS-422A/485**

| Esc O | Open | Yes | Yes |
| Esc C | Closed | Yes | Yes |

**Dedicated barcode commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV</td>
<td>Enters a string</td>
<td>This command is valid when on the DX screen, the cursor is on an item that you need to specify a string for or when a window for entering a string appears. You cannot use this command to enter passwords.</td>
</tr>
<tr>
<td>BP</td>
<td>Supports login</td>
<td>Enters the user name or the user name and user ID for logging in. You have to set the password using key operations.</td>
</tr>
<tr>
<td>KE</td>
<td>Key operations</td>
<td>Performs the same operations as pressing a key on the DX.</td>
</tr>
</tbody>
</table>

**How to Use**

A user who is registered on the DX can use barcodes to supplement key input. Scan the communication commands encoded in bar codes to operate the DX with a barcode reader. You can perform the same operations that you can perform using the DX keys.

**Handling of Barcode Input**

Barcode input is handled as key input.

**Operations**

You can only use the following commands when you have logged into the DX using the keys.

The KE and BV commands and all control commands other than CM and CE. Users cannot execute operations (commands) that are not allowed under their user privileges. See section 2.8 for the correspondence between the commands that can be used and the user privilege settings.
2.9 Using Barcode Input (AS1 option)

Operation Log
Operations are recorded in the DX operation log. The operator is the user who was logged in using the DX keys.

Barcode Readers
The DX recognizes the following barcode readers:

- Model name: MS9540-RS (RS-232 interface)
  Maker: Metrologic Instruments Inc.
- Model name: LS1902T-RS (RS-232 interface)
  Maker: Symbol Technologies Inc.

Because only a small number of characters can be specified in the header, the input method may be limited when you use this barcode reader with the DX.

Operation Examples
This section contains operation examples.

Note
In this section, “CRLF” is used to indicate a terminator. For information about terminators, see page 3-2.

Operation Example 1
Logging in with a User Name of ABC2001 and a User ID of 5555
While logged out, enter the command “BP2,ABC2001,5555CRLF” using barcodes. The user name and user ID are entered, and a window for entering the password appears (you have to use the keys to enter the password).

Note
- When you enter commands using barcodes, you can enter them separated or all at once.
- You can separate commands however you want to. For instance, in example 1, you could scan the data as indicated below:
  “BP2” → “,” → “ABC2001” → “,” → “5555” → “CRLF”
- If you use a barcode reader that automatically attaches a footer and a header to every transmission, set the header to “BP2,” the footer to “CRLF” and scan “ABC2001,5555.”

Operation Example 2
Entering into a Measurement Ready State with a Batch Number of Process1 and a Lot Number of 0031
When measurement has not been started, scan the command “BT1,Process1,0031;KES TARTCRLF” with the barcode reader.
The batch and lot number are set and the start window appears.

Operation Example 3
In setting mode, set the file header to “process sample.”
1. In the screen for setting the file header in setting mode, move the cursor to the box for entering a character string.
   After this, if you press the Input soft key and display the window for entering a character string, you can still enter a character string with the barcode reader.
2. Use the barcode reader to enter “BV0,process sampleCRLF.”
   The “Header” box is set to “process sample.”
3.1 Command Syntax

Command Syntax

The syntax of the setting/basic setting/output commands (see sections 3.4 to 3.9) of the DX is given below. ASCII codes (see appendix 1) are used for the character codes. For the syntax of the maintenance/test commands (see section 3.10) and instrument information output commands (see section 3.11), see the corresponding sections or the examples for each command.

Command example

`SR002,SKIP;SR003,VOLT,2V,-1500,1800`

Command Name

Defined using two alphabet characters.

Parameters

- Command parameters.
- Set using alphabet characters or numeric values.
- Parameters are separated by delimiters (commas).
- All numeric values are specified using integers.
- When the parameter is a numeric value, the valid range of the value varies depending on the command.
- Spaces around the parameter are discarded. (However, spaces are valid for parameters (units) specified using an ASCII character string.) In the examples given in this manual, spaces are not used.
- You can omit the parameters that do not need to be changed from their current settings. However, delimiters cannot be omitted.
- If multiple parameters are omitted and delimiters occur at the end of the command, those delimiters can be omitted.
- The number of digits of the parameters below is fixed. If the number is exceeded when entering the command, a syntax error results.
  - Date: `YY/MM/DD` (8 characters)
    - `YY`: 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: 3 characters
  - Relay number: 3 characters
3.1 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 3.4 to 3.7.

  Example 1  SR[? p1]?  SR? or SRp1? can be executed.
  Example 2  SA[? p1[,]p2]?  SA?, SAP1?, and SAP1,p2? can be executed.

Delimiter

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

Sub Delimiter

- A semicolon is used as a sub delimiter.
- By separating each command with a sub delimiter, up to 10 commands can be specified one after another. However, the following commands and queries cannot be specified one after another. Use them independently.
  - Output commands other than BO, CS, IF, or CB
  - YO command
  - Query
    - 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;SR001,VOLT;;;SR002,VOLT;<terminator> is taken to be SR001,VOLT;SR002,VOLT<terminator>.

Terminator

Use either of the following two characters for the terminator.

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

Note

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

Response

The DX returns a response (affirmative/negative response) to a command that is delimited by a single terminator.* The controller should follow the one command to one response format. When the command-response rule is not followed, the operation is not guaranteed. For the response syntax, see section 4.1.

* Commands dedicated to RS-422/485 (see section 3.9) and instrument information output commands (section 3.11) are exceptions.
3.2 A List of Commands

When the /AS1 Advanced Security Option Is Not in Use

DX Execution Modes

There are two execution modes on the DX. 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 execution mode, and then execute the command. Query commands can be executed in either mode.

- **Basic setting mode**
  Measurement and computation are stopped, and settings are changed in this mode.

- **Operation mode**
  As a general rule, commands other than those for the basic setting mode described above are used in this mode.

Administrator and User

The administrator and user specifications in the table indicate the user level that is specified using the login function for Ethernet communications.

"Yes" and “No” in the table indicate the following:

- Yes: Command usable
- No: Command not usable

Setting Commands

*Note*

If the multi batch function (/BT2 option) is enabled, you cannot use the SR, SO, SK, TJ, SW, TE, SJ, ER, TQ, and TK commands unless all batch recording operations are stopped.

<table>
<thead>
<tr>
<th>Group</th>
<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>SA</td>
<td>SR</td>
<td>Sets an input range</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-19</td>
</tr>
<tr>
<td>SA</td>
<td>SO</td>
<td>Sets a computing equation</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-20</td>
</tr>
<tr>
<td>SA</td>
<td>ER</td>
<td>Sets the range of an external input channel</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-20</td>
</tr>
<tr>
<td>SA</td>
<td>TJ</td>
<td>Sets memory sampling</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-21</td>
</tr>
<tr>
<td>SA</td>
<td>SA</td>
<td>Sets an alarm</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-21</td>
</tr>
<tr>
<td>SA</td>
<td>SN</td>
<td>Sets the trend interval and auto save interval</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-22</td>
</tr>
<tr>
<td>SA</td>
<td>TI</td>
<td>Sets the circular display offset time</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-22</td>
</tr>
<tr>
<td>SA</td>
<td>TO</td>
<td>Sets how the DX operates after one circular display cycle</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-23</td>
</tr>
<tr>
<td>SA</td>
<td>TN</td>
<td>Sets the secondary trend interval</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-23</td>
</tr>
<tr>
<td>SA</td>
<td>TM</td>
<td>Sets manual sampling</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-23</td>
</tr>
<tr>
<td>SA</td>
<td>TE</td>
<td>Sets sampling conditions for event data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-23</td>
</tr>
<tr>
<td>SA</td>
<td>SE</td>
<td>Sets a zone</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-23</td>
</tr>
<tr>
<td>SA</td>
<td>SP</td>
<td>Sets a partial expanded display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-24</td>
</tr>
<tr>
<td>SA</td>
<td>ST</td>
<td>Sets a tag</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-24</td>
</tr>
<tr>
<td>SA</td>
<td>SX</td>
<td>Sets a display group (release number 2 or earlier)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-24</td>
</tr>
<tr>
<td>SA</td>
<td>SL</td>
<td>Sets a trip line (release number 2 or earlier)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-24</td>
</tr>
<tr>
<td>SA</td>
<td>NS</td>
<td>Sets a display group (release number 3 or later)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-25</td>
</tr>
<tr>
<td>SA</td>
<td>NL</td>
<td>Sets a trip line (release number 3 or later)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-25</td>
</tr>
<tr>
<td>SA</td>
<td>SG</td>
<td>Sets a message</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-25</td>
</tr>
<tr>
<td>SA</td>
<td>TH</td>
<td>Sets the directory on the external storage medium for saving data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-25</td>
</tr>
<tr>
<td>SA</td>
<td>TZ</td>
<td>Sets a file header</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-25</td>
</tr>
<tr>
<td>SA</td>
<td>TF</td>
<td>Sets a data file name</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-26</td>
</tr>
<tr>
<td>SA</td>
<td>SD</td>
<td>Sets the date and time</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-26</td>
</tr>
<tr>
<td>SA</td>
<td>TD</td>
<td>Sets daylight saving time</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-26</td>
</tr>
<tr>
<td>SA</td>
<td>TT</td>
<td>Sets the trend display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-26</td>
</tr>
<tr>
<td>SA</td>
<td>SE</td>
<td>Sets the line width and the number of grids to use on the trend graph</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td>SA</td>
<td>TB</td>
<td>Sets the bar graph display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td>SA</td>
<td>SB</td>
<td>Sets the bar graph for a channel</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
</tbody>
</table>
## 3.2 A List of Commands

<table>
<thead>
<tr>
<th>Group</th>
<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></td>
<td>TN</td>
<td>Sets a scale</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td></td>
<td>SV</td>
<td>Sets a measurement channel's moving average</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>Sets a channel display color</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td></td>
<td>TA</td>
<td>Sets an alarm point mark</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-27</td>
</tr>
<tr>
<td></td>
<td>TG</td>
<td>Sets a color scale band</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>SQ</td>
<td>Sets the LCD brightness and the screen backlight saver</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>TC</td>
<td>Sets the background color</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>TP</td>
<td>Sets the automatic switching back to default display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>Sets the favorite key operation</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>Sets the automatic switching back to default display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>TQ</td>
<td>Sets a timer</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-28</td>
</tr>
<tr>
<td></td>
<td>TK</td>
<td>Sets a match time timer</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-29</td>
</tr>
<tr>
<td></td>
<td>TU</td>
<td>Sets an event action</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-29</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>Sets a constant</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-31</td>
</tr>
<tr>
<td></td>
<td>SI</td>
<td>Sets the rolling average function of a computation channel</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-31</td>
</tr>
<tr>
<td></td>
<td>SJ</td>
<td>Sets a TLOG timer</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-31</td>
</tr>
<tr>
<td></td>
<td>TX</td>
<td>Sets the ancillary operation of the start key</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-32</td>
</tr>
<tr>
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<td>BH</td>
<td>Sets a batch text field</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-32</td>
</tr>
<tr>
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<td>EH</td>
<td>Sets calibration correction</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>BD</td>
<td>Sets an alarm delay</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>NC</td>
<td>Sets a comment text field</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>NB</td>
<td>Sets a comment text block</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>NW</td>
<td>Sets an annunciator display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>NG</td>
<td>Sets a Web report layout</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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</tr>
<tr>
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<td>NH</td>
<td>Sets Web report layout details</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>FR</td>
<td>Sets the interval for acquiring data to the FIFO buffer</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>SY</td>
<td>Sets a four panel display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<td>SM</td>
<td>Sets the custom menu</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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### Control Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
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<tr>
<td>BT</td>
<td>Sets a batch name</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>BU</td>
<td>Sets a batch comment</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>MH</td>
<td>Writes a batch text field</td>
<td>Operation mode</td>
<td>Yes</td>
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<td>UD</td>
<td>Switches the screen</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>PS</td>
<td>Starts or stops measurement</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-39</td>
</tr>
<tr>
<td>AK</td>
<td>Clears alarm output (acknowledge alarms)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-39</td>
</tr>
<tr>
<td>EV</td>
<td>Executes manual sample, generates a manual trigger, takes a snapshot, or causes a timeout</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-39</td>
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<tr>
<td>CL</td>
<td>Executes manual SNTP</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-39</td>
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<tr>
<td>CV</td>
<td>Switches between normal and secondary trend interval</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>MS</td>
<td>Writes a message (display and write)</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>BJ</td>
<td>Writes a free message</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>EJ</td>
<td>Changes the login password</td>
<td>Operation mode</td>
<td>Yes</td>
<td>Yes</td>
<td>3-40</td>
</tr>
<tr>
<td>TL</td>
<td>Starts, stops, resets computation (MATH) or clears the computation dropout status display</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-40</td>
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<tr>
<td>DS</td>
<td>Switches the execution mode between operation and setting</td>
<td>All modes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>LO</td>
<td>Loads setup data for setting mode</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-41</td>
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<tr>
<td>LI</td>
<td>Saves setup data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-41</td>
</tr>
<tr>
<td>CM</td>
<td>Sets communication input data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-41</td>
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<tr>
<td>CE</td>
<td>Sets communication input of an external input channel</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-41</td>
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<tr>
<td>EM</td>
<td>Starts or stops the e-mail transmission function</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-41</td>
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<tr>
<td>CU</td>
<td>Recovers Modbus manually</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-42</td>
</tr>
<tr>
<td>BV</td>
<td>Enters a string (can only be used during serial communications)</td>
<td>All modes</td>
<td>Yes</td>
<td>No</td>
<td>3-44</td>
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<tr>
<td>KE</td>
<td>Key operation command</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-44</td>
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<tr>
<td>YO</td>
<td>Loads a setup file for basic setting mode</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>YC</td>
<td>Clears measured and computed data and initializes setup data</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>IR</td>
<td>Resets a relative timer</td>
<td>Operation mode</td>
<td>Yes</td>
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<tr>
<td>MA</td>
<td>Resets a match time timer</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>CN</td>
<td>Sets an event switch</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-42</td>
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<tr>
<td>LR</td>
<td>Loads custom display screens</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-42</td>
</tr>
<tr>
<td>LN</td>
<td>Saves custom display screens</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-43</td>
</tr>
</tbody>
</table>
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. Make sure to save the settings before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.

- The settings that are returned in response to a query in basic setting mode contain the new settings even if they are not saved. However, the new settings are not activated unless they are saved. If the settings are cleared or if you change from basic setting mode to operation mode before saving the settings, the settings that are returned in the response to a query contain the settings that were used before they were changed.

**Note**

- The settings that are changed using the YA, YK, RU, YQ, YS, YB, YD, WS, WW, and WQ commands are activated after saving the new settings using the XE command and restarting the DX.

- When you execute the YE or YO command, communication is disconnected. Commands listed after the YO or YE command are ignored.

<table>
<thead>
<tr>
<th>Group</th>
<th>Command</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
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<tr>
<td>WU</td>
<td>Sets the environment</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-45</td>
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<tr>
<td>WE</td>
<td>Sets calibration management</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-47</td>
<td></td>
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<tr>
<td>WO</td>
<td>Sets alarm and DO settings</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
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<tr>
<td>WH</td>
<td>Sets alarm hysteresis</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
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<tr>
<td>XV</td>
<td>Sets the scan interval and A/D integral time</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
<td></td>
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<tr>
<td>XB</td>
<td>Sets burnout detection</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
<td></td>
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<tr>
<td>XJ</td>
<td>Sets RJC</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
<td></td>
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<tr>
<td>XM</td>
<td>Sets memory sampling conditions</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<td>XT</td>
<td>Sets the temperature unit</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>RF</td>
<td>Sets key lock</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<td></td>
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<tr>
<td>RN</td>
<td>Sets basic key login</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-50</td>
<td></td>
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<tr>
<td>RP</td>
<td>Sets user limitations</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-50</td>
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<tr>
<td>RO</td>
<td>Sets the type of report and when to create reports</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-51</td>
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<tr>
<td>RM</td>
<td>Sets a report channel</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
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<tr>
<td>XG</td>
<td>Sets the time zone</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
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<tr>
<td>XN</td>
<td>Sets the date format</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
<td></td>
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<tr>
<td>YB</td>
<td>Sets host information</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
<td></td>
</tr>
<tr>
<td>YD</td>
<td>Sets network parameters</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
</tr>
<tr>
<td>YA</td>
<td>Sets the IP address, subnet mask, and default gateway</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
</tr>
<tr>
<td>YK</td>
<td>Sets keepalive</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
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<tr>
<td>RU</td>
<td>Sets DNS parameters</td>
<td>Basic setting mode</td>
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<tr>
<td>WS</td>
<td>Sets a server</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
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<tr>
<td>WW</td>
<td>Sets Webpage parameters</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
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<tr>
<td>YQ</td>
<td>Sets communication timeout</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
<td></td>
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<td>YT</td>
<td>Sets FTP transfer timing</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>YU</td>
<td>Sets what kind of information to send using e-mail</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-54</td>
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<tr>
<td>YV</td>
<td>Sets an e-mail recipient address</td>
<td>Basic setting mode</td>
<td>Yes</td>
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<td>YW</td>
<td>Sets the e-mail sender address</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>YX</td>
<td>Sets the e-mail SMTP server name</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>YJ</td>
<td>Sets the Modbus client’s destination server</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
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<tr>
<td>YP</td>
<td>Sets basic Modbus client settings</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<td>YR</td>
<td>Sets the Modbus client’s transmit command</td>
<td>Basic setting mode</td>
<td>Yes</td>
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<tr>
<td>WB</td>
<td>Sets SNTP client parameters</td>
<td>Basic setting mode</td>
<td>Yes</td>
<td>No</td>
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<td>KC</td>
<td>Sets the SNTP operation when memory start is executed</td>
<td>Basic setting mode</td>
<td>Yes</td>
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<td>YS</td>
<td>Sets the serial interface</td>
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### 3.2 A List of Commands

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<tr>
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<td>YL</td>
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<td>YM</td>
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<td>WR</td>
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<td>Basic setting mode</td>
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<td>WF</td>
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<td>WG</td>
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<td>WJ</td>
<td>Basic setting mode</td>
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<td>WQ</td>
<td>Basic setting mode</td>
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<td>XE</td>
<td>Basic setting mode</td>
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<td>YE</td>
<td>Basic setting mode</td>
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</table>

#### Output Commands

*Note*

Output commands except BO, CS, and IF cannot be placed in a command sequence.

<table>
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<tr>
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<th>User</th>
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<tr>
<td>Control</td>
<td>BO</td>
<td>All modes</td>
<td>Yes</td>
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<td>CS</td>
<td>All modes</td>
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<td>Yes</td>
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<td>IF</td>
<td>All modes</td>
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<td>Yes</td>
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<td>CB</td>
<td>All modes</td>
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<td>Yes</td>
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<tr>
<td></td>
<td>CC</td>
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#### Setup, measurement, and control data output

<table>
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<th>Function</th>
<th>Execution Mode</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC</td>
<td>Outputs screen image data</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-61</td>
</tr>
<tr>
<td>FE</td>
<td>Outputs setup data</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-61</td>
</tr>
<tr>
<td>FD</td>
<td>Outputs the most recent measured/computed data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>FF</td>
<td>Outputs FIFO data</td>
<td>Operation mode</td>
<td>Yes</td>
<td>Yes</td>
<td>3-61</td>
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<tr>
<td>FL</td>
<td>Outputs a log, alarm summary, or message summary</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-62</td>
</tr>
<tr>
<td>IS</td>
<td>Outputs status information</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-62</td>
</tr>
<tr>
<td>FU</td>
<td>Outputs user levels</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-63</td>
</tr>
<tr>
<td>FA</td>
<td>Outputs internal DX information</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-63</td>
</tr>
<tr>
<td>ME</td>
<td>Outputs data stored on the external storage medium and internal memory</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-63</td>
</tr>
<tr>
<td>MO</td>
<td>Outputs the data stored in the internal memory.</td>
<td>Operation mode</td>
<td>Yes</td>
<td>No</td>
<td>3-63</td>
</tr>
</tbody>
</table>

#### Dedicated commands for RS-422/485

<table>
<thead>
<tr>
<th>Command</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 an instrument</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-64</td>
</tr>
<tr>
<td>Esc C</td>
<td>Closes an instrument</td>
<td>All modes</td>
<td>Yes</td>
<td>Yes</td>
<td>3-64</td>
</tr>
</tbody>
</table>

#### Common commands among instruments

* I | Outputs instrument information | All modes | Yes | Yes | 3-65 |

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>close</td>
<td>Closes another device’s connection</td>
<td>Yes</td>
<td>No</td>
<td>3-65</td>
</tr>
<tr>
<td>con</td>
<td>Outputs connection information</td>
<td>Yes</td>
<td>Yes</td>
<td>3-65</td>
</tr>
<tr>
<td>eth</td>
<td>Outputs Ethernet statistics</td>
<td>Yes</td>
<td>Yes</td>
<td>3-65</td>
</tr>
<tr>
<td>help</td>
<td>Outputs help</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
<tr>
<td>net</td>
<td>Outputs network statistics</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
<tr>
<td>quit</td>
<td>Closes the connection to the instrument that you are operating</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
</tbody>
</table>

#### Instrument Information Output Commands (Available when using the instrument information server function via 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>3-67</td>
</tr>
<tr>
<td>host</td>
<td>Outputs the host name</td>
<td>3-67</td>
</tr>
<tr>
<td>ip</td>
<td>Outputs the IP address</td>
<td>3-67</td>
</tr>
</tbody>
</table>
When the /AS1 Advanced Security Option Is in Use

DX Execution Modes

The DX has five execution modes. The modes that each command can be executed in are predetermined. Trying to execute a command in the wrong mode results in a syntax error. Before executing a command, use a mode switching command to switch to the appropriate mode. Queries can be executed in any mode. The letters in parentheses in the titles below are the used to represent the different modes in explanations.

- **Basic Setting Mode (B)**
  Basic setting mode when recording is stopped.

- **Basic Setting Mode during Memory Sampling (b)**
  The basic setting mode that appears during recording.

- **Setting Mode (S)**
  Setting mode when recording is stopped.

- **Setting Mode during Memory Sampling (s)**
  The setting mode that appears during recording.

- **Operation Mode (O)**
  The mode in which operations are performed.

Switching Execution Modes

The figure below indicates the commands that can make the DX switch between different modes and operation modes.

\[
\text{Operation mode (while logged out)} \quad \xrightarrow{\text{Log in}} \quad \text{Operation mode} \quad \xrightarrow{\text{CC}} \quad \text{Operation mode} \quad \xrightarrow{\text{BE}} \quad \text{Setting mode during memory sampling} \quad \xrightarrow{\text{EE ENG}} \quad \text{Operation mode} \quad \xrightarrow{\text{EE SYS}} \quad \text{Operation mode} \quad \xrightarrow{\text{YE}} \quad \text{Setting mode during memory sampling} \quad \xrightarrow{\text{LO}} \quad \text{Operation mode} \quad \xrightarrow{\text{EE SYS}} \quad \text{Operation mode} \quad \xrightarrow{\text{YE}} \quad \text{Setting mode during memory sampling} \quad \xrightarrow{\text{Y0, EC}} \quad \text{Operation mode}
\]

**Note**

If there is no CF card in the DX, an error will occur when you change the settings and then try to switch to operation mode from basic setting mode, basic setting mode during memory sampling, or setting mode.
3.2 A List of Commands

Administrators and Users
The distinction between administrators and users indicates the user levels set through
the DX Ethernet login function. For details, see section 1.2.
"Yes" and "No" in the table indicate the following:
Yes: The command can be used.
No: The command cannot be used.

Connecting to the Setting Function and Connecting to the Monitoring Function
There are two types of Ethernet connections that can be made to the DX setting/
measurement server: connections to the setting function (setting connection) and
connections to the monitoring function (monitoring connections). For details, see section
1.12.
### Setting Commands (IAS1)

To apply settings that you have changed using the setting commands, you need to save the settings using the BE command.

**Note**

If the multi batch function (/BT2 option) is enabled, you cannot use the SR, SO, SK, TJ, SW, TE, SJ, ER, TQ, TK, SX, SL, NX, NL, TZ, TF, or BH command unless recording of all batch groups is stopped.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td>Sets an input range</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SO</td>
<td>Sets a computing equation</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ER</td>
<td>Sets the range of an external input channel</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TJ</td>
<td>Sets memory sampling</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SA</td>
<td>Sets an alarm</td>
<td>Ss</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SW</td>
<td>Sets the trend interval and auto save interval</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TI</td>
<td>Sets the circular display offset time</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TO</td>
<td>Sets how the DX operates after one circular display cycle</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TW</td>
<td>Sets the secondary trend interval</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TM</td>
<td>Sets manual sampling</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TE</td>
<td>Sets sampling conditions for event data</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TZ</td>
<td>Sets a zone</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SP</td>
<td>Sets a partial expanded display</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ST</td>
<td>Sets a tag</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SX</td>
<td>Sets a display group (release number 2 or earlier)</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SL</td>
<td>Sets a trip line (release number 2 or earlier)</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NX</td>
<td>Sets a display group (release number 3 or later)</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NL</td>
<td>Sets a trip line (release number 3 or later)</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SG</td>
<td>Sets a message</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TH</td>
<td>Sets the directory on the external storage medium for saving data</td>
<td>Ss</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TZ</td>
<td>Sets a file header</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TF</td>
<td>Sets a data file name</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TD</td>
<td>Sets the date and time</td>
<td>OSs</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TT</td>
<td>Sets the trend display</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SE</td>
<td>Sets the line width and the number of grids to use on the trend graph</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TB</td>
<td>Sets the bar graph display</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SB</td>
<td>Sets the bar graph for a channel</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TN</td>
<td>Sets a scale</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SV</td>
<td>Sets a measurement channel’s moving average</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SC</td>
<td>Sets a channel display color</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TA</td>
<td>Sets an alarm point mark</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TG</td>
<td>Sets a color scale band</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SQ</td>
<td>Sets the LCD brightness and the screen backlight saver</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TC</td>
<td>Sets the background color</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TP</td>
<td>Sets automatic display group switching</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NF</td>
<td>Sets the favorite key operation</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TR</td>
<td>Sets the automatic switching back to default display</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TQ</td>
<td>Sets a timer</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TK</td>
<td>Sets a match time timer</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TU</td>
<td>Sets an event action</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SK</td>
<td>Sets a constant</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SI</td>
<td>Sets the rolling average function of a computation channel</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SJ</td>
<td>Sets a TLOG timer</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TX</td>
<td>Sets the ancillary operation of the start key</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
### 3.2 A List of Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH</td>
<td>Sets a batch text field</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EH</td>
<td>Sets calibration correction</td>
<td>Ss</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BD</td>
<td>Sets an alarm delay</td>
<td>Ss</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NC</td>
<td>Sets a comment text field</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NB</td>
<td>Sets a comment text block</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NW</td>
<td>Sets an annunciator display</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NG</td>
<td>Sets a Web report layout</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NH</td>
<td>Sets Web report layout details</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>FR</td>
<td>Sets the interval for acquiring data to the FIFO buffer</td>
<td>OSsb</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SY</td>
<td>Sets a four panel display</td>
<td>OS</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>SM</td>
<td>Sets the custom menu</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

* Operations are limited by the user privilege settings.
3.2 A List of Commands

**Control Commands (/AS1)**

To apply settings that you have changed using the basic setting commands, you need to save the settings using the YE command.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>Sets a batch name</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>BU</td>
<td>Sets a batch comment</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>MH</td>
<td>Writes a batch text field</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>UD</td>
<td>Switches the screen</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PS</td>
<td>Starts or stops measurement</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AK</td>
<td>Clears alarm output (acknowledge alarms)</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>EV</td>
<td>Executes manual sample, takes a snapshot, or causes a timeout</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CL</td>
<td>Executes manual SNTP</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CV</td>
<td>Switches between normal and secondary trend interval</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>MS</td>
<td>Writes a message (display and write)</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>BJ</td>
<td>Writes a free message</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>EJ</td>
<td>Changes the login password</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>TL</td>
<td>Starts, stops, resets computation (MATH) or clears the computation dropout status display</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>LO</td>
<td>Loads setup data for setting mode</td>
<td>OS</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>LI</td>
<td>Saves setup data</td>
<td>S</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CM</td>
<td>Sets communication input data</td>
<td>OSsb</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CE</td>
<td>Sets communication input of an external input channel</td>
<td>OSsb</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EM</td>
<td>Starts or stops the e-mail transmission function</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CU</td>
<td>Recovers Modbus manually</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>YO</td>
<td>Loads a setup file for basic setting mode</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>IR</td>
<td>Resets a relative timer</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>MA</td>
<td>Resets a match time timer</td>
<td>O</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CW</td>
<td>Sets an event switch</td>
<td>O</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LR</td>
<td>Loads custom display screens</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LW</td>
<td>Saves custom display screens</td>
<td>S</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BQ</td>
<td>User locked ACK (/AS1 advanced security option)</td>
<td>O</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EC</td>
<td>Clears setup data (and executes a cold reset; /AS1 advanced security option)</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EE</td>
<td>Switches out of operation mode (/AS1 advanced security option)</td>
<td>O</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BE</td>
<td>Returns to operation mode (/AS1 advanced security option)</td>
<td>Ss</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Dedicated Barcode Commands (Handled as key input)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV</td>
<td>Enters a string (can only be used during serial communication)</td>
<td>ALL</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>KE</td>
<td>Performs key operations</td>
<td>OSsb</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BP</td>
<td>Supports login (/AS1 advanced security option)</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**Dedicated Serial Communication Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL</td>
<td>Logs in through serial communication (/AS1 advanced security option)</td>
<td>ALL</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* Operations are limited by the user privilege settings.
Basic Setting Commands (/AS1)

- To apply settings that you have changed using the basic setting commands, you need to save the settings using the YE command.
- The settings that are returned in response to a query in basic setting mode contain the new settings even if they are not saved. However, the new settings are not activated unless you save them.
- To configure login items, use the following commands: RN, RP, EK, and EL

**Note**
The connection is closed when you execute the YE command. Commands listed after the YE command are ignored.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU</td>
<td>Sets the environment</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-45</td>
</tr>
<tr>
<td>WE</td>
<td>Sets calibration management</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-47</td>
</tr>
<tr>
<td>BI</td>
<td>Configures signature settings</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-47</td>
</tr>
<tr>
<td>WO</td>
<td>Sets alarm and DO settings</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
</tr>
<tr>
<td>WH</td>
<td>Sets alarm hysteresia</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
</tr>
<tr>
<td>XV</td>
<td>Sets the scan interval and A/D integral time</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-48</td>
</tr>
<tr>
<td>XB</td>
<td>Sets burnout detection</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
</tr>
<tr>
<td>XJ</td>
<td>Sets RJC</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
</tr>
<tr>
<td>XM</td>
<td>Sets memory sampling conditions</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
</tr>
<tr>
<td>XT</td>
<td>Sets the temperature unit</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-49</td>
</tr>
<tr>
<td>RN</td>
<td>Sets basic login</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-50</td>
</tr>
<tr>
<td>RP</td>
<td>Sets user limitations</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-50</td>
</tr>
<tr>
<td>EK</td>
<td>Configures administrator settings (/AS1 advanced security option)</td>
<td>Bb</td>
<td>Yes</td>
<td>No</td>
<td>3-50</td>
</tr>
<tr>
<td>EL</td>
<td>Configures user settings (/AS1 advanced security option)</td>
<td>Bb</td>
<td>Yes</td>
<td>No</td>
<td>3-51</td>
</tr>
<tr>
<td>WD</td>
<td>Configures authentication server settings (/AS1 advanced security option)</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-51</td>
</tr>
<tr>
<td>RO</td>
<td>Sets the type of report and when to create reports</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-51</td>
</tr>
<tr>
<td>RM</td>
<td>Sets a report channel</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
</tr>
<tr>
<td>XG</td>
<td>Sets the time zone</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
</tr>
<tr>
<td>XN</td>
<td>Sets the date format</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
</tr>
<tr>
<td>YB</td>
<td>Sets host information</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-52</td>
</tr>
<tr>
<td>YD</td>
<td>Sets network parameters</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>YA</td>
<td>Sets the IP address, subnet mask, and default gateway</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>YK</td>
<td>Sets keepalive</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>RU</td>
<td>Sets DNS parameters</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>WS</td>
<td>Sets a server</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>WW</td>
<td>Sets Webpage parameters</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>YQ</td>
<td>Sets communication timeout</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-53</td>
</tr>
<tr>
<td>YT</td>
<td>Sets FTP transfer timing</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-54</td>
</tr>
<tr>
<td>YU</td>
<td>Sets what kind of information to send using e-mail</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-54</td>
</tr>
<tr>
<td>YY</td>
<td>Sets an e-mail recipient address</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>YW</td>
<td>Sets the e-mail sender address</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>YX</td>
<td>Sets the e-mail SMTP server name</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>YJ</td>
<td>Sets the Modbus client’s destination server</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>YP</td>
<td>Sets basic Modbus client settings</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>YR</td>
<td>Sets the Modbus client’s transmit command</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-55</td>
</tr>
<tr>
<td>WB</td>
<td>Sets SNTP client parameters</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-56</td>
</tr>
<tr>
<td>WC</td>
<td>Sets the SNTP operation when memory start is executed</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-56</td>
</tr>
<tr>
<td>YS</td>
<td>Sets the serial interface</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-56</td>
</tr>
<tr>
<td>YL</td>
<td>Sets the operation of the Modbus master function</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-57</td>
</tr>
<tr>
<td>YM</td>
<td>Sets a transmit command of the Modbus master function</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-57</td>
</tr>
<tr>
<td>WR</td>
<td>Sets the instrument information output</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>3-58</td>
</tr>
</tbody>
</table>
### 3.2 A List of Commands

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>WI</td>
<td>Sets the relay operations</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WF</td>
<td>Sets the Modbus connection limitation</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WG</td>
<td>Sets an IP address that is allowed to connect via Modbus</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WJ</td>
<td>Sets the FTP transfer wait time</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WQ</td>
<td>Sets PROFIBUS-DP</td>
<td>B</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>YE</td>
<td>Activates basic settings (cold reset)</td>
<td>Bb</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Output Commands (/AS1)

**Note**

Output commands except BO, CS, and IF cannot be placed in a command sequence.

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO</td>
<td>Sets the byte output order</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CS</td>
<td>Sets the check sum (can only be used during serial communication)</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>IF</td>
<td>Sets status filters</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CB</td>
<td>Sets the data output format</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CC</td>
<td>Disconnects the Ethernet connection (can only be used for Ethernet communications)</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Setup, measurement, and computed data output

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC</td>
<td>Outputs screen image data</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FE</td>
<td>Outputs setup data</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FD</td>
<td>Outputs the most recent measured and computed data</td>
<td>OSsb</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FF</td>
<td>Outputs FIFO data</td>
<td>OSsb</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FL</td>
<td>Outputs a log, alarm summary, or message summary</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FI</td>
<td>Outputs an operation log</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>IS</td>
<td>Outputs status information</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FU</td>
<td>Outputs user levels</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FA</td>
<td>Outputs internal DX information</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ME</td>
<td>Outputs data stored on the external storage medium and internal memory</td>
<td>Ossb</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>MO</td>
<td>Manages and outputs the data stored in the internal memory</td>
<td>Ossb</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Dedicated commands for RS-422/485

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Execution Mode</th>
<th>Setting Connection</th>
<th>Monitor Connection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esc O</td>
<td>Opens an instrument</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Esc C</td>
<td>Closes an instrument</td>
<td>ALL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

The administrator is “admin.” The user is “user.”

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Function</th>
<th>Administrator</th>
<th>User</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>close</td>
<td>Closes another device’s connection</td>
<td>No</td>
<td>No</td>
<td>3-65</td>
</tr>
<tr>
<td>con</td>
<td>Outputs connection information</td>
<td>Yes</td>
<td>Yes</td>
<td>3-65</td>
</tr>
<tr>
<td>eth</td>
<td>Outputs Ethernet statistics</td>
<td>Yes</td>
<td>Yes</td>
<td>3-65</td>
</tr>
<tr>
<td>help</td>
<td>Outputs help</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
<tr>
<td>net</td>
<td>Outputs network statistics</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
<tr>
<td>quit</td>
<td>Closes the connection to the instrument that you are operating</td>
<td>Yes</td>
<td>Yes</td>
<td>3-66</td>
</tr>
</tbody>
</table>

### Instrument Information Output Commands (Available when using the instrument information server function via 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>3-67</td>
</tr>
<tr>
<td>host</td>
<td>Outputs the host name</td>
<td>3-67</td>
</tr>
<tr>
<td>ip</td>
<td>Outputs the IP address</td>
<td>3-67</td>
</tr>
</tbody>
</table>
3.3 Setup Parameters

The measurement range and setup range of parameters used in a command vary depending on the combination of the command, range, and options.

