
**User's
Manual**

DXAdvanced[™]

**DX1000/DX1000N/DX2000
Communication Interface**

vigilantplant.[™]

Foreword

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.

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

Manual Name	Manual No.	Description
DX1000/DX1000N User's Manual	IM 04L41B01-01E	Explains all functions and procedures of the DX1000/DX1000N excluding the communication functions.
DX2000 User's Manual	IM 04L42B01-01E	Explains all functions and procedures of the DX2000 excluding the communication functions.
DX1000/DX1000N/DX2000 Communication Interface User's Manual	IM 04L41B01-17E	Explains the communication functions of the Ethernet/serial interface.
DAQSTANDARD User's Manual	IM 04L41B01-61E	Explains the functions and operating procedure of DAQSTANDARD.

- **Paper manual**

Manual Name	Manual No.	Description
DX1000/DX1000N Operation Guide	IM 04L41B01-02E	Explains concisely the operating procedure of the DX1000 and DX1000N.
DX2000 Operation Guide	IM 04L42B01-02E	Explains concisely the operating procedure of the DX2000.

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.
- Copying or reproducing all or any part of the contents of this manual without YOKOGAWA's permission is strictly prohibited.
- The TCP/IP software of this product and the document concerning the TCP/IP software have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the Regents of the University of California.

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Revisions

- First edition: December 2005

Conventions Used in This Manual

- **Unit**
 - k: Denotes 1000. Example: 5 kg, 100 kHz
 - K: Denotes 1024. Example: 640 KB (storage capacity of floppy disks)

- **Markings**

The following markings are used in this manual.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the manual to identify those instructions.

WARNING

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

CAUTION

Calls attentions 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.

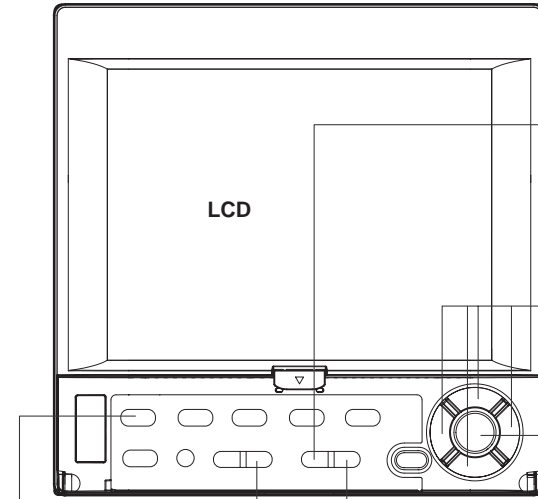
Models Covered in This Manual

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.

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.

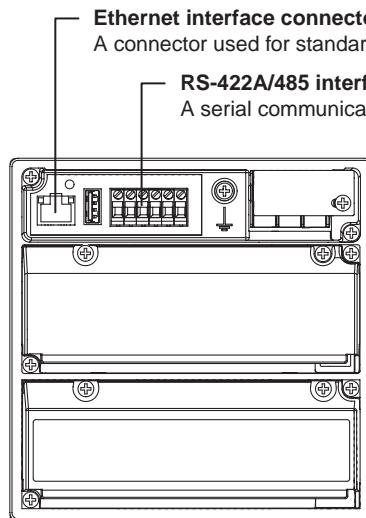
DISP/ENTER key
Press this key when confirming the setting or when closing the entry box.

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 enter the communication setup menus.

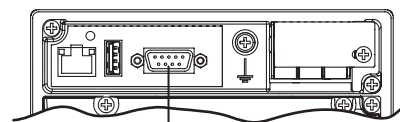
Rear Panel

DX1000



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

RS-422A/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.

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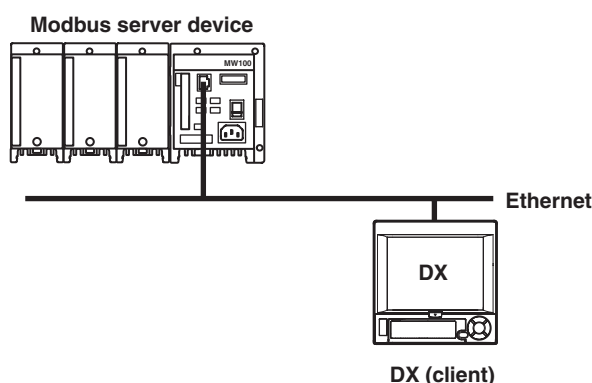
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1.1 DX1000/DX2000 Features

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.