Parameter Input Example of Measurement Range

The span upper and lower limit parameters of the SR command (input range setting command) requires all digits including those to the right of the decimal to be entered. For example, if you want to set the upper limit to 1.0000 V when the measurement range is -2.0000 V to 2.0000 V, the value is 10000. If you want to set the limit to 0.5000 V, the value is 5000.

The table below gives configuration examples.

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>Input Type Parameter</th>
<th>Selectable Range of Measurement Range</th>
<th>Specified Range</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLT</td>
<td>20mV</td>
<td>-20.000mV to 20.000mV</td>
<td>-10.000mV to 20.000mV -10000 to 20000</td>
<td></td>
</tr>
<tr>
<td>/SQRT</td>
<td>2V</td>
<td>-2.0000V to 2.0000V</td>
<td>-2.0000V to 0.5000V -20000 to 5000</td>
<td></td>
</tr>
<tr>
<td>TC</td>
<td>R</td>
<td>0.0 to 1760.0</td>
<td>0.0 to 400.0</td>
<td>0 to 4000</td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>-200.0 to 1370.0</td>
<td>-200.0 to 1370.0 -2000 to 13700</td>
<td></td>
</tr>
<tr>
<td>RTD</td>
<td>Pt100</td>
<td>-200.0 to 600.0</td>
<td>-10.0 to 500.0</td>
<td>-100 to 5000</td>
</tr>
<tr>
<td>DI</td>
<td>LEVEL</td>
<td>0 to 1</td>
<td>0 to 1</td>
<td>0 to 1</td>
</tr>
</tbody>
</table>
### Measurement Range Parameters

The table below shows the relationship between the input types and range parameters. For a description of the selectable range, see the DX1000 or DX2000 User’s Manual.

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Input Type Parameter</th>
<th>Range</th>
<th>Range Parameter</th>
<th>Required Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Voltage</td>
<td>VOLT</td>
<td>20 mV</td>
<td>20MV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 mV</td>
<td>60MV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 mV</td>
<td>200MV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 V</td>
<td>2V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 V</td>
<td>6V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 V</td>
<td>20V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 V</td>
<td>50V</td>
<td></td>
</tr>
<tr>
<td>Thermocouple</td>
<td>TC</td>
<td>R</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>K</td>
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<td>J</td>
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<tr>
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<td>T</td>
<td>T</td>
<td></td>
</tr>
<tr>
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### 3.3 Setup Parameters

#### Channel Number and Other Notations and Valid Ranges

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<th>Notation and Valid Range</th>
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<td>Varies depending on the /A# option</td>
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<td>Remote control terminals</td>
<td>DX1000/DX2000</td>
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<td>1 to 12 Models with the /BT2 multi batch option</td>
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<td>Match time timers</td>
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<td>Report groups (integral bar graph)</td>
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<td>1 to 4</td>
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<td>DX2000</td>
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High-speed input models: DX1002, DX1004, DX1002N, DX1004N, DX2004, DX2008
Medium-speed input models: DX1006, DX1012, DX1006N, DX1012N, DX2010, DX2020, DX2030, DX2040, DX2048
Multi batch is an option (/BT2 option) for DXs with release number 3 or later.
3.4 Setting Commands

**SR**

Sets a input range

### When Setting Channels to Skip

**Syntax**
```
SR p1,p2<terminator>
p1  Measurement channel number
p2  Setting type (SKIP)
```

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

**Example**
```
Skip channel 001.
SR001,SKIP
```

**Description**
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Channels set to SKIP are not measured.
- Set p1 by referring to the table in section 3.3.

### When Setting the Channels to Voltage, TC, RTD, or ON/OFF Input

**Syntax**
```
SR p1,p2,p3,p4,p5,p6,p7<terminator>
p1  Measurement channel number
p2  Input type
VOLT  DC voltage
TC    Thermocouple
RTD   Resistance temperature detector
DI    ON/OFF input
p3  Measurement range
p4  Span lower limit
p5  Span upper limit
```

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

**Example**
```
Set the channel 001 input type to TC type R, the span lower limit to 0°C, and the span upper limit to 1760.0°C.
SR001,TC,R,0,17600
```

**Description**
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 and p3 by referring to the table in section 3.3.
- For parameters p4 and p5, enter values with five digits or less excluding the decimal point.

### When Computing the Difference between Channels

**Syntax**
```
SR p1,p2,p3,p4,p5,p6,p7,p8,p9,p10<terminator>
p1  Measurement channel number
p2  Setting type (DELTA)
p3  Input type
VOLT  DC voltage
TC    Thermocouple
RTD   Resistance temperature detector
DI    ON/OFF input
p4  Measurement range
p5  Span lower limit
p6  Span upper limit
p7  Reference channel number (measurement channel number)
```

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

**Example**
```
Convert the DC voltage measured on channel 002 to DC current. Set the measurement range to 6 V, the span lower limit to 1 V, the span upper limit to 5 V, the scaling lower limit to 1.00 A, and the scaling upper limit to 5.00 A.
SR002,SCALE,VOLT,6V,1000,5000,100,500,2,A
```

**Description**
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 and p3 by referring to the table in section 3.3.
- For parameters p5 and p6, enter values with five digits or less excluding the decimal point.
3.4 Setting Commands

For parameters p7, p8, and p9, either set all three parameters or omit all three parameters.

When Setting Channels to Square Root Computation

Syntax: SR p1, p2, p3, p4, p5, p6, p7, p8, p9, p10, p11

- p1: Measurement channel number
- p2: Setting type (SQRT)
- p3: Measurement range
- p4: Span lower limit
- p5: Span upper limit
- p6: Scaling lower limit (-30000 to 30000)
- p7: Scaling upper limit (-30000 to 30000)
- p8: Scaling decimal place (0 to 4)
- p9: Unit (up to 6 characters)
- p10: Low-cut function (OFF, ON)
- p11: Low-cut point (0 to 50)

Example: Convert the DC voltage measured on channel 001 to an amount of flow using the square root computation. Set the measurement range to 6 V, the span lower limit to 1 V, the span upper limit to 5 V, the scaling lower limit to 10.0 m3/s, and the scaling upper limit to 100.0 m3/s.

SR001, SQRT, 6V, 1000, 5000, 100, 1000, 1, m3/s

Description:
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 by referring to the table in section 3.3.
- For parameters p4 and p5, enter values with five digits or less excluding the decimal point.
- For parameters p6, p7, and p8, either set all three parameters or omit all three parameters.

SO Sets a computing equation

Syntax: SO p1, p2, p3, p4, p5, p6, p7

- p1: Computation channel number
- p2: Computation (ON, OFF)
- p3: Computing equation (up to 120 characters)
- p4: Span lower limit (-9999999 to 99999999)
- p5: Span upper limit (-9999999 to 99999999)
- p6: Span decimal place (0 to 4)
- p7: Unit (up to 6 characters)

Example: Compute the sum of channels 001 and 002 using channel 106. Set the span lower limit to -10.0000, the span upper limit to 15.0000, and the unit to V.

SO106, ON, 001+002, -100000, 150000, 4, V

Description:
- You can use this command on models with the /M1 or /PM1 math option.
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- For details on computing equations, see the DX1000/DX2000 User’s Manual.
- Set p1 by referring to the table in section 3.3.
- For parameters p4 and p5, enter values with seven digits or less, excluding the decimal, for negative numbers and with eight digits or less for positive numbers.
- For parameters p4, p5, and p6, either set all three parameters or omit all three parameters.

ER Sets the range of an external input channel

Syntax: ER p1, p2, p3, p4, p5, p6

- p1: External input channel number
- p2: External input channel (ON, OFF)
- p3: Span lower limit (-30000 to 30000)
- p4: Span upper limit (-30000 to 30000)
- p5: Decimal place (0 to 4)
- p6: Unit (up to 6 characters)

Example: Set the channel 005 input type to 1-5V, the span lower limit to 1 V, the span upper limit to 5 V, and turn the 1-5V low-cut function ON.

SR005, 1-5V, 1-5V, 1000, 5000, ON

Query: SR[p1]?

Description:
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 by referring to the table in section 3.3.
- For parameters p4 and p5, enter values with four digits or less excluding the decimal point.
- For parameters p6, p7, and p8, either set all three parameters or omit all three parameters.
3.4 Setting Commands

**TJ** Sets memory sampling

**Syntax**

```
TJ p1,p2<terminator>
```

- **p1** Measurement, computation, or external input channel number
- **p2** Memory sampling (OFF, ON)

**Query**

```
TJ[p1]?
```

**Example**

Turn off memory sampling on channel 002.

```
TJ002,OFF
```

**Description**

- You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).

**SA** Sets an alarm

### When Not Using Alarms

**Syntax**

```
SA p1,p2,p3<terminator>
```

- **p1** Measurement, computation, or external input channel number
- **p2** Alarm number (1 to 4)
- **p3** Alarm on/off (OFF)

**Query**

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

**Example**

Set alarm number 1 of channel 010 to OFF.

```
SA010,1,OFF
```

**Description**

You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.

### When Using Alarms

**Syntax**

```
SA p1,p2,p3,p4,p5,p6,p7,p8<terminator>
```

- **p1** Measurement, computation, or external input channel number
- **p2** Alarm number (1 to 4)
- **p3** Alarm on/off (ON)
- **p4** Alarm type
  - **H** High limit alarm
  - **L** Low limit alarm
  - **h** Difference high limit alarm
  - **l** Difference low limit alarm
- **p5** Alarm value
- **p6** Relay setting
  - **ON** Relay setting on
  - **OFF** Relay setting off
- **p7** Relay number when p6 is set to ON
- **p8** Detection of alarm (ON, OFF)

**Example**

Set a high limit alarm (alarm value = 1000) on channel 002 alarm number 1, and activate relay 101 when an alarm occurs.

```
SA002,1,ON,H,1000,ON,I01
```

**Description**

- For a channel whose input range is set to SKIP (using the SR command), p3 cannot be set to ON.
- For a channel whose computation channel is set to OFF (using the SO command), p3 cannot be set to ON.
- For a channel whose external input channel is set to OFF (ER command), p3 cannot be set to ON.
- All alarm settings on a channel are set to OFF when:
  - Its input type is changed (VOLT, TC, etc).
  - Its measurement range is changed.
  - Its span or scaling values are changed during scaling display (includes changing the decimal place).
  - The channel is a computation channel, and the channel is turned on or off or an expression or a span value is changed.
  - The h and l settings of p4 are valid only when the measurement range is set to differential computation between channels.
  - 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.
  - If p4 is set to T or t, set the alarm delay for the delay high/low limit alarm using the BD command.
  - Set the p5 alarm value in the following range based on the p4 alarm type or the target channel.
  - Upper, Lower, Delay Upper and Delay Lower alarms
    - DC voltage, thermocouple, or RTD input
    - Within the measurable range of the selected range
  - Contact input
    - 0 or 1
3.4 Setting Commands

- Scaling input (1-5V, scaling, and square root)
  -5 to 105% of span (except, within –30000 to 30000)
- Difference high limit and difference low limit alarms
  Within the measurable range
- High limit on rate-of-change and low limit on rate-of-change alarms
  A value that consists of at least one non-zero digit. For example, 0.0001 for the 2 V range.
  The maximum value is within the measurable range (except within –30000 to 30000).
  For example, 3.0000 for the 2 V range.
  For contact input, only the value of “1” can be specified.
- Computation channels
  For computation channels –9999999 to 99999999 (excluding the decimal point. Set using an integer.)
- External input channels
  –30000 to 30000

For contact input, only the value of “1” can be specified.

• Computation channels
  For computation channels –9999999 to 99999999 (excluding the decimal point. Set using an integer.)
• External input channels
  –30000 to 30000
• An error occurs if p7 is set to a number of a relay that is not installed.
• You can specify computation channels on models with the /M1 or /PM1 math option.
• For computation channels and external input channels, the only alarm types that you can specify are H (high limit alarm), L (low limit alarm), T (delay high limit alarm), and t (delay low limit alarm).
• For computation channels, the alarm hysteresis is fixed at zero. Use the XA command to set the alarm hysteresis.

**SW**  
Sets the trend interval and auto save interval

Syntax:  
`SW p1,p2,p3,p4<terminator>`

**T-Y Display**

- Waveform type (specify T-Y)
- Trend interval (5S, 10S, 15S, 30S, 1MIN, 2MIN, 5MIN, 10MIN, 15MIN, 20MIN, 30MIN, 1H, 2H, 4H, 10H)
- Auto save interval (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 1DAY, 14DAY, 31DAY)

Query:  
`SW?`

Description:  
- You cannot use this command while recording (memory sampling) in progress.
- The selectable auto save intervals (p4) vary depending on the trend interval (p3). For details, see the DX1000/DX2000 User’s Manual.
- You can only set the trend interval (p3) to 5S and 10S for high-speed input models (DX1002, DX1002N, DX1004, DX1004N, DX2004, and DX2008).
- You can only set the trend interval (p3) on medium-speed models to 15S if fast sampling mode is enabled.
- Set the trend interval (p3) to a value less than the scan interval.
- The p4 setting is valid when the saving method to the external storage medium is set to auto (using the XM command with p1 set to AUTO).

**Circular Display**

- Waveform type (CIRCULAR)
- Time length of one cycle (20MIN, 30MIN, 1H, 2H, 6H, 8H, 12H, 16H, 1DAY, 2DAY, 1WEEK, 2WEEK, 4WEEK)
- Auto save interval (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 1DAY, 14DAY, 31DAY)

Query:  
`SW?`

Example:  
Set the waveform type to CIRCULAR, the time length of one cycle to 20 minutes, and the auto save interval to 1 hour.

**TI**  
Sets the circular display offset time

Syntax:  
`TI p1, p2<terminator>`


Query:  
`TI[p1]?`

Example:  
Set the offset time to 1 hour.

**Description**

- You cannot use this command while recording (memory sampling) in progress.
- The selectable auto save intervals (p4) vary depending on the trend interval (p3). For details, see the DX1000/DX2000 User’s Manual.
- The p4 setting is valid when the saving method to the external storage medium is set to auto (using the XM command with p1 set to AUTO).
- Set the time length of one cycle (p3) to a value less than the scan interval.
3.4 Setting Commands

**TO** Sets how the DX operates after one circular display cycle

**Syntax**

```
TO p1<terminator>
```

**p1** Operation after one cycle

- **ALLCLEAR** Clears the entire waveform display and starts drawing a new waveform.
- **DIVCLEAR** Clears a section of the waveform display and starts drawing a new waveform.

**Query**

```
TO?
```

**Example**

Set the operation after one cycle to all clear.
```
TOALLCLEAR
```

**TW** Sets the secondary trend interval

**Syntax**

```
TW p1<terminator>
```

**p1** Trend interval (5S, 10S, 15S, 30S, 1MIN, 2MIN, 5MIN, 10MIN, 15MIN, 20MIN, 30MIN, 1H, 2H, 5MIN, 10MIN, 15MIN, 20MIN, 30MIN)

**Query**

```
TW?
```

**Example**

Set the interval to 2 minutes.
```
TW2MIN
```

**Description**

- Set the trend interval (p1) to a value less than the scan interval.
- You can only set the trend interval (p3) to 5S and 10S for high-speed input models (DX1002, DX1002N, DX1004, DX1004N, DX2004, and DX2008).
- You can only set the trend interval (p3) on medium-speed models to 15S if fast sampling mode is enabled.
- You cannot use this command when multi batch /BT2 is enabled.

**TM** Sets manual sampling

**Syntax**

```
TM p1,p2,p3<terminator>
```

**p1** Manual sample number

**p2** Enable or disable (ON or OFF)

**p3** Measurement, computation, or external input channel number

**Query**

```
TM[p1]?
```

**Example**

Assign measurement channel 002 to manual sample number 001.
```
TM001,ON,002
```

**Description**

- You can use this command on models with the /MC1 external input channel option.
- You can specify computation channels on models with the /M1 or /PM1 math option.

**SZ** Sets a zone

**Syntax**

```
SZ p1,p2,p3<terminator>
```

**p1** Measurement, computation, or external input channel number

**p2** Lower zone boundary position (0 to 95) [%]

**p3** Upper zone boundary position (5 to 100) [%]

**Query**

```
SZ[p1]?
```

**Example**

Display channel 002 in a zone between 30% and 50%.
```
SZ002,30,50
```

**Description**

- You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.
- Set the boundary positions as percentages of the entire amplitude axis in the waveform.
3.4 Setting Commands

display area.
• The zone size must be at least 5%.
• Set the upper zone boundary position greater than the lower zone boundary position.

SP  Sets a partial expanded display
Syntax  SP p1,p2,p3,p4<terminator>
  p1  Measurement, computation, or external input channel number
  p2  Partial expanded display (ON, OFF)
  p3  Boundary position (1 to 99) [%]
  p4  Boundary value
Query  SP[p1]?
Example  Partially expand the display of channel 001. Set the boundary position to 25% and the boundary value to 1.00 V.
  SP001,ON,25,100
Description  • You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.
  • For a channel whose input range is set to SKIP (using the SR command), p2 cannot be set to ON.
  • For a channel whose computation channel is turned off (using the SO command), p2 cannot be set to ON.
  • For a channel whose external input channel is set to OFF (using the ER command), p2 cannot be set to ON.
  • Set p3 as a percentage of the range defined by the span upper and lower limits (scale upper and lower limits when scaling is enabled).
  • Set p4 to a value from (span upper limit – 1) to (span lower limit + 1). If scaling is enabled, set p4 to a value from (scaling lower limit – 1) to (scaling upper limit + 1).
  • The decimal place and the number of digits are the same as those for the span or scaling settings (see the SR command).
  • You can use this command (includes the query) when the partial expanded display function is set to USE (using the XU command).
  • You cannot use this command if the partial expanded display range does not exist (for example when the span range is 1).

ST  Sets a tag
Syntax  ST p1,p2,p3<terminator>
  p1  Measurement, computation, or external input channel number
  p2  Tag comment (up to 32 characters)
  p3  Tag number (up to 16 characters)
Query  ST[p1]?
Example  Set the channel 002 tag (tag comment) to TAG2.
  ST002,TAG2
Description  • For the characters that you can use for tags, see appendix 3, “ASCII Character Codes.” Note that you cannot use semicolons or commas.
  • You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.
  • Parameter p3 is invalid when you are not using the tag number. The DX returns the previous value in response to a query.

SX  Sets a display group (release number 2 or earlier)
Syntax  SX p1,p2,p3,p4<terminator>
  p1  Display group number
  p2  Display group (ON, OFF)
  p3  Display group name (up to 16 characters)
  p4  Channel configuration
Query  SX[p1]?
Example  Assign channels 001, 003, 004 to 006 to group number 1 and name the group GROUP2.
  SX1,ON,GROUP2,001.003.004-006
Assign channels by using periods to separate each channel or a hyphen to specify a range of channels.
Description  • For the characters that you can use for group names, see appendix 3, “ASCII Character Codes.” Note that you cannot use semicolons or commas.
  • If you are using the multi batch feature /BT2, this command affects batch group 1.
  • If you are using the multi batch feature /BT2 and batch group 1 is recording (memory sampling), you cannot use this command.
  • Set p1 by referring to the table in section 3.3.
  • If you are using the /AS1 advanced security and /BT2 multi batch options, you cannot use this command if any of the batch groups is recording (memory sampling).

SL  Sets a trip line (release number 2 or earlier)
Syntax  SL p1,p2,p3,p4,p5,p6<terminator>
  p1  Display group number
  p2  Trip line number (1 to 4)
  p3  Trip line display (ON, OFF)
  p4  Display position (0 to 100) [%]
  p5  Display color (RED, GREEN, BLUE, B.VIOLET, BROWN, ORANGE, Y.GREEN, LIGHTBLUE, VIOLET, GRAY, LIME, CYAN, DARKBLUE, YELLOW, LIGHTGRAY, PURPLE, BLACK, PINK,
3.4 Setting Commands

**NX**

Sets a display group (release number 3 or later)

**Syntax**

```
NX p1,p2,p3,p4,p5<terminator>
```

- **p1**: Batch group number
  - Set the number to 1 if multi batch /BT2 is not in use.

- **p2**: Display group number

- **p3**: Enable or disable (ON or OFF)

- **p4**: Display group name (up to 16 characters)

- **p5**: Channel configuration

**Query**

```
NX[p1,[p2]]?
```

**Example**

Assign channels 001, 003, 004 to 006 to batch group 3's group number 1 and name the group GROUP2.

```
NX3,1,ON,GROUP2,001.003.004-006
```

**Description**

- For the characters that you can use for group names, see appendix 3, "ASCII Character Codes." Note that you cannot use semicolons or commas.
  - If you are using the multi batch feature /BT2, you cannot use this command on a batch group that is recording (memory sampling).
  - If you are using the /AS1 advanced security and /BT2 multi batch options, you cannot use this command if any of the batch groups is recording (memory sampling).
  - Set p1 and p2 by referring to the table in section 3.3.

**NL**

Sets a trip line (release number 3 or later)

**Syntax**

```
NL p1,p2,p3,p4,p5,p6,p7<terminator>
```

- **p1**: Batch group number

**Query**

```
NL[p1,[p2],[p3]]?
```

**Example**

Display trip line 2 in red at the 10% position of batch group 3's display group 1. Set the line width to 1.

```
NL3,1,2,ON,10,RED,1
```

**Description**

- Set the position as percentages of the entire amplitude axis in the waveform display area.
  - If you are using the multi batch feature /BT2, this command affects batch group 1.
  - If you are using the multi batch feature /BT2 and batch group 1 is recording (memory sampling), you cannot use this command.
  - Set p1 by referring to the table in section 3.3.
  - If you are using the /AS1 advanced security and /BT2 multi batch options, you cannot use this command if any of the batch groups is recording (memory sampling).

**SG**

Sets a message

**Syntax**

```
SG p1,p2<terminator>
```

- **p1**: Message number (1 to 100)

- **p2**: Message (up to 32 characters)

**Query**

```
SG[p1]?
```

**Example**

Assign character string "MESSAGE1" to message number 2.

```
SG2,MESSAGE1
```

**Description**

For the characters that you can use for messages, see appendix 3, "ASCII Character Codes." Note that you cannot use semicolons or commas.

**TH**

Sets the directory on the external storage medium for saving data

**Syntax**

```
TH pl<terminator>
```

- **p1**: Directory name (up to 20 characters)

**Query**

```
TH ?
```

**Example**

Select the DATA1 folder on the external storage medium for saving data.

```
THDATA1
```
3.4 Setting Commands

**TZ**

Sets a file header

**Syntax**

TZ\ tp1,p2<terminator>

**p1**

Batch group number
Set the number to 1 if multi batch /BT2 is not in use.

**p2**

File header (up to 50 characters)

**Query**

TZ[p1]?

**Example**

Set the batch group 2's header to DX1000DATA.

**TZ2,DX1000DATA**

**Description**

- If you are using the /BT2 multi batch option, you cannot use this command on a batch group that is recording (memory sample).
- If you are using the /AS1 advanced security and /BT2 multi batch options, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 by referring to the table in section 3.3.

**TF**

Sets a data file name

**Syntax**

TF\ tp1,p2,p3<terminator>

**p1**

Batch group number
Set the number to 1 if multi batch /BT2 is not in use.

**p2**

Configuration

- BATCH: File name based on the batch name
- DATE: User-assigned character string + date
- SERIAL: User-assigned character string + serial number

**p3**

User-assigned name (up to 16 characters) (valid when p2 is set to DATE or SERIAL)

**Query**

TF[p1]?

**Example**

Set the batch group 2's file name configuration to BATCH and set the user-assigned string to DX1DATA.

**TF2,BATCH,DX1DATA**

**Description**

- If you are using the /BT2 multi batch option, you cannot use this command on a batch group that is recording (memory sample).
- If you are using the /AS1 advanced security and /BT2 multi batch options, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 by referring to the table in section 3.3.

**SD**

Sets the date and time

**Syntax**

SD\ tp1,p2<terminator>

**p1**

Date in the YY/MM/DD format (fixed)

- YY: Year (00 to 79)
- MM: Month (01 to 12)
- DD: Day (01 to 31)

**p2**

Time in the HH:MM:SS format (fixed)

- HH: Hour (00 to 23)
- MM: Minute (00 to 59)
- SS: Second (00 to 59)

**Query**

SD?

**Example**

Set the internal clock to 13:00:00 on October 1, 2005.

**SD05/10/01,13:00:00**

**Description**

- The p1 and p2 format is fixed at eight characters. Use the format below. Do not insert spaces. If you do, an error will occur.
  
  p1 = YY/MM/DD (lower two digits of the year/month/day)
  
  p2 = HH:MM:SS (hour:minute:second)

- On a DX whose release number is 3 or earlier, when you send an SD command, the DX switches to setting mode and sets the date and time.
- On a DX whose release number is 4 or later, when you send an SD command, the DX sets the date and time without switching to setting mode.

**TD**

Sets daylight saving time

**Syntax**

TD\ tp1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>

**p1**

Enable or disable (USE or NOT)

**p2**

Daylight saving time start month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)

**p3**

Daylight saving time start week (1ST, 2ND, 3RD, 4TH, LAST)

**p4**

Daylight saving time start day (SUN, MON, TUE, WED, THU, FRI, SAT)

**p5**

Daylight saving time start hour (0 to 23)

**p6**

Daylight saving time end month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)

**p7**

Daylight saving time end week (1ST, 2ND, 3RD, 4TH, LAST)

**p8**

Daylight saving time end day (SUN, MON, TUE, WED, THU, FRI, SAT)

**p9**

Daylight saving time end hour (0 to 23)

**Query**

TD?

**Example**

Switch to daylight saving (summer) time on the first Sunday of June and switch out of it on the first Sunday in December.

**TDUSE,JUN,1ST,SUN,0,DEC,1ST,SUN,0**

**TT**

Sets the trend display

**Syntax**

TT\ tp1,p2,p3,p4,p5<terminator>

**p1**

Graph display direction

- HORIZONTAL: Horizontal display
- VERTICAL: Vertical display
- WIDE: Horizontal wide display
- SPLIT: Horizontal split display

**p2**

Clear waveform at start (ON or OFF)
### 3.4 Setting Commands

**p3** Message display direction
- HORIZONTAL
- VERTICAL

**p4** Scale digits
- NORMAL 3-digit display
- FINE 4-digit display

**p5** Current value display
- MARK Displays using a mark
- BARGRAPH Display using a bar graph

For the circular display, only p1=HORIZONTAL is valid.

**Query** TT?

**Example** Display waveform horizontally, set the message direction to vertical, and display waveforms by clearing the current waveforms at memory start.

TTHORIZONTAL, ON, VERTICAL

**Description** When using the /BT2 multi batch option, p2 is fixed at ON.

---

**SE** Sets the line width and the number of grids to use on the trend graph

**Syntax**
```
SE p1, p2<terminator>
```

**p1** Trend line width (1 to 3) [dots]
**p2** Number of grids (4 to 12, AUTO)

**Query** SE?

**Example** Set the trend waveform line width to 1 dot and the number of grids to 10.

SE1, 10

---

**TB** Sets the bar graph display

**Syntax**
```
TB p1<terminator>
```

**p1** Bar graph display direction
- HORIZONTAL
- VERTICAL

**Query** TB?

**Example** Display the bar graph horizontally.

TBHORIZONTAL

---

**SB** Sets the bar graph for a channel

**Syntax**
```
SB p1, p2, p3<terminator>
```

**p1** Measurement, computation, or external input channel number
**p2** Bar graph base position
  - NORMAL Normal (lower limit)
  - CENTER Center
  - LOWER Lower limit
  - UPPER Upper limit
**p3** Number of scale divisions (4 to 12)

**Query** SB[p1]?

**Example** Set the number of scale divisions on the bar graph for channel 002 to five, and display the bar graph from the span lower limit (the scale lower limit if scale is enabled).

SB002, NORMAL, 5

---

**TN** Sets a scale

**Syntax**
```
TN p1, p2, p3<terminator>
```

**p1** Measurement, computation, or external input channel number
**p2** Display position (OFF, 1 to 10)
**p3** Number of divisions (4 to 12, C10)

**Query** TN[p1]?

**Example** Set the scale position for channel 003 to 2, and the number of divisions to 10.

TN003, 2, 10

---

**SV** Sets a measurement channel’s moving average

**Syntax**
```
SV p1, p2, p3<terminator>
```

**p1** Measurement channel number
**p2** Moving average (OFF, ON)
**p3** Number of moving average samples (2 to 400)

**Query** SV[p1]?

**Example** Set the number of moving average samples for channel 002 to 12.

SV002, ON, 12

---

**SC** Sets a channel display color

**Syntax**
```
SC p1, p2<terminator>
```

**p1** Measurement, computation, or external input channel number
**p2** Display color (see SL (sets a trip line))

**Query** SC[p1]?

**Example** Set the channel 002 display color to blue.

SC002, BLUE

---

**TA** Sets an alarm point mark

**Syntax**
```
TA p1, p2, p3, p4, p5, p6, p7<terminator>
```

**p1** Measurement, computation, or external input channel number
**p2** Mark type
  - ALARM Alarm mark
  - FIXED Fixed mark
**p3** Scale board (ON, OFF)
**p4** Alarm level 1 color (AUTO or 24 colors (see NL; sets a trip line))
**p5** Alarm level 2 color (AUTO or 24 colors (see NL; sets a trip line))

**Description** You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the /MC1 external input channel option.
3.4 Setting Commands

**p6**  
Alarm level 3 color (AUTO or 24 colors (see NL; sets a trip line))
AUTO The same color as the alarm color

**p7**  
Alarm level 4 color (AUTO or 24 colors (see NL; sets a trip line))
AUTO The same color as the alarm color

**Query**

**Example**

Display alarm marks on the channel 004 scale.
TA004, ALARM, ON

---

**TG**  
Sets a color scale band

**Syntax**

TG p1,p2,p3,p4,p5<terminator>

- **p1** Measurement, computation, or external input channel number
- **p2** Area (OFF, IN, OUT)
- **p3** Color (AUTO or 24 colors (see NL; sets a trip line))
- **p4** Lower display position limit
- **p5** Upper display position limit

**Query**

**Example**

Set the channel 005 color scale band to the range from -1.0000 to 0.5000 V (2-V range), and set the color to green.
TG005, IN, GREEN, -10000, 5000

---

**SQ**  
Sets the LCD brightness and the screen backlight saver

**Syntax**

SQ p1,p2,p3,p4<terminator>

- **p1** LCD brightness
  - 1 to 8: DX1000
  - 1 to 6: DX2000

- **p2** Screen backlight saver type
  - OFF: Disables the saver function.
  - DIMMER: Dims the backlight
  - TIMEOFF: Turns off the backlight

- **p3** Amount of time until the DX switches to saver mode
  - 1MIN, 2MIN, 5MIN, 10MIN, 30MIN, 1H

- **p4** Event that causes the DX to return from saver mode
  - KEY: Pressing of a key
  - KEY+ALM: Pressing of a key or an alarm occurrence

**Query**

**Example**

Set the LCD brightness to 2 and the screen backlight saver type to dimmer. Set the amount of time until the DX switches to saver mode to 5 minutes and the event that causes the DX to return from saver mode to pressing of a key.
SQ2, DIMMER, 5MIN, KEY

**Description**

If p2 is set to OFF, do not set p3 or p4.

---

**TC**  
Sets the background color

**Syntax**

TC p1,p2<terminator>

- **p1** Screen (WHITE, BLACK)

- **p2** Historical trend screen (WHITE, CREAM, LIGHTGRAY, BLACK)

**Query**

**Example**

Set the screen background to black and the historical trend screen background to cream.
TC BLACK, CREAM

---

**TP**  
Sets automatic display group switching

**Syntax**

TP p1<terminator>

- **p1** Auto switching interval (5S, 10S, 20S, 30S, 1MIN)

**Query**

**Example**

Switch between display groups at 5-s intervals.
TP 5S

---

**NF**  
Sets the favorite key operation

**Syntax**

NF p1,p2,p3<terminator>

- **p1** Type of operation
  - FAVORITE: Operates as a favorite key.
  - HISTORY: Operates as a key for switching to the historical display.

- **p2** Display group
  - SAVED: Displays the display group that was selected when you registered the favorite key.
  - CURRENT: Displays the current display group

- **p3** Historical trend time axis zoom
  - SAVED: Displays the historical trend using the time axis zoom setting that was used when you registered the favorite key.
  - CURRENT: Displays the historical trend using the current time axis zoom setting

**Query**

**Example**

Set the favorite key as a key used to switch to the historical display.
NF, HISTORY

**Description**

Parameters p2 and p3 are valid when p1 is set to FAVORITE.

---

**TR**  
Sets the automatic switching back to default display

**Syntax**

TR p1<terminator>

- **p1** Automatic return time limit (OFF, 1MIN, 2MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H)

**Query**

**Example**

Set the automatic return time limit to 5 minutes.
TR 5MIN

---

**TQ**  
Sets a timer

**When p2 is set to OFF (no timer)**

**Syntax**

TQ p1,p2<terminator>

- **p1** Timer number
- **p2** Timer type (OFF)
### 3.4 Setting Commands

#### When p2 is set to ABSOLUTE (absolute timer)
**Syntax**
```
TQ p1,p2,p3,p4<terminator>
p1 Timer number
p2 Timer type (ABSOLUTE)
p3 Time interval (1MIN to 6MIN, 10MIN, 12MIN, 15MIN, 20MIN, 30MIN, 1H to 4H, 6H, 8H, 12H, 24H)
p4 Reference time (hh; fixed format)
```

#### When p2 is set to RELATIVE (relative timer)
**Syntax**
```
TQ p1,p2,p3,p4<terminator>
p1 Timer number
p2 Timer type (RELATIVE)
p3 Time (hh:mm; fixed format)
p4 Reset at computation start (OFF, ON)
```

#### TK Sets a match time timer
**When p2 is set to OFF (disable the match time timer)**
**Syntax**
```
TK p1,p2<terminator>
p1 Timer number
p2 Timer type (OFF)
```

**When p2 is set to DAY**
**Syntax**
```
TK p1,p2,p3,p4,p5<terminator>
p1 Timer number
p2 Timer type (DAY)
p3 Day (1 to 28)
p4 Hour (hh:mm; fixed format; 00:00 to 23:59)
p5 Timer operation (SINGLE, REPEAT)
```

**When p2 is set to WEEK**
**Syntax**
```
TK p1,p2,p3,p4,p5<terminator>
p1 Timer number
p2 Timer type (WEEK)
p3 Day of week (SUN, MON, TUE, WED, THU, FRI, SAT)
p4 Hour (hh:mm; fixed format; 00:00 to 23:59)
p5 Timer operation (SINGLE, REPEAT)
```

#### When p2 is set to MONTH
**Syntax**
```
TK p1,p2,p3,p4,p5<terminator>
p1 Timer number
p2 Timer type (MONTH)
p3 Day (1 to 28)
p4 Hour (hh:mm; fixed format; 00:00 to 23:59)
p5 Timer operation (SINGLE, REPEAT)
```

#### When p2 is set to YEAR
**Syntax**
```
TK p1,p2,p3,p4,p5,p6<terminator>
p1 Timer number
p2 Timer type (YEAR)
p3 Month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)
p4 Day (1 to 31; varies depending on the specified month)
p5 Hour (hh:mm; fixed format; 00:00 to 23:59)
p6 Timer operation (SINGLE, REPEAT)
```

#### TU Sets an event action
**When p2 is set to MONTH**
**Syntax**
```
TU p1,p2,p3,p4,p5<terminator>
p1 Logic number (1 to 40)
p2 Event type
```

**When multi batch /BT2 is not in use**
**Syntax**
```
TU p1,p2,p3,p4,p5,p6,p7,p8<terminator>
p1 Logic number (1 to 40)
p2 Event type
```

**p2 Event type**
- NONE
- REMOTE
- RELAY
- SWITCH
- ALARM
- TIMER
- MATCHTIMETIMER
- USERKEY
- EVENTLEVELSWITCH
- EVENTEDGESWITCH
- RELAY-OFF
- SWITCH-OFF
- ALARM-OFF
- EVENTLEVELSWITCH-OFF

**p3 Event details**
- p2=REMOTE
- p2=RELAY
- p2=RELAY-OFF
- p2=SWITCH
- p2=SWITCH-OFF
- p2=TIMER

Description • Set p1 by referring to the table in section 3.3.
• You cannot use this command while recording (memory sampling) in progress.
  If you are using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
### 3.4 Setting Commands

- **Action type**
  - MEMORYSTART/STOP
  - MEMORYSTART
  - MEMORYSTOP
  - TRIGGER
  - ALARMACK
  - MATHSTART/STOP
  - MATHSTART
  - MATHSTOP
  - MATHRESET
  - SAVEDISPLAY
  - SAVEEVENT
  - MESSAGE
  - SNAPSHOT
  - MANUALSAMPLE
  - TIMERRESET
  - DISPLAYRATE1/2
  - DISPLAYGROUPCHANGE
  - FLAG
  - TIMEADJUST
  - PANELLOAD
  - ALARMDISPLAYRESET
  - COMMENTDISPLAY
  - FAVORITEDISPLAY

- **Action details 1**
  - Timer number
  - Display group number
  - Flag number
  - Message number (1 to 100)
  - Setup file number (1 to 3)
  - Comment text block number

- **Action details 2**
  - Presses the favorite key
  - Specifies a registered screen

- **Action details 3**
  - Method of specifying the destination to write the message

- **Action details 4**
  - Method of specifying the destination to write the message

- **Action details 5**
  - Batch group number

- **Query**
  - If there is a parameter whose setting is invalid, the DX responds to queries for that parameter with a fixed value.
    - If `p4 = MEMORYSTART/STOP, MEMORYSTART, MEMORYSTOP, SAVEDISPLAY, SAVEEVENT, MATHRESET` and `p5` is invalid, the DX returns "ALL."
    - If `p4 = DISPLAYGROUPCHANGE` and `p6` is invalid, the DX returns "ALL."

#### When multi batch /BT2 is in use

**Syntax**

```plaintext
TU p1,p2,p3,p4,p5,p6,p7,p8 <terminator>
```

- **p1**
  - Same as when multi batch is not in use

- **p2**
  - Same as when multi batch is not in use

- **p3**
  - Same as when multi batch is not in use

- **p4**
  - Same as when multi batch is not in use except the following:
    - `p4=MEMORYSTART/STOP, MEMORYSTART, MEMORYSTOP, SAVEDISPLAY, SAVEEVENT, MATHRESET`
    - `p4=MATHRESET`

- **p5**
  - Batch group number
  - Batch group number

- **p6**
  - Method of specifying the destination to write the message

- **p7**
  - Display group number

- **p8**
  - You can specify any value.

The DX returns 1 in response to this query.
### 3.4 Setting Commands

#### SK Sets a constant

**Syntax**

SK p1,p2<terminator>

- **p1** Constant number
- **p2** Constant (-9.9999E+29 to -1.0000E-30, 0, 1.0000E-30 to 9.9999E+29, 5 significant digits)

**Query**

SK[p1]?

**Example**

Set the constant in constant number K01 to 1.0000E-10.

SKK01,1.0000E-10

**Description**

- You can use this command on models with the /M1 or /PM1 math option.
- You cannot use this command while recording (memory sampling) or computation is in progress. When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- Set p1 by referring to the table in section 3.3.

#### SI Sets the rolling average function of a computation channel

**Syntax**

SI p1,p2,p3,p4<terminator>

- **p1** Computation channel number
- **p2** Moving average (ON, OFF)
- **p3** Sampling interval (1S, 2S, 3S, 4S, 5S, 6S, 10S, 12S, 15S, 20S, 30S, 1MIN, 2MIN, 3MIN, 5MIN, 6MIN, 10MIN, 12MIN, 15MIN, 20MIN, 30MIN, 1H)
- **p4** Number of samples (1 to 1500)

**Query**

SI[p1]?

**Example**

Turn on the rolling average function of computation channel 107, set the sampling interval to 1 minute, and the number of samples to 20.

SI107,ON,1MIN,20

**Description**

- You can use this command on models with the /M1 or /PM1 math option.
- Do not set p3 or p4 when p2 is set to OFF.
- Set the sampling interval to a value greater than the scan interval.

#### SJ Sets a TLOG timer

**Syntax**

SJ p1,p2,p3,p4,p5<terminator>

- **p1** Computation channel number
- **p2** Timer number
- **p3** Conversion of the unit of time for TLOG.
  - SUM computation
    - OFF: Do not convert.
    - /S: Converts as though the physical values are integrated in units of seconds.
    - /MIN: Converts as though the physical values are integrated in units of minutes.
    - /H: Converts as though the physical values are integrated in units of hours.
- **p4** Reset (ON, OFF)
- **p5** Timer type
  - TIMER: Timer
  - MATCHTIMETIMER: Match time timer

**Query**

SJ[p1]?

**Example**

Assign timer 1 to computation channel number 110. Do not convert the unit of time and enable the reset setting.

SJ110,1,OFF,ON,TIMER
3.4 Setting Commands

**Description**
- You can use this command on models with the /M1 or /PM1 math option.
- Set parameters p1 and p2 by referring to the table in section 3.3.
- You cannot use this command while computation is in progress.
- When using the /BT2 multi batch option, you cannot use this command if any of the batch groups is recording (memory sampling).
- About p3
  - Because the DX integrates sampled data over each scan interval, the physical value integrated over a given unit of time may be different from the actual integrated value. This occurs if the unit of time is different from the scan interval. If this occurs, set p3 to the same unit of time as that for the physical value that you are measuring. The DX calculates the integrated value using one of the following conversion formulas based on p3.
    - OFF: \( \Sigma(\text{measured value}) \)
    - S: \( \Sigma(\text{measured value}) \times \text{scan interval} \)
    - MIN: \( \Sigma(\text{measured value}) \times \text{scan interval/60} \)
    - HOUR: \( \Sigma(\text{measured value}) \times \text{scan interval/3600} \)
  - The scan interval unit is seconds.

**TX**
- Sets the ancillary operation of the start key

**Syntax**
```
TX p1<terminator>
```

**Query**
```
TX?
```

**Example**
Configure the start key so that computation also starts when the start key is pressed.
```
TXSTART
```

**BH**
- Sets a batch text field

**Syntax**
```
BH p1,p2,p3,p4<terminator>
```

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

**Example**
Register the title "OPERATOR" and the string "DAQSTATION" to batch group 1’s field number 2.
```
BH1,2,OPERATOR,DAQSTATION
```

**Description**
- First, use this command with p2 set to BEGIN to specify the number of break points.
- Then, use this command with p2 set to SET to specify the value of each break point.
- Finally, use this command with p2 set to END to finalize the settings.
- The command "EH2?" causes the DX to return the CH2 settings.
- The DX returns the settings in the format shown in the above example.
- You cannot use this command when computation is in progress.

**EH**
- Sets calibration correction

**When p2 is set to BEGIN**

**Syntax**
```
EH p1,p2,p3<terminator>
```

- **p1**: Measurement channel number
- **p2**: Type of operation (BEGIN)
- **p3**: Number of break points of the calibration segment (OFF, 2 to 16)

**Description**
- Set p1 by referring to the table in section 3.3.
- The selectable range for p4 and p5 varies depending on the currently specified range.
- When the measurement range is set to scale, the selectable range for p4 and p5 is -30000 to 30000.
- Set input value p4 so that the value increases as break point p3 increases.

**When p2 is set to SET**

**Syntax**
```
EH p1,p2,p3,p4,p5<terminator>
```

- **p1**: Measurement channel number
- **p2**: Type of operation (SET)
- **p3**: A specific break point (1 to 16)
- **p4**: Input value of the specific break point
- **p5**: Output value of the specific break point

**When p2 is set to END**

**Syntax**
```
EH p1,p2<terminator>
```

- **p1**: Measurement channel number
- **p2**: Type of operation (END)

**Example**
Set three break points for CH2.
```
EH002,BEGIN,3
EH002,SET,1,0,1
EH002,SET,2,50,49
EH002,SET,3,100,101
EH002,END
```

**BD**
- Sets an alarm delay

**On DXs without the /AS1 Advanced Security Option**

**Syntax**
```
BD p1,p2<terminator>
```

- For the characters that you can use, see appendix 3.
- Set p1 by referring to the table in section 3.3.
### 3.4 Setting Commands

**Example** Assign the channel 2’s alarm level 1 alarm to display window 4 and display the comment text block 3 label.

```
NW,4,ON,2,1,3
```

**Description**
- Set parameters p1 and p5 by referring to the table in section 3.3.
- You cannot use this command when the annunciator mode is set to Off (using the WU command).

**NG** Sets the Web report layout

**Syntax**
```
NG p1,p2,p3<terminator>
p1 Report page number (1 to 10)
p2 Creation (ON, OFF)
p3 Report title string (up to 64 characters)
```

**Example** Set the title of report page 2 to “Factory 3.”

```
NG2,ON,Factory 3
```

**Description**
- You can use this command on models with the /M1 or /PM1 math option.
- You cannot use this command if:
  - The Web server function is set to Not (using the WS command).
  - The operator and monitor pages are both set to Off (using the WW command).

**NH** Sets Web report layout details

**Syntax**
```
NH p1,p2,p3,p4,p5,p6<terminator>
p1 Report page number (1 to 10)
p2 Item number (1 to 10)
p3 Creation (ON, OFF)
p4 Report channel number (R01 to R60)
p5 Value (MIN, MAX, AVE, SUM, INST)
p6 Item name string (up to 16 characters)
```

**Example** Assign the title “Average” to report page 2 item 6, and display the average of the measured values for the channel assigned to report channel R07.

```
NH2,6,R07,AVE,Average
```

**Description**
- You can use this command on models with the /M1 or /PM1 math option.
- The selectable values for p4 varies depending on the model.
- You cannot use this command if:
  - The Web server function is set to Not (using the WS command).
  - The operator and monitor pages are both set to Off (using the WW command).

**FR** Sets the interval for acquiring data to the FIFO buffer

**Syntax**
```
FR p1<terminator>
p1 1 (fixed)
p2 FIFO acquisition interval (25MS, 125MS, 250MS, 500MS, 1S, 2S, 5S)
```

**Example**

```
FR1
```

**Description**

- **Example** Set the channel 001 alarm delay to 120 s.

```
BD001,120
```

**Description**
- Set p1 by referring to the table in section 3.3.
- The p2 unit is seconds.

---

**NC** Sets a comment text field

**Syntax**
```
NC p1,p2<terminator>
p1 Comment text field number
p2 Comment string (up to 32 characters)
```

**Example** Set comment text field 30 to “P1 end.”

```
NC30,P1	end
```

**Description**
- Set parameter p2 by referring to the table in section 3.3.

**NB** Sets a comment text block

**Syntax**
```
NB p1,p2,p3,p4,p5,p6<terminator>
p1 Comment text block number
p2 Comment text field number of line 1
p3 Comment text field number of line 2
p4 Comment text field number of line 3
p5 Comment text field number of line 4
p6 Comment text field number of line 5
```

**Example** Set comment text block 5’s lines 1, 2, and 3 to comment text field 10, 11, and 14, respectively.

```
NB5,10,11,14
```

**Description**
- Set parameters p1 through p6 by referring to the table in section 3.3.

---

**NW** Sets an annunciator display

**Syntax**
```
NW p1,p2,p3 p4,p5<terminator>
p1 Display window number
p2 On/Off (ON, OFF)
p3 Measurement, computation, or external input channel number
p4 Alarm level (1 to 4, ALL)
p5 Label (comment text block number)
```

**Example**

```
NW1
```

**Description**
- Set p1 by referring to the table in section 3.3.
- The p2 unit is seconds.

---

**On DXs with the /AS1 Advanced Security Option**

**Syntax**
```
BD p1,p2,p3<terminator>
p1 Measurement, computation, or external input channel number
p2 Alarm delay (1 to 3600)
p3 Unit (SEC, HOUR)
```

**Example** Set the channel 001 alarm delay to 2 hours.

```
BD001,2,HOUOR
```

**Description**
- Set p1 by referring to the table in section 3.3.
- When p3 = HOUR, you can set p2 to a value from 1 to 24.
### 3.4 Setting Commands

**Query**  FR?
**Example**  Set the FIFO acquisition interval to 1 s.
FR1,1S

**Description**
- Set the FIFO acquisition interval to a value greater than the scan interval.
  - If you set the scan interval to a value greater than the acquisition interval using the XV command or from the screen, the acquisition interval is automatically set equal to the scan interval.
  - The DX has a circular FIFO (First In First Out) buffer. The DX acquires measured/computed values to the internal memory at predetermined time intervals from the time the power is turned on. The DX outputs the data when you send an FF command. The DX remembers the previous output position for each connection and updates the position when the DX outputs the next set of data when you send another FF command. This scheme compensates for the differences in the processing power of the measurement PCs and the communication delay. It enables data to be retrieved without any dropouts if the measurement PC reads the data before the ring buffer is overwritten. For details on the FIFO data output process, see appendix 5.

---

**SY**
**Sets a four panel display**

**Syntax**

```
SY p1,p2,p3,p4,p5,p6,p7,p8,p9,p10,p11<terminator>
```

- **p1** Batch group number
  - Set this parameter to 1 when multi batch /BT2 is not in use
- **p2** Screen number (1 to 4)
- **p3** Screen group name (up to 16 characters)
- **p4** Screen 1 type
  - TREND Trend display
  - DIGITAL Digital value display
  - BAR Bar graph display
  - OVERVIEW Overview
  - ALARM Alarm summary
  - MESSAGE Message summary
  - MEMORY Memory summary
  - MODBUS-M Modbus master status display
  - MODBUS-C Modbus client status display
  - RELAY Relay status display
  - REPORT Report display
  - COLUMN_BAR Stacked bar graphs
  - ANNUNCIATOR Annunciator display
  - EVENT_SWITCH Event switch status display
- **p5** Number of the group to display in screen 1
- **p6** Screen 2 type (see p4)
- **p7** Number of the group to display in screen 2
- **p8** Screen 3 type (see p4)
- **p9** Number of the group to display in screen 3
- **p10** Screen 4 type (see p4)
- **p11** Number of the group to display in screen 4

**Query**  SY[p1,[p2]]?
**Example**  Set screen number 1 as follows:

```
Four panel name: Temperature
Screen 1: TREND display, group 1
Screen 2: DIGITAL, group 3
Screen 3: ALARM, group 1
Screen 4: OVERVIEW
```

---

**SM**
**Sets the custom menu**

**Setting the main menu**

**Syntax**

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

- **p1** Type (DISP_MAIN)
  - The DX displays the menu items in the specified order.
- **p2 to p9** Menu items to display
  - The DX does not display menu items that are not specified.
  - TREND
  - DIGITAL
  - BAR
  - OVERVIEW
  - INFORMATION
  - TRENDHISTORY
  - LOG
  - 4PANEL
  - ESC
  - EXPAND
  - CUSTOM_PANEL
  - ANNUNCIATOR
  - SEPARATOR
### 3.4 Setting Commands

**Example**
Set the first menu item to TREND and the second menu item to TRENDHISTORY.

SMDISP_MAIN,TREND,TRENDHISTORY,

**Description**
- If parameter p2 and subsequent parameters are omitted, all menus are hidden.
- A command error occurs if you specify the same menu item multiple times.
- You can specify up to three separators. If you specify more than three, an error occurs.
- You cannot omit parameters using delimiters (, ).
- “4PANEL” is available only on the DX2000.
- You cannot set the first menu item to “SEPARATOR.”

**Setting the submenu**

**Syntax**
SM p1,p2,p3,...<terminator>

- **p1**: Type (DISP_SUB)
- **p2**: Menu type (TREND, DIGITAL, BAR, TRENDHISTORY, OVERVIEW, INFORMATION, LOG, 4PANEL, CUSTOM_PANEL, ANNUNCIATOR)
- **p3** ≥ Submenu items to display

The DX displays the items in the specified order.

The DX does not display menu items that are not specified.

When p2 is set to TREND (select from the items below)

- **GROUP1** to **GROUP36**: Display group
- **CIRCULAR_KIND**: Circular type
- **ALL_CHANNEL**: All channel display
- **SCALE**: Scale display
- **DIGITAL**: Digital display
- **MESSAGE_DISP**: Message display
- **TREND_SPACE**: Trend space
- **AUTO**: Auto switching
- **EXPAND**: Expand
- **FINE_GRID**: Fine grid
- **AUTO_ZONE**: Auto zone display or normal display
- **TAG_PRIORITY**: Tag prioritized display

**SEPARATOR**

When p2 is set to DIGITAL (select from the items below)

- **GROUP1** to **GROUP36**: Display group
- **AUTO**: Auto switching
- **EXPAND**: Expand
- **TAG_PRIORITY**: Tag prioritized display

**SEPARATOR**

When p2 is set to BAR (select from the items below)

- **GROUP1** to **GROUP36**: Display group
- **AUTO**: Auto switching
- **EXPAND**: Expand
- **TAG_PRIORITY**: Tag prioritized display

**SEPARATOR**

When p2 is set to TRENDHISTORY (select from the items below)

- **GROUP1** to **GROUP36**: Display group
- **SEPARATOR**

When p2 is set to OVERVIEW (select from the items below)

- **CURSOR**: Cursor display
- **TO_ALARM**: Alarm summary
- **TO_TREND**: To the trend display
- **TO_DIGITAL**: To the digital display
- **TO_BAR**: To the bar graph display
- **EXPAND**: Expand
- **TAG_PRIORITY**: Tag prioritized display
- **ALARMACK1**: Individual alarm acknowledgment (level 1)
- **ALARMACK2**: Individual alarm acknowledgment (level 2)
- **ALARMACK3**: Individual alarm acknowledgment (level 3)
- **ALARMACK4**: Individual alarm acknowledgment (level 4)

**SEPARATOR**

When p2 is set to INFORMATION (select from the items below)

- **ALARM**: Alarm summary
- **MESSAGE**: Message summary
- **MEMORY**: Memory summary
- **MODBUS_CLIENT**: ModbusTCP status display
- **MODBUS_MASTER**: ModbusRTU status display
- **RELAY**: Relay status display
- **EVENT_SWITCH**: Event switch status display
- **REPORT**: Report display
- **TO_HISTORY**: To the historical display
- **TO_HISTORY_D**: To historical (display data)
- **TO_HISTORY_E**: To historical (event data)
- **TO_OVERVIEW**: To the overview display
- **SORT_KEY**: Sort key switching
- **SORT_ORDER**: Sort order switching
- **DISP_ITEM**: Date/user name switching
- **DATA_KIND**: Data type switching
- **DATE/FILE**: Date/file name switching
- **SELECT_SAVE**: Select save
- **REPORT_CHANNEL**: Report channel display switching
- **ALL_SAVE**: All save
- **MANUAL_SAVE**: Save manual samples
- **REPORT_SAVE**: Save reports
- **EXPAND**: Expand
- **DATA_SAVE_MODE**: Data save mode
- **COLUMN_BAR**: Stacked bar graph
- **COLUMN_BAR_DISP**: Single graph or dual graph
- **COLUMN_BAR_SELECT**: Selects bar or group
- **REPORT_GROUP1** to **REPORT_GROUP6**: Selects the report group
### 3.4 Setting Commands

| TAG_PRIORITY | Tag prioritized display |
| DISP_GROUP   | Group number display    |
| SEPARATOR    |                         |

When p2 is set to LOG (select from the items below)

- LOGIN_LOG: Login log
- ERROR_LOG: Error log
- COMMU_LOG: Communication log
- FTP_LOG: FTP log
- WEB_LOG: Web log
- MAIL_LOG: E-mail log
- SNTP_LOG: SNTP log
- DHCP_LOG: DHCP log
- MODBUS_LOG: Modbus log
- OPERATE_LOG: Operation log
- SETTING_LOG: Change settings log
- DISP_ITEM: Switches the displayed items

**SEPARATOR**

When p2 is set to 4PANEL (select from the items below)

- 4PANEL1 to 4PANEL4: Selects 4-panel

**SEPARATOR**

When p2 is set to CUSTOM_PANEL (select from the items below)

- INTERNAL1 to INTERNAL3: Selects one from internal 1 to 3
- EXTERNAL1 to EXTERNAL25: Selects one from external 1 to 25
- NEW: New

When p2 is set to ANNUNCIATOR (select from the items below)

- EXPAND: Expand

**SEPARATOR**

Example

Register the following items to the Trend main menu's sub menu: SCALE and DIGITAL.

SM DISP_SUB,TREND,SCALE,DIGITAL

**Description**

- Items that you can set for p3 and subsequent parameters vary depending on p2.
  - If parameter p3 and subsequent parameters are omitted, all menu items are hidden.
  - A command error occurs if you specify the same menu item multiple times.
  - You can specify up to three separators. If you specify more than three, an error occurs.
  - You cannot specify EXPAND for log and 4-panel.
  - You cannot omit parameters using delimiters (, ).
  - The SM DISP_SUB? command causes the DX to return sub menu items whose display is turned off.
  - You cannot set the first menu item to "SEPARATOR."
  - The display group parameter "GROUP1" to "GROUP36" and the auto switching parameter "AUTO" on/off setting apply to the trend, digital, bar graph, and historical trend menus. (For example, if you set AUTO to off for the trend menu, and then set AUTO to on for the digital menu, AUTO is turned on for the trend, digital, bar graph, and historical trend menus.)

- When p2 is set to ANNUNCIATOR, the DX1000 does not have submenus.
- When p2 is set to INFORMATION, you can only set p3 to DISP_GROUP on the DX1000.
- When p2 is set to OVERVIEW, you can only set p3 to ALARMACK on models with the /AS1 advanced security option.
- When p2 is set to LOG, you can only set p3 to OPERATE_LOG, SETTING_LOG, or DISP_ITEM on models with the /AS1 advanced security option. LOGIN_LOG cannot be specified on models with the /AS1 advanced security option.

#### Setting the function menu

**p1** Type (FUNC)

**p2** Menu items to display

The DX displays the functions that you select from below in the menu in the specified order. The DX does not display menu items that are not specified.

- ALARMACK: Alarm acknowledge
- ALARM_RESET: Alarm display reset
- MESSAGE: Message
- FREE_MESSAGE: Free message
- MEDIA_EJECT: Media eject
- SNAPSHOT: Snapshot
- MANUAL_SAMPLE: Manual sample
- TRIGGER: Trigger
- SAVE_DISPLAY: Save display
- SAVE_EVENT: Save event
- SAVE_STOP: Save stop
- MATH_START/STOP: Math start/stop
- MATH_RESET: Math reset
- MATH_ACK: Math acknowledge
- EDGE_SWITCH: Edge switch
- TIMER_RESET: Timer reset
- MATCH_T_RESET: Match T reset
- KEYLOCK: Keylock
- LOGOUT: Logout
- PASSWORD_CHANGE: Password change
- RATE_CHANGE: Rate change
- DISPLAY RATE 1 OR DISPLAY RATE 2
- BATCH: Batch
- TEXT_FIELD: Text field
- FAVORITE_REGIST: Favorite register
- 4PANEL: 4-panel
- JUMP_DISPLAY: Jump display

**Example**

Register the following items to the Trend main menu's sub menu: SCALE and DIGITAL.

SM DISP_SUB,TREND,SCALE,DIGITAL

**Description**

- Items that you can set for p3 and subsequent parameters vary depending on p2.
  - If parameter p3 and subsequent parameters are omitted, all menu items are hidden.
  - A command error occurs if you specify the same menu item multiple times.
  - You can specify up to three separators. If you specify more than three, an error occurs.
  - You cannot specify EXPAND for log and 4-panel.
  - You cannot omit parameters using delimiters (, ).
  - The SM DISP_SUB? command causes the DX to return sub menu items whose display is turned off.
  - You cannot set the first menu item to "SEPARATOR."
  - The display group parameter "GROUP1" to "GROUP36" and the auto switching parameter "AUTO" on/off setting apply to the trend, digital, bar graph, and historical trend menus. (For example, if you set AUTO to off for the trend menu, and then set AUTO to on for the digital menu, AUTO is turned on for the trend, digital, bar graph, and historical trend menus.)

- When p2 is set to ANNUNCIATOR, the DX1000 does not have submenus.
- When p2 is set to INFORMATION, you can only set p3 to DISP_GROUP on the DX1000.
- When p2 is set to OVERVIEW, you can only set p3 to ALARMACK on models with the /AS1 advanced security option.
- When p2 is set to LOG, you can only set p3 to OPERATE_LOG, SETTING_LOG, or DISP_ITEM on models with the /AS1 advanced security option. LOGIN_LOG cannot be specified on models with the /AS1 advanced security option.
3.5 Control Commands

**BT** Sets a batch name
Syntax
```
BT p1,p2,p3<terminator>
```
- **p1** Batch group number
- **p2** Batch number (up to 32 characters)
- **p3** Lot number (up to 8 digits)
Query
```
BT[p1]?
```
Example
Assign the batch number "PRESS5LINE" and lot number 007 to batch group 1.
```
BT1,PRESS5LINE,007
```
Description
- Set p1 by referring to the table in section 3.3.
- You cannot specify "SEPARATOR." You cannot omit parameters using delimiters (,).
- You cannot hide "LOGOUT." If you do not include it in the parameters, it is displayed as the last item.
- You can only set p2 to USRLOCKACK on models with the /AS1 advanced security option.
- You cannot set p2 to TRIGGER or KEYLOCK on models with the /AS1 advanced security option.

**BU** Sets a batch comment
Syntax
```
BU p1,p2,p3<terminator>
```
- **p1** Batch group number
- **p2** Comment number (1 to 3)
- **p3** Comment string (up to 50 characters)
Query
```
BU[p1,[p2]]?
```
Example
Set comment number 2 to "THIS_PRODUCT_IS_COMPLETED."
```
BU1,2,THIS_PRODUCT_IS_COMPLETED
```
Description
- Set p1 by referring to the table in section 3.3.
- You cannot specify "SEPARATOR." You cannot omit parameters using delimiters (,).
- You cannot hide "LOGOUT." If you do not include it in the parameters, it is displayed as the last item.
- You cannot set p2 to TRIGGER or KEYLOCK on models with the /AS1 advanced security option.

**MH** Writes a Batch Text Field
Syntax
```
MH p1,p2,p3,p4<terminator>
```
- **p1** Batch group number
- **p2** Field number (1 to 24)
- **p3** Field title (up to 20 characters)
- **p4** Field string (up to 30 characters)
Query
```
MH[p1,[p2]]?
```
Example
Set batch group 2 text field 1 title to "Ope" and the string to "DX."
```
MH2,1,Ope,DX
```
Description
- Set p1 by referring to the table in section 3.3.
- This command can only be performed when memory sampling for the specified batch group is not taking place.

**UD** Switches the screen
To return to the screen that was used before you started using communication commands
Syntax
```
UD p1<terminator>
```
- **p1** Screen type (0)
Example
Return to the screen that was used before you started using communication commands.
```
UD0
```

Examples
- Display FREE MESSAGE and SNAPSHOT in the function menu.
```
SMFUNC,FREE_MESSAGE,SNAPSHOT
```
- Set the batch group to 1 when multi batch /BT2 is not in use.
```
BT1
```
- Assign the batch number "PRESS5LINE" and lot number 007 to batch group 1.
```
BT1,PRESS5LINE,007
```
- Set comment number 2 to "THIS_PRODUCT_IS_COMPLETED."
```
BU1,2,THIS_PRODUCT_IS_COMPLETED
```
- Set batch group 2 text field 1 title to "Ope" and the string to "DX."
```
MH2,1,Ope,DX
```
- Return to the screen that was used before you started using communication commands.
```
UD0
```
3.5 Control Commands

Description On models with the /AS1 advanced security option, use the BE command to return to operation mode.

To switch to one panel display
Syntax  UD p1,p2,p3<terminator>
p1 Screen type (1)
p2 Display item
  TREND  Trend display
  DIGITAL  Digital display
  BAR  Bar graph display
  OVERVIEW  Overview display
  ALARM  Alarm summary display
  MESSAGE  Message summary display
  MEMORY  Memory summary display
  MODBUS-M  Modbus master status display
  MODBUS-C  Modbus client status display
  RELAY  Relay status display
  REPORT  Report display
  HISTRICAL  Historical trend display
  COLUMN_BAR  Stacked bar graph
  INTERNAL1 to INTERNAL3  Custom display, internal 1 to 3
  EXTERNAL1 to EXTERNAL25  Custom display, external 1 to 25
  ANNUNCIATOR  Annunciator display
  EVENT_SWITCH  Event switch status display

Example Set the display to one screen trend, and set the number of the group to display in the screen to 4.
UD1,TREND,4

Description • The setting p4=MODBUS-M is only valid if the serial interface protocol is set to MODBUS-M.
• The setting p4=REPORT is only valid on models with the /M1 or /PM1 math option.
• When multi batch /BT2 is in use, there are limitations on the screens that the DX can switch to depending on the screen mode.

Batch overview mode
Overview display, Modbus master status display, Modbus client status display, relay status display, report display, stacked bar graph, custom display, annunciator display, and event switch status display

Batch single mode
Trend display, digital display, bar graph display, overview display, alarm summary display, message summary display, memory summary display, historical trend display, and custom display

• When multi batch /BT2 is in use, you cannot specify a display group that does not belong to the currently displayed batch group.
• Set parameter p3 by referring to the table in section 3.3.
• The setting p2=ANNUNCIATOR is only valid when the annunciator mode is turned on (by the WU command).

To switch to four panel display
Syntax  UD p1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>
p1 Screen type (2)
p2 Screen 1 type (see SY; sets a screen group)
p3 Number of the group to display in screen 1
p4 Screen 2 type (see SY; sets a screen group)
p5 Number of the group to display in screen 2
p6 Screen 3 type (see SY; sets a screen group)
p7 Number of the group to display in screen 3
p8 Screen 4 type (see SY; sets a screen group)
p9 Number of the group to display in screen 4

Example Assign group 1 to screen 1, group 2 to screen 2, group 3 to screen 3, group 4 to screen 4, and set the screen type of all screens to trend.
UD2,TREND,1,TREND,2,TREND,3,TREND,4

Description • You can use this command on the DX2000.
• When multi batch /BT2 is in use, you cannot specify a display group that does not belong to the currently displayed batch group.

To display a specific four panel display
Syntax  UD p1,p2<terminator>
p1 Display type (3)
p2 Four panel configuration number
  0  Displays the four panel configuration that you specify directly.
  1 to 4  Displays a four panel configuration that you set using SY (sets a screen group).

Description • You can use this command on the DX2000.
• When multi batch /BT2 is in use, you cannot use this command in batch overview mode.

To switch the operation screen
Syntax  UD p1,p2,p3,p4,p5,p6,p7,p8,p9,p10<terminator>
p1 Screen type (4)
p2 Automatic display switching (ON, OFF)
p3 Switches between all channel display and group display (ALL, GROUP)
p4 Scale display (ON, OFF)
p5 Digital display (ON, OFF)
p6 Message display options
  1  Normal display
  2  List display
  3  Trend space (ON, OFF)
p7 Auto zone (ON, OFF)
p8 Fine grid (ON, OFF)

### 3.5 Control Commands

#### Tag prioritized display (ON, OFF)
**Example**
Enable automatic display switching, switch to the group display, turn on the scale display, and turn off the digital display.

```
UD4,ON,GROUP,ON,OFF
```

**Description**
- Parameter p2 is valid for the trend, digital, and bar graph displays. Use the SE command to set the switching interval.
- Parameters p3 to p7 are valid for the trend display.
- When multi batch /BT2 is in use, you cannot use this command in batch overview mode.

#### To switch the operation screen mode
**Syntax**
```
UD p1,p2,p3<terminator>
```

- **p1** Display type (5)
  - 0 Tag prioritized display
  - 1 Tag trend display
  - 2 Batch trend display
  - 3 Batch overview display
  - 4 Batch single mode

- **p2** Operation screen mode (COMMON, BATCH)
  - COMMON Batch overview mode
  - BATCH Batch single mode

- **p3** Batch group number

**Example**
Enable automatic display switching, switch to the group display, turn on the scale display, and turn off the digital display.

```
UD4,ON,GROUP,ON,OFF
```

**Description**
- Parameter p2 is valid for the trend, digital, and bar graph displays. Use the SE command to set the switching interval.
- Parameters p3 to p7 are valid for the trend display.
- When multi batch /BT2 is in use, you cannot use this command in batch overview mode.

#### Starts or stops measurement
**Syntax**
```
PS p1,p2<terminator>
```

- **p1** Measurement start or stop
  - 0 Start
  - 1 Stop

- **p2** Batch group number
  - 0 All groups
  - 1, 2, ... Batch group number

**Example**
Execute manual sampling.

```
PS0
```

**Description**
- EV1 is only valid when the key trigger is set to ON using the event data sampling condition command (TE command). This command is equivalent to a key trigger.
- When multi batch /BT2 is in use, p2 is valid when p1 is set to 3 or 4. If you omit p2, it is the same as setting p2 to zero.
- Set parameter p2 by referring to the table in section 3.3.

#### Executes manual SNTP
**Syntax**
```
CL p1<terminator>
```

**Example**
Synchronize the clock.

```
CL0
```

#### Switches between normal and secondary trend interval
**Syntax**
```
CV p1<terminator>
```

- **p1** Trend interval (0, 1)
  - 0 Switches to the normal trend interval
  - 1 Switches to the secondary trend interval
3.5 Control Commands

Example
Set the trend interval to the secondary trend interval.
CV1

**MS** Writes a message (display and write)

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

- **p1** Message number (1 to 100)
- **p2** Message write destination
  - GROUP A specified display group
  - ALL All display groups
  - All display groups in the specified batch group number (p4) when multi batch /BT2 is in use

- **p3** Display group number
  - The display group number when p2 is set to GROUP
  - Carries no meaning when p2 is set to ALL

- **p4** Message write destination batch group number

Example
Write the message in message number 8 to display group 1.
MS8,GROUP,1

Description
- If you omit p2, the message is written to all display groups.
- Parameter p4 is only valid when multi batch /BT2 is in use.
- When multi batch /BT2 is in use, you cannot omit p4.
- Set parameters p3 and p4 by referring to the table in section 3.3.

**BJ** Write a free message

Syntax
BJ p1,p2,p3,p4,p5<terminator>

- **p1** Message number (1 to 10)
- **p2** Message (up to 32 characters)
- **p3** Message write destination
  - GROUP A specified display group
  - ALL All display groups
  - All display groups in the specified batch group number (p5) when multi batch /BT2 is in use

- **p4** Display group number
  - The display group number when p2 is set to GROUP
  - Carries no meaning when p2 is set to ALL

- **p5** Message write destination batch group number

Example
Using message number 3, write the string “ALARM” to all groups.
BJ3,ALARM,ALL

Description
- If you omit p3, the message is written to all display groups.
- Parameter p5 is only valid when multi batch /BT2 is in use. When multi batch /BT2 is in use, you cannot omit p5.

**EJ** Changes the login password

Syntax
EJ p1,p2,p3<terminator>

- **p1** Old password (see the description)
- **p2** New password (see the description)
- **p3** New password (see the description)

Example
Change the password from "PASS001" to "WORD005."
EJPASS001,WORD005,WORD005

Description
- The password character lengths are indicated below.
  - Release numbers 3 and earlier: Up to 8 characters
  - Release numbers 4 and later: Up to 20 characters
  - On models with the /AS1 advanced security option: Between 6 and 20 characters
- When you use password management (the WU command) on models with the /AS1 advanced security option, this command is invalid.

**TL** Starts, stops, resets computation (MATH) or clears the computation dropout status display

Syntax
TL p1,p2<terminator>

- **p1** Type of operation
  - 0 Start computation
  - 1 Stop computation
  - 2 Reset computation
  - 3 Clear the computation data dropout display

- **p2** Batch group number
  - 0 All computation channels
  - 1, 2, ... Batch group number

Example
Start computation.
TL0

Description
- You cannot use this command while the DX is saving or loading setup data.
- You can use this command on models with the /M1 or /PM1 option.
- When multi batch /BT2 is in use, p2 is valid when p1 is set to 2 (reset computation). If you omit p2, it is the same as setting p2 to zero. If p2 is set to zero, the DX resets the values of all computation channels.
- Set parameter p2 by referring to the table in section 3.3.

**DS** Switches the execution mode between operation and setting

Syntax
DS p1<terminator>

Description
- Set parameters p3, p4, and p5 by referring to the table in section 3.3.
### 3.5 Control Commands

**LO** Loads setup data for setting mode

- **Syntax**: LO p1,p2<terminator>
  - p1: File name (up to 32 characters)
  - p2: Medium
    - 0: CF slot
    - 1: USB

- **Example**: Load setup data for setting mode from the setup file named SETFILE1.PDL.
  - LOSETFILE1

- **Description**:
  - Do not specify the extension when specifying the file name.
  - You can set p2 to 1 on models with the /USB1 interface option.
  - On models with the /CP1 PROFIBUS-DP interface option, the communication input data for C01 to C32 (on the DX2000) is reserved for PROFIBUS-DP. The client device cannot specify values for this communication input data.

**CM** Sets communication input data

- **Syntax**: CM p1,p2<terminator>
  - p1: Communication input datal number
  - p2: Communication input data
    - The selectable range is -9.9999E+29 to -1.0000E-30, 0, and 1.0000E-30 to 9.9999E+29.

- **Example**: Enter 1.0000E-10 to communication input data C01.
  - CMC01,1.0000E-10

- **Description**:
  - You can use this command on models with the /M1 or /PM1 option.
  - On models with the /CP1 PROFIBUS-DP interface option, the communication input data for C01 to C24 (on the DX1000) or for C01 to C32 (on the DX2000) is reserved for PROFIBUS-DP. The client device cannot specify values for this communication input data.