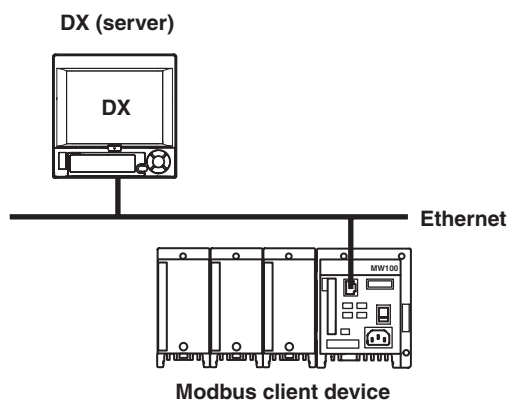
Modbus Client

- 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 (/M1 option) 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.
- 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 connect to the DX, the Modbus server device, to read the measured/computed/external input data written in the input register or write/read communication input data and external input channel through the hold register of the DX.
- 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/OFF, register users, set the key lock password, or set the connection destination of the FTP client function.
- The following types of data can be output.
 - Measured, computed, and external input 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, and external input 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.

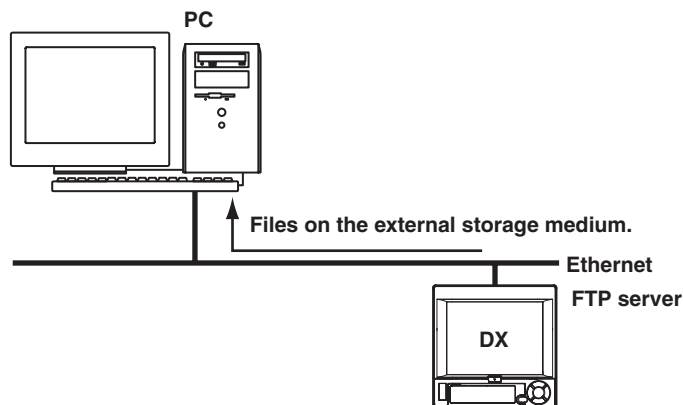
- The commands that can be used with this function are setting commands (see sections 3.4 and 3.5), basic setting commands (see section 3.6), and output commands (see sections 3.7 and 3.8).
- This function can be used when communicating via the Ethernet interface or the serial interface (option).
- For a description of the settings required to use this function via the serial interface, see chapter 2.

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).

FTP Server

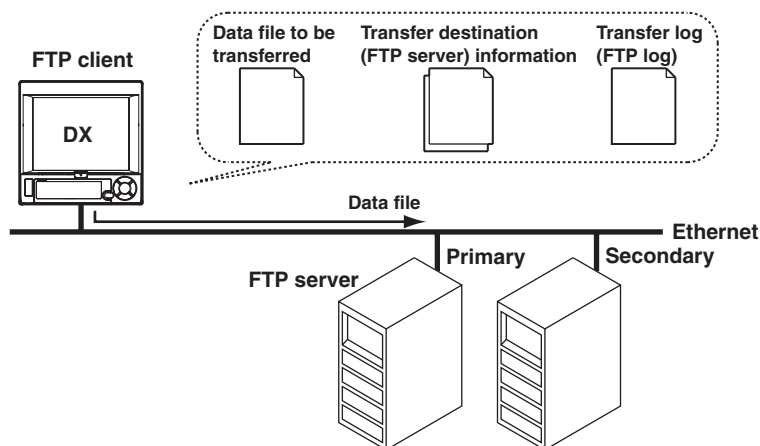
- You can use a PC to access the DX via FTP. You can perform operations such as retrieving directory and file lists from the external storage medium of the DX and transferring and deleting files. In addition, you can also retrieve the directory or file list and transfer files in the internal memory.
- 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, and snapshot data file 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.



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.

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 3.11).

Login

- This function can be used only when communicating via the Ethernet interface and when using the setting/measurement server, maintenance/test server, and the FTP server functions.
- For 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. The privileges and limitations of each user level are described below.