**LI** Saves setup data

- **Syntax**: LI p1<terminator>
  - p1: File name (up to 32 characters)

- **Example**: Saves setup data for both setting and basic setting modes to a file named SETFILE2 on the CF card.
  - LISETFILE2

- **Description**:
  - Do not specify the extension when specifying the file name.
  - You can set p2 to 0 on models with the /USB1 interface option.
  - If you omit parameter p2, the medium is set to CF slot.
  - A .PDL extension is attached to the file that you save. This command is equivalent to the Y1 command.
  - You cannot use this command when there is no external storage medium inserted in the DX.

**CE** Sets communication input of an external input channel

- **Syntax**: CE p1,p2<terminator>
  - p1: External input channel number
  - p2: Data value (-30000 to 30000)

- **Example**: Set external input channel number 440 to 12345.
  - CE440,12345

- **Description**:
  - You can use this command on models with the /MC1 external input channel option.

**EM** Starts or stops the e-mail transmission function

- **Syntax**: EM p1<terminator>
  - p1: Type of operation
    - 0: Start
    - 1: Stop

- **Example**: Start the e-mail transmission function.
  - EM0

Description:
- Do not specify the extension when specifying the file name.
- You can set p2 to 1 on models with the /USB1 interface option.
- If you omit parameter p2, the medium is set to CF slot.
- A .PDL extension is attached to the file that you save. This command is equivalent to the Y1 command.
- You cannot use this command when there is no external storage medium inserted in the DX.

- Do not specify the extension when specifying the file name.
- You can set p2 to 1 on models with the /USB1 interface option.
- If you omit parameter p2, the medium is set to CF slot.
- A .PDL extension is attached to the file that you save. This command is equivalent to the Y1 command.
- You cannot use this command when there is no external storage medium inserted in the DX.

- You can use this command on models with the /MC1 external input channel option.

- Start the e-mail transmission function.

---

**Example**

- Set the mode to basic setting.
  - DS1

- You cannot set p1 to 1 when the DX is recording (memory sampling) or computing, is formatting an external storage medium, or is storing data to an external storage medium.

- You cannot set p1 to zero when the DX is formatting an external storage medium or is storing data to an external storage medium.

- To activate the settings you have changed using basic setting commands, you must use the XE command to save the settings. Be sure to use the XE command to save the settings before switching the execution mode back to operation. If you do not save the settings and change the execution mode back to operation, the DX returns to the previous settings.

- This command is invalid on models with the /AS1 advance security option.

- Do not specify the extension when specifying the file name.

- You can set p2 to 1 on models with the /USB1 USB interface option.

- If you omit parameter p2, the medium is set to CF slot.

- You cannot use this command to load setup data for basic setting mode. To load setup data for both setting and basic setting modes, use the Y1 command.

- You cannot use this command when there is no external storage medium inserted in the DX.
3.5 Control Commands

Description To use the e-mail transmission function, you must configure the Ethernet interface, set e-mail addresses, and enter the contents you want to transmit.

CU Recovers Modbus manually
Syntax
CU p1<terminator>
p1 Communication type
0 Modbus client (Ethernet)
1 Modbus master (serial)

YO Loads a setup file for basic setting mode
Syntax
YO p1,p2,p3<terminator>
p1 Name of the file to load (up to 32 characters)
p2 Medium
0 CF slot
1 USB
p3 What to load (0 to 2)
0 Basic setting mode and setting mode settings
1 Basic setting mode settings (except for login settings) and setting mode settings
2 Login settings
Example Only load the CONFIG1 login settings from the CF card.
YOCONFIG1,0,2
Description • Do not include the extension when specifying the file name.
• You can set p2 to 1 on models with the /USB1 USB interface option.
• If you omit parameter p2, the medium is set to CF slot.
• p3 is only valid on models with the /AS1 advanced security option.
• Omitting p3 is the same as setting it to 0.

YC Clears measured and computed data and initializes setup data
Syntax
YC p1<terminator>
p1 The types of data to be initialized and cleared
0 Basic setting mode settings, setting mode settings, measured and computed data, custom display screen setup data, and log data ("Clear 1" on the DX)
1 Setting mode settings, measured and computed data, custom display screen setup data, and log data ("Clear 2" on the DX)

IR Resets a relative timer
Syntax
IR p1<terminator>
p1 Number of the timer to reset
0 All timers
1,2,... Timer number
Example Reset timer 2.
IR2
Description This command is invalid on models with the /AS1 advanced security option.

MA Resets a match time timer
Syntax
MA p1<terminator>
p1 Number of the timer to reset
1,2,... Timer number
Example Reset match time timer 2.
MA2
Description • Set p1 by referring to the table in section 3.3.
• This command is valid for expired match time timers whose operation is set to single.

CW Sets an event switch
Syntax
CW p1,p2,p3<terminator>
p1 Type of operation (LEVEL, EDGE)
p2 Event switch number (1 to 30)
p3 On/off (OFF, ON)
Parameter p3 is valid when p1 is set to LEVEL.
Example Set event level switch 2 to ON.
CWLEVEL,2,ON

LR Loads custom display screens
Syntax
LR p1,p2,p3,p4<terminator>
p1 Medium (fixed at 0)
0 External CF card
p2 Screen range (ALL, SELECT)
ALL All screens
Loads all of the custom display screens that are stored in the specified directory.
SELECT A specific screen
Loads a specific custom display setup file to the screen that you specify.
When p2 is set to ALL
p3 Name of the directory to load from (up to 20 characters)
When p2 is set to SELECT

p3 Custom display screen to load into
   (INTERNAL1 to INTERNAL3 or EXTERNAL
   1 to EXTERNAL 25)

p4 Name of the file to load from (up to 32 characters)
   • Do not specify the extension.
   • The directory to load from is fixed to the root directory.

Example Load the custom display setup file named CD1 from the root directory to INTERNAL2.
LR0,SELECT,INTERNAL2,CD1

Description • You can only use this command on models with the /DC1 custom display option.
• An error occurs when there is no external storage medium (CF) inserted in the DX or when there is an error in the external storage medium.
• An error occurs if the external storage medium (CF) does not contain the directory or file name that you specify.

LW Saves custom display screens

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

p1 Medium (fixed at 0)
0 External CF card

p2 Screen range (ALL, CLEAR+ALL, SELECT)
ALL All screens
   Saves all of the custom display screens that is currently in use to the specified directory.
   CLEAR+ALL All screens
   Clears all files in the save destination directory, and then saves all of the custom display screens that is currently in use to that directory.
   SELECT A specific screen
   Saves a specific custom display screen to a file that you specify. If there is a file with the same name, it is overwritten.

When p2 is set to ALL

p3 Name of the directory to save to (up to 20)

When p2 is set to SELECT

p3 Custom display screen to save
   (INTERNAL1 to INTERNAL 3, EXTERNAL1 to EXTERNAL 25)

p4 Name of the file to save to (up to 32 characters)
   • Do not specify the extension.
   • The directory to save to is fixed to the root directory.

Example Save the custom display setup file named INTERNAL3 to a file named CD3 in the root directory.
LR0,SELECT,INTERNAL3,CD3

Description • You can only use this command on models with the /DC1 custom display option.
• An error occurs when there is no external storage medium (CF) inserted in the DX or when there is an error in the external storage medium.
• An error does not occur even if there is not enough free space on the external storage medium (CF).
• To check whether or not the save operation was successful, check the status byte. For details on the status byte, see section 5.2.

BQ User Locked ACK (/AS1 advanced security option)

Syntax BQ p1<terminator>

Example Execute the User Locked ACK operation.
BQ0

Description This command is only valid when the user is locked.

EC Clears setup data (and executes a cold reset; /AS1 advanced security option)

Syntax EC p1<terminator>

p1 The types of data to be initialized and cleared (0 to 3)
0 Basic setting mode settings, setting mode settings, measured and computed data, custom display screen setup data, and log data
   (“Clear 1” on the DX)
1 Setting mode settings, measured and computed data, custom display screen setup data, and log data
   (“Clear 2” on the DX)
2 Measured and computed data, custom display screen setup data, and log data
   (“Clear 3” on the DX)
3 Basic setting mode settings (except for login settings), setting mode settings, measured and computed data, custom display screen setup data, and log data
   (“Clear 4” on the DX)

Example Perform “Clear 1” on the DX.
EC0
### 3.5 Control Commands

**EE** Switches out of operation mode (/AS1 advanced security option)

**Syntax**

EE p1<terminator>  

- **p1** Mode switch destination (ENG, SYS)

<table>
<thead>
<tr>
<th>Memory sampling</th>
<th>ENG</th>
<th>SYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>In progress</td>
<td>Setting mode during memory sampling</td>
<td>Basic setting mode during memory sampling</td>
</tr>
<tr>
<td>Stopped</td>
<td>Setting mode</td>
<td>Basic setting mode</td>
</tr>
</tbody>
</table>

**Example**  
Switch to setting mode.  
EEENG

**BE** Returns to operation mode (/AS1 advanced security option)

**Syntax**

BE p1<terminator>  

- **p1** Mode switch operation (END)

<table>
<thead>
<tr>
<th>Current Mode</th>
<th>ENG</th>
<th>SYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting mode file</td>
<td>Returns to operation mode. Creates a setup file.</td>
<td>Returns to operation mode.</td>
</tr>
<tr>
<td>Setting mode during memory sampling</td>
<td>Returns to operation mode.</td>
<td></td>
</tr>
</tbody>
</table>

**Example**  
Press the DISP/ENTER key.  
KEDISP

**BV** Enters a string (can only be used during serial communication)

**Syntax**

BV p1,p2<terminator>  

- **p1** 0  
- **p2** Character string (up to 100 characters)

**Example**  
Enter "user123."  
BV0,user123

**Description**  
- You can use this command to enter character strings when the DX is displaying the character input window.
- On models with the /USB1 USB interface option, this command can be used through the use of USB barcodes.
- On models with the /AS1 advanced security option, this command can only be used through the use of the serial communication barcode protocol or through a USB barcode reader.

**KE** Performs key operations

**Syntax**

KE p1<terminator>  

- **p1** Key  
  - F1 to F7: Soft keys 1 to 7  
  - ESC: ESC key  
  - MENU: MENU key  
  - FUNC: FUNC key  
  - START: START key  
  - STOP: STOP key  
  - USER: USER key  
  - FAVORITE: Favorite key  
  - 0 to 9: Number keys 0 to 9  
  - MINUS: The minus key  
  - DOT: The decimal point key  
  - DISP: The DISP/ENTER key  
  - UP: The up arrow key

**Example**  
Press the F7 key.

**BP** Supports login (/AS1 advanced security option)

**Syntax**

BP p1,p2,p3<terminator>  

- **p1** Input type  
  - 1: User name  
  - 2: User name and user ID
- **p2** User name (up to 20 characters)
- **p3** User ID (up to 8 characters)

**Example**  
Set the user name to "DX."  
BP1,DX

**Description**  
- If you execute this command when p1=1, the DX displays the user ID input window.
- If you execute this command when p1=2, the DX displays the password input window.
- p3 is valid when p1=2.
- On models with the /AS1 advanced security option, this command can only be used through the use of the serial communication barcode protocol or through a USB barcode reader.

**LL** Logs in through serial communication (/AS1 advanced security option)

**Syntax**

LL p1,p2,p3,p4,p5<terminator>  

- **p1** User name (up to 20 characters)
- **p2** User ID (up to 8 characters)
- **p3** Password (up to 20 characters)
- **p4** The new password to use if the current one has expired (up to 20 characters)
- **p5** This parameter is meaningless if you are not using a user ID.

**Example**  
Set the user name to "DX."  
LLDX

**Description**  
- This parameter is meaningless if the current password has not yet expired. This parameter can be omitted.
Reconfirmation of the new password to use if the current one has expired (up to 20 characters)
This parameter is meaningless if the current password has not yet expired. This parameter can be omitted.

Example
Log in as user a (whose user ID is “aaaa” and whose password is “aaaaaa”), start computation, and execute memory start.
LLa,aaaa,aaaaaa;TL0;PS0

Description
- This command can be used if the login function has been enabled (by an administrator).
- After the LL command, use sub delimiters to make a list of commands to execute.
- You log into the DX when you execute this command, and you are automatically logged out after the command is executed.
- The LL command communication responses, including those for errors, are the same as those for other commands.

### 3.6 Basic Setting Commands

#### WU
Sets the environment

<table>
<thead>
<tr>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL, BATCH, DISPLAY, MESSAGE, INPUT, ALARM, SECURITY, MEDIA, MATH, REPORT, SERVICEPORT, DECIMALPOINT, POP3, ALARM_LEVEL, ALARM_COLOR, TAG, MENU, REMOTE, and FTPSERVER</td>
</tr>
</tbody>
</table>

#### General environment settings

<table>
<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU p1,p2,p3,p4&lt;terminator&gt;</td>
</tr>
<tr>
<td><strong>p1</strong> Setting type (GENERAL)</td>
</tr>
<tr>
<td><strong>p2</strong> Selects tag or channel number</td>
</tr>
<tr>
<td>TAG Channel number</td>
</tr>
<tr>
<td><strong>p3</strong> Language</td>
</tr>
<tr>
<td>ENGLISH JAPANESE CHINESE GERMAN FRENCH</td>
</tr>
<tr>
<td><strong>p4</strong> Remote control ID (OFF, 0 to 31)</td>
</tr>
</tbody>
</table>

#### Batch settings

<table>
<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU p1,p2,p3,p4,p5&lt;terminator&gt;</td>
</tr>
<tr>
<td><strong>p1</strong> Setting type (BATCH)</td>
</tr>
<tr>
<td><strong>p2</strong> Batch function (OFF, ON, MULTIBATCH)</td>
</tr>
<tr>
<td>OFF Disables the batch function</td>
</tr>
<tr>
<td>ON Enables the batch function</td>
</tr>
<tr>
<td>MULTIBATCH Enables the multi batch function</td>
</tr>
<tr>
<td><strong>p3</strong> Number of lot number digits (OFF, 4, 6, 8)</td>
</tr>
<tr>
<td><strong>p4</strong> Auto increment (ON, OFF)</td>
</tr>
<tr>
<td><strong>p5</strong> Number of batch groups (DX1000: 2 to 6. DX2000 with standard memory: 2 to 6, DX2000 with large memory: 2 to 12)</td>
</tr>
</tbody>
</table>

Description
- Parameters p3 and p4 are valid when p2 is set to ON.
- Parameters p3, p4, and p5 are valid when p2 is set to MULTIBATCH.

#### Display settings

<table>
<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU p1,p2,p3,p4&lt;terminator&gt;</td>
</tr>
<tr>
<td><strong>p1</strong> Setting type (DISPLAY)</td>
</tr>
<tr>
<td><strong>p2</strong> Trend type</td>
</tr>
<tr>
<td>T-Y T-Y display</td>
</tr>
<tr>
<td>CIRCULAR Circular display</td>
</tr>
<tr>
<td><strong>p3</strong> Partial expansion(OFF, ON)</td>
</tr>
<tr>
<td><strong>p4</strong> Trend interval switching (OFF, ON)</td>
</tr>
</tbody>
</table>

Description
- Parameters p3 and p4 are valid when p2 is set to T-Y.
- When multi batch is in use, p4 is fixed at OFF.

#### Message settings

<table>
<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU p1,p2,p3,p4&lt;terminator&gt;</td>
</tr>
<tr>
<td><strong>p1</strong> Setting type (MESSAGE)</td>
</tr>
</tbody>
</table>
3.6 Basic Setting Commands

**Input settings**
Syntax: \texttt{WU p1,p2<terminator>}
- \texttt{p1 Setting type (INPUT)}
- \texttt{p2 How to detect values that exceed the scale}
  - \texttt{FREE} When the measurement range is exceeded
  - \texttt{OVER} When ±105% of the scale is exceeded

**Alarm settings**
Syntax: \texttt{WU p1,p2,p3,p4,p5<terminator>}
- \texttt{p1 Setting type (ALARM)}
- \texttt{p2 Alarm suppression function (OFF, ON)}
- \texttt{p3 Annunciator mode (OFF, ON)}
- \texttt{p4 Sequence (ISA-A-4, ISA-A, ISA-M)}
  - \texttt{ISA-A-4} No lock-in
  - \texttt{ISA-A} Lock-in
  - \texttt{ISA-M} Double lock-in
- \texttt{p5 Color when no alarms are activated}
  - (GREEN, WHITE)

**Security settings**
Syntax: \texttt{WU p1,p2,p3,p4,p5<terminator>}
- \texttt{p1 Setting type (SECURITY)}
- \texttt{p2 Key}
  - \texttt{OFF} Disables security features
  - \texttt{KEYLOCK} Locks the keys
  - \texttt{LOGIN} Enables the login function
- \texttt{p3 Communication}
  - \texttt{OFF} Disables security features
  - \texttt{LOGIN} Enables the login function
- \texttt{p4 Multi login (ON, OFF)}
- \texttt{p5 Password management (ON, OFF)}

**Media settings**
Syntax: \texttt{WU p1,p2,p3<terminator>}
- \texttt{p1 Setting type (MEDIA)}
- \texttt{p2 Automatic saving (OFF, ON)}
- \texttt{p3 Media FIFO (OFF, ON)}

**Computation settings**
Syntax: \texttt{WU p1,p2,p3,p4<terminator>}
- \texttt{p1 Setting type (MATH)}

**Report settings**
Syntax: \texttt{WU p1,p2,p3,p4,p5,p6,p7<terminator>}
- \texttt{p1 Setting type (REPORT)}
- \texttt{p2 Report computation type 1}
  - \texttt{MAX} Maximum value
  - \texttt{MIN} Minimum value
  - \texttt{AVR} Average value
  - \texttt{SUM} Integrated value
  - \texttt{INST} Instantaneous value
- \texttt{p3 Report computation type 2}
  - \texttt{OFF} Disables report computation
  - \texttt{MAX} Maximum value
  - \texttt{MIN} Minimum value
  - \texttt{AVR} Average value
  - \texttt{SUM} Integrated value
  - \texttt{INST} Instantaneous value
- \texttt{p4 Report computation type 3}
  - Same as \texttt{p3}
- \texttt{p5 Report computation type 4}
  - Same as \texttt{p3}
- \texttt{p6 Creation of “hourly+daily,” “daily+weekly,” and “daily+monthly” files}
  - \texttt{COMBINE} Saves reports to one file.
  - \texttt{SEPARATE} Saves reports to separate files.
  - \texttt{SEPARATE2} Saves reports to separate files (DX100/DX200 format).
- \texttt{p7 Report template function (USE, NOT)}
  - For parameters \texttt{p2} to \texttt{p5}, you cannot specify the same computation type except \texttt{OFF}. 

**Description**
- Parameters \texttt{p4} and \texttt{p5} are valid when \texttt{p3} is set to \texttt{ON}.
- Parameters \texttt{p4} and \texttt{p5} are only valid on models with the /AS1 advanced security option.
- On models with the /AS1 advanced security option, \texttt{p2} is fixed at \texttt{LOGIN}.
- For parameters \texttt{p2} to \texttt{p5}, you cannot specify the same computation type except \texttt{OFF}.

**Syntax**
\texttt{WU p1,p2<terminator>}

**Where to write messages that you enter using keys**
- \texttt{COMMON} All display groups
- \texttt{SEPARATE} Display group that you specify

**Power failure message (OFF, ON)**

**Message change (OFF, ON)**

**Display on error**
- \texttt{+OVER} Positive overflow
- \texttt{−OVER} Negative overflow

**Data when the SUM or AVE value overflows**
- \texttt{ERROR} Sets the computed result to computation error
- \texttt{SKIP} Discards the data that overflowed and continues the computation

**Process the data as follows:**
- For measurement channels that do not have linear scaling specified, the DX sets the data to the upper or lower limit of the measurement range.
- For measurement channels that have linear scaling specified, the DX sets the data to the specified scan upper or lower limit.

**Data when the MAX, MIN, or P-P value overflows**
- \texttt{OVER} Computes using the overflow data
- \texttt{SKIP} Discards the data that overflowed and continues the computation
When p6 is set to SEPARATE2, p7 can only be set to OFF.

Service ports
Syntax: WU p1,p2,p3,p4,p5<terminator>
p1: Setting type (SERVICEPORT)
p2: FTP service port (1 to 65535)
p3: Web service port (1 to 65535)
p4: SNTP service port (1 to 65535)
p5: Modbus service port (1 to 65535)

Decimal point type
Syntax: WU p1,p2<terminator>
p1: Setting type (DECIMALPOINT)
p2: Decimal type (POINT, COMMA)

POINT: Uses a period for the decimal point.
COMMA: Uses a comma for the decimal point.

Detailed FTP server settings
Syntax: WU p1,p2<terminator>
p1: Setting type (FTPSERVER)
p2: Directory output format (MS-DOS, UNIX)
MS-DOS
UNIX

Detailed POP3 settings
Syntax: WU p1,p2,p3<terminator>
p1: Setting type (POP3)
p2: Delay after accessing POP3 until transmission (seconds; 0 to 10)
p3: POP3 login method (PLAIN, APOP)

Alarm level settings
Syntax: WU p1,p2<terminator>
p1: Setting type (ALARM_LEVEL)
p2: Levels (1-2-3-4, 1-4-2-3, 1-4-3-2)

Alarm color settings
Syntax: WU p1,p2,p3,p4,p5<terminator>
p1: Setting type (ALARM_COLOR)
p2: Alarm level 1 color (RED, ORANGE, YELLOW, PINK)
p3: Alarm level 2 color (RED, ORANGE, YELLOW, PINK)
p4: Alarm level 3 color (RED, ORANGE, YELLOW, PINK)
p5: Alarm level 4 color (RED, ORANGE, YELLOW, PINK)

Tag basic setting
Syntax: WU p1,p2<terminator>
p1: Setting type (TAG)
p2: Tag number usage (USE, NOT)

Basic setting mode menu display settings
Syntax: WU p1,p2<terminator>
p1: Setting type (MENU)
p2: Basic setting mode menu display (ON, OFF)

Remote contact input operation
Syntax: WU p1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>
p1: Setting type (REMOTE)
p2: Remote contact 1 input (N.O, N.C)
N.O: Normally opened
N.C: Normally closed
p3: Remote contact 2 input (N.O, N.C)

Description
- Use this command on models with the remote control option.
- On models with the pulse input option, if you use the remote control input terminal as a pulse input terminal, the DX counts the rising pulse edges, independent of the remote control input settings.

Detailed FTP server settings
Syntax: WU p1,p2<terminator>
p1: Setting type (FTPSERVER)
p2: Directory output format (MS-DOS, UNIX)

Query: WU[p1]?
Example: This is an example for general environment settings. Display tags, display in English, and turn remote control off.
WUGENERAL,TAG,ENGLISH,OFF

WE Sets calibration management
Syntax: WE p1,p2,p3<terminator>
p1: Whether or not to use calibration management (USE, NOT)
p2: Alarm (days; 1 to 10)
This setting determines how many days before the specified calibration due date to start displaying notifications.
p3: Renotification interval (10min, 30min, 1h, 8h, 24h)

Query: WE?
Example: Use the calibration management function. Start notifications a day before the calibration due date and continue producing notifications every 8 hours afterwards.
WEUSE,1,8h

Description
- p2 and p3 are valid when p1 is set to USE.
- You can make settings with this command on models with the /CC1 input calibration option.

BI Configures signature settings (/AS1 advanced security option)
Syntax: BI p1,p2,p3,p4<terminator>
p1: Process type (BATCH, CONTINUE)
p2: Signature on the DX (OFF, SIGNIN1, SIGNIN1+2, SIGNIN1+2+3)
p3: Signature at batch stop (ON, OFF)
p4: FTP transfer at signing (ON, OFF)

Query: BI ?
Example: Set the command so that the process type is BATCH, only signatures 1 and 2 are used on the
3.6 Basic Setting Commands

DX, the DX switches to the signature window at memory stop, and there is no FTP transfer at signing.
BIBATCH,SIGNIN1+2,ON,OFF
Description p3 and p4 are valid when p2 is set to SIGNIN1, SIGNIN1+2, or SIGNIN1+2+3.

WO Sets alarm and DO settings
Alarm and DO settings
Syntax WO p1,p2,p3,p4,p5<terminator>
p1 Alarm setting (ALARM)
p2 Reflash operation (ON, OFF, ON-1S, ON-2S)
p3 Interval for the low limit on the rate-of-change (1 to 32)
p4 Interval for the high limit on the rate-of-change (1 to 32)
p5 Hold/Not hold the alarm status display
   HOLD
   NONHOLD
Description If annunciator is set to ON in the alarm environment settings (using WU ALARM), p2 and p5 are fixed to the following values based on the annunciator sequence.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>p2</th>
<th>p5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA-A-4</td>
<td>OFF</td>
<td>NONHOLD</td>
</tr>
<tr>
<td>ISA-A</td>
<td>OFF</td>
<td>HOLD</td>
</tr>
<tr>
<td>ISA-M</td>
<td>OFF</td>
<td>HOLD</td>
</tr>
</tbody>
</table>

The meanings of the different p2 options are indicated below:

<table>
<thead>
<tr>
<th>p2</th>
<th>Duration for which the Reflash Relays Are Deactivated</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>500 ms</td>
</tr>
<tr>
<td>ON-1S</td>
<td>1 s</td>
</tr>
<tr>
<td>ON-2S</td>
<td>2 s</td>
</tr>
</tbody>
</table>

Internal switch settings
Syntax WO p1,p2<terminator>
p1 DO type (SWITCH)
p2 AND switch number
   NONE   No AND setting
   S01    Only specify S01
   S01-Sxx Specify S01 to Sxx
   where xx = {02 to 30}

Output relay settings
Syntax WO p1,p2,p3,p4,p5<terminator>
p1 DO type (RLY)
p2 Relay number
   NONE   No AND setting
   I01    Only specify I01
   I01-Ixx Specify I01 to Ixx
   where xx = {02 to 36}
p3 Energize/De-energize the relay
   DE_ENERGIZE
   ENERGIZE
p4 Hold/Not hold the relay
   NONHOLD
   HOLD

p5 Relay Action on ACK
   NORMAL
   RESET
Description Set parameter p2 by referring to the table in section 3.3.
If annunciator is set to ON in the alarm environment settings (using WU ALARM), p4 and p5 are fixed to the following values based on the annunciator sequence.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>p4</th>
<th>p5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA-A-4</td>
<td>NONHOLD</td>
<td>RESET</td>
</tr>
<tr>
<td>ISA-A</td>
<td>HOLD</td>
<td>RESET</td>
</tr>
<tr>
<td>ISA-M</td>
<td>HOLD</td>
<td>RESET</td>
</tr>
</tbody>
</table>

Query WO[p1]?
Example Specify no AND operation of the output relays, set the relay action to energize, and release the relay output when the alarm ACK operation is performed regardless of the alarm status.
WORLY,NONE,ENERGINE,HOLD,RESET

WH Sets alarm hysteresis
Measurement channels
Syntax WH p1,p2,p3<terminator>
p1 Channel type (MEASURE)
p2 Hysteresis on high and low limit alarms (0 to 50)
p3 Hysteresis on difference high and low limit alarms (0 to 50)

Computation channels
Syntax WH p1,p2<terminator>
p1 Channel type (MATH)
p2 Hysteresis on high and low limit alarms (0 to 50)

External input channels
Syntax WH p1,p2<terminator>
p1 Channel type (EXTERNAL)
p2 Hysteresis on high and low limit alarms (0 to 50)

Description You can specify computation channels on models with the /M1 or /PM1 math option. You can specify external input channels on models with the external input channel option.

XV Sets the scan interval and A/D integral time
Syntax XV p1,p2,p3,p4<terminator>
p1 (fixed)
p2 Scan interval mode
   NORMAL
   FAST  Fast sampling
### 3.6 Basic Setting Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>XM</strong></td>
<td>Sets memory sampling conditions&lt;br&gt;Syntax&lt;br&gt;<code>XM p1&lt;terminator&gt;</code>&lt;br&gt;<strong>p1</strong> Data type&lt;br&gt;- DISPLAY Display data&lt;br&gt;- EVENT Event data&lt;br&gt;- E+D Display data and event data&lt;br&gt;<strong>Query</strong> <code>XM?</code>&lt;br&gt;<strong>Example</strong> Set the memory sampling condition to display data.&lt;br&gt;<code>XMDISPLAY</code>&lt;br&gt;<strong>Description</strong> You cannot specify E+D when:&lt;br&gt;• Multi batch /BT2 is in use.&lt;br&gt;• Trend interval switching is on.&lt;br&gt;• You are using a DX with the /AS1 advanced security option.</td>
</tr>
<tr>
<td><strong>XT</strong></td>
<td>Sets the temperature unit&lt;br&gt;Syntax&lt;br&gt;<code>XT p1&lt;terminator&gt;</code>&lt;br&gt;<strong>p1</strong> Temperature unit (C, F)&lt;br&gt;<strong>Query</strong> <code>XT?</code>&lt;br&gt;<strong>Example</strong> Set the temperature unit to Celsius.&lt;br&gt;<code>XTC</code>&lt;br&gt;<strong>Description</strong> You cannot specify E+D when:&lt;br&gt;• Multi batch /BT2 is in use.&lt;br&gt;• Trend interval switching is on.&lt;br&gt;• You are using a DX with the /AS1 advanced security option.</td>
</tr>
<tr>
<td><strong>RF</strong></td>
<td>Sets key lock&lt;br&gt;<strong>When p1 is set to KEY</strong>&lt;br&gt;Syntax&lt;br&gt;<code>RF p1,p2,p3,p4,p5,p6,p7&lt;terminator&gt;</code>&lt;br&gt;<strong>p1</strong> Type (KEY)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p2</strong> START key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p3</strong> STOP key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p4</strong> MENU key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p5</strong> USER key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p6</strong> DISP/ENTER key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p7</strong> FAVORITE key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>When p1 set to FUNC (function key)</strong>&lt;br&gt;Syntax&lt;br&gt;<code>RF p1,p2,p3,p4,p5,p6,p7,p8&lt;terminator&gt;</code>&lt;br&gt;<strong>p1</strong> Type (FUNC)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p2</strong> Alarm ACK (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p3</strong> Message/batch key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p4</strong> Math key (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p5</strong> Data save (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p6</strong> E-mail/FTP (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p7</strong> Time set (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p8</strong> Display Function (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>When p1 is set to MEDIA (external storage media)</strong>&lt;br&gt;Syntax&lt;br&gt;<code>RF p1,p2,p3&lt;terminator&gt;</code>&lt;br&gt;<strong>p1</strong> Type (MEDIA)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p2</strong> External storage media operation (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>p3</strong> Setup loading operation (FREE, LOCK)&lt;br&gt;- FREE Free&lt;br&gt;- LOCK Lock&lt;br&gt;<strong>Query</strong> <code>RF[p1]?</code>&lt;br&gt;<strong>Example</strong> Lock the MENU key (leave other keys unlocked).&lt;br&gt;<code>RFKEY,FREE,FREE,LOCK,FREE,FREE,FREE,FREE</code></td>
</tr>
</tbody>
</table>

**Scan interval (25MS, 125MS, 250MS, 1S, 2S, 5S)**<br>**A/D integration time (AUTO, 600Hz, 50Hz, 60Hz, 100ms)**

**Query** `XV?`<br>**Example** Set the scan interval to 1 second in normal mode.<br>`XV1,NORMAL,1S`<br>**Description** The combinations of available scan interval modes and scan intervals vary depending on the model. For details, see the DX1000/DX2000 User's Manual (IM04L41B01-01E or IM04L42B01-01E).<br>• You can set p4 to 600 Hz for fast sampling mode. You can choose 100 ms when the scan interval is set to 2 s or 5 s.<br>• On models with multi batch /BT2, you can only set p2 to NORMAL and p3 to 1S, 2S, or 5S.

**Sets burnout detection**<br>Syntax<br>`XB p1,p2<terminator>`<br>**p1** Measurement channel number<br>**p2** Burnout processing<br>- OFF No processing<br>- UP Sets the computed result to positive overflow.<br>- DOWN Sets the computed result to negative overflow.<br>**Query** `XB[p1]?`<br>**Example** Set the measured result to UP (positive overflow) when channel 001 burns out.<br>`XB001,UP`<br>**Description** Set p1 by referring to the table in section 3.3.

**Sets RJC**

**When using the internal compensation circuit**<br>Syntax<br>`XJ p1,p2<terminator>`<br>**p1** Measurement channel number<br>**p2** RJC mode (INTERNAL)<br>**Query** `XJ[p1]?`<br>**Example** Set the channel 001 RJC to internal compensation circuit.<br>`XJ001,INTERNAL`<br>**Description** Set p1 by referring to the table in section 3.3.

**When using an external RJC**<br>Syntax<br>`XJ p1,p2,p3<terminator>`<br>**p1** Measurement channel number<br>**p2** RJC mode (EXTERNAL)<br>**p3** External RJC value (-20000 to 20000)<br>**Query** `XJ[p1]?`<br>**Example** Set the channel 002 RJC to external, and set the compensation value to 0 μV.<br>`XJ002,EXTERNAL,0`<br>**Description** Set p1 by referring to the table in section 3.3. The unit of p3 is the μV.
3.6 Basic Setting Commands

**RN** Sets basic key login

**Syntax**

RN p1,p2,p3,p4<terminator>

**p1**
Auto logout (OFF, 1MIN, 2MIN, 5MIN, 10MIN)

**p2**
Operation when logged out

- OFF: Disables DX operation
- DISPLAY: Only enables screen operations

**p3**
Whether or not to use a user ID (USE, NOT)

**p4**
Number of password retries (OFF, 3, 5)

**Query**

RN?

**Example**

Set the auto logout time to 1 minute, and disable the DX operation when logged out. Use a user ID. Set the number of password retries to 5.

RN1MIN,OFF,ON,5

**Description**

- p3 and p4 are only valid on models with the /AS1 advanced security option.
- When you use password management (the WU command) on models with the /AS1 advanced security option, p3 is fixed at OFF.

**RP** Sets user limitations

**On DXs without the /AS1 Advanced Security Option**

**Syntax**

RP p1,p2,•••<terminator>

**p1**
User limitation number (1 to 10)

**p2**
User limitation item (KEY, FUNC, MEDIA)

**Description**

Parameters p3 and subsequent parameters vary depending on the p2 setting as follows:

- **When p2 is set to KEY**
  - **p3**: START key (FREE, LOCK)
  - **p4**: STOP key (FREE, LOCK)
  - **p5**: MENU key (FREE, LOCK)
  - **p6**: USER key (FREE, LOCK)
  - **p7**: DISP/ENTER key (FREE, LOCK)
  - **p8**: FAVORITE key (FREE, LOCK)

- **When p2 set to FUNC (function key)**
  - **p3**: Alarm ACK (FREE, LOCK)
  - **p4**: Message/batch key (FREE, LOCK)
  - **p5**: Math key (FREE, LOCK)
  - **p6**: Data save (FREE, LOCK)
  - **p7**: E-mail/FTP (FREE, LOCK)
  - **p8**: Time set (FREE, LOCK)
  - **p9**: Display Function (FREE, LOCK)

- **When p2 is set to MEDIA (external storage media)**
  - **p3**: External storage media operation (FREE, LOCK)
  - **p4**: Setup loading operation (FREE, LOCK)

**On DXs with the /AS1 Advanced Security Option**

**Syntax**

RP p1,p2,...<terminator>

**p1**
Authority of user number (1 to 10)

**p2**
Authority of user item (KEY, ACTION, MEDIA, SIGNIN)

**p2=KEY**

- **p3**: START key (FREE, LOCK)
- **p4**: STOP key (FREE, LOCK)
- **p5**: MENU key (FREE, LOCK)
- **p6**: USER key (FREE, LOCK)
- **p7**: DISP/ENTER key (FREE, LOCK)
- **p8**: FAVORITE key (FREE, LOCK)

**p2=ACTION (Functions)**

- **p3**: Alarm ACK (FREE, LOCK)
- **p4**: Message and batch (FREE, LOCK)
- **p5**: Computation (FREE, LOCK)
- **p6**: Data save (FREE, LOCK)
- **p7**: E-mail/FTP (FREE, LOCK)
- **p8**: Time operations (FREE, LOCK)
- **p9**: Display operations (FREE, LOCK)
- **p10**: Calibration settings (FREE, LOCK)

**p2=MEDIA (External media)**

- **p3**: External media operations (FREE, LOCK)
- **p4**: Setting load operations (FREE, LOCK)

**p2=SIGNIN (Signature permissions)**

- **p3**: Signature1 (FREE, LOCK)
- **p4**: Signature2 (FREE, LOCK)
- **p5**: Signature3 (FREE, LOCK)

**Query**

- **RP[p1,[p2]]??**

**Example**

Lock the START, STOP, and DISP/ENTER keys.

RP1,KEY,LOCK,LOCK,,,LOCK

**Description**

- When p2=ACTION, p10 is valid if calibration management (/CC1 option) is enabled.

**EK** Configures administrator settings (/AS1 advanced security option)

**Syntax**

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

**p1**
Registration number (1 to 5)

**p2**
Login method (OFF, KEY, KEY+COMM, WEB)

**p3**
User name (up to 20 characters)

**p4**
User ID (up to 8 characters)

**p5**
Password

**p6**
Period of password validity (OFF, 1MONTH, 3MONTH, 6MONTH)

**Query**

EK[p1]?