- **Administrator**

An administrator has privileges to use all the functions of the setting/measurement server, maintenance/test server, and FTP server.

- **User**

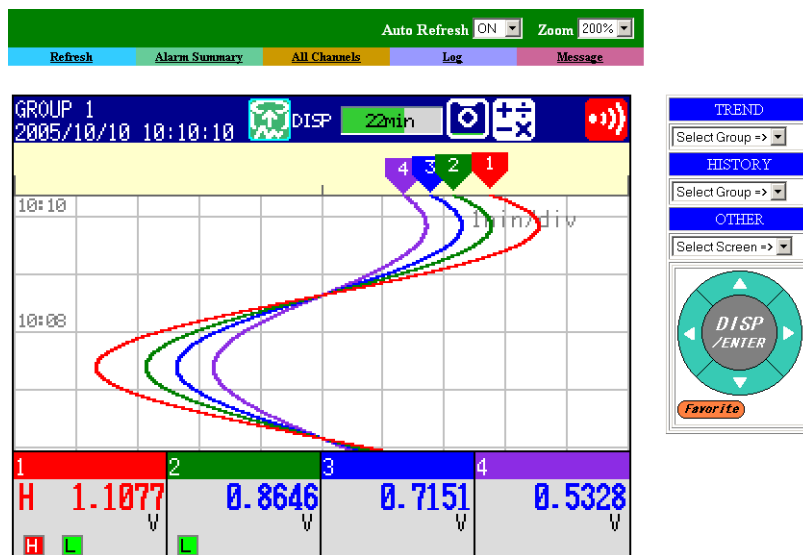
A user has limited privileges to use the setting/measurement server, maintenance/test server, and FTP server. For the limitation on the commands, see section 3.2.

- **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.
- **Application timeout**
This function drops 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 which would prohibit other users from making new connections for data transfer.

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 30 s).
- The following information can be displayed.
 - Alarm summary
 - Measured and computed values of all channels
 - Log (message summary, error log, etc.)
- 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
Notifies alarm information when an alarm occurs or releases.
- 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.
- 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 optional computation function (/M1)
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	
Date: Sun, 5 Oct 2003 08:00:45 +0900 (JST)	
Subject: Periodic_data	Subject
To: user1@daqstation.com, user2@daq.co.jp	
LOOP1	Header 1
TEMPERATURE	Header 2
Time	
Host name	
DX1000	
Time of transmission	
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.

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.

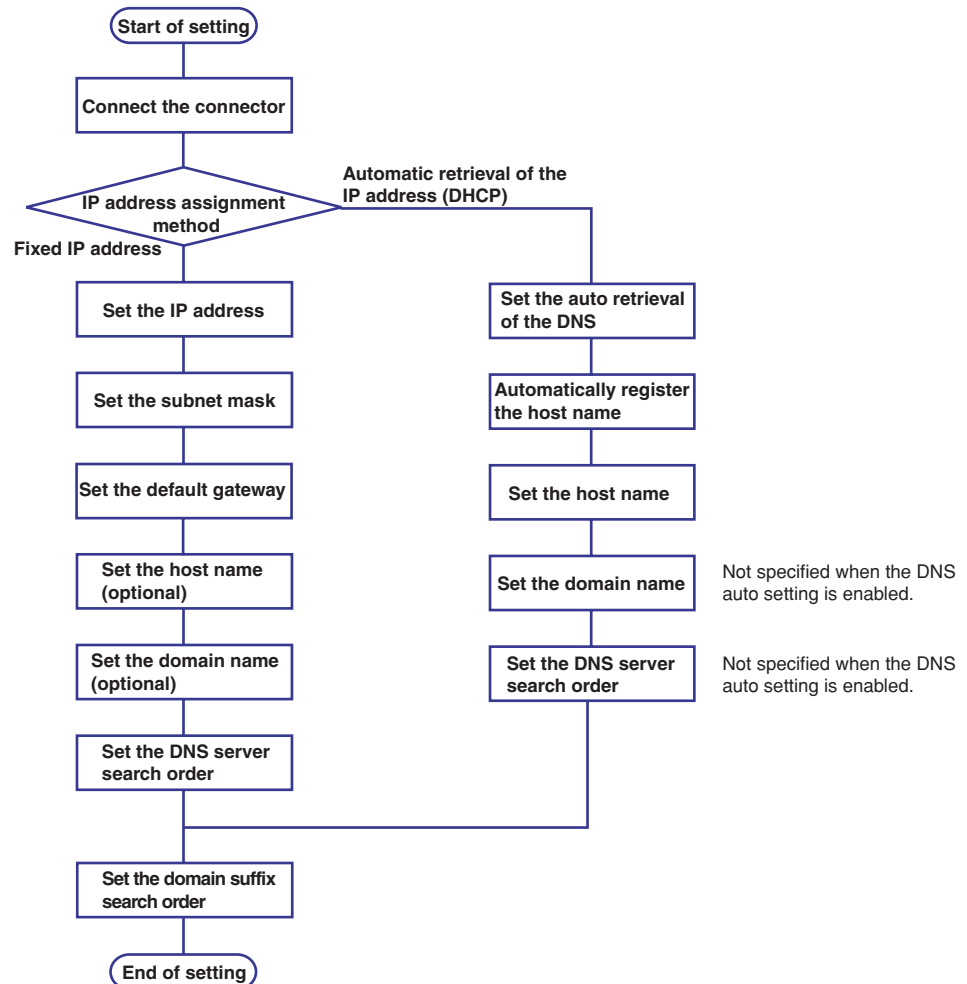
- Error log screen: Log of operation errors
- Communication log screen: Log of communication input/output to the setting/measurement server
- FTP log screen : Log of file transfers carried out using the FTP client function.
- WEB log screen : Log of operations using the Web server function
- Mail log screen : Log of E-mail transmissions
- Login log screen : Log of login and logout
- 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)