**Password output in response to queries:**

- **Default password**: ********
- **Valid password specified by a user**: ********
- **Expired password**: --------

**Example**

Configure the settings for an administrator who can log in using the DX keys. Set the user name to “A,” the user ID to “0000,” and the period of password validity to 3 months.

EK1,KEY,A,0000,,3MONTH

**Description**

- About user names
  - You cannot specify more than one of the same user name.
3.6 Basic Setting Commands

**EL** Configures user settings (/AS1 advanced security option)

**Syntax**

EL p1,p2,p3,p4,p5,p6,p7<terminator>

- **p1**: Registration number (1 to 90)
- **p2**: Login method (OFF, KEY, COMM, KEY+COMM, WEB)
- **p3**: User name (up to 20 characters)
- **p4**: User ID (up to 8 characters)
- **p5**: Password
- **p6**: Period of password validity (OFF, 1MONTH, 3MONTH, 6MONTH)
- **p7**: User privilege setting (OFF or 1 to 10)

**Query**

EL[p1]?

Password output in response to queries:

- Default password: ******
- Valid password specified by a user: ******
- Expired password: --------

**Example**

Configure the settings for a user who can log in using the DX keys and communication commands. Set the user name to “User,” the user ID to “1234,” and the period of password validity to 3 months. Use user privilege setting 1.

EL1,KEY+COMM,User,1234,,3MONTH,1

**Description**

- **About user names**
  - You cannot specify more than one of the same user name.
  - You cannot set the user name to “quit” or all spaces, and you cannot use spaces inside the user name.
  - When p2 is set to KEY or KEY+COMM, p5 is invalid. Regardless of the setting, the default password is used.
  - When password management is enabled (by the WU command), p4 is invalid (the DX responds to queries with a string of spaces), and p6 is fixed at off.

- **When the user ID is disabled (by the RN command), p4 is invalid (the DX responds to queries with a string of spaces).**

- **When p2=WEB**
  - p4 is invalid (the DX responds to queries with a string of spaces).
  - You can set a password for p5 (6 characters or more).
  - p6 is fixed at OFF.

**WD** Configures authentication server settings (/AS1 advanced security option)

**Syntax**

WD p1,p2,p3<terminator>

- **p1**: Priority (PRIMARY, SECONDARY)
- **p2**: Server name (up to 64 characters)
- **p3**: Port number (0 to 65535)

**Query**

WD[p1]?

**Example**

Set the primary server to WIN111. Use port 88.

WDPRIMARY,WIN111,88

**Description**

The settings made by this command are valid when password management is enabled (by the WU command).

**RO** Sets the type of report and when to create reports

**For creating no reports**

**Syntax**

RO p1<terminator>

- **p1**: Report type (OFF)

**Query**

RO?

**Example**

Create no reports.

ROOFF

**Description**

You can use this command on models with the /M1 or /PM1 math option.

**For creating hourly, daily, hourly + daily and daily + monthly reports**

**Syntax**

RO p1,p2,p3<terminator>

- **p1**: Report type
  - HOUR: Hourly report
  - DAY: Daily report
  - HOUR+DAY: Hourly and daily reports
  - DAY+MONTH: Daily and monthly reports
- **p2**: Day to create reports (dd; fixed format)
- **p3**: Hour to create reports (hh; fixed format)

**Query**

RO?

**Example**

Create a daily report at 9 O’clock everyday (parameter p2 (05 in this example) is invalid in this case).

RODAY,05,09

**Description**

- You can use this command on models with the /M1 or /PM1 math option.
  - Parameter p2 is invalid even if it is specified for reports other than monthly and daily reports.
3.6 Basic Setting Commands

**For creating daily + weekly reports**

Syntax
\[ \text{RO}\ p_1,p_2,p_3<\text{terminator}> \]
- \( p_1 \) Report type (DAY+WEEK)
- \( p_2 \) Day of week to create reports (SUN, MON, TUE, WED, THU, FRI, SAT)
- \( p_3 \) Hour to create reports (hh; fixed format)
  - \( hh \) Hour (00 to 23)

Query
\[ \text{RO}? \]

Example
Create a daily report at 9 O’clock every day and a weekly report at 9 O’clock every Tuesday.
\[ \text{RODY+WEEK,TUE,09} \]

Description
You can use this command on models with the /M1 or /PM1 math option.

**RM** Sets a report channel

When not using report channels

Syntax
\[ \text{RM}\ p_1,p_2<\text{terminator}> \]
- \( p_1 \) Report channel number
- \( p_2 \) Report channel usage (OFF)

Query
\[ \text{RM}[p_1]? \]

Example
Disable the channel 001 report channel.
\[ \text{RM}001,\text{OFF} \]

Description
- You can use this command on models with the /M1 or /PM1 math option.
- Set \( p_1 \) by referring to the table in section 3.3.

When using a report channel

Syntax
\[ \text{RM}\ p_1,p_2,p_3,p_4<\text{terminator}> \]
- \( p_1 \) Report channel number
- \( p_2 \) Report channel usage (ON)
- \( p_3 \) Measurement, computation, or external input channel number on which to report
- \( p_4 \) Conversion of the unit of time for integration
  - OFF  \( \Sigma(\text{measured value}) \)
  - /S  \( \Sigma(\text{measured value}) \times \text{scan interval} \)
  - /MIN  \( \Sigma(\text{measured value}) \times \text{scan interval/60} \)
  - /HOUR  \( \Sigma(\text{measured value}) \times \text{scan interval/3600} \)
  - /DAY  \( \Sigma(\text{measured value}) \times \text{scan interval/86400} \)

The scan interval unit is seconds.

**XG** Sets the time zone

Syntax
\[ \text{XG}\ p_1,p_2<\text{terminator}> \]
- \( p_1 \) Offset time from GMT (–1300 to 1300)
  - Upper 2 digits: Hour (00 to 13)
  - Lower 2 digits: Minute (00 to 59)
- \( p_2 \) Time deviation limit (OFF, 10S, 20S, 30S, 1MIN, 2MIN, 3MIN, 4MIN, 5MIN)

Example
Set the offset time from the GMT to 9 hours ahead and the deviation limit to 30 s.
\[ \text{XG}0900,30S \]

**XN** Sets the date format

Syntax
\[ \text{XN}\ p_1,p_2<\text{terminator}> \]
- \( p_1 \) Date format (Y/M/D, M/D/Y, D/M/Y, D.M.Y)
- \( p_2 \) Starting day of the week on the calendar (SUN, MON)

Query
\[ \text{XN}? \]

Example
Set the date format to Y/M/D. Set the starting day of the week on the calendar to Monday.
\[ \text{XNY}/M/D,\text{MON} \]

**YB** Sets host information

Syntax
\[ \text{YB}\ p_1,p_2<\text{terminator}> \]
- \( p_1 \) Host name (up to 64 characters)
- \( p_2 \) Domain name (up to 64 characters)

Query
\[ \text{YB}? \]

Example
Set the host name to dx1000 and the domain name to dxadv.daqstation.com.
\[ \text{YBdx1000,dxadv.daqstation.com} \]

Description
- About \( p_4 \)
  Because the DX integrates sampled data over each scan interval, the physical value integrated over a given unit of time may be different from the actual integrated value. This occurs if the unit of time is different from the scan interval. If this occurs, set \( p_4 \) to the same unit of time as that for the physical value that you are measuring. The DX calculates the integrated value using one of the following conversion formulas based on \( p_3 \).
  - OFF  \( \Sigma(\text{measured value}) \)
  - /S  \( \Sigma(\text{measured value}) \times \text{scan interval} \)
  - /MIN  \( \Sigma(\text{measured value}) \times \text{scan interval/60} \)
  - /HOUR  \( \Sigma(\text{measured value}) \times \text{scan interval/3600} \)
  - /DAY  \( \Sigma(\text{measured value}) \times \text{scan interval/86400} \)

The scan interval unit is seconds.
3.6 Basic Setting Commands

**YD** Sets network parameters

When not obtaining network parameters automatically
Syntax
YD p1,p2,p3<terminator>
p1 Automatic retrieval (NOT)

When obtaining network parameters automatically
Syntax
YD p1,p2,p3<terminator>
p1 Automatic retrieval (USE)
p2 DNS information retrieval (USE, NOT)
p3 Automatic host name registration (USE, NOT)

Query
YD?

Example
Automatically retrieve the IP address and DNS information and automatically register the host name.
YDUSE,USE,USE

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

Syntax
YA p1,p2,p3<terminator>
p1 IP address (0.0.0.0 to 255.255.255.255)
p2 Subnet mask (0.0.0.0 to 255.255.255.255)
p3 Default gateway (0.0.0.0 to 255.255.255.255)

Query
YA?

Example
Set the IP address to 192.168.111.24, the subnet mask to 255.255.255.0, and the default gateway to 0.0.0.0.
YA192.168.111.24,255.255.255.0,0.0.0.0

**YK** Sets keepalive

Syntax
YK p1<terminator>
p1 Keepalive (ON, OFF)

Query
YK?

Example
Disable keepalive.
YKOFF

**RU** Sets DNS parameters

Server settings
Syntax
RU p1,p2,p3<terminator>
p1 Setting type (SERVER)
p2 Primary DNS server address (0.0.0.0 to 255.255.255.255)
p3 Secondary DNS server address (0.0.0.0 to 255.255.255.255)

Suffix settings
Syntax
RU p1,p2,p3<terminator>
p1 Setting type (SUFFIX)
p2 Domain suffix 1 (up to 64 characters)
p3 Domain suffix 2 (up to 64 characters)

Query
RU[p1]?

Example
Set domain suffix 1 to rec1.daqstation.com and domain suffix 2 to rec2.daqstation.com.
NOSUFFIX,rec1.daqstation.com,rec2.daqstation.com

**WS** Sets a server

Syntax
WS p1,p2<terminator>
p1 Server type (FTP, WEB, MODBUS, SNTP, ETHERNETIP)
p2 Server on/off (USE, NOT)

Query
WS[p1]?

Example
Enable the Web server.
WSWEB,USE

**WW** Sets Webpage parameters

Syntax
WW p1,p2,p3,p4<terminator>
p1 Webpage type
OPERATOR Operator page
MONITOR Monitor page
p2 Webpage (ON, OFF)
p3 Authentication
OFF No authentication
ADMIN Administrator privileges
USER User privileges
p4 Command input on/off (USE, NOT)

Query
WW[p1]?

Example
Enable the operator page, disable authentication, and enable command input.
WWOPERATOR,USE,OFF,USE

Description
- Parameters p3 and p4 are valid when p2 is set to ON.
- Parameter p3 is OFF or ADMIN when p1 is set to OPERATOR.
- Parameter p4 is valid when p1 is set to OPERATOR.
- p4 is invalid on models with the /AS1 advanced security option.

**YQ** Sets communication timeout

When using no timeouts
Syntax
YQ p1<terminator>
p1 Communication timeout (OFF)

Query
YQ?

Example
Disable the communication timer.
YQOFF

When using timeouts
Syntax
YQ p1,p2<terminator>
p1 Communication timeout (ON)
p2 Timeout value in minutes (1 to 120)

Query
YQ?

Example
Enable the communication timer and set the timeout value to 3 minutes.
YQON,3
### YT  Sets FTP transfer timing

**Syntax**

YT \( p1,p2,p3,p4 \)<terminator>

- **p1**: Automatically transfer data when display and event data files are created (ON, OFF)
- **p2**: Automatically transfer data when report data files are created (ON, OFF)
- **p3**: Automatically transfer data when snapshot data files are created (when snapshot is executed) (ON, OFF)
- **p4**: Transfer data when the DX creates a setup file as a result of setting changes (OFF, ON)

**Query**

YT?

**Example**

Automatically transfer display and event data files. Do not transfer report data files. Transfer a setup file when the settings change.

YTON,OFF,OFF,ON

**Description**

- When the method to save data to the external storage medium is set to “Auto,” the DX automatically transfers relevant data files when they are created. For the procedure to save various data files to the storage medium, see the DX1000/DX2000 User's Manual.
- **p2** is only valid on models with the /M1 or /PM1 math option.
- **p4** is only valid on models with the /AS1 advanced security option.

### YU  Sets what kind of information to send using e-mail

#### To send changes in the alarm status

**Syntax**

YU \( p1,p2,p3,p4,p5,p6,p7,p8,p9,p10, p11,p12 \)<terminator>

- **p1**: Information to send (ALARM)
- **p2**: Recipient 1 (ON, OFF)
- **p3**: Recipient 2 (ON, OFF)
- **p4**: Whether to send the alarm number 1 status (ON, OFF)
- **p5**: Whether to send the alarm number 2 status (ON, OFF)
- **p6**: Whether to send the alarm number 3 status (ON, OFF)
- **p7**: Whether to send the alarm number 4 status (ON, OFF)
- **p8**: Whether to include instantaneous data (ON, OFF)
- **p9**: Whether to include source URL (ON, OFF)
- **p10**: Subject (up to 32 characters)
- **p11**: Header 1 (up to 64 characters)
- **p12**: Header 2 (up to 64 characters)

**Query**

YU[p1]?

**Example**

Send e-mail at 17 hours 15 minutes every day to recipient 1. Do not include instantaneous data but include the source URL. Set the subject to “GOOD” and header 1 to “LP2.”

YUTIME,ON,OFF,ON,OFF,ON,GOOD,LP2

#### To send system notifications

**Syntax**

YU \( p1,p2,p3,p4,p5,p6 \)<terminator>

- **p1**: Information to send (SYSTEM)
- **p2**: Recipient 1 (ON, OFF)
- **p3**: Recipient 2 (ON, OFF)
- **p4**: Whether to include source URL (ON, OFF)
- **p5**: Subject (up to 32 characters)
- **p6**: Header 1 (up to 64 characters)
- **p7**: Header 2 (up to 64 characters)

**Query**

YU[p1]?

**Example**

Send system notification e-mail that includes the source URL to recipient 1. Set the subject to “SystemAlert” and header 1 to “LP2.”

YUSYSTEM,ON,OFF,ON,SystemAlert,LP2

#### To send report generation notifications

**Syntax**

YU \( p1,p2,p3,p4,p5,p6,p7 \)<terminator>

- **p1**: Information to send (REPORT)
- **p2**: Recipient 1 (ON, OFF)
- **p3**: Recipient 2 (ON, OFF)
- **p4**: Whether to include source URL (ON, OFF)
## 3.6 Basic Setting Commands

### YU

**Sets system notifications**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YU[?p1]</td>
<td>Set system notifications. For details on system notifications, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

Send report generation notification e-mail that includes the source URL to recipient 1. Set the subject to “Report” and header 1 to “LP2.”

YUREPORT,ON,OFF,ON,Report,LP2

**Description**

- For details on system notifications, see section 1.4.

### YV

**Sets an e-mail recipient address**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YV[?p1]</td>
<td>Set the e-mail recipient address. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

Set recipient 1 to “dxuser1@daqstation.com" and “dxuser2@daqstation.com.”

YV1,dxuser1@daqstation.com	dxuser2@daqstation.com

**Description**

- To specify multiple recipients, separate each recipient with a space.

### YW

**Sets the e-mail sender address**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YW[?p1]</td>
<td>Set the e-mail sender address. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

Set the sender address to “dxadv.”

YWdxadv

### YX

**Sets the e-mail SMTP server name**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YX[?p1]</td>
<td>Set the SMTP server name. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

Set the SMTP server to “smtp.daqstation.com” and port number to “25.” Use POP3 authentication.

YX smtp.daqstation.com,25,POR BEFORE SMTP

**Description**

- For details on e-mail settings, see section 1.4.

### YJ

**Sets the Modbus client’s destination server**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YJ[?p1]</td>
<td>Set the Modbus client’s destination server. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

For server number 3, set the port number to 502, the host name to dx2000, the unit number registration to FIXED, and the unit number to 127.

YJ3,502,dx2000,FIXED,127

### YP

**Sets basic Modbus client settings**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YP[?p1]</td>
<td>Set basic Modbus client settings. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

Set the read cycle to 500 ms and the retry (reconnection) interval to 10 min.

YP500MS,10MIN

### YR

**Sets the Modbus client’s transmit command**

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR[?p1]</td>
<td>Set the Modbus client’s transmit command. For details on e-mail settings, see section 1.4.</td>
</tr>
</tbody>
</table>

**Example**

When p2 is set to OFF

There are no parameters after p2.

When p2 is set to R (read external input channels)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p3</td>
<td>First channel (external input channel number)</td>
</tr>
<tr>
<td>p4</td>
<td>Last channel (external input channel number)</td>
</tr>
<tr>
<td>p5</td>
<td>Server number (1 to 16)</td>
</tr>
<tr>
<td>p6</td>
<td>First register number (30001 to 39999, 40001 to 49999, 300001 to 365536, 400001 to 465536)</td>
</tr>
</tbody>
</table>
3.6 Basic Setting Commands

When p2 is set to R-M (read communication input data)

- **p3**: First channel (communication input data number)
- **p4**: Last channel (communication input data number)
- **p5**: Server number (1 to 16)
- **p6**: First register number (30001 to 39999, 300001 to 365536, 400001 to 465536)
- **p7**: Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L)

When p2 is set to W (write to measurement channels)

- **p3**: First channel (measurement channel number)
- **p4**: Last channel (measurement channel number)
- **p5**: Server number (1 to 16)
- **p6**: First register number (40001 to 49999, 400001 to 465536)
- **p7**: Register data type (INT16, FLOAT_B, FLOAT_L)

When p2 is set to W-M (write to computation channels)

- **p3**: First channel (computation channel number)
- **p4**: Last channel (computation channel number)
- **p5**: Server number (1 to 16)
- **p6**: First register number (40001 to 49999, 400001 to 465536)
- **p7**: Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L)

When p2=E-M (Communication input channel data exchange)

- **p3**: First channel (communication input data number)
- **p4**: Last channel (communication input data number)
- **p5**: Server number (1 to 16)
- **p6**: First register number (40001 to 49999, 400001 to 465536)
- **p7**: Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, FLOAT_B, FLOAT_L)

When p2 is set to E-M (Communication input channel data exchange)

- **p3**: First channel (communication input data number)
- **p4**: Last channel (communication input data number)
- **p5**: Server number (1 to 16)
- **p6**: First register number (30001 to 39999, 300001 to 365536, 400001 to 465536)
- **p7**: Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, FLOAT_B, FLOAT_L)

**Example**

- When p2 is set to R-M:
  - `YR5`, set communication input data
  - `W`, write to measurement channels
  - `YR5,W,01,04,1,40001,INT16`

**Description**

- Set p3 to a value that is less than or equal to p4.
- The number of registers that are read from or written to is determined by the values that you set for p3, p4, and p7. An error occurs if the specified number of registers exceeds the number of registers that actually follow the first register (p6).

### WB
Sets SNTP client parameters

**Syntax**

```
WB p1,p2,p3,p4,p5,p6<terminator>
```

- **p1**: SNTP client function (USE, NOT)
- **p2**: SNTP server name (up to 64 alphanumeric characters)
- **p3**: SNTP port number (0 to 65535)
- **p4**: Access interval (OFF, 1H, 8H, 12H, 24H)
- **p5**: Reference time for the access interval (00:00 to 23:59)
- **p6**: Timeout value (10S, 30S, 90S)

**Query**

```
WB?
```

**Example**

- Enable the SNTP client function, set the server name to sntp.daqstation.com, the port number to 123, the access interval to 24 hours, the reference time to 12:00, and the timeout value to 30 seconds.
  - `WBUSE,sntp.daqstation.com,123,24H,12:00,30S`

### WC
Sets the SNTP operation when memory start is executed

**Syntax**

```
WC p1<terminator>
```

- **p1**: Time adjustment using SNTP at memory start (ON, OFF)

**Query**

```
WC?
```

**Example**

- Set the DX so that time is adjusted using SNTP at memory start.
  - `WCON`

**Description**

- This command is valid when the SNTP client function is enabled (WB command).

### YS
Sets the serial interface

**Syntax**

```
YS p1,p2,p3,p4,p5,p6<terminator>
```

- **p1**: Baud rate (1200, 2400, 4800, 9600, 19200, 38400)
- **p2**: Data length (7, 8)
- **p3**: Parity check (NONE, ODD, EVEN)
- **p4**: Handshaking (OFF:OFF, XON:XON, XON:RS, CS:RS)
- **p5**: RS-422/485 address (01 to 99)
- **p6**: Protocol (NORMAL, MODBUS, MODBUS-M)

**Query**

```
YS?p1?
```

**Example**

- For command number 5, set the command type to W, the first channel to 01, the last channel to 04, the server number to 1, the first register number to 40001, and the register data type to INT16.
  - `YR5,W,01,04,1,40001,INT16`
3.6 Basic Setting Commands

**YL**

Sets the operation of the Modbus master function

**Syntax**

```
YL p1,p2,p3,p4,p5<terminator>
```

- **p1**
  - Read cycle (125MS, 250MS, 500MS, 1S, 2S, SS, 10S)
- **p2**
  - Timeout (125MS, 250MS, 500MS, 1S, 2S, 5S, 10S, 1MIN)
- **p3**
  - Retrials (OFF, 1 to 5, 10, 20)
- **p4**
  - Command wait time (OFF, 5MS, 10MS, 15MS, 45MS, 100MS)
- **p5**
  - Auto recovery (OFF, 1MIN, 2MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H)

**Query**

```
YL?
```

**Example**

Set the read cycle to 500 ms, the timeout to 250 ms, the number of retrials to 2, the command wait time to 10 ms, and the automatic return time limit to 5 min.

```
YL500MS,250MS,2,10MS,5MIN
```

**Description**

- You can use this command on models with the /IC2 or /IC3 serial interface option.
- The setting p5=BARCODE is only valid on models with the /AS1 advanced security option.

To set a command that reads communication input data

**Syntax**

```
YM p1,p2,p3,p4,p5,p6,p7<terminator>
```

- **p1**
  - Registration number (1 to 16)
- **p2**
  - Command type (R-M)
- **p3**
  - First channel (communication input data number)
- **p4**
  - Last channel (communication input data number)
- **p5**
  - Slave device address (1 to 247)
- **p6**
  - First register number (30001 to 39999, 40001 to 49999, 300001 to 365535, 400001 to 465535)
- **p7**
  - Type of data assigned to the registers (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, FLOAT_B, FLOAT_L)

**Query**

```
YM[p1]?
```

**Example**

Register the following command in command registration number 2: Read the 32-bit signed integer data that is assigned to registers 30002 (upper 16 bits) and 30004 (lower 16 bits) in the slave device at address 5 into the DX channels C02 to C05.

```
YM2,R-M,C02,C05,5,30003,INT32_B
```

To set a command that writes to measurement channels

**Syntax**

```
YM p1,p2,p3,p4,p5,p6,p7<terminator>
```

- **p1**
  - Registration number (1 to 16)
- **p2**
  - Command type (W)
- **p3**
  - First channel (measurement channel number)
- **p4**
  - Last channel (measurement channel number)
- **p5**
  - Slave device address (1 to 247)
- **p6**
  - First register number (40001 to 49999, 400001 to 465535)
- **p7**
  - Type of data assigned to the registers (INT16, UINT16, FLOAT_B, FLOAT_L)

**Query**

```
YM[p1]?
```

**Example**

Register the following command in command registration number 3: Write the measured data 3.6  Basic Setting Commands
3.6 Basic Setting Commands

of channels 003 to 006 in registers 40003 to 40006 in the slave device at address 7.
YM3,W,003,006,7,40003,INT16

To set a command that writes to computation channels
Syntax
YM p1,p2,p3,p4,p5,p6,p7<terminator>
   p1 Registration number (1 to 16)
   p2 Command type (W-M)
   p3 First channel (computation channel number)
   p4 Last channel (computation channel number)
   p5 Slave device address (1 to 247)
   p6 First register number (40001 to 49999, 400001 to 465535)
   p7 Type of data assigned to the registers (INT16, UINT16, INT32_B, INT32_L, FLOAT_B, FLOAT_L)

To set a command for communication input channel data exchange
p1 Registration number (1 to 16)
p2 Command type (E-M)
p3 First channel (communication input data number)
p4 Last channel (communication input data number)
p5 Address of the slave device (1 to 247).
p6 First register number (40001 to 49999, 400001 to 465536)
p7 Register data type (INT16, UINT16, INT32_B, INT32_L, FLOAT_B, FLOAT_L)

WR Sets the instrument information output
Syntax
WR p1,p2,p3,p4,p5<terminator>
p1 Memory and media status (OFF, ON)
p2 Self diagnosis (OFF, ON)
p3 Communication errors (OFF, ON)
p4 Memory stop (OFF, ON)
p5 Alarms (OFF, ON)
Query
WR?
Example
Set the DX to transmit various types of information.
WRON, ON, ON, ON, ON

WI Sets the relay operations
On DXs without the /AS1 Advanced Security Option
Syntax
WI p1,p2<terminator>
p1 FAIL relay (Fail, Status)
p2 Status relay (Fail, Status)
   Fail FAIL
   Status Instrument information
Query
WI?
Example
Output FAIL to the FAIL relay and the instrument information to the status relay.
WIFail,Status

WI Fail, Status

WF Sets the Modbus connection limitation
Syntax
WF p1<terminator>
p1 Modbus connection limitation (USE, NOT)
Query
WF?
Example
Place limitations on Modbus connections.
WFUSE
### WG
**Sets an IP address that is allowed to connect via Modbus**

**Syntax**
```
WG p1,p2<terminator>
p1  Registration number (1 to 10)
p2  Whether or not to register (ON, OFF)
p3  IP address (0.0.0.0 to 255.255.255.255)
```

**Query**
```
WG?[p1]
```

**Example**
Allow connection from 192.168.111.24. Use registration number 1.

```
WG1,ON,192.168.111.24
```

**Description**
This command is valid when the Modbus connection limitation is placed (WF command).

### WJ
**Sets the FTP transfer wait time**

**Syntax**
```
WJ p1,p2<terminator>
p1  Display data and event data [minutes] (0 to 120)
p2  Reports [minutes] (0 to 120)
```

**Query**
```
WJ?
```

**Example**
Set the FTP transfer wait time for report data to 30 minutes. Do not set a wait time for display data and event data.

```
WJ0,30
```

### WQ
**Sets PROFIBUS-DP**

**Syntax**
```
WQ p1<terminator>
p1  Node address (0 to 125)
```

**Query**
```
WQ ?
```

**Example**
Set the node address to 121.

```
WQ121
```

**Description**
- You can use this command on models with the /CP1 PROFIBUS-DP option.

### YE
**Activates basic settings (cold reset)**

**Syntax**
```
YE p1<terminator>
p1  Whether or not to activate settings
```

**Example**
Saves basic settings and restart.

```
YE
```

**Description**
If the settings are changed during memory sampling in basic setting mode, a cold reset is not executed. The login status is sustained.

---

**3.6 Basic Setting Commands**

**WG**
Sets an IP address that is allowed to connect via Modbus

**Syntax**
```
WG p1,p2<terminator>
p1  Registration number (1 to 10)
p2  Whether or not to register (ON, OFF)
p3  IP address (0.0.0.0 to 255.255.255.255)
```

**Query**
```
WG?[p1]
```

**Example**
Allow connection from 192.168.111.24. Use registration number 1.

```
WG1,ON,192.168.111.24
```

**Description**
This command is valid when the Modbus connection limitation is placed (WF command).

**WJ**
Sets the FTP transfer wait time

**Syntax**
```
WJ p1,p2<terminator>
p1  Display data and event data [minutes] (0 to 120)
p2  Reports [minutes] (0 to 120)
```

**Query**
```
WJ?
```

**Example**
Set the FTP transfer wait time for report data to 30 minutes. Do not set a wait time for display data and event data.

```
WJ0,30
```

**WQ**
Sets PROFIBUS-DP

**Syntax**
```
WQ p1<terminator>
p1  Node address (0 to 125)
```

**Query**
```
WQ ?
```

**Example**
Set the node address to 121.

```
WQ121
```

**Description**
- You can use this command on models with the /CP1 PROFIBUS-DP option.

**XE**
Activates basic settings

**Syntax**
```
XE p1<terminator>
p1  Whether or not to save settings (STORE, ABORT)
```

**Example**
Save basic settings.

```
XE
```

**Description**
- To activate the settings you have changed using basic setting commands, you must use the XE command to save the settings. Be sure to use the XE command to save the settings before switching the execution mode back to operation. If you do not save the settings and change the execution mode back to operation, the DX returns to the previous settings.
- This command is invalid on models with the /AS1 advanced security option.

**YE**
Activates basic settings (cold reset)

**Syntax**
```
YE p1<terminator>
p1  Whether or not to activate settings
```

**Example**
Saves basic settings and restart.

```
YE
```

**Description**
If the settings are changed during memory sampling in basic setting mode, a cold reset is not executed. The login status is sustained.
3.7 Output Commands (Control)

**BO**
Sets the output byte order

**Syntax**
BO p1<terminator>
p1 Byte order
0 Outputs data MSB first.
1 Outputs data LSB first.

**Query**
BO?

**Example**
Output data MSB first.
BO0

**Description**
This command applies to the byte order of numeric data for BINARY output.

---

**CS**
Sets the check sum (can only be used during serial communications)

**Syntax**
CS p1<terminator>
p1 Checksum usage
0 Do not calculate (value fixed at zero)
1 Calculate

**Query**
CS?

**Example**
Enable (Calculate) the checksum.
CS1

**Description**
You can use this command only for serial communications.

---

**IF**
Sets status filters

**Syntax**
IF p1,p2<terminator>
p1 Filter values for status information numbers 1 to 4
(0.0.0.0 to 255.255.255.255)
p2 Filter values for status information numbers 5 to 8
(0.0.0.0 to 255.255.255.255)

**Query**
IF?

**Example**
Set the status filter values to 1.0.4.0 and 255.127.63.31.
IF 1.0.4.0,255.127.63.31

**Description**
For details, see chapter 5.

---

**CB**
Sets the data output format

**Syntax**
CB p1<terminator>
p1 Output format
0 Normal output (includes data from channels set to SKIP and OFF)
1 Do not output data from channels set to SKIP or OFF

**Query**
CB?

**Example**
Set the output format to normal output.
CB0

**Description**
• This setting is separate for each connection.

---

**Note**
Initialization of settings specified using the BO, CS, IF, and CB commands

- **Serial communications**
  Settings specified using the BO, CS, IF, and CB commands are reset to the following default values when you reset the DX (when you turn the DX off and then back on or when you exit from basic setting mode).
  - Output byte order, checksum, output format: 0
  - Status filter: 255.255.255.255
  - If you reset the DX, you must set these values again.

- **Ethernet communications**
  Settings specified using the BO, IF, and CB commands are reset to their default values when you disconnect the connection to the DX. After reconnecting to the DX, set these values again.
3.8 Output Commands
(Setting, Measured, and Computed Data Output)

### FC Outputs screen image data

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC (p1&lt;\text{terminator}&gt;)</td>
<td>FC GET (Output screen image data)</td>
</tr>
<tr>
<td>Example</td>
<td>Output screen image data from the DX.</td>
</tr>
<tr>
<td>Example</td>
<td>FCGET</td>
</tr>
<tr>
<td>Description</td>
<td>The DX captures the currently displayed screen and outputs the data in PNG format.</td>
</tr>
</tbody>
</table>

### FE Outputs setup data

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE (p1,p2,p3,p4&lt;\text{terminator}&gt;)</td>
<td>FE (p1&lt;\text{terminator}&gt;) (p1) Output data type (0) Setup data of setting mode (1) Decimal place and unit information (2) Setup data of basic setting mode (4) Setup data file (5) Setup channel information output (6) Configured alarm information output (p2) First channel number (measurement, computation, or external input channel) (p3) Last channel number (measurement, computation, or external input channel) (p4) Format version (see “Setup Channel Information Output” in “Response Format.”) (1) Format for Release number 2 or Earlier (format version 1) (2) Format for Release number 3 or later (format version 2)</td>
</tr>
<tr>
<td>Example</td>
<td>Output the setup data of setting mode for channels 001 to 005 from the DX.</td>
</tr>
<tr>
<td>Example</td>
<td>FE0,001,005</td>
</tr>
</tbody>
</table>
| Description     | • Make sure that the last channel number is greater than or equal to the first channel number. 
• Parameters \(p2\) and \(p3\) are valid when \(p1\) is set to 0 or 1. If you omit \(p2\) or \(p3\), all channels are specified. 
• Set parameters \(p2\) and \(p3\) by referring to the table in section 3.3. |

### FF Outputs FIFO data

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF (p1,p2,p3,p4&lt;\text{terminator}&gt;)</td>
<td>FF (p1&lt;\text{terminator}&gt;) (p1) Type of operation (1) GET Output starting with the next block (2) RESEND Retransmit the previous output (3) RESET Set the most recent data position (block) to the FIFO buffer read position (block) (p2) First channel number (measurement, computation, or external input channel) (p3) Last channel number (measurement, computation, or external input channel) (p4) Maximum number of blocks to read out (1200) DX1002/DX1004/DX2004/DX2008 (240) DX1006/DX1012/DX2010/DX2020/DX2030/DX2040/DX2048 (60) Models with the /MC1 external input channel option If the amount of measured, computed, and external input data is less than the specified number of blocks, the DX sends all of the available data.</td>
</tr>
<tr>
<td>Example</td>
<td>Output two blocks of FIFO data from channels 1 to 10.</td>
</tr>
<tr>
<td>Example</td>
<td>FFGET,001,010,2</td>
</tr>
</tbody>
</table>
| Description     | • The FIFO buffer is a cyclic buffer in which the oldest data is overwritten first. Use the FR command to set the acquisition interval. 
• The DX sends the specified number of blocks (\(p4\)) of FIFO data starting with the next block. |
Be sure to read the data within the following buffer period to prevent data dropouts.
- DX1004
  FIFO buffer size
  240 cycles (scan interval)
  Maximum buffer period
  240 x (acquisition interval)
  You cannot resend data if the buffer period elapses.
- Parameters p2 to p4 are valid when p1 is set to GET.
- If you omit p4, all blocks are specified.
- Make sure that the last channel number is greater than or equal to the first channel number.
- For details on the FIFO data output process, see appendix 5.
- Set parameters p2 and p3 by referring to the table in section 3.3.

**FL Outputs a log, alarm summary, or message summary**

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

**p1 Log type**
- COM Communication
- FTPC FTP client
- ERR Operation errors
- LOGIN Login log
- WEB Web operation
- EMAIL E-mail
- SNTP SNTP access log
- DHCP DHCP access log
- ALARM Alarm summary
- MSG Message summary
- MODBUS Modbus communication log
- SETTIN Change settings log

**p2 Maximum log readout length**
1 to 200 When p1 is set to COM, MODBUS, or SETTING
1 to 1000 when p1 is set to ALARM
1 to 450 when p1 is set to MSG
1 to 50 When p1 is set to a value other than those listed above

**p3 Batch group number**

**Example**
Output the 10 most recent operation error logs.
FLERR,10

**Description**
- Outputs the log that is stored in the DX.
- If you omit p2, all written logs are output.
- Parameter p3 is valid when multi batch /BT2 is in use and p1 is set to ALARM or MSG (all other parameters don’t care).
- All logged items are output when you omit p3.
- Set parameter p3 by referring to the table in section 3.3.
- The setting p1=LOGIN is invalid on models with the /AS1 advanced security option.

**FI Outputs an operation log (/AS1 advanced security option)**

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

**p1 Output format**
- 0 Fixed length
- 1 Details attached

**p2 User name**
You can specify multiple user names (up to five) by delimiting them with commas.

**p3 Operations**
You can specify multiple operations (up to five) by delimiting them with commas.
Specify operations by using the notation that is used in the operation log (see appendix 1 in IM04L41B01-05EN).

**p4 Maximum number of items to output (1 to 100)**

**Example**
Output up to 100 items from the log of User1’s operations.
FI0,User1,,100

**Description**
- Omitting p2 is the same as specifying all users.
- If you specify more than five users for p2, users from the sixth user onwards are invalid.
- If you enter five colons for p2 without specifying any user names, users from the sixth user onwards are invalid.
- Omitting p3 is the same as specifying all operations.
- If you specify more than five items for p3, items from the sixth item onwards are invalid.
- If you enter five colons for p3 without specifying any items, items from the sixth item onwards are invalid.
- p4 cannot be omitted.
- p3 is not case sensitive. Items that start with the specified characters are output.
- If p2 and p3 are both specified, the DX outputs items that match the logical AND of p2 and p3.
- The setting p1=SETTING is only valid on models with the /AS1 advanced security option.

**IS Outputs status information**

**Syntax**
IS p1<terminator>

**p1 Status information output**
- 0 Status information 1 and 4
- 1 Status information 1 and 8

**Example**
Output status information 1 to 4.
ISO
3.8 Output Commands (Setting, Measured, and Computed Data Output)

**FU**

**Outputs user levels**

**Syntax**

```
FU p1<terminator>
```

- **p1** User information output
  - 0 Information about the users currently logged in
  - 1 Information about the users currently logged into a general-purpose service

**Example**

Output information about the users logged into a general-purpose service.
```
FU1
```

**Description**

This command sends information about users that are connected to the DX.

**FA**

**Outputs internal DX information**

**Syntax**

```
FA p1<terminator>
```

- **p1** Type of operation
  - IP Address information that includes the IP address, subnet mask, default gateway, DNS server as well as the host name and domain name

**ME**

**Outputs data stored on the external storage medium and internal memory**

**Syntax**

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

- **p1** Type of operation
  - DIR File list output
  - GET Data output
  - SIZE Data size output
  - NEXT Output (subsequent times). This parameter is used to output the remaining data when the first output operation is not enough to output all of the data.
  - RESEND Retransmit the previous output
  - DEL Delete
  - DIRNEXT Output the subsequent file list after the file list is output using the DIR or LIST command. The number of output lists is the p3 value specified using the DIR command. If you use this command after all lists have been output, the following data is output.
    - EACRLF
    - ENCR LF
    - CHKDSK Checks the disk. Outputs information about the free space on the external storage medium.

- **p2** Path name (up to 100 characters)
  - Set the path name using a full path.

- **p3** Maximum number of file lists to output (1 to 1000)
  - If you omit this parameter, the DX outputs the entire file list of the specified directory.

**Example**

- Output the entire file list of the DRV0 directory
  
  MEDIR,/DRV0/

- Output the DRV0 directory file list for 10 files.
  
  MEDIR,/DRV0/,10

- Output the data in the file 72615100.DAD in the DRV0/DATA0 directory.
  
  MEGET,/DRV0/DATA0/72615100.DAD

**Description**

- Parameter p2 is valid when p1 is set to DIR, GET, DEL, or CHKDSK.
- Parameter p3 is valid when p1 is set to DIR.
- If an error occurs during data transmission, you can set p1 to RESEND to retransmit data.
- The setting p1=DEL is invalid on models with the /AS1 advanced security option.

**Path name specifications**

- The first level directories point to the following locations.
  - Path that starts with /MEM0/DATA/Internal memory
  - Path that starts with /DRV0/External storage medium
- Path names are case-sensitive.

**MO**

**Outputs the data stored in the internal memory**

**Syntax**

```
MO p1,p2,p3<terminator>
```

- **p1** Type of operation
  - DIR Data list output
  - GET Data output
  - SIZE Data size output

- **p2** Path name (up to 100 characters)
  - Set the path name using a full path.
3.8 Output Commands (Setting,...) / 3.9 Output Commands (RS-422/485 ...)

p2 Output data type
  MANUAL Manual sampled data
  REPORT Report

p3 Specified file name

Example Output report data, 000142_080102_004127H_.DAR from the DX.

Description Parameter p3 is valid when p1 is set to GET or SIZE.

3.9 Output Commands
(RS-422/485 Dedicated Commands)

ESC O Opens an instrument
ESC in ASCII code is 1BH. For details, see appendix 3.

Syntax ESC O p1<terminator>
p1 Instrument address (01 to 99)

Example Open the instrument at address 99, and enable all commands.
ESC O99

Description • Specifies the address of the instrument that you want to communicate with.
• You can only open one instrument at any given time.
• If you execute ESC O, any instrument that is already open is automatically closed.
• When the DX receives this command successfully, the DX returns “ESC O□□”. 
• Normally, the terminator can be CR+LF or LF for communication commands. However, you must terminate this command with CR+LF.

ESC C Closes an instrument
ESC in ASCII code is 1BH. For details, see appendix 3.

Syntax ESC C p1<terminator>
p1 Instrument address (01 to 99)

Example Close the device whose address is 77.
ESC C77

Description • This command closes the connection to the instrument you are communicating with.
• When the DX receives this command successfully, the DX returns “ESC C□□”. 
• Normally, the terminator can be CR+LF or LF for communication commands. However, you must terminate this command with CR+LF.
3.10 Output Commands (Special Response Commands)

*\ I Outputs instrument information

Syntax  *I<terminator>
Description This command sends the maker, model, serial number, and firmware version in a comma-separated ASCII string with a terminator at the end.
Example  YOKOGAWA,DXI000,99AA0123,F1.01

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

close Closes another device’s connection

Syntax  close,p1,p2:p3<terminator>
        p1  Port on the DX side (1 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 You cannot use this command to disconnect a server port. You cannot use this command to disconnect from the DX that you are operating. Use the quit command instead.

con Outputs connection information

Syntax  con<terminator>
Example  con
        EA
        08/00/00 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>0.0.0.0:0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0.0.0.0:34159</td>
<td>0.0.0.0:0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0.0.0.0:34150</td>
<td>0.0.0.0:0</td>
<td>LISTEN</td>
</tr>
</tbody>
</table>

TCP

Protocol used.
Local Address
DX socket address.
Displays “IP address:port number.”
Foreign Address
Destination socket address
Displays “IP address:port number.”
State
Connection state.
ESTABLISHED
Connection established.

eth Outputs Ethernet statistics

Syntax  eth<terminator>
Example  eth
        EA
        08/00/00 12:34:56
3.11 Maintenance and Test Commands

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>

EN

help Outputs help

Syntax

help [p1]<terminator>

p1  Command name

(close, con, eth, help, net, quit)

Example

help

EA

con  -  echo connection information

eth  -  echo ethernet information

help  -  echo help

net  -  echo network status

quit  -  close this connection

EN

net Outputs network statistics

Syntax

net<terminator>

Example

net

EA

00/00/00 12:34:56

Network Status

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

EN

TCP: keepalive

Keepalive check cycle
TCP: connect

Total number of connections established
TCP: closed

Total number of closed connections
TCP: timeoutdrop

Total number of closed connections due to TCP retransmission timeout. When the transmitted packet is not received, the DX retransmits the packet at a predetermined time interval. If the packet is not received after 14 retransmissions, a timeout occurs, and the connection is closed.

quit Closes the connection to the instrument that you are operating

Syntax

quit<terminator>

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

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

Port number 34264/udp
Transfer data ASCII
Receive buffer size 128
Transmit buffer size 512
Maximum number of parameters 32

In the command packet, you arrange the parameters that correspond to information you want to receive.

<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 (host name that you specified in section 1.3).</td>
</tr>
<tr>
<td>ip</td>
<td>Outputs the IP address (the IP address that you specified in section 1.3).</td>
</tr>
</tbody>
</table>

Example
Query the IP address and host name. (The first frame below contains the command packet. The second frame contains the response packet.)

```
ip host
```

```
EA
ip = 192.168.111.24
host = DX1000-1
EN
```

Description
- Separate each parameter with one or more spaces (space, tab, carriage return, or line feed).
- Parameters are not case sensitive.
- Undefined parameters are ignored.
- Parameters after the 32nd parameter are ignored.
4.1 Response Syntax

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

The DX returns a response (affirmative/negative response) to a command that is delimited by a single terminator. The controller should follow the one command to one response format. When the command-response rule is not followed, the operation is not guaranteed.

<table>
<thead>
<tr>
<th>Commands</th>
<th>Group</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting commands</td>
<td>Setting</td>
<td>Affirmative response</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>Single negative response</td>
</tr>
<tr>
<td>Basic Setting commands</td>
<td>Control</td>
<td>ASCII output</td>
</tr>
<tr>
<td>Output commands</td>
<td>Control</td>
<td>Binary output</td>
</tr>
<tr>
<td>Setup, measurement, and control data output</td>
<td>ASCII output</td>
<td>No response</td>
</tr>
<tr>
<td>RS-422/485 dedicated</td>
<td>Dedicated response</td>
<td></td>
</tr>
<tr>
<td>Special response commands</td>
<td>Dedicated response</td>
<td></td>
</tr>
</tbody>
</table>

* For the responses to the instrument information server function, see section 4.4.
  
* For the responses to special commands, see section 3.10.

**Note**

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

**Affirmative Response**

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

- **Syntax**
  
  `E0 CRLF`

- **Example**
  
  `E0`

**Single Negative Response**

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

- **Syntax**
  
  `E1_nnn_mmm...mCRLF`

  `nnn` Error number (001 to 999)

  `mmm...m` Message (variable length, one line)

  `_` Space

- **Example**
  
  `E1 001 "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.
4.1 Response Syntax

- **Syntax**
  
  \[ \text{E2} \_ee:nnn \text{CRLF} \]
  
  (When there is only one error)
  
  \[ \text{E2} \_ee:nnn, ee:nnn, \ldots, ee:nnn \text{CRLF} \]
  
  (When there are multiple errors)
  
  - \( ee \) Error position (01 to 10)
  - \( nnn \) Error number (001 to 999)
  - \( \_ \) Space

- **Example**
  
  \[ \text{E2} \ 02:001 \]

**Text Output**

For details on the text data types and their formats, see section 4.2.

- **Syntax**
  
  \[ \text{EA}\text{CRLF} \]
  
  \[ \text{:::} \text{CRLF} \]
  
  \[ \text{:::} \text{CRLF} \]
  
  \[ \text{:::} \text{CRLF} \]
  
  \[ \text{EN}\text{CRLF} \]

**Binary Output**

**Conceptual Diagram**

- **EB\text{CRLF}** 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 Value**

For the output format of various data types, see section 4.3.

**Data Sum**

The sum value of the binary data.

**Note**

The data length of the binary header section is output according to the byte order specified with the BO command.
4.1 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>END</td>
<td>Middle</td>
<td>End</td>
<td>In the middle or at the end of the continuous data</td>
</tr>
</tbody>
</table>

- When the BO flag is “0,” the high byte is output first. When the BO flag is “1,” the low byte 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. 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.
- If the amount of data output in response to a ME/MO command is large, not all the data may be returned in one output request (parameter GET). In this case the END flag becomes 0. You must send output requests (parameter NEXT) to receive the rest of the data until the END flag becomes 1.
- The bits that have “•” for the name and flag are not used. The value is undefined.

ID

An ID number indicating the binary data type. The table below indicates the data types and the corresponding output commands. Binary data that is not indicated in the above table is considered undefined files.

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Binary Data Type</th>
<th>Type</th>
<th>Format</th>
<th>Output Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Undefined file</td>
<td>file (<em>.</em> )</td>
<td>–</td>
<td>ME</td>
</tr>
<tr>
<td>1</td>
<td>Instantaneous data</td>
<td>Data</td>
<td>Yes</td>
<td>FD</td>
</tr>
<tr>
<td>1</td>
<td>FIFO data</td>
<td>Data</td>
<td>Yes</td>
<td>FF</td>
</tr>
<tr>
<td>13</td>
<td>Screen data file</td>
<td>File (* .PNG)</td>
<td>–</td>
<td>ME, FC</td>
</tr>
<tr>
<td>15</td>
<td>Display data file</td>
<td>File (* .DAD)</td>
<td>No</td>
<td>ME</td>
</tr>
<tr>
<td>16</td>
<td>Event data file</td>
<td>File (* .DAE)</td>
<td>No</td>
<td>ME</td>
</tr>
<tr>
<td>17</td>
<td>Manual sample file</td>
<td>File (* .DAM)</td>
<td>Yes</td>
<td>ME, MO</td>
</tr>
<tr>
<td>18</td>
<td>Report file</td>
<td>File (* .DAR)</td>
<td>Yes</td>
<td>ME, MO</td>
</tr>
<tr>
<td>19</td>
<td>Setup data file</td>
<td>File (* .PDL)</td>
<td>No</td>
<td>ME, FE4</td>
</tr>
<tr>
<td>25</td>
<td>Setup channel information output</td>
<td>Data</td>
<td>Yes</td>
<td>FE5</td>
</tr>
<tr>
<td>26</td>
<td>Configured alarm information output</td>
<td>Data</td>
<td>Yes</td>
<td>FE6</td>
</tr>
<tr>
<td>31</td>
<td>Display data file</td>
<td>File (* .DSD)</td>
<td>No</td>
<td>ME</td>
</tr>
<tr>
<td>32</td>
<td>Event data file</td>
<td>File (* .DSE)</td>
<td>No</td>
<td>ME</td>
</tr>
<tr>
<td>33</td>
<td>Setup data file</td>
<td>File (* .PEL)</td>
<td>No</td>
<td>ME, FE4</td>
</tr>
<tr>
<td>34</td>
<td>Change settings log file</td>
<td>File (* .TXT)</td>
<td>–</td>
<td>ME</td>
</tr>
<tr>
<td>35</td>
<td>Report file (for a report template)</td>
<td>File (* .xml)</td>
<td>–</td>
<td>ME</td>
</tr>
</tbody>
</table>

*1 Advanced security (IAS1 option)
*2 Release numbers 4 and later

Yes: Disclosed. No: Undisclosed. –: Common format.
- The table above shows the different types of binary data.
- Binary data comes in two types, data and file.
- **Data**
  - Measured/computed data can be output using the FD command.
  - FIFO data can be output using the FF command.
  - The data format is disclosed. See section 4.3.
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 the binary data.

If the data length of the buffer is odd, a zero 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)
 *
 * Parameter buff: Pointer to the top of the data on which the sum is calculated
 * len: Length of the data on which the sum is calculated
 * Returned value: Calculated sum
 */

int cksum(unsigned char *buff, int len)
{
    unsigned short *p; /* Pointer to the next two-byte data word in the buffer that is to be summed. */
    unsigned int csum; /* Checksum value */
    int i;
    int odd;
    csum = 0; /* Initialize. */
    odd = len%2; /* Check whether the number of data points is even. */
    len >>= 1; /* Determine the number of data points using a “short” data type. */
    p = (unsigned short *)buff;
    for(i=0;i<len;i++) /* Sum using an unsigned short data type. */
        csum += *p++;
```
if (odd)
    /* When the data length is odd */
    union tmp
        /* Pad with a 0, and add to the unsigned short data */
    {
        unsigned short s;
        unsigned char c[2];
    } tmp;
    tmp.c[1] = 0;
    tmp.c[0] = *((unsigned char*)p);
    csum += tmp.s;
}
if ((csum = (csum & 0xffff) + ((csum>>16) & 0xffff)) != 0xffff)
    /* Add the overflowed digits */
    csum = csum - 0xffff;
    /* If the digit overflows again, add a 1 */
    return((-csum) & 0xffff); /* bit inversion */

RS-422/485 Dedicated Responses

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

<table>
<thead>
<tr>
<th>Command Syntax</th>
<th>Meaning</th>
<th>Response</th>
</tr>
</thead>
</table>
| ESC Oxx CRLF   | Opens the device. | • Response from the device with the specified address ESC Oxx CRLF
|                |         | • No response when the device with the specified address does not exist* |
| ESC Cxx CRLF   | Closes the instrument. | • Response from the device with the specified address ESC Cxx CRLF
|                |         | • No response when the device with the specified address does not exist* |

* Some of the possible reasons that cause the condition in which the device with the specified address cannot be found are a command error, the address not matching that of the device, the device is not turned ON, and the device not being connected via the serial interface.

• The "xx" in the table indicates the device address. Specify the address that is assigned to the instrument from 01 to 99.
• Only one device can be opened at any given time.
• When a device is opened with the ESC O command, all commands on the device become active.
• When a device is opened with the ESC O command, any other device that is open is automatically closed.
• Normally, either CR+LF or LF can be used as a terminator for communication commands. However, the terminator for these commands must be set to CR+LF.

**Note**

• The ASCII code of ESC is 1BH. See appendix 3.
4.2 Output Format of ASCII Data

The following types of ASCII data are available. The format for each type is described in this section. The table below indicates the data types and the corresponding output commands.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Corresponding Output Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting data/basic setting data</td>
<td>FE0, FE2</td>
</tr>
<tr>
<td>Decimal position/unit information</td>
<td>FE1</td>
</tr>
<tr>
<td>Measured, computed, and external input data</td>
<td>FD0</td>
</tr>
<tr>
<td>Communication log</td>
<td>FLCOM</td>
</tr>
<tr>
<td>FTP client log</td>
<td>FLFTPC</td>
</tr>
<tr>
<td>Operation error log</td>
<td>FLERR</td>
</tr>
<tr>
<td>Login log</td>
<td>FLLOGIN</td>
</tr>
<tr>
<td>Operation log (/AS1 option)</td>
<td>FI</td>
</tr>
<tr>
<td>Web operation log</td>
<td>FLWEB</td>
</tr>
<tr>
<td>E-mail log</td>
<td>FLEMAIL</td>
</tr>
<tr>
<td>SNTP access log</td>
<td>FLSNTP</td>
</tr>
<tr>
<td>DHCP access log</td>
<td>FLDHCP</td>
</tr>
<tr>
<td>Modbus communication log</td>
<td>FMLMODBUS</td>
</tr>
<tr>
<td>Alarm summary</td>
<td>FLALARM</td>
</tr>
<tr>
<td>Message summary</td>
<td>FMLMSG</td>
</tr>
<tr>
<td>Change settings log (/AS1 option)</td>
<td>FLSYSTEMING</td>
</tr>
<tr>
<td>Status information</td>
<td>ISO, ISI</td>
</tr>
<tr>
<td>Ethernet information</td>
<td>FAIP</td>
</tr>
<tr>
<td>File list</td>
<td>MEDIR</td>
</tr>
<tr>
<td>Check disk</td>
<td>MECHKDSK</td>
</tr>
<tr>
<td>Manual sampled/report data information</td>
<td>MODIR</td>
</tr>
<tr>
<td>User information</td>
<td>FU0, FU1</td>
</tr>
<tr>
<td>Event level switch status (Release number 3 or later)</td>
<td>FD7</td>
</tr>
</tbody>
</table>

**Note**

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

Setting Data/Basic Setting Data

- The FE command is used to output the data.
- The setting/basic setting data is output in the order of the listed commands in the table in section 3.2, “A List of Commands.” However, the setting information for the following commands is not output.

  - **Setting commands (setting)**
    SD/FR command
  - **Setting commands (control)**
    All commands from BT to IR
  - **Basic setting commands**
    XE, YO, YE, and YC commands

- The output format of the setting/basic setting data conforms to the syntax of each command.
- Some commands are output in multiple lines. (Example: Commands that are specified for each channel.)

- **Syntax**
  The two-character command name and the subsequent parameters are output in the following syntax.

  ```
  EA
  CRLF
  ttssssssCRLF
  ................
  EN
  CRLF
  ```
4.2 Output Format of ASCII Data

**tt** Command name (SR, SA..., XA, XI...)

**sss...s** Setting/basic setting data (variable length, one line)

- **Example**
  
  EA
  
  SR001,VOLT,20mV,0,20
  SR002,VOLT,20mV,0,20
  
  .....................
  
  EN

**Decimal Point Position/Unit Information**

- The FE command is used to output the data.
- You can use the CB command to specify whether to output the data of measurement channels set to skip and computation channels set to OFF.

- **Syntax**
  
  The data is output for each channel in the following syntax.
  
  EA CRLF
  sccccuuuuuu,ppCRLF
  
  ENCRLF

  **s** Data status (N, D, or S)
  
  N: Normal
  
  D: Differential input
  
  S: Skip (When the measurement range is set to SKIP for a measurement channel or when the channel is turned OFF for a computation channel)

  **ccc** Channel number (3 digits)
  
  001 to 048: Measurement channel
  
  101 to 160: Computation channel
  
  201 to 440: External input channel

  **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 (00000) 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.

  _ Space

- **Example**
  
  EA
  
  N 001mV ,01
  N 002mV ,01
  
  EN
4.2 Output Format of ASCII Data

Measured, computed, and external input data

- The FD command is used to output the data.
- You can use the CB command to specify whether to output the data of measurement channels set to skip and computation channels set to OFF.

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

  EA
  CRLF
  DATE_yy/mo/dd
  CRLF
  TIME_hh:mm:ss.mmmt
  CRLF
  s_ccca1a2a3a4uuuuuuudddddE-pp
  CRLF
  .....................
  EN
  CRLF

- yy
  Year (00 to 99)

- mo
  Month (01 to 12)

- dd
  Day (01 to 31)

- hh
  Hour (00 to 23)

- mm
  Minute (00 to 59)

- ss
  Second (00 to 59)

- mmm
  Millisecond (000 to 999. A period is placed between seconds and milliseconds.)

- t
  Reserved (Space.)

- s
  Data status (N, D, S, O, E, or B)
  N: Normal
  D: Differential input
  S: Skip
  O: Over
  E: Error
  B: Burnout

- ccc
  Channel number (3 digits)
  001 to 048: Measurement channel
  101 to 160: Computation channel
  201 to 440: External input channel

- a1a2a3a4
  Alarm status (level 1)
  a2
  Alarm status (level 2)
  a3
  Alarm status (level 3)
  a4
  Alarm status (level 4)
  (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
  xxxxxxx: (User-defined character string)

- f
  Sign (+, -)
4.2 Output Format of ASCII Data

`dddd` Mantissa (00000 to 99999, 5 digits)
- Eight digits for computed data.
- For abnormal data (data status is E) or data of which the mantissa or the exponent exceeds the range (data status is O), the mantissa is set to 99999 (99999999 for computed data).

`pp` Exponent (00 to 04)
- Space

- **Example**

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

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

**Relay Status and Internal Switch Status**
The FD command is used to output the DO status and internal switch status.

- **Syntax**

  EA
  I01-I06:aaaaaaCRLF
  I11-I16:aaaaaaCRLF
  I21-I26:aaaaaaCRLF
  I31-I36:aaaaaaCRLF
  S01-S30:aaa···CRLF
  EN

  aaa··· Indicates the relay statuses in ascending order by relay number from the left.
  1: Relay ON
  0: Relay OFF
  -: Relay not installed

- **Example 1**

  When relays I01 to I04 are ON, and I05 and I06 are not installed (for the DX1000).

  EA
  I01-I06:1111--
  I11-I16:------
  I21-I26:------
  I31-I36:------
  S01-S30:00000000000000000000000000000000
  EN
4.2 Output Format of ASCII Data

Communication Log

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

- Syntax

```plaintext
EA\r\nyy/mo/dd hh:mm:ss n_uuu···ufd_mmm···m\r\n ........................................
EN\r
```

- **yy** Year (00 to 99)
- **mo** Month (01 to 12)
- **dd** Day (01 to 31)
- **hh** Hour (00 to 23)
- **mm** Minute (00 to 59)
- **ss** Second (00 to 59)
- **n** Connection ID. A number used to identify the user that is connected.
  - 0: Serial
  - 1 to 3: Ethernet
- **uuu···u** User name (up to 20 characters)
- **f** Multiple command flag
  - Space: Single
  - *: Multiple
  (If multiple commands are separated by sub delimiters and output at once, "**" is displayed. The multiple commands are divided at each sub delimiter and stored as individual logs (1 log for 1 command and 1 log for 1 response.)
- **d** Input/Output
  - >: Input
  - <: Output
- **mmm···m** Message (up to 20 characters)
  - The communication log contains only the error number and not the error message section.
  - Normally, the transfer data are transmitted as they are, but in some cases, a special message is output. The special messages are shown below.

Reception

- **(Over length)**: Command length exceeded.
- **(Over number)**: Number of commands exceeded.
- **(Serial error)**: Received an error character through serial communications.
4.2 Output Format of ASCII Data

Transmission

(ddd byte): Data output (where ddd is the number of data values)
(Login): Login
(Logout): Logout
(Disconnected): Forced disconnection (occurs when the connection was disconnected when transmitting data using Ethernet).
(Time out): Timeout, keepalive, TCP retransmission, etc.
E1 nnn: Single negative response (where nnn is the error number)
E2 ee:nnn: Multiple negative response (where ee is the error position and nnn is the error number)

Advanced security (/AS1 option)
- The parameters of commands whose parameters include the user password (EK, EL, EJ, and LL) are not output.
- Commands performed through the barcode protocol are not logged in the communication log (operations performed through the barcode protocol are logged in the operation log).

Example
The following example shows the log when multiple commands separated by sub delimiters, "BO1;???:PS0," are transmitted. The commands are separated and output in order with the multiple command flags "."

```
EA
99/05/11 12:31:11 1 12345678901234567890*: BO1
99/05/11 12:31:11 1 12345678901234567890*< E0
99/05/11 12:31:11 1 12345678901234567890*: ???
99/05/11 12:31:11 1 12345678901234567890*< E2 01:124
99/05/11 12:31:11 1 12345678901234567890*: PS0
99/05/11 12:31:11 1 12345678901234567890*< E0
EN
```
FTP Client Log

• The FL command is used to output the data.
• The FTP client log is output. Up to 50 file transfer logs are retained. Logs that exceed 50 are cleared from the oldest data.
• For the meanings of the error codes, see the DX1000/DX2000 User's Manual (IM04L41B01-01E or IM04L42B01-01E).

• Syntax

  EA
  CRLF
  yy/mo/dd hh:mm:ss nnn_xxxxxxxxx_k_ffffffff_···
  CRLF
  ..........................
  EN
  CRLF

  yy  Year (00 to 99)
  mo  Month (01 to 12)
  dd  Day (01 to 31)
  hh  Hour (00 to 23)
  mm  Minute (00 to 59)
  ss  Second (00 to 59)
  nnn  Error code (001 to 999)
  xxxxxxxxx  Detailed code (9 characters)
  k  Server type ( P, S)
      P: Primary
      S: Secondary
  fff...  File name (up to 51 characters including the extension)
          Space

• Example

  EA
  99/07/26 10:00:00  P display.dsp
  99/07/27 10:00:00  P setting.pnl
  99/07/28 10:00:00 123 HOSTADDR P trend.png
  EN
Operation Error Log

- The FL command is used to output the data.
- The operation error log is output. Up to 50 operation error logs are retained. Logs that exceed 50 are cleared from the oldest data.
- Other communication messages (400 to 999) and status messages (500 to 599) are not output.
- For the meanings of the error codes, see the DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E).

- Syntax

  EA
  CRLF
  yy/mo/dd hh:mm:ss nnn_uuu···u CRLF
  ······························· CRLF
  EN

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

- Example

  EA
  99/05/11 12:20:00 212“Range setting error”
  99/05/11 12:30:00 217“Media access error”

  EN
Login Log

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

**Syntax**

```
EA CRLF
yy/mo/dd hh:mm:ss_xxxxxxxxxx_nnn_uuu···u CRLF
```

```
EN CRLF
```

- **yy** Year (00 to 99)
- **mo** Month (01 to 12)
- **dd** Day (01 to 31)
- **hh** Hour (00 to 23)
- **mm** Minute (00 to 59)
- **ss** Second (00 to 59)
- **xxxxxxxxxx** Login history is output left-justified.
  - **Login:** Login
  - **Logout:** Logout
  - **NewTime:** New time
  - **TimeChg:** Time change
  - **PowerOff:** Power Off
  - **PowerOn:** Power On
  - **TRevStart:** Start of gradual time adjustment
  - **TRevEnd:** End of gradual time adjustment
  - **TimeDST:** Switching of the daylight savings time
  - **SNTPtimset:** Time change by SNTP
  - **CCSetEnd:** Completion of calibration correction
  - **CCExpire:** Passing of the calibration due date
- **nnn** Operation property
  - **KEY:** Key operation
  - **COM:** Communication
  - **REM:** Remote
  - **ACT:** Event action
  - **SYS:** System
- **uuu···u** User name (up to 20 characters)
  - **_** Space

**Example**

```
EA
99/05/11 12:20:00 Login KEY administrator
99/05/11 12:30:00 Logout KEY administrator
99/05/11 12:20:00 Login COM user
99/05/11 12:30:00 Logout COM user
EN
```
Operation Log (/AS1 option)

- The operation log is output by the FL command.
- An operation history is output. Up to the most recent 100 log items can be output.

- Syntax
  
  EACRLF
  
  `yy/mo/dd_hh:mm:ss_xxxxxxxxxx_nnn_uuu•••u_ddd•••dCRLF`
  
  ENCRLF
  
  `yy    Year (00 to 99)`
  `mo    Month (01 to 12)`
  `dd    Day (1 to 31)`
  `hh    Hour (00 to 23)`
  `mm    Minute (00 to 59)`
  `ss    Second (00 to 59)`
  `xxxxxxxxxx  The operation. It is left justified.`
  `nnn    Operation type`
  
  `KEY:   Key operation`
  `COM:   Communication operation (includes serial and Modbus communication)`
  `REM:   Remote operation`
  `ACT:   Event action`
  `SYS:   System operation`
  `uuu•••u  User name (20 characters)`
  `ddd•••d  Detailed information`
  

- Example
  
  EA
  1  99/05/11 12:20:00 AlarmACK  KEY yoshino
  2  99/05/11 12:30:00 ChgPasswd  KEY tsuchiya
  3  01/06/11 10:00:00 TimeAdj  REM tsuchiya
  4  01/06/12 12:30:00 MathStart  KEY uchiyama
  5  01/06/13 12:30:00 MathStop  KEY uchiyama
  6  01/06/14 12:30:00 Message  KEY uchiyama
  7  01/06/15 12:30:00 MathStart  KEY tsuchiya
  8  01/06/16 12:30:00 MathStop  KEY tsuchiya
  EN

In response to the command “FI0,yoshino;tsuchiya,,10,” 1, 2, 3, 7, and 8 are output.
In response to the command “FI0,,MathStart;MathStop,10,” 4, 5, 7, and 8 are output.
In response to the command “FI0,,MathStart;MathStop,2,” 7 and 8 are output.
In response to the command “FI0,uchiyama,MathStart,10,” 4 is output.
In response to the command “FI0,,MathStart,1,” 7 is output.
Web Operation Log

- The FL command is used to output the data.
- The log of operations on the Web screen is output. Up to 50 operations are retained. Logs that exceed 50 are cleared from the oldest data.

**Syntax**

```
EA
CRLF
yy/mo/dd_hh:mm:ss_ffffff_eee_???
CRLF
CRLF
```

**EN**

```
CRLF
yy
 Year (00 to 99)
mo
 Month (01 to 12)
dd
 Day (01 to 31)
hh
 Hour (00 to 23)
mm
 Minute (00 to 59)
ss
 Second (00 to 59)
ffffff Requested operation
```

- **SCREEN:** Screen change
- **KEY:** Key operation
- **MSG:** Message assignment/write
- **SEARCH:** View data by searching
- **BATCH:** Batch switch

```
eee
 Error code when executing the requested operation
```

- All spaces: Success
- 001 to 999: Failure (error code)

- **???···??** Parameter for each event (see below)

- **When $ffffff = \text{SCREEN}**
  
  ```
  yy/mo/dd_hh:mm:ss_ffffff_eee_dddddd_nnCRLF
  dddddd Screen type
  TREND: Trend display
  DIGIT: Digital display
  BAR: Bar graph display
  HIST: Historical trend display
  OV: Overview display
  nn Group number (01 to 36)
  ```

- **When $ffffff = \text{KEY}**
  
  ```
  yy/mo/dd_hh:mm:ss_ffffff_eee_kkkkkCRLF
  kkkkk Type of key that was operated
  DISP: DISP/ENTER key
  UP: Up key
  DOWN: Down key
  LEFT: Left key
  RIGHT: Right key
  FAVOR: Favorite key
  ```

- **When $ffffff = \text{MSG}**
  
  ```
  yy/mo/dd_hh:mm:ss_ffffff_eee_mmm···mCRLF
  mmmm···m Message (up to 32 characters)
  ```
4.2 Output Format of ASCII Data

- When $fffff = \text{SEARCH}$
  
  $yy/0d/dd_hh:mm:ss_fffff___ee_ddddCRLF$

  $ddddd$  Data search method

  $TIME$: Time designation

- When $fffff = \text{BATCH}$
  
  $yy/0d/dd_hh:mm:ss_fffff___ee_nnCRLF$

  $nn$  Batch group number (00 to 12)

  00  Batch overview mode screen

  01 to 12  Batch group number

  Space

- Example

  EA

  01/02/11 12:20:00 SCREEN 275 TREND 01
  01/02/11 12:21:00 SCREEN  BAR
  01/02/11 12:30:00 KEY   UP
  01/02/11 12:31:00 KEY   RIGHT
  01/02/11 12:40:00 MSG   Hello-Hello

  EN
4.2 Output Format of ASCII Data

E-mail Log

- The FL command is used to output the data.
- The e-mail transmission log is output. Up to 50 operations are retained. Logs that exceed 50 are cleared from the oldest data.

**Syntax**

```
EA
yy/mo/dd hh:mm:ss_ffffff_eee_n_uuu

EN
```

**yy** Year (00 to 99)

**mo** Month (01 to 12)

**dd** Day (01 to 31)

**hh** Hour (00 to 23)

**mm** Minute (00 to 59)

**ss** Second (00 to 59)

**ffffff** E-mail type

| ALARM:      | Alarm mail                      |
| TIME:       | Scheduled mail                  |
| REPORT:     | Report timeout mail             |
| FAIL:       | Power failure recovery mail     |
| FULL:       | Memory full mail                |
| TEST:       | Test mail                       |
| ERROR:      | Error message mail              |
| PASSWD:     | Invalid user mail               |

**eee** Error code

| All spaces:  | Success                      |
| 001 to 999:  | Error code                  |

**n** Recipient list

1: List 1

2: List 2

+: List 1 and list 2

**uuuu...u** Series of recipient e-mail addresses (up to 30 characters)

**_** Space

**Example**

When list 1 is “user1@daqstation.com user2@daqmaster.com” and list 2 is “adv1@daqmaster.com adv2@daqstation.com”

```
EA
01/05/11 12:20:00 ALARM + user1 user2 adv adv2
01/05/11 12:30:00 REPORT 375 1 user1 user2
```

EN
SNTP Log

- The FL command is used to output the data.
- The SNTP log is output. Up to 50 accesses to the SNTP server are retained.

**Syntax**

```
EA
yy/mo/dd hh:mm:ss nnn xxxxxxxxxx
CRLF

yy: Year (00 to 99)
m: Month (01 to 12)
d: Day (01 to 31)
h: Hour (00 to 23)
m: Minute (00 to 59)
s: Second (00 to 59)
nn: Error number (000 to 999)
```

```
xxxxxxxxxxx Detailed code (9 characters)
SUCCESS: Success
OVER: Over the limit
DORMANT: Internal processing error
HOSTNAME: Failed to look up the host name
TCPIP: Internal processing error
SEND: Failed to send the request
TIMEOUT: A response timeout occurred
BROKEN: Packet was corrupt
LINK: The data link is disconnected
```

**Example**

```
EA
01/05/11 12:20:00 SUCCESS
01/05/11 12:21:00 SUCCESS
01/05/11 12:30:00 292 HOSTNAME
EN
```
DHCP Log

- The FL command is used to output the data.
- The DHCP log is output. Up to 50 accesses to the DHCP server are retained.

**Syntax**