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 1.9.

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.

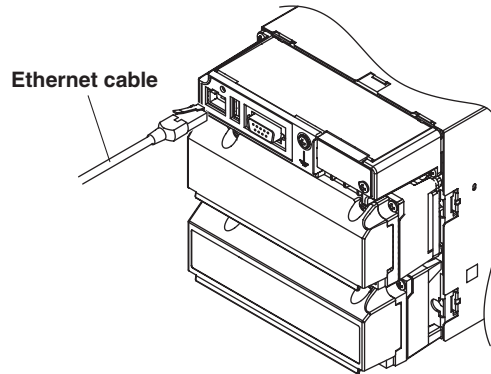


1.3 Connecting the DX

Connecting to the Port

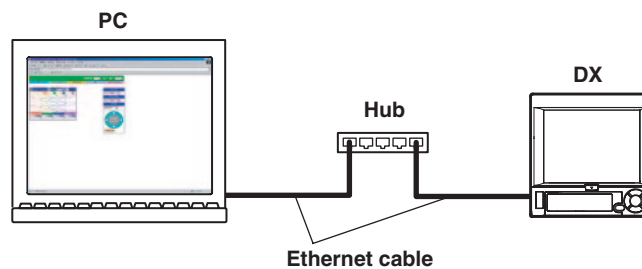
Connector

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



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.



Setting the IP Address and Host Information

- DX1000
 - ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet) > IP address**
 - ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet) > Host Settings**
- DX2000
 - ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet) > IP Address, Host settings**

IP address setting

Basic Setting Mode		Ethernet Link
IP address		
DHCP	<input type="button" value="Not"/>	
Fixed IP-address		
IP address	<input type="text" value="192.168. 1.100"/>	
Subnet mask	<input type="text" value="255.255.255. 0"/>	
Default gateway	<input type="text" value="192.168. 1. 10"/>	
<input type="button" value="Use"/> <input type="button" value="Not"/>		

Host name setting

Basic Setting Mode		Ethernet Link
Host settings		
Host name	<input type="text" value="dx1000"/>	
Domain name	<input type="text" value="daqstation.com"/>	
<input type="button" value="Input"/> <input type="button" value="Clear"/> <input type="button" value="Copy"/>		

DNS setting

The screenshot shows a terminal window titled "Basic Setting Mode" with an "Ethernet Link" indicator. The menu is as follows:

```
Basic Setting Mode Ethernet Link
Domain suffix
Primary 192.168.1.20
Secondary 192.168.1.30
Domain suffix search order
Primary
Pri.daqstation.com
Secondary
Sec.daqstation.com
Input
```

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.

When using a fixed IP address

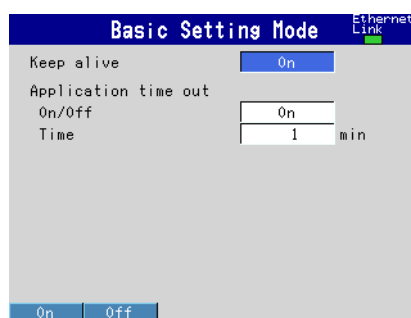
- **DHCP**
Set DHCP to **Not**.
- **IP address**
Set the IP address to assign to the DX.
- **Subnet mask**
Set the subnet mask according to the system or network to which the DX belongs.
- **Default gateway**
Set the IP address of the gateway.
- **Host name**
Set the DX's host name using up to 64 alphanumeric 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.
- **Domain suffix**
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 domain suffix.
- **Host-name register**
To automatically register the host name, 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.
- **Setting the domain suffix (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.

Setting the Communication Status

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

**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

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

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

Basic settings

Basic Setting Mode Ethernet Link

Basic settings

SMTP server name

Port number

Recipient 1

Recipient 2

Sender

Input Clear Copy

Alarm settings

Basic Setting Mode Ethernet Link

Alarm settings

Recipient 1 Recipient 2

Active Alarms

Alarm 1 Alarm 2

Alarm 3 Alarm 4

Include INST

Include source URL

Subject

Header 1

Header 2

Scheduled settings

Basic Setting Mode Ethernet Link

Scheduled settings

Recipient 1 Recipient 2

Interval Interval

Ref.time Ref.time

Include INST

Include source URL

Subject

Header 1

Header 2

Report settings

Basic Setting Mode Ethernet Link

System settings

Recipient 1 Recipient 2

Include source URL

Subject

Header 1

Header 2

System settings

Basic Setting Mode Ethernet Link

Report settings

Recipient 1 Recipient 2

Include source URL

Subject

Header 1

Header 2

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.
- **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.

Alarm Settings

Specify the settings for sending e-mail when alarms occur.

- **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. 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 when the alarm occurred.
- **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.

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.

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**
When you start the e-mail transmission, the e-mail transmission function is enabled.

Stopping the e-mail transmission

- ◇ Press **FUNC** and select **E-Mail STOP**
When you stop the e-mail transmission, 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.

E-mail Format

The formats of alarm e-mails, scheduled e-mails, system e-mails, 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

- **Syntax**

```
header1 CRLF
header2 CRLF
CRLF
Alarm_summary.CRLF
<Host_name> CRLF
host CRLF
CRLF
<CH>ccc...c CRLF
<Type>lq CRLF
<aaa>mo/dd_hh:mi:ss CRLF
CRLF
<Inst._value> CRLF
mo/dd_hh:mi:ss CRLF
ccc...c=ddd...d CRLF
.....
CRLF
Access_the_following_URL_in_order_to_look_at_a_screen.CRLF
http://host.domain/ CRLF
CRLF
```

ccc...c Channel No. or tag name
(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)
 Positive overrange: +OVER
 Negative overrange: -OVER
 Burnout data: Burnout
 Error data: *****

The channel number, alarm type, and alarm status are transmitted for up to 10 events in a single e-mail.

Scheduled E-mail Format

- **Subject**

Subject:Periodic_Data

- **Syntax**

header1 CRLF

header2 CRLF

CRLF

Periodic_data.CRLF

<Host_name>CRLF

hostCRLF

CRLF

<Time>CRLF

mo/dd_hh:mi:ss CRLF

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 CRLF

ccc...c=ddd...d CRLF

.....