```
EA
CRLF
yy/mo/dd_hh:mm:ss_nnn_xxxxxxxxxx
CRLF

------------------------------
EN
```

- `yy`: Year (00 to 99)
- `mo`: Month (01 to 12)
- `dd`: Day (01 to 31)
- `hh`: Hour (00 to 23)
- `mm`: Minute (00 to 59)
- `ss`: Second (00 to 59)
- `nnn`: Error number (000 to 999)

Description given in the table.

`xxxxxxxxx`: Detailed code (9 characters)

Description given in the table.

- `_`: Space

The table below shows the contents of the log during normal operation.

<table>
<thead>
<tr>
<th>Error Number</th>
<th>Detail Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>562</td>
<td>ON</td>
<td>Detected that an Ethernet cable was connected.</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>Detected that an Ethernet cable was disconnected.</td>
</tr>
<tr>
<td>563</td>
<td>RENEW</td>
<td>Requesting address renewal to the DHCP server.</td>
</tr>
<tr>
<td></td>
<td>RELEASE</td>
<td>Requesting address release to the DHCP server.</td>
</tr>
<tr>
<td>564</td>
<td>RENEVED</td>
<td>Address renewal complete.</td>
</tr>
<tr>
<td></td>
<td>EXTENDED</td>
<td>Address release extension request complete.</td>
</tr>
<tr>
<td></td>
<td>RELEASED</td>
<td>Address release complete.</td>
</tr>
<tr>
<td>565</td>
<td>IPCONFIG</td>
<td>IP address configured.</td>
</tr>
<tr>
<td>566</td>
<td>NOREQUEST</td>
<td>Configured not to register the host name.</td>
</tr>
<tr>
<td>567</td>
<td>UPDATE</td>
<td>Registered the host name to the DNS server.</td>
</tr>
<tr>
<td>568</td>
<td>REMOVE</td>
<td>Removed the host name from the DNS server.</td>
</tr>
</tbody>
</table>
The table below shows the contents of the log during erroneous operation.

<table>
<thead>
<tr>
<th>Error Number</th>
<th>Detail Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>295</td>
<td>REJECT</td>
<td>Address obtained by DHCP is inappropriate.</td>
</tr>
<tr>
<td>296</td>
<td>ESEND</td>
<td>Failed to send to the DHCP server.</td>
</tr>
<tr>
<td></td>
<td>ESERVER</td>
<td>DHCP server not found</td>
</tr>
<tr>
<td></td>
<td>ESENVFAIL</td>
<td>No response from the DHCP server.</td>
</tr>
<tr>
<td></td>
<td>ERENEWED</td>
<td>Address renewal rejected by the DHCP server.</td>
</tr>
<tr>
<td></td>
<td>EEEXTENDED</td>
<td>Address lease extension request rejected by the DHCP server.</td>
</tr>
<tr>
<td>297</td>
<td>INTERNAL</td>
<td>Host name registration failure (transmission error, reception timeout, etc.)</td>
</tr>
<tr>
<td></td>
<td>FORMERR</td>
<td>Host name registration failure (format error: DNS message syntax error)</td>
</tr>
<tr>
<td></td>
<td>SERVFAIL</td>
<td>Host name registration failure (server failure: DNS server processing error)</td>
</tr>
<tr>
<td></td>
<td>NXDOMAIN</td>
<td>Host name registration rejection (non existent domain)</td>
</tr>
<tr>
<td></td>
<td>NOTIMP</td>
<td>Host name registration rejected (not implemented)</td>
</tr>
<tr>
<td></td>
<td>REFUSED</td>
<td>Host name registration rejected (operation refused)</td>
</tr>
<tr>
<td></td>
<td>YXDOMAIN</td>
<td>Host name registration rejected (name exists)</td>
</tr>
<tr>
<td></td>
<td>YXRRSET</td>
<td>Host name registration rejected (RR set exists)</td>
</tr>
<tr>
<td></td>
<td>NXRRSET</td>
<td>Host name registration rejected (RR set does not exist)</td>
</tr>
<tr>
<td></td>
<td>NOTAUTH</td>
<td>Host name registration rejection (not authoritative for zone)</td>
</tr>
<tr>
<td></td>
<td>NOTZONE</td>
<td>Host name registration rejection (different from zone section)</td>
</tr>
<tr>
<td></td>
<td>NONAME</td>
<td>Host name not entered on the DX.</td>
</tr>
<tr>
<td>298</td>
<td>INTERNAL</td>
<td>Host name removal failure (transmission error, reception timeout, etc.)</td>
</tr>
<tr>
<td></td>
<td>FORMERR</td>
<td>Host name removal failure (format error: DNS message syntax error)</td>
</tr>
<tr>
<td></td>
<td>SERVFAIL</td>
<td>Host name removal failure (server failure: DNS server processing error)</td>
</tr>
<tr>
<td></td>
<td>NXDOMAIN</td>
<td>Host name removal rejection (non existent domain)</td>
</tr>
<tr>
<td></td>
<td>NOTIMP</td>
<td>Host name removal rejected (not implemented)</td>
</tr>
<tr>
<td></td>
<td>REFUSED</td>
<td>Host name removal rejected (operation refused)</td>
</tr>
<tr>
<td></td>
<td>YXDOMAIN</td>
<td>Host name removal rejected (name exists)</td>
</tr>
<tr>
<td></td>
<td>YXRRSET</td>
<td>Host name removal rejected (RR set exists)</td>
</tr>
<tr>
<td></td>
<td>NXRRSET</td>
<td>Host name removal rejected (RR set does not exist)</td>
</tr>
<tr>
<td></td>
<td>NOTAUTH</td>
<td>Host name removal rejection (not authoritative for zone)</td>
</tr>
<tr>
<td></td>
<td>NOTZONE</td>
<td>Host name removal rejection (different from zone section)</td>
</tr>
<tr>
<td></td>
<td>NOTLINKED</td>
<td>Physical layer was disconnected when removing the host name.</td>
</tr>
</tbody>
</table>

**Example**

EA  
01/05/11 12:20:00 563 RENEW  
01/05/11 12:20:01 564 RENEWED  
01/05/11 12:20:01 565 IPCONFIG  
01/05/11 12:21:02 567 UPDATE  
EN
Modbus Communication Log

- The FL command is used to output the data.
- The Modbus communication log is output. Up to 50 Modbus communication events are retained.

**Syntax**

```
EA
yy/mo/dd hh:mm:ss_c_xxxxxxx_kkkk_nn_dCRLF
```

**Example**

```
EA
01/05/11 12:20:00 C DROPOUT
01/05/11 12:21:00 C READY NONE 01 R
01/05/11 12:25:00 C HALT NONE 01 R
EN
```
### Alarm Summary

- The FL command is used to output the data.
- The alarm summary is output. Up to 1000 alarm events are retained. Alarm events that exceed 1000 are cleared from the oldest data.

#### Syntax

```
EA CRLF
yy/mo/dd_hh:mm:ss_kkk_ccc_ls_nnnnnnnnnnCRLF
.........................
EN CRLF
```

**yy/mo/dd hh:mm:ss**  Time when the alarm occurred

- **yy**  Year (00 to 99)
- **mo**  Month (01 to 12)
- **dd**  Day (01 to 31)
- **hh**  Hour (00 to 23)
- **mm**  Minute (00 to 59)
- **ss**  Second (00 to 59)
- **kkk**  Alarm cause
  - OFF:  Alarm release
  - ON:  Alarm occurrence
  - ACK:  Alarm acknowledge
- **ccc**  Measurement, computation, or external input channel number
- **1**  Alarm level (1 to 4)
- **s**  Alarm type (H, h, L, l, R, r, T, or t)
- **nnnnnnnnn**  Alarm sequence
- **_**  Space

For all-channel alarms, the channel number, alarm level, and alarm status items are all set to asterisk.
The channel numbers and alarm levels of individual alarm acknowledgments are logged.

#### Example

```
EA
01/05/11 12:20:00 ON 001 1L 1
01/05/11 12:30:00 OFF 131 3t 2
01/05/11 12:31:00 OFF *** ** 2
01/05/11 12:32:00 ACK 4
EN
```
Message Summary

- The FL command is used to output the data.
- The message summary is output. Up to 100 messages are retained. Messages that exceed 100 are cleared from the oldest log.

**Syntax**

```
EA
yy/mo/dd_hh:mm:ss_mmm···_ggg···_zzz_uuu···_nnn···CRLF
CRLF
```

**Example**

```
01/05/11 12:20:00 operation-start 01,02,03,04 KEY admin 11
01/05/11 12:20:00 operation-start 01,02 KEY admin 11
01/05/11 12:20:00*0123456789abcdefg 01,02,03,04 KEY admin 12
EN
```
4.2 Output Format of ASCII Data

Change Settings Log (/AS1 option)

- The change settings log is output by the FLSETTING command.

- **Syntax**
  
  EACRLF
  
  \[yy/mm/dd hh:mm:ss_ffffffff_zzz_uuuuuuuuuuuuuuuuuuu_xxxxxxxxxx\]
  
  CRLF
  
  ****************************

  **ENCRLF**
  
  \[yy\]
  
  Year (00 to 99)
  
  \[mo\]
  
  Month (01 to 12)
  
  \[dd\]
  
  Day (1 to 31)
  
  \[hh\]
  
  Hour (00 to 23)
  
  \[mm\]
  
  Minute (00 to 59)
  
  \[ss\]
  
  Second (00 to 59)

  \[ffffffff\]
  
  File name (no extension, 8 characters)

  \[zzz\]
  
  Operation type

  KEY Key operation

  COM Communication operation

  \[uuuu...\]
  
  User name (20 characters)

  \[xxxxxxxxxx\]
  
  File serial number (10 characters)

- **Example**

  **EA**

  09/08/12 11:07:00 81211079 KEY Admin678901234567890 1234567890

  09/08/12 11:07:00 81211069 KEY Admin678901234567890 123
4.2 Output Format of ASCII Data

Status Information

- The IS command is used to output the data. The output format varies between IS0 and IS1.
- The operation status of the recorder is output.
- For details on the status information, see section 5.2, “The Bit Structure of the Status Information.”

Output for the IS0 command

**Syntax**

EA
CRLF
aaa.bbb.ccc.ddd
CRLF
EN
CRLF

<table>
<thead>
<tr>
<th></th>
<th>Status information 1 (000 to 255)</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa</td>
<td>Status information 1 (000 to 255)</td>
</tr>
<tr>
<td>bbb</td>
<td>Status information 2 (000 to 255)</td>
</tr>
<tr>
<td>ccc</td>
<td>Status information 3 (000 to 255)</td>
</tr>
<tr>
<td>ddd</td>
<td>Status information 4 (000 to 255)</td>
</tr>
</tbody>
</table>

**Example**

EA
000.000.032.000
EN

Output for the IS1 Command

**Syntax**

EA
CRLF
aaa.bbb.ccc.ddd.eee.fff.ggg.hhh
CRLF
EN
CRLF

<table>
<thead>
<tr>
<th></th>
<th>Status information 1 (000 to 255)</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa</td>
<td>Status information 1 (000 to 255)</td>
</tr>
<tr>
<td>bbb</td>
<td>Status information 2 (000 to 255)</td>
</tr>
<tr>
<td>ccc</td>
<td>Status information 3 (000 to 255)</td>
</tr>
<tr>
<td>ddd</td>
<td>Status information 4 (000 to 255)</td>
</tr>
<tr>
<td>eee</td>
<td>Status information 5 (000 to 255)</td>
</tr>
<tr>
<td>fff</td>
<td>Status information 6 (000 to 255)</td>
</tr>
<tr>
<td>ggg</td>
<td>Status information 7 (000 to 255)</td>
</tr>
<tr>
<td>hhh</td>
<td>Status information 8 (000 to 255)</td>
</tr>
</tbody>
</table>

**Example**

EA
000.000.032.000.000.000.000.000
EN

- Status information 3, 4, 7, and 8 are edge operation. They are cleared when read by the IS command.
- Status information 1, 2, 5, and 6 are level operation. They are not cleared when read. They are cleared when the event clears.
- The status information is made up of bits that correspond to each event. Each bit can be turned ON/OFF with a filter.
- If an event occurs for a bit set to OFF by the filter, status information 3, 4, 7, and 8 discard the event. Status information 1, 2, 5, and 6 hold the event.
- The default filter setting is all ON.
Ethernet Information

- The FA command is used to output the data.

- Syntax

  `EA<CRLF>
  IP_Address______:xxx.xxx.xxx.xxx<CRLF>
  Subnet_mask______:xxx.xxx.xxx.xxx<CRLF>
  Default_Gateway__:xxx.xxx.xxx.xxx<CRLF>
  Primary_DNS______:xxx.xxx.xxx.xxx<CRLF>
  Secondary_DNS___:xxx.xxx.xxx.xxx<CRLF>
  Host____________:yyy······<CRLF>
  Domain__________:zzz······<CRLF>
  EN<CRLF>

  xxx        IP address number (000 to 255)
  yyy······  Host name (up to 64 characters)
  zzz······  Domain name (up to 64 characters)
4.2 Output Format of ASCII Data

File List

- The ME command is used to output the data.
- The file sizes and a list of files from the specified directory in the external storage medium or internal memory are output.

**Syntax**

```
EACRLF
yy/mo/dd_hh:mm:ssssssss_fff•••_n_xxx•••CRLF
```

```
yy       Year (00 to 99)
mo       Month (01 to 12)
dd       Day (01 to 31)
hh       Hour (00 to 23)
mm       Minute (00 to 59)
ss       Second (00 to 59)
ssssssss Data size of the file (_______0 to 99999999) [byte(s)]
fff•••    File name (51 characters including the extension. If it is less than 51, spaces are entered.)
          If this is a directory, the characters <DIR> are shown at the position displaying the file data size.

n       Batch group number (0, A to H, J to M)
          0: No multi batch
          A to H: Batch group number 1 to 8
          J to M: Batch group number 9 to 12

xxx•••   Data serial number (16-digit hexadecimal)
          _ Space
```

The "." and "." directories are not output. The batch group number and data serial number are included only for files in the internal memory DATA directory. For all other files, the numbers are empty.

**Example 1**

File list output of an external storage medium

```
EA
05/02/24 20:07:12 1204 setting.pnl
05/02/24 20:18:36 <DIR> DATA0
EN
```

**Example 2**

Output of a file list in the DATA directory in the internal memory

```
EA
05/02/24 20:07:12 1204 006607_050101_000402.DAD 0 1ABCDE123
05/02/24 20:07:12 1204 006608_050101_000403.DAD 0 1234567890123456
EN
```
Check Disk

The ME command is used to output the free space on the storage medium.

- **Syntax**
  
  ```
  EA
  zzz..._Kbyte_freeCRLF
  ENCRLF
  ```
  
  ```
  zzz... Free space on the storage medium (16 digits)
  _ Space
  ```

- **Example**
  
  ```
  EA
  12345678 Kbyte free
  EN
  ```
4.2 Output Format of ASCII Data

Manual Sampled/Report Data Information
The MO command is used to output the data.

- **Syntax**

  ```
  EA
  CRLF
  slll...yy/mo/dd:hh:mm:ss_bbbb_fff...
  CRLF
  EN
  ```

  * Data flag
  * Space Confirmed data
  * +: Data that was overwritten
  * *: Data being added

  **File number (10 digits)**

  **yy** Year (00 to 99)

  **mo** Month (01 to 12)

  **dd** Day (01 to 31)

  **hh** Hour (00 to 23)

  **mm** Minute (00 to 59)

  **ss** Second (00 to 59)

  **bbbb** Number of events (4 characters)

  **fff...** File name (up to 48 characters including the extension)

  **Space**

  When the mode is Seprt2, an individual report file is output for each event. Because of this, the file numbers of the report files saved to the CF card will be different.

- **Example**

  ```
  EA
  +  05/03/04 00:00:00 20 aaaa30312345.DAR
  7 05/03/05 00:00:00 20 30400005.DAR
  8 05/03/06 00:00:00 20 30500005.DAR
  *  05/03/06 13:00:00 20 uuuu0005.DAR
  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···CRLF
ENCRLF
```

- **p** Login method
  - **E:** Ethernet
    - On models with the /AS1 advanced security option, this indicates connection to the setting function.
  - **e:** Ethernet
    - On models with the /AS1 advanced security option, this indicates connection to the monitoring function.
  - **S:** RS-232 or RS-422/485
  - **K:** Login using keys

- **l** User level
  - **A:** Administrator
  - **U:** User

- **uuu···** User name (up to 20 characters)
- **_** Space

**Example 1**

When the FU0 command is used, information only on the user himself or herself that is logged in is output.
```
EA
E A admin
EN
```

**Example 2**

When the FU1 command is used, information on all users logged in through a general-purpose service or using keys is output.
```
EA
K A admin_abc
E A admin_def
E U user0033
E U user0452
EN
```
4.2 Output Format of ASCII Data

Event Level Switch Status (Release number 3 or later)

- The FD command is used to output the event level switch status.

- Syntax
  
  EACRLF
  
  aaaaaaaaaaaaaaaaaaaaaaaaaaCRLF
  
  ENCRLF

  aaa...Event level switch status in ascending numerical order.
  
  1: ON
  
  0: OFF

- Example
  
  EA
  
  1111111111000000000111111111
  
  EN
4.3 Output Format of Binary Data

This section describes the output format of the binary data that is disclosed. For information on other binary data, see section 4.1.

• Instantaneous data (measured/computed/external input) and FIFO data
• Configured channel information data
• Configured alarm information data
• Manual sample file
• Report sample file

The measured data and computed data are output using signed 16-bit integer and signed 32-bit integer, respectively. These integers can be understood as physical values by adding the decimal point and the unit. The decimal point position can be determined using the FE command.

<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>

Note

The "CRLF" used in this section denotes carriage return line feed.
4.3 Output Format of Binary Data

Measured/Computed Data and FIFO Data
- The FD command is used to output the measured/computed data.
- The FF command is used to output the FIFO data.
- You can use the CB command to specify whether to output the data of measurement channels set to skip and computation or external input channels set to OFF.
- The ID number of the output format is 1. See “ID” in section 4.1.

<table>
<thead>
<tr>
<th>2 byte</th>
<th>2 byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of blocks</td>
<td>Number of bytes</td>
</tr>
<tr>
<td>Block 1</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
<tr>
<td>Block n</td>
<td></td>
</tr>
</tbody>
</table>

Binary data
(The binary data section on the “Conceptual diagram” in section 4.1.)

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>Min</td>
<td>s</td>
<td>ms</td>
<td>(Reserved)*</td>
</tr>
<tr>
<td>T**</td>
<td>Channel</td>
<td>A2A1</td>
<td>A4A3</td>
<td>Measured data</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>T**</td>
<td>Channel</td>
<td>A2A1</td>
<td>A4A3</td>
<td>Computed data</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>T**</td>
<td>Channel</td>
<td>A2A1</td>
<td>A4A3</td>
<td>External input data</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 bits 12 bits
* The sections indicated as (Reserved) are not used. The value is undefined.
** Abbreviation of “Type” for the purpose of this figure.

Flag
The meaning of the each flag is given in 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</th>
<th>1</th>
<th>Meaning of the Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>No</td>
<td>Yes</td>
<td>Indicates that the screen snapshot was executed.</td>
</tr>
<tr>
<td>6</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>Yes</td>
<td>Indicates that the decimal position or unit information was changed during measurement.</td>
</tr>
<tr>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>Indicates that the FIFO acquiring interval was changed with the FR command during measurement.</td>
</tr>
<tr>
<td>0</td>
<td>No</td>
<td>Yes</td>
<td>Indicates that the internal process took too much time (computation, for example) and that the measurement could not keep up at the specified scan interval.</td>
</tr>
</tbody>
</table>

The bits that have "•" for the flag column are not used. The value is undefined.
### 4.3 Output Format of Binary Data

#### • 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>(Reserved)</td>
<td>Undefined</td>
</tr>
<tr>
<td>Type</td>
<td>0x0: 16-bit integer (measurement channel/external input channel)</td>
</tr>
<tr>
<td></td>
<td>0x8: 32-bit integer (computation channel)</td>
</tr>
<tr>
<td>Channel</td>
<td>1 to 48, 101 to 160, or 201 to 440</td>
</tr>
</tbody>
</table>

#### Alarm status*

- A1 (Bit 0 to 3)
- A2 (Bit 4 to 7)
- A3 (Bit 0 to 3)
- A4 (Bit 4 to 7)

<table>
<thead>
<tr>
<th>Measured data/external input data</th>
<th>0 to 0xFFFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computed data</td>
<td>0 to 0xFFFFFFFF</td>
</tr>
</tbody>
</table>

* A 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:

- 0: no alarm
- 1: H
- 2: L
- 3: h
- 4: l
- 5: R
- 6: r
- 7: T
- 8: t

#### Special Data Values

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>Error</td>
<td>8004H</td>
<td>80048004H</td>
</tr>
<tr>
<td>Undefined</td>
<td>8005H</td>
<td>80058005H</td>
</tr>
<tr>
<td>Power failure data</td>
<td>7F7FH</td>
<td>7F7F7F7F7FH</td>
</tr>
<tr>
<td>Burnout (up setting)</td>
<td>7FFAH</td>
<td>7FFF7FFFH</td>
</tr>
<tr>
<td>Burnout (down setting)</td>
<td>8006H</td>
<td>80018001H</td>
</tr>
</tbody>
</table>

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

**Configured Channel Information Data**

- The FE5 command is used to output the data.
- The ID number of the output format is 25.
- You can use the CB command to specify whether to output the data of measurement channels set to skip and computation channels set to OFF.
- The figure below indicates the format.

```
1 byte 1 byte 2 bytes 2 bytes 1 byte 1 byte
Version (Reserved) Number of blocks Block size (Reserved) (Reserved)
```

**Format for Release Number 2 or Earlier (Format version 1)**

- **Format Details**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Output Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>Format version</td>
<td>1</td>
</tr>
<tr>
<td>Number of blocks*</td>
<td>Number of configured channel information blocks</td>
<td>Up to 348</td>
</tr>
<tr>
<td>Block size*</td>
<td>Configured channel information block size</td>
<td>72 (fixed)</td>
</tr>
<tr>
<td>Block 1 to n</td>
<td>Configured channel information blocks</td>
<td>Up to 25056 bytes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See Block Details.</td>
</tr>
</tbody>
</table>

* Output in the byte order specified by the BO command.

- **Block Details**

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Bytes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel number*</td>
<td>2</td>
<td>1 to 440</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Channel type*</td>
<td>4</td>
<td>2H for measurement and external input channels and 4H for computation channels. This value is ORed with 800H when the range mode is DI or 8000H when the range mode is skip.</td>
</tr>
<tr>
<td>Unit information</td>
<td>8</td>
<td>The terminator is ‘\0.’</td>
</tr>
<tr>
<td>Tag information</td>
<td>24</td>
<td>You can enter up to 16 characters for the tag comment. The terminator is ‘\0.’</td>
</tr>
<tr>
<td>Minimum input value*</td>
<td>4</td>
<td>Measurement channels: Allowable input range under the current setting</td>
</tr>
<tr>
<td>Maximum input value*</td>
<td>4</td>
<td>Computation channels: –99999999, +999999999 (fixed)</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>4</td>
<td>External input channels: –30000, +30000 (fixed)</td>
</tr>
<tr>
<td>Span lower limit*</td>
<td>4</td>
<td>Measurement channels when scaling is not used: Same value as the DX span setting</td>
</tr>
<tr>
<td>Span upper limit*</td>
<td>4</td>
<td>Measurement channels when scaling is used: Same value as the DX scale setting</td>
</tr>
<tr>
<td>Scale lower limit*</td>
<td>4</td>
<td>Measurement channels: Same value as the span</td>
</tr>
<tr>
<td>Scale upper limit*</td>
<td>4</td>
<td>Computation and external input channels: Same value as the span</td>
</tr>
<tr>
<td>FIFO type*</td>
<td>2</td>
<td>Indicates the position of its own channel in the FIFO block of one sample.</td>
</tr>
<tr>
<td>Area in the FIFO*</td>
<td>1</td>
<td>The value starts from zero.</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

* Output in the byte order specified by the BO command.
### 4.3 Output Format of Binary Data

#### Format for Release Number 3 or Later (Format version 2)

**• Format Details**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Output Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>Format version</td>
<td>2</td>
</tr>
<tr>
<td>Number of blocks</td>
<td>Number of configured channel information blocks</td>
<td>348 maximum</td>
</tr>
<tr>
<td>Block size</td>
<td>Configured channel information block size</td>
<td>176 (fixed)</td>
</tr>
<tr>
<td>Blocks 1 to n</td>
<td>Configured channel information block</td>
<td>61248 bytes max</td>
</tr>
</tbody>
</table>

**• Block Details**

<table>
<thead>
<tr>
<th>Description</th>
<th>Bytes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel number</td>
<td>2</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Decimal place</td>
<td>1</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>1</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Channel type</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Unit information</td>
<td>8</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Tag information</td>
<td>24</td>
<td>You can enter up to 23 characters for the tag comment. The terminator is '0.'</td>
</tr>
<tr>
<td>Minimum input value</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Maximum input value</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Span lower limit</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Span upper limit</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Scale lower limit</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Scale upper limit</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>FIFO type</td>
<td>2</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Area in the FIFO</td>
<td>2</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>4</td>
<td>Same as format version 1.</td>
</tr>
<tr>
<td>Tag comment</td>
<td>64</td>
<td>The terminator is '0.'</td>
</tr>
<tr>
<td>Tag number usage, use or not use</td>
<td>1</td>
<td>0: Do not use. 1: Use.</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>7</td>
<td>0 (fixed)</td>
</tr>
<tr>
<td>Tag No.</td>
<td>32</td>
<td>The terminator is '0.'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If tag number usage is set to zero (do not use): All zeroes.</td>
</tr>
</tbody>
</table>
4.3 Output Format of Binary Data

Configured Alarm Information Data

- The FE6 command is used to output the data.
- The ID number of the output format is 26.
- You can use the CB command to specify whether to output the data of measurement channels set to skip and computation channels set to OFF.
- The figure below indicates the format.

```
<table>
<thead>
<tr>
<th></th>
<th>1 byte</th>
<th>1 byte</th>
<th>2 bytes</th>
<th>2 bytes</th>
<th>1 byte</th>
<th>1 byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Reserved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configured alarm information block 1</td>
<td></td>
<td></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>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configured alarm information block n</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Format Details

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Output Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>Format version</td>
<td>1</td>
</tr>
<tr>
<td>Number of blocks*</td>
<td>Number of configured alarm information blocks</td>
<td>Up to 348</td>
</tr>
<tr>
<td>Block size*</td>
<td>Size of the configured alarm information blocks</td>
<td>24</td>
</tr>
<tr>
<td>Block 1 to n</td>
<td>Configured alarm information blocks</td>
<td>Up to 8352 bytes See Block Details.</td>
</tr>
</tbody>
</table>

* Output in the byte order specified by the BO command.

Block Details

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Bytes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel number*</td>
<td>2</td>
<td>1 to 440</td>
</tr>
<tr>
<td>Decimal place</td>
<td>1</td>
<td>0 to 4</td>
</tr>
<tr>
<td>(Reserved)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Alarm type</td>
<td>4</td>
<td>The following settings are entered in order from level 1 to 4.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Setting off, 1: H (high limit), 2: L (low limit),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: h (difference high limit), 4: l (difference low limit),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5: R (high limit on rate-of-change),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6: r (low limit on rate-of-change),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7: T (delay high limit), 8: t (delay low limit)</td>
</tr>
<tr>
<td>Alarm value*</td>
<td>4×4</td>
<td>The alarm values are entered in order from level 1 to 4.</td>
</tr>
</tbody>
</table>

* Output in the byte order specified by the BO command.

Manual Sampled Data

- The ME or MO command is used to output the data.
- The ID number of the output format is 17. See section 4.1.
- For the data format, see the *DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E)*.

Report Data

- The ME or MO command is used to output the data.
- The ID number of the output format is 18. See section 4.1.
- For the data format, see the *DX1000/DX2000 User’s Manual (IM04L41B01-01E or IM04L42B01-01E)*.
4.4 Output Format of Instrument Information

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

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

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

```
EA CRLF
(Parameter 1)_=__(value of parameter 1)CRLF
(Parameter 2)_=__(value of parameter 2)CRLF
................................................
EN CRLF
```

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

The following table shows the parameter types.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Output Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>serial</td>
<td>Serial number</td>
</tr>
<tr>
<td>host</td>
<td>Host name</td>
</tr>
<tr>
<td>ip</td>
<td>IP address</td>
</tr>
</tbody>
</table>

**Output Example**

Several output examples are indicated below.

<table>
<thead>
<tr>
<th>Packet Parameter Sent as Commands</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters are not case sensitive.</td>
<td></td>
</tr>
<tr>
<td>ip Host</td>
<td>EA</td>
</tr>
<tr>
<td>ip = 192.168.111.24</td>
<td></td>
</tr>
<tr>
<td>host = DX2000</td>
<td>EN</td>
</tr>
</tbody>
</table>

Even if the same parameters are specified numerous times, only the first occurrence is output.

<table>
<thead>
<tr>
<th>Packet Parameter Sent as Commands</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>host ip host ip host</td>
<td>EA</td>
</tr>
<tr>
<td>host = DX2000</td>
<td></td>
</tr>
<tr>
<td>ip = 192.168.111.24</td>
<td>EN</td>
</tr>
</tbody>
</table>

Undefined parameters will be ignored.

<table>
<thead>
<tr>
<th>Packet Parameter Sent as Commands</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Space)</td>
<td>EA</td>
</tr>
<tr>
<td></td>
<td>EN</td>
</tr>
</tbody>
</table>
5.1 Status Information and Filter

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

- The IF command can be used to set the filter.
- When a status indicated on the following page is entered, the corresponding bit in the condition register is set to 1. The logical AND of the condition register and the filter becomes the status information.
- The IS command is used to output the status information. Status information 3, 4, 7, and 8 are cleared when they are output. Status information 1, 2, 5, and 6 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.
- Empty bits indicated as “—” are fixed to 0.
5.2 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 4.2, “Output Format of ASCII Data.”

### Status Information 1

<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>Memory sampling</td>
<td>Set to 1 during recording (memory sample). On models with the multi batch (/BT2 option), this bit is set to 1 if any batch group is recording (memory sample).</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 activated</td>
<td>Set to 1 while the alarm is activated.</td>
</tr>
<tr>
<td>4</td>
<td>Accessing medium</td>
<td>Set to 1 while the display, event, manual sampled, report, or screen image data file are being saved to the external storage medium.</td>
</tr>
<tr>
<td>5</td>
<td>E-mail started</td>
<td>Set to 1 while the e-mail transmission is started.</td>
</tr>
<tr>
<td>6</td>
<td>Invalid user check operation</td>
<td>Set to 1 only during the period when there is an invalid user and the invalid user acknowledge operation has not finished (the period during which the invalid user icon appears on the DX screen).</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

*1 Advanced security (/AS1 option)

### Status Information 2

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Setting function communication login</td>
<td>Set to 1 while a user is logged in to the DX setting function through Ethernet communication.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>Memory end</td>
<td>Set to 1 while the free space in the internal memory or external storage medium is low. This is the same as the internal memory and CF card status of the device information output (/F1 or /F2 options; see section 1.9 in the DX1000/DX2000 User’s Manual).</td>
</tr>
<tr>
<td>3</td>
<td>Logged in through keys</td>
<td>Set to 1 while logged in through keys.</td>
</tr>
<tr>
<td>4</td>
<td>Login not possible</td>
<td>Set to 1 while the multi-login function is not being used and login through key operations, login to the setting function through Ethernet communication, and login through the sending of the LL command through serial communication are not possible, because another user is logged in.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>6</td>
<td>Detecting measurement error</td>
<td>Set to 1 while error is being detected in the A/D converter or a burnout is being detected.</td>
</tr>
<tr>
<td>7</td>
<td>Detecting communication error</td>
<td>Set to 1 if any command is stopping the communication on the Modbus master or Modbus client.</td>
</tr>
</tbody>
</table>

*1 Advanced security (/AS1 option)

### Status Information 3

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Measurement dropout</td>
<td>Set to 1 when the measurement process could not keep up.</td>
</tr>
<tr>
<td>1</td>
<td>Decimal point/unit information change</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>SNTP error when memory</td>
<td>Set to 1 when the time could not be adjusted using SNTP</td>
</tr>
<tr>
<td>5</td>
<td>Custom display setup error</td>
<td>Set to 1 if an error occurs when a custom display setup file is saved or loaded.</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>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>Medium access complete</td>
<td>Set to 1 when the display, event, manual sampled, report, or screen image data file are finished being saved to the external storage medium. Set to 1 when setup data is successfully saved or loaded.</td>
</tr>
<tr>
<td>2</td>
<td>Report generation complete</td>
<td>Set to 1 when report generation is complete.</td>
</tr>
<tr>
<td>3</td>
<td>Timeout</td>
<td>Set to 1 when the timer expires.</td>
</tr>
<tr>
<td>4</td>
<td>Custom display setup complete</td>
<td>Set to 1 when the custom display setup is successfully saved or loaded.</td>
</tr>
<tr>
<td>5</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>USER key detection</td>
<td>Set to 1 when the USER key is pressed.</td>
</tr>
<tr>
<td>7</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

### Status Information 5

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Batch group #1 memory sampling</td>
<td>Set to 1 during memory sampling.</td>
</tr>
<tr>
<td>1</td>
<td>Batch group #2 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>2</td>
<td>Batch group #3 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>3</td>
<td>Batch group #4 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>4</td>
<td>Batch group #5 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>5</td>
<td>Batch group #6 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>6</td>
<td>Batch group #7 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>7</td>
<td>Batch group #8 memory sampling</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

### Status Information 6

<table>
<thead>
<tr>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Batch group #9 memory sampling</td>
<td>Set to 1 during memory sampling.</td>
</tr>
<tr>
<td>1</td>
<td>Batch group #10 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>2</td>
<td>Batch group #11 memory sampling</td>
<td>Same as above</td>
</tr>
<tr>
<td>3</td>
<td>Batch group #12 memory sampling</td>
<td>Same as above</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 7 to 8

All bits are zeroes.
6.1 Ethernet Interface Specifications

Basic Specifications

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

Maximum Number of Connections and Number of Simultaneous Uses

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Maximum Number of Connections</th>
<th>Number of Simultaneous Uses</th>
<th>Port Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting/measurement server</td>
<td>3</td>
<td>1</td>
<td>34260/tcp</td>
</tr>
<tr>
<td>Maintenance/test server</td>
<td>2</td>
<td>1</td>
<td>34261/tcp</td>
</tr>
<tr>
<td>FTP server</td>
<td>1</td>
<td>−</td>
<td>21/tcp</td>
</tr>
<tr>
<td>Web server (HTTP)</td>
<td>1</td>
<td>−</td>
<td>80/tcp</td>
</tr>
<tr>
<td>SNTP server</td>
<td>−</td>
<td>−</td>
<td>123/udp</td>
</tr>
<tr>
<td>Modbus server</td>
<td>2</td>
<td>−</td>
<td>502/tcp</td>
</tr>
<tr>
<td>Instrument information server</td>
<td>−</td>
<td>−</td>
<td>34264/udp</td>
</tr>
<tr>
<td>EtherNet/IP Explicit message</td>
<td>10</td>
<td>−</td>
<td>44818/tcp</td>
</tr>
<tr>
<td>EtherNet/IP Explicit message</td>
<td>−</td>
<td>−</td>
<td>44818/udp</td>
</tr>
<tr>
<td>EtherNet/IP Implicit message</td>
<td>−</td>
<td>−</td>
<td>2222/udp</td>
</tr>
</tbody>
</table>

*1 There are user limitations. For details, see section 1.1.
*2 The port numbers are fixed.
*3 The default port number. You can set the value in the range of 1 to 65535. Use the default port number unless there is a special reason not to do so.
*4 Make sure that port number settings are not duplicated.
*5 On models with the /AS1 advanced security option, connections to the setting/measurement server are divided into connections to the setting function and connections to the monitoring function.
6.2 Serial Interface Specifications

RS-232 Specifications

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

RS-422/485 Specifications

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

Modbus Client Function

Basic Operation
- The DX, as a Modbus client device, communicates with Modbus servers periodically by sending commands at specified intervals.
- The Modbus client function operates independently from the Modbus master function via the serial communication.
- The supported functions are "reading data from the input registers and hold registers on the server" and "writing data into the hold registers on the server."

Modbus Client Specifications

Communicate via ModbusTCP
Communication media: Ethernet 10Base-T
Read cycle: Select from the following:
- 125 ms, 250 ms, 500 ms, 1 s, 2 s, 5 s, and 10 s
Connection retry: Select the reconnection interval after disconnecting the connection after the connection wait time has elapsed from the following:
- OFF, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, and 1 h
Connection timeout value: 1 min
However, when the IP address is not established with DHCP, a communication error results immediately.
Command timeout value: 10 s
Server: Set up to 16 servers
Supported functions: Supported Modbus client functions are as follows:
- The server device must support these functions.

<table>
<thead>
<tr>
<th>Function Code</th>
<th>Function</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Read the hold register</td>
<td>The DX reads the hold register of the server device into the communication input data or external input channel.</td>
</tr>
<tr>
<td></td>
<td>(4XXXX, 4XXXXX)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Read the input register</td>
<td>The DX reads the input register of the server device into the communication input data or external input channel.</td>
</tr>
<tr>
<td></td>
<td>(3XXXX, 3XXXXX)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Write to the hold register</td>
<td>The DX writes the measured or computed data to the hold register of the server device.</td>
</tr>
<tr>
<td></td>
<td>(4XXXX, 4XXXXX)</td>
<td></td>
</tr>
</tbody>
</table>

On Models with the PROFIBUS-DP Interface (/CP1 option)
On models with the PROFIBUS-DP interface (/CP1 option), the communication input data for C01 to C24 (on the DX1000) or for C01 to C32 (on the DX2000) is reserved for PROFIBUS-DP. The DX cannot load values into this received data.
6.3 Modbus Protocol Specifications

Command
Command type: R, R-M, W, W-M, E-M
Number of commands: Set up to 16 commands
Data type: See the table below.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT16</td>
<td>16-bit signed integer</td>
</tr>
<tr>
<td>UINT16</td>
<td>16-bit unsigned integer</td>
</tr>
<tr>
<td>INT32_B</td>
<td>32-bit signed integer (higher and lower order)</td>
</tr>
<tr>
<td>INT32_L</td>
<td>32-bit signed integer (lower and higher order)</td>
</tr>
<tr>
<td>UINT32_B</td>
<td>32-bit unsigned integer (higher and lower order)</td>
</tr>
<tr>
<td>UINT32_L</td>
<td>32-bit unsigned integer (lower and higher order)</td>
</tr>
<tr>
<td>FLOAT_B</td>
<td>32-bit floating point (higher and lower order)</td>
</tr>
<tr>
<td>FLOAT_L</td>
<td>32-bit floating point (lower and higher order)</td>
</tr>
</tbody>
</table>

- Reading Values into the External Input Channels (DX2000 Only)
  - External input channels are an option (/MC1).
  - Reads values from the server register into the external input channels of the DX.
  - The data type of external input channels is signed 16-bit integer.
  - The measurement range and unit are set using the external input channels. The decimal point position is determined by the Span_L settings.

<table>
<thead>
<tr>
<th>Command type</th>
<th>External input channel</th>
<th>Number: 201 to 440</th>
<th>Data type: 16-bit signed integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td></td>
<td>30001 to 39999</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>300001 to 365536</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40001 to 49999</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400001 to 465536</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L</td>
</tr>
</tbody>
</table>

External Input Channel Values
The range of external input channel values is –30000 to 30000 excluding the decimal. If this range is exceeded, the value is set to +Over or -Over.

<table>
<thead>
<tr>
<th>Value in the register on the server</th>
<th>Value on the external input channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 30000</td>
<td>+ Over (7FFFH)</td>
</tr>
<tr>
<td>-30000 to 30000</td>
<td>-30000 to 30000</td>
</tr>
<tr>
<td>Less than -30000</td>
<td>- Over (8001H)</td>
</tr>
</tbody>
</table>

- Reading Values into Communication Input Data
  - Reads values from the server register into the communication input data of the DX.
  - Communication input data is an option (/M1, /PM1 option).
  - The data type of the communication input data is 32-bit floating point.
  - Communication input data can be displayed on a computation channel by including the data in the equation of a DX computation channel (/M1, /PM1 option). The measurement range and unit are also set using the computation channel.

<table>
<thead>
<tr>
<th>Command type</th>
<th>Communication input data</th>
<th>Number: C01 to C24 (DX1000)</th>
<th>C01 to C60 (DX2000)</th>
<th>Data type: 32-bit floating point</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-M</td>
<td></td>
<td>30001 to 39999</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L, FLOAT_B, FLOAT_L</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>300001 to 365536</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L, FLOAT_B, FLOAT_L</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>40001 to 49999</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L, FLOAT_B, FLOAT_L</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>400001 to 465536</td>
<td>INT 16, UINT 16, INT 32_B, INT 32_L, UINT 32_B, UINT 32_L, FLOAT_B, FLOAT_L</td>
<td></td>
</tr>
</tbody>
</table>

When the Data Type of the Read Source Server Is Not Floating Point Type
Because the data type of the communication input data is 32-bit floating point, the value never overflows. However, if the absolute value of the data is large for INT32_B, INT32_L, UINT32_B, or UINT32_L, a rounding error may appear. This is because the mantissa of the floating point type is 24 bits.
6.3 Modbus Protocol Specifications

• Writing the Measured Values of the Measurement Channels
  • Writes the measured values of the measurement channels to the server registers.
  • The data type of measured values is signed 16-bit integer.
  • The values can be written directly including special data (See “Special Data Values” in section 4.3). Perform data processing on the slave device.

<table>
<thead>
<tr>
<th>Command type</th>
<th>Measurement channel</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>001 to 012 (DX1000)</td>
<td>001 to 048 (DX2000)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Server</th>
<th>Register</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40001 to 49999</td>
<td>INT 16</td>
</tr>
<tr>
<td></td>
<td>400001 to 465536</td>
<td>FLOAT_B, FLOAT_L</td>
</tr>
</tbody>
</table>

• Writing the Computed Values of the Computation Channels
  • Writes the computed values of the computation channels to the server registers.
  • The computation function is an option (/M1, /PM1 option).
  • The data type of computed values is signed 32-bit integer.

<table>
<thead>
<tr>
<th>Command type</th>
<th>Computation channel</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-M</td>
<td>101 to 124 (DX1000)</td>
<td>101 to 160 (DX2000)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Server</th>
<th>Register</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40001 to 49999</td>
<td>INT 16, UINT 16,</td>
</tr>
<tr>
<td></td>
<td>400001 to 465536</td>
<td>INT 32_B, INT 32_L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FLOAT_B, FLOAT_L</td>
</tr>
</tbody>
</table>

When the Data Type of the Write Destination Server Is Identical (INT32_B or INT32_L)
The values can be written directly including special data (See “Special Data Values” in section 4.3). Perform data processing on the slave device.

When the Data Type of the Write Destination Server Is Different (INT16 or UINT16)
INT16: A value in the range of –32768 to 32767 (excluding the decimal point) can be written. If lower than –32768 the value reverts to –32768, and if higher than 32767 it reverts to 32767.

UINT16: A value in the range of 0 to 65535 (excluding the decimal point) can be written. If lower than 0 the value reverts to 0, and if higher than 65535 it reverts to 65535.

<table>
<thead>
<tr>
<th>Computed value</th>
<th>Data type of the write destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 32767</td>
<td>32767</td>
</tr>
<tr>
<td>-32768 to 32767</td>
<td>-32768 to 32767</td>
</tr>
<tr>
<td>Less than -32768</td>
<td>-32768</td>
</tr>
<tr>
<td>More than 65535</td>
<td>65535</td>
</tr>
<tr>
<td>0 to 65535</td>
<td>0 to 65535</td>
</tr>
<tr>
<td>Less than 0</td>
<td>0</td>
</tr>
</tbody>
</table>

Special values

<table>
<thead>
<tr>
<th>Computed value</th>
<th>Data type of the write destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Over</td>
<td>32767</td>
</tr>
<tr>
<td>Burnout (Up)</td>
<td>65535</td>
</tr>
<tr>
<td>- Over</td>
<td>-32768</td>
</tr>
<tr>
<td>Burnout (Down)</td>
<td>0</td>
</tr>
<tr>
<td>Skip</td>
<td>0</td>
</tr>
<tr>
<td>Error</td>
<td>0</td>
</tr>
<tr>
<td>Undefined</td>
<td>0</td>
</tr>
<tr>
<td>Power failure data</td>
<td>0</td>
</tr>
</tbody>
</table>
6.3 Modbus Protocol Specifications

- Loading to Communication Input Data and Direct Writing of Values to the Server
  - Values from the server register are loaded into the DX communication input data. When you perform the appropriate operation from the custom display, the values are written to the server register.
  - Loading and writing occur in sync with the communication interval.
  - Values are only written to the server when the state of communication is normal (the lamp in the Modbus status display is green), otherwise an error occurs. The DX only attempts to write to the server once. It does not retry after failing.
  - Communication input data is an option (/M1, /PM1 option).
  - The data type of the communication input data is 32-bit floating point.
  - You can display communication input data on a computation channel by including the data in the equation of a DX computation channel (/M1, /PM1 option). You can also set the measurement range and unit for computation channels.

<table>
<thead>
<tr>
<th>DX1000, DX2000</th>
<th>Server Device</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command type</strong></td>
<td><strong>Register</strong></td>
</tr>
<tr>
<td>E-M</td>
<td>Communication input data Number: C01 to C24 (DX1000) C01 to C60 (DX2000) Format: 32-bit floating point</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Modbus Server Function

Modbus Server Specifications
Communicate via ModbusTCP
Communication media: Ethernet 10Base-T
Port: 502/tcp (default value)
Command wait timeout: 1 minute. However, the timeout to receive the command after starting to receive the command is 10 seconds.
Maximum number of connections: 2
Supported functions: The functions that the DX supports are listed below.

<table>
<thead>
<tr>
<th>Function Code</th>
<th>Function Code</th>
<th>Function Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Read the hold register (4XXXXX)</td>
<td>The client device reads the communication input data.</td>
</tr>
<tr>
<td>4</td>
<td>Read the input register (3XXXXX)</td>
<td>The client device reads the computed, measured, alarm, and time data of the DX.</td>
</tr>
<tr>
<td>6</td>
<td>Single write to hold register (4XXXXX)</td>
<td>The client device writes to the communication input data or external input channel of the DX.</td>
</tr>
<tr>
<td>8</td>
<td>Loopback test</td>
<td>The client device performs a loopback test of the DX.</td>
</tr>
<tr>
<td>16</td>
<td>Write to the hold register (4XXXXX)</td>
<td>The master device writes to the communication input data or external input channel of the DX.</td>
</tr>
</tbody>
</table>

Register assignments (shared with the Modbus slave function)

<table>
<thead>
<tr>
<th>Data</th>
<th>Input register</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement ch.</td>
<td>Measured data 300001 to 300048 16-bit signed integer</td>
</tr>
<tr>
<td></td>
<td>Alarm status 301001 to 301048 Bit string</td>
</tr>
<tr>
<td>Computation ch.</td>
<td>Computed data 302001 to 302120 32-bit signed integer</td>
</tr>
<tr>
<td></td>
<td>Alarm status 303001 to 303066 Bit string</td>
</tr>
<tr>
<td>External input ch.</td>
<td>Measured data 304001 to 304240 16-bit signed integer</td>
</tr>
<tr>
<td></td>
<td>Alarm status 305001 to 305240 Bit string</td>
</tr>
<tr>
<td>Measurement ch.</td>
<td>Alarm list 306001 to 306012 Bit string</td>
</tr>
<tr>
<td>Computation ch.</td>
<td>Alarm list 306021 to 306035 Bit string</td>
</tr>
<tr>
<td>External input ch.</td>
<td>Alarm list 306041 to 306100 Bit string</td>
</tr>
<tr>
<td>Time</td>
<td>309001 to 309008 16-bit signed integer</td>
</tr>
</tbody>
</table>

On Models with the PROFIBUS-DP Interface (/CP1 option)
On models with the PROFIBUS-DP interface (/CP1 option), the communication input data for C01 to C24 (on the DX1000) or for C01 to C32 (on the DX2000) is reserved for PROFIBUS-DP. The client device cannot write values to this communication input data.
Input Register (shared with the Modbus slave function)

- **Common Items**
  - The client device can only read the input registers.
  - Decimal position and unit are not included. Specify them on the client device.
  - External input channels are DX2000 option (/MC1).

- **Details**

<table>
<thead>
<tr>
<th>Input Register</th>
<th>Data Description</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>300001</td>
<td>Measured data of measurement channel 001</td>
<td>16-bit signed integer</td>
</tr>
<tr>
<td>300048</td>
<td>Measured data of measurement channel 048</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• There is no decimal position information.</td>
<td></td>
</tr>
<tr>
<td>301001</td>
<td>Alarm status of measurement channel 001</td>
<td>Bit string</td>
</tr>
<tr>
<td>301048</td>
<td>Alarm status of measurement channel 048</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Register structure and alarm status values</td>
<td></td>
</tr>
<tr>
<td>302001</td>
<td>Lower bytes of the computed data of computation channel 101</td>
<td>32-bit signed integer</td>
</tr>
<tr>
<td>302002</td>
<td>Higher bytes of the computed data of computation channel 101</td>
<td></td>
</tr>
<tr>
<td>302119</td>
<td>Lower bytes of the computed data of computation channel 160</td>
<td></td>
</tr>
<tr>
<td>302120</td>
<td>Higher bytes of the computed data of computation channel 160</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Register structure</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example: Channel 101</strong></td>
<td></td>
</tr>
<tr>
<td>303001</td>
<td>Alarm status of computation channel 101</td>
<td>Bit string</td>
</tr>
<tr>
<td>303060</td>
<td>Alarm status of computation channel 160</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Register structure and alarm status values: Same as the alarm status of the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>measurement channels.</td>
<td></td>
</tr>
<tr>
<td>304001</td>
<td>Measured data of external input channel 201</td>
<td>16-bit signed integer</td>
</tr>
<tr>
<td>304240</td>
<td>Measured data of external input channel 440</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• There is no decimal position information.</td>
<td></td>
</tr>
<tr>
<td>305001</td>
<td>Alarm status of external input channel 201</td>
<td>Bit string</td>
</tr>
<tr>
<td>305240</td>
<td>Alarm status of external input channel 440</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Register structure and alarm status values: Same as the alarm status of the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>measurement channels.</td>
<td></td>
</tr>
</tbody>
</table>
### Input Register Data

<table>
<thead>
<tr>
<th>Input Register</th>
<th>Data</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>306001</td>
<td>List of alarms of measurement channels 001 to 004</td>
<td>Bit string</td>
</tr>
<tr>
<td>306012</td>
<td>List of alarms of measurement channels 045 to 048</td>
<td>Bit string</td>
</tr>
<tr>
<td>306021</td>
<td>List of alarms of computation channels 101 to 104</td>
<td>Bit string</td>
</tr>
<tr>
<td>306035</td>
<td>List of alarms of computation channels 157 to 160</td>
<td>Bit string</td>
</tr>
<tr>
<td>306041</td>
<td>List of alarms of external input channels 201 to 204</td>
<td>Bit string</td>
</tr>
<tr>
<td>306100</td>
<td>List of alarms of external input channels 437 to 440</td>
<td>Bit string</td>
</tr>
</tbody>
</table>

*Input registers 306001 to 306100 can be accessed consecutively. All unassigned register bits are read as zeroes.*
Hold Register (shared with the Modbus slave function)

- **Common Items**
  - The client device can read and write to the hold registers.
  - Communication input data is an option (/M1, /PM1).
  - External input channels are DX2000 option (/MC1).

**When Writing**
- Communication input data can be handled on a computation channel by including the data in the equation of a DX computation channel.
- External input channel data can be handled on an external input channel.
- Details

**Details**

<table>
<thead>
<tr>
<th>Hold Register</th>
<th>Data Type</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>400001</td>
<td>Communication input data C01</td>
<td>16-bit signed integer</td>
</tr>
<tr>
<td>4000060</td>
<td>Communication input data C60</td>
<td></td>
</tr>
</tbody>
</table>
  - Precautions to be taken when the client device reads the data
    - The communication input data of the DX is floating point type, but the data is converted to signed 16-bit integer when the data is read.
  - Precautions to be taken when the client device writes the data
    - Only data in signed 16-bit integer type can be written. Floating point values cannot be written.
| 400301        | Lower bytes of communication input data C01 | 32-bit floating point |
| 400302        | Higher bytes of communication input data C01 |                  |
| 400419        | Lower bytes of communication input data C60  |                  |
| 400420        | Higher bytes of communication input data C60  |                  |
  - Precautions to be taken when the client device writes the data
    - Input range: –9.9999E29 to –1E–30, 0, 1E–30 to 9.9999E29
    - If values outside this range are used on a computation channel, a computation error occurs.
| 401001        | External input channel write register 201  | 16-bit signed integer |
| 401240        | External input channel write register 440  |                  |
  - Precautions to be taken when the client device writes the data
    - Only data in signed 16-bit integer type can be written.
    - The measurement range and unit are set using the external input channels. The decimal point position is determined by the Span, L settings.
Extended Hold Registers (Shared with the Modbus slave function; release number 3 or later)
The following hold registers have been added. You can perform a portion of the operations by writing in the registers. You can write to these registers when a DX with the /AS1 advanced security option is in operation mode.

- Internal switch
- Lot number or lot number for each batch group (when the multi batch function (/BT2 option) is in use)
- Batch number or batch group number for each batch group (when the multi batch function (/BT2 option) is in use)
- Recording (memory sample) start and stop or recording (memory sample) start and stop for each batch group (when the multi batch function (/BT2 option) is in use)
- Alarm ACK
- Alarm display reset
- Computation start, computation stop, computation reset, computation dropout ACK, and computation reset for each batch group (when the multi batch function (/BT2 option) is in use)
- Manual sampling, event data sampling start trigger, and snapshot
- Message and free message writing or message and free message writing for each batch group (when the multi batch function (/BT2 option) is in use)
- Event edge switch
- Event level switch

List of Registers
### 6.3 Modbus Protocol Specifications

<table>
<thead>
<tr>
<th>Register</th>
<th>Description</th>
<th>Supplementary Information</th>
<th>Type</th>
<th>Access</th>
<th>Simultaneous Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>406061</td>
<td>Internal switch 1</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406062</td>
<td>Internal switch 2</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406063</td>
<td>Internal switch 3</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406064</td>
<td>Internal switch 4</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406065</td>
<td>Internal switch 5</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406066</td>
<td>Internal switch 6</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406067</td>
<td>Internal switch 7</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406068</td>
<td>Internal switch 8</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406069</td>
<td>Internal switch 9</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406070</td>
<td>Internal switch 10</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406071</td>
<td>Internal switch 11</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406072</td>
<td>Internal switch 12</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406073</td>
<td>Internal switch 13</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406074</td>
<td>Internal switch 14</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406075</td>
<td>Internal switch 15</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406076</td>
<td>Internal switch 16</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406077</td>
<td>Internal switch 17</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406078</td>
<td>Internal switch 18</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406079</td>
<td>Internal switch 19</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406080</td>
<td>Internal switch 20</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406081</td>
<td>Internal switch 21</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
<td>R</td>
<td>–</td>
</tr>
<tr>
<td>406082</td>
<td>Internal switch 22</td>
<td>OFF: 0. ON: 1.</td>
<td>INT16</td>
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<td>406083</td>
<td>Internal switch 23</td>
<td>OFF: 0. ON: 1.</td>
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<td>407833 to 407834</td>
<td>Lot number</td>
<td>Valid range: 0 to 99999999</td>
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<tr>
<td>407835 to 407851</td>
<td>Batch number</td>
<td>Up to 17 registers (up to 33 characters with '0' termination). The batch number must be 32 characters or less. (When the multi batch function (/BT2 option) is in use, this is the batch number of batch group 1.)</td>
<td>STR34</td>
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<td>Stop: 0. Start: 1.</td>
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<td>R/W</td>
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<td>409504</td>
<td>Alarm acknowledge</td>
<td>Applies to all alarms. Execute alarm ACK: 1 (fixed)</td>
<td>INT16</td>
<td>R/W</td>
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<td>Alarm display reset</td>
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<td>410001 to 410002</td>
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<td>410003 to 410020</td>
<td>Batch 1 batch number</td>
<td>Up to 18 registers (up to 35 characters with ‘0’ termination). The batch number must be 32 characters or less.</td>
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<td>410051 to 410052</td>
<td>Batch 2 lot number</td>
<td>Valid range: 0 to 99999999</td>
<td>INT32_L</td>
<td>R/W</td>
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<tr>
<td>410053 to 410070</td>
<td>Batch 2 batch number</td>
<td>Up to 18 registers (up to 35 characters with ‘0’ termination). The batch number must be 32 characters or less.</td>
<td>STR36</td>
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<td>410101 to 410102</td>
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<td>410103 to 410120</td>
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<td>Up to 18 registers (up to 35 characters with ‘0’ termination). The batch number must be 32 characters or less.</td>
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<td>410201 to 410202</td>
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<td>410221 to 410250</td>
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<td>410251 to 410252</td>
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<td>410301 to 410302</td>
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<td>410351 to 410352</td>
<td>Batch 8 lot number</td>
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### 6.3 Modbus Protocol Specifications

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<td>410401 to 410402</td>
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<td>410403 to 410420</td>
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<td>410451 to 410452</td>
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<td>410501 to 410502</td>
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<td>410503 to 410520</td>
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<td>Up to 18 registers (up to 35 characters with ’0’ termination). The batch number must be 32 characters or less.</td>
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<td>410521 to 410550</td>
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<td>410551 to 410552</td>
<td>Batch 12 lot number</td>
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<td>410553 to 410570</td>
<td>Batch 12 batch number</td>
<td>Up to 18 registers (up to 35 characters with ’0’ termination). The batch number must be 32 characters or less.</td>
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<td>R/W</td>
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<td>410571 to 410600</td>
<td>(Reserved) batch 12</td>
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<td>410601</td>
<td>Preset message writing</td>
<td>Message number (1 to 100)</td>
<td>INT16</td>
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<tr>
<td>410602</td>
<td>Message write destination</td>
<td>When the multi batch function is not in use: 0: All groups, 1 to 36: Specified group number. When the multi batch function is in use: 0: All groups of a specified batch number (410603), 1 to 12: Specified group number</td>
<td>INT16</td>
<td>W</td>
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<td>410603</td>
<td>Batch number designation for multi batch: 1 to 12</td>
<td>(Valid only when the multi batch function is available, Any value when the multi batch function is not available)</td>
<td>INT16</td>
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<td>410604 to 410610</td>
<td>(Reserved) Preset message</td>
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| Register | Description | Supplementary Information | Type | Access | Simultaneous Access
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<tr>
<td>410611</td>
<td>Free message writing</td>
<td>Message number (1 to 10)</td>
<td>INT16</td>
<td>W</td>
<td>Write Read</td>
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</table>
| 410612   | Message write destination | • When the multi batch function is not in use  
          |                  | 0: All groups. 1 to 36: Specified group number.  
          |                  | • When the multi batch function is in use  
          |                  | 0: All groups of a specified batch number (410613)  
          |                  | 1 to 12: Specified group number | INT16 | W      | Write Read |
| 410613   | Batch number designation for multi batch: 1 to 12 (Valid only when the multi batch function is available. Any value when the multi batch function is not available) | INT16 | W      | Write Read |
| 410614 to 410631 | Free message | Up to 18 registers (up to 35 characters with '0' termination).  
                   |                  | The message must be 32 characters or less. | STR36 | W      | Write Read |
| 410632 to 410680 | (Reserved) Free message | - | - | - | - |
| 410681   | Batch 1 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410682   | Batch 2 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410683   | Batch 3 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410684   | Batch 4 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410685   | Batch 5 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410686   | Batch 6 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410687   | Batch 7 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410688   | Batch 8 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410689   | Batch 9 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410690   | Batch 10 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410691   | Batch 11 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
| 410692   | Batch 12 memory start and stop | Stop: 0. Start: 1. | INT16 | R/W | Write Read |
### 6.3 Modbus Protocol Specifications

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<td>410693</td>
<td>Batch 1 computation reset</td>
<td>Execute computation reset: 1 (fixed)</td>
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<td>Batch 2 computation reset</td>
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<td>INT16</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>410728</td>
<td>Event edge switch 24</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
<td>W</td>
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</tr>
<tr>
<td>410729</td>
<td>Event edge switch 25</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
<td>W</td>
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<td>410730</td>
<td>Event edge switch 26</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
<td>W</td>
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<td>410731</td>
<td>Event edge switch 27</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
<td>W</td>
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<tr>
<td>410732</td>
<td>Event edge switch 28</td>
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<td>INT16</td>
<td>W</td>
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</tr>
<tr>
<td>410733</td>
<td>Event edge switch 29</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
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<tr>
<td>410734</td>
<td>Event edge switch 30</td>
<td>Execute event edge switch: 1 (fixed)</td>
<td>INT16</td>
<td>W</td>
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</table>
### 6.3 Modbus Protocol Specifications

<table>
<thead>
<tr>
<th>Register</th>
<th>Description</th>
<th>Supplementary Information</th>
<th>Type</th>
<th>Access</th>
<th>Simultaneous Access</th>
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<tbody>
<tr>
<td>410765</td>
<td>Event level switch 1</td>
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<td>Event level switch 23</td>
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<td>410792</td>
<td>Event level switch 28</td>
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<td>INT16</td>
<td>R/W</td>
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<td>Event level switch 29</td>
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<td>R/W</td>
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<td>Event level switch 30</td>
<td></td>
<td>INT16</td>
<td>R/W</td>
<td></td>
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<tr>
<td>410801</td>
<td>Setting function communication login</td>
<td>The value is 1 only when a user has logged into the DX setting function through Ethernet communication.</td>
<td>INT16</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>410802</td>
<td>Key login</td>
<td>The value is 1 when a user has logged into the DX through key operations.</td>
<td>INT16</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>410803</td>
<td>Login not possible</td>
<td>The value is 1 when login through key operations, login to the setting function through Ethernet communication, and login through the sending of the LL command through serial communication are not possible, because another user is logged in.</td>
<td>INT16</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>410804</td>
<td>Individual alarm ACK channel number</td>
<td>Specifies the alarm released by an individual alarm ACK operation. The channel and alarm level are accessed successively. This only applies to DXs with the /AS1 advanced security option.</td>
<td>INT16</td>
<td>W</td>
<td>—</td>
</tr>
<tr>
<td>410805</td>
<td>Individual alarm acknowledgment alarm level</td>
<td>—</td>
<td>INT16</td>
<td>W</td>
<td>—</td>
</tr>
</tbody>
</table>

**Notation used in the Access column**

W: Writable  
R: Readable  

If you read a write-only (W) register, zero is always read.  
If you write to a read-only (R) register, an error occurs.

**Notation used in the Simultaneous access column**

Blank: Indicates a range of registers that can be written to or read from simultaneously.  
You cannot simultaneously access across a solid line.  
- : Not accessible.
### How to Use

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data type</td>
<td>STRnn Registers in which ASCII codes are entered starting with the specified register. It is terminated with a NULL character (\0). The number of characters that can be entered that includes the NULL character is indicated in the nn section.</td>
</tr>
</tbody>
</table>

Example of setting the batch number (STR36 type) of batch group 1 to "ABCD". **"""" denotes any value.

<table>
<thead>
<tr>
<th>Register</th>
<th>Value to Write</th>
<th>Hexadecimal Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>410003</td>
<td>'A''B'</td>
<td>(4142H)</td>
</tr>
<tr>
<td>410004</td>
<td>'C''D'</td>
<td>(4344H)</td>
</tr>
<tr>
<td>410005</td>
<td>'**'</td>
<td>(00**H)</td>
</tr>
<tr>
<td>410006 to</td>
<td>**</td>
<td>(**,**H)</td>
</tr>
</tbody>
</table>

Write the entire character string using one command.

In the above example, registers 410003 to 410005 must be written using one command.

A zero is read when you read a write-only register.

#### Lot number
- Access the registers two registers at a time.
- You can only access from the first register.
- On models without the multi batch function (/BT2 option) or on models with the multi batch function (/BT2 option) but with the multi batch function disabled, if you access a lot number of a batch group, an error occurs.

#### Batch number
- You can only access from the first register.
- On models without the multi batch function (/BT2 option) or on models with the multi batch function (/BT2 option) but with the multi batch function disabled, if you access a batch number of a batch group, an error occurs.

#### Message
- You can only write from the first register.
- A message is written using one command. In other words, write to registers 410601 to 410603 using one command. On models without the multi batch function, you only have to write to registers 410601 and 410602 instead.

On models without the multi batch function, the message write destination can be omitted (write only to 410601). If you omit it, the operation is the same as when all groups are specified.

#### Free message
- You can only write from the first register.
- A free message is written using one command.

If you omit the free message section, an all-space message is written.

On models without the multi batch function, the message write destination and subsequent registers can be omitted (write only to 410611). If you omit them, an all-space message is written to every group.

Example: To write the free message "ABCD" to all display groups in batch group number 4 using message number 10, write the values in the following table using one command. **"""" denotes any value.

<table>
<thead>
<tr>
<th>Register</th>
<th>Value to Write</th>
<th>Hexadecimal Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>410611</td>
<td>10</td>
<td>(000AH)</td>
</tr>
<tr>
<td>410612</td>
<td>0</td>
<td>(000H)</td>
</tr>
<tr>
<td>410613</td>
<td>4</td>
<td>(004H)</td>
</tr>
<tr>
<td>410614</td>
<td>'A''B'</td>
<td>(4142H)</td>
</tr>
<tr>
<td>410615</td>
<td>'C''D'</td>
<td>(4344H)</td>
</tr>
<tr>
<td>410616</td>
<td>'**'</td>
<td>(00**H)</td>
</tr>
</tbody>
</table>

#### Computation reset
On models without the multi batch function (/BT2 option) or on models with the multi batch function (/BT2 option) but with the multi batch function disabled, if you access computation reset of a batch group, an error occurs.
Simultaneous access

- Batch numbers and lot numbers can be written using one command for each batch.

Example 1: On models without the multi batch function (/BT2 option), you can write to registers 407833 to 407851 using one command.
Example 2: For batch group 1, you can write to registers 410001 to 410020 using one command.
Example 3: To set the batch number of batch group 1 to "ABCD" (see the explanation for "Data type STRnn" for details), you can write registers 410001 to 410005 using one command.

- You cannot simultaneously access batch numbers or lot numbers across multiple batch groups.
- When reading, you can access the following registers simultaneously.
  - Internal switches 1 to 30
  - Memory start/stop for batches 1 to 12
  - Event level switches 1 to 30

When the Data Type in a Command Differs from the DX Data Type

Every DX data value has a set data type. If you access the DX using the same data type, all of the data, including special data, are sent to the DX without any change. If you access the DX using a data type that is different from the DX data type, the data type is converted. For details on the conversion rules, see “Communication Considerations” in the DX1000/DX1000N/DX2000 EtherNet/IP Communication Interface User’s Manual (IM04L41B01-18E).

Modbus Error Response (Common to Modbus server and Modbus slave)

The DX returns the following error codes to a client or master device.

<table>
<thead>
<tr>
<th>Code</th>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ILLEGAL FUNCTION</td>
<td>Invalid function code. An attempt was made to execute a function that is not supported.</td>
</tr>
<tr>
<td>2</td>
<td>ILLEGAL DATA ADDRESS</td>
<td>Invalid register number. Failed to access the register.</td>
</tr>
<tr>
<td>3</td>
<td>ILLEGAL DATA VALUE</td>
<td>Invalid number of registers. When reading, the specified number of registers was less than or equal to zero or greater than or equal to 126. When writing, the specified number of registers was less than or equal to zero or greater than or equal to 124.</td>
</tr>
<tr>
<td>7</td>
<td>NEGATIVE ACKNOWLEDGE</td>
<td>Invalid contents written. A lot number that is outside the valid range was entered. Invalid characters (such as ‘\x1b’) were written in batch number or free message registers. Failed to control the following operations. Writing messages Writing free messages Writing batch numbers and lot numbers</td>
</tr>
</tbody>
</table>

However, no response is returned for the following errors.

- CRC error
- Errors other than those shown above
6.3 Modbus Protocol Specifications

Modbus Master Function

Basic Operations
- The DX, as a Modbus master device, communicates with Modbus slaves periodically by sending commands at specified intervals.
- The Modbus master function operates independently from the Modbus client function via the Ethernet communication.
- The supported functions are “reading data from the input registers and hold registers on the slave” and “writing data into the hold registers on the slave.”

Serial Communication Specifications (Common to the Modbus Slave Function)
Communicate via ModbusRTU
Communication media: RS-232, RS-422, or RS-485
Control system: No flow control (none only)
Baud rate: Select from 1200, 2400, 4800, 9600, 19200, and 38400
Start bit: 1 bit (fixed)
Data length: 8 bit (fixed)
Parity: Select odd, even, or none
Stop bit: 1 bit (fixed)
Message termination determination: Time equivalent to 48 bits

Modbus Master Specifications
Read cycle: Select the cycle at which data is read from other devices from the following: 125, 250, 500 ms, 1, 2, 5, and 10 s
Timeout value: Select the timeout value when there is no response from the specified slave after sending a command from the DX from the following: 125, 250, 500 ms, 1, 2, 5, 10 s, and 1 min
Retry count: Select the retry count when there is no response for a command sent from the DX to the specified slave.
OFF, 1, 2, 3, 4, 5, 10, and 20
Auto recovery cycle: Select the cycle for automatically recovering from the following:
OFF, 1, 2, 5, 10, 20, 30 min, and 1 h
Wait between commands: Select the wait time* after receiving a response of a command until sending the next command from the following:
OFF, 5, 10, 15, 45, and 100 ms
* When communicating using an RS-485 two-wire system, the signals may collide, because the master and slave devices driving the communication switch in half-duplex mode. If the communication does not work, increase the wait time.

Command type: R, R-M, W, W-M
Command setting: Set up to 16 commands
Command items: Read channel 201 to 440, C01 to C60
Write channel 001 to 048, 101 to 160 (varies depending on the model)
Address: 1 to 247
Input register: 30001 to 39999, 300001 to 365535
Hold register: 40001 to 49999, 400001 to 465535
Access method: Same as the Modbus client.
Supported functions: Same as the Modbus client.
Data type: Same as the Modbus client.
Modbus Slave Function

Serial Communication Specifications: Same as the Modbus Master Function
Slave address: 1 to 99.
Supported functions: Same as the Modbus server.
Register assignments: Same as the Modbus server.
Modbus error response: Same as the Modbus server.
Appendix 1  Data Dropout during Modbus Communication

Data Dropout during Modbus Client

If the response to the previous command is not complete when the DX attempts to issue a command to a server device, the DX command cannot issue the command causing a data dropout. Take appropriate measures by referring to the following figures.

1. When the response from the server device takes a long time

2. When the connection is dropped because there is no response from the server device

3. When the communication recovers by connection retry

Status lamp

: Status lamp

: Command from the DX

: Response from the server device

* The first connection retry after the connection is dropped is shorter than the specified interval. The status lamp condition is an example when connection retry is configured.
Data Dropout during Modbus Master

If the response to the previous command is not complete when the DX attempts to issue a command to a slave device, the DX command cannot issue the command causing a data dropout. Take appropriate measures by referring to the following figures.

1. When the response from the slave device takes a long time

2. When there is no response from the slave device

3. When the slave device that is not responding is disconnected (retry count is set to 1)

Status lamp:
- : Command from the DX
- : Response from the slave device
Appendix 2  Login Procedure

You log into the DX from your PC to use the functionality of the setting/measurement server and the maintenance/test server via the Ethernet interface. If you complete the procedure successfully up to login complete in the following figure, the commands in chapter 3 become functional.

When Using the Login Function (Standard Security Function) of the DX

1. Connect
   - Within the number of connections*1
   - Disconnect

2. Within 2 minutes?
   - User name
     - Yes
     - Increment retry count
     - E1 400
     - E1 401
     - E1 402
     - E1 403
     - E1 404

3. Within 3 retries?*2
   - Within the number of simultaneous uses?*3
   - Login complete

4. Within 2 minutes?
   - Password
     - Verification match?
     - Wait 5 s
     - Within 3 retries?*2

5. Within 3 retries?*2

---

E1 403
Response from the DX (message omitted)
For a description of the response format, see section 6.1.
Code (for a description of codes and messages, see page App-17)

*1 Connections cannot exceed the maximum number of connections (see section 2.1).
*2 If you try to log in using a wrong password four consecutive times, the communication is dropped (the number of retries for login is three).
*3 If you try 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 of the DX
Login as "admin" or "user."

- The user name "admin" can be used to login to the DX as an administrator.
- The user name "user" can be used to access the DX as a user.
When Using the Login Function on a DX With the /AS1 Advanced Security Option

The following is the flow of the setting/measurement server login operation.

- Function name: Enter “setting” to select the setting function and “monitor” to select the monitoring function.
- The user ID is requested even for settings that do not use it, but for these settings, you can enter anything you want to.
- For information about the maximum number of simultaneous connections, see section 6.1.
- For information about the login conditions, see section 1.12.
## Appendix 3  ASCII Character Codes

### Upper 4 bits

<table>
<thead>
<tr>
<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>
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</thead>
<tbody>
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### Lower 4 bits

- The delimiter (,), sub delimiter (;), query symbol (?), and terminator (CR+LF) characters are reserved. You cannot use them as parameter characters.

### German and French only

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<td>Message</td>
<td>BJ</td>
</tr>
<tr>
<td>Group</td>
<td>Group name</td>
<td>SX</td>
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<td>Comment character string</td>
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<td>YU</td>
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<td>Header 2</td>
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Appendix 4  Output Flow of the File or the File List on the External Storage Medium and Internal Memory

Example in Which the File 10101000.DAD Is Output

The figure below shows the output flow of the file 10101000.DAD in the DATA0 directory of the external storage medium.

START
Send the command
MEGET,/DRV0/DATA0/10101000.DAD (Specify the file name using full path and output the data.)
Receive response
Binary (see section 4.1)

Is there more data?
NO
YES
Send the command
MENEXT (Output the subsequent data.)
Receive response
Binary (see section 4.1)

END

Command to send
Command description
Received response data

* Bit 0 of the binary header flag
  0: There is more data.
  1: Data transmission is complete.
Example in Which the File List Is Output 10 Files at a Time

The figure below shows the flow in which the file list in the DATA0 directory of the external storage medium is output 10 files at a time.

When the number of output file lists is smaller than the maximum number of file lists specified by the ME DIR command (10 in this example), one can conclude that there are no more file lists.
Appendix 5  Flow Chart of the FIFO Data Output

Overview of the FIFO Buffer

The DX 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 acquisition interval is 1 s and the capacity of the FIFO memory is for 8 intervals.

- Acquiring of the Measured/Computed Data
  - The measured/computed data are acquired to the internal memory at 1 s intervals.
  - Measured/computed data is acquired to positions 1 through 8 in order. After acquiring to position 8, the next data is acquired to position 1.

- Reading the Measured/Computed Data (FF GET command is used)
  Outputs the data from the previous read position (RP1) to the most recent acquisition 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.

The size of the internal memory reserved for FIFO (FIFO buffer data size) varies depending on the model.

<table>
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<tr>
<th>Model</th>
<th>Data size</th>
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<tbody>
<tr>
<td>DX1002, DX1004, DX2004, and DX2008</td>
<td>1200 intervals (30 s at the fastest acquisition interval of 25 ms)</td>
</tr>
<tr>
<td>DX1006, DX1012, DX2010, DX2020, DX2030, DX2040, and DX2048</td>
<td>240 intervals (30 s at the fastest acquisition interval of 125 ms)</td>
</tr>
<tr>
<td>Models with the external channel input option</td>
<td>60 intervals (60 s at the fastest acquisition interval of 1 s)</td>
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</tbody>
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