CRLF

Access_the_following_URL_in_order_to_look_at_a_screen.CRLF

http://host.domain/ CRLF

CRLF

ccc...c Channel No. or tag name
 (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

1.4 Sending E-mail Messages

ddd...d Measured/Computed value (up to 10 digits including the sign and decimal point) + unit (up to 6 characters)
Positive overrange: +OVER
Negative overrange: -OVER
Burnout data: Burnout
Error data: *****

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

System Mail (Power Failure) Format

- **Subject**

Subject: System_warning

- **Syntax**

header1 CRLF

header2 CRLF

CRLF

Power_failure.CRLF

<Host_name> CRLF

host CRLF

CRLF

<Power_fail>mo/dd_hh:mi:ss CRLF

<Power_on>mo/dd_hh:mi:ss CRLF

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**

header1 CRLF

header2 CRLF

CRLF

Memory_full.CRLF

<Host_name> CRLF

host CRLF

CRLF

<Memory_remain>ppp...pMbytes CRLF

<Memory_blocks>bbb/400 CRLF

<Media_remain>rrr...rMbytes CRLF

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**

header1 CRLF

header2 CRLF

CRLF

Error. CRLF

<Host_name> CRLF

host CRLF

CRLF

mo/dd_hh:mi:ss CRLF

ERROR: fff 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)*.**Report Mail Format**• **Subject**

Subject: Report_data

• **Syntax**

header1 CRLF

header2 CRLF

CRLF

ti_report. CRLF

<Host_name> CRLF

host CRLF

CRLF

mo/dd_hh:mi:ss CRLF

<CH>ccc...c CRLF

<tp>eee...e CRLF

<tp>eee...e CRLF

<tp>eee...e CRLF

<tp>eee...e CRLF

<Unit>uuu...u CRLF

.....

CRLF

Access_the_following_URL_in_order_to_look_at_a_screen. CRLF

http://host.domain/ CRLF

CRLF

ti Contents of the report mail (hourly, daily, weekly, or monthly report)

ccc...c Channel No. or tag name
(Up to 16 characters. Channels set to Skip or Off are not output. For the channel number, see section 3.3.)

1.4 Sending E-mail Messages

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. Positive overrange: +OVER Negative overrange: -OVER Burnout data: Burnout Error data: Empty 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

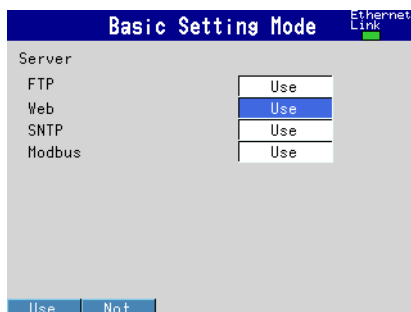
1.5 Monitoring the DX on a PC Browser

Setting the Web Server Function

From the basic setting mode menu, set the server function and Web page of communications (Ethernet).

Setting the Web server

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



- **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

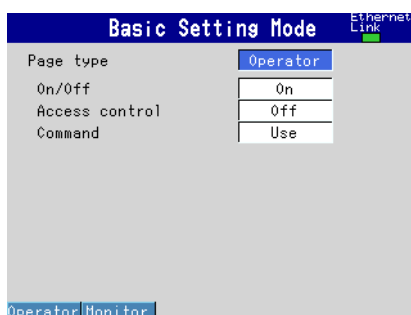
The default value is 80. To change the setting,

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Environment** > **Service port**

For the selectable range of port numbers, see section 6.1.

Setting the Web page

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet)** > **Web page**



Page type (type of screen to be displayed)

- Monitor
Set the monitor page. The following information can be displayed.
 - Alarm summary
 - Measured and computed values of all channels
 - Log (message summary, error log, etc.)
 - 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 display on the DX by specifying the display type (trend, historical trend, digital, bar graph, or overview). In addition, you can specify the group of the trend and historical trend.
 - Operate the DISP/ENTER key, arrow keys, and Favorite key on the DX.
 - Set messages on the DX and write them.
 - For screen examples, see “Monitoring with the Browser” in this section.

Setting the monitor page

- Setting the page type
To set the monitor page, select **Monitor**.
- Setting On/Off
To display the monitor page on a browser, select **On**; otherwise, select **Off**.
- Setting the access control
To use access control, select **On**. You must enter a user name and password to display the monitor page. You must set the security and login in the environmental settings to use this function. For the settings, see the *DX1000/DX2000 User's Manual (IM04L41B01-01E or IM04L42B01-01E)*.

Setting the operator page

- Setting the page type
To set the operator page, select **Operator**.
- Setting the access control
This is the same as the setting on the monitor page.
- Selecting whether to use command input
To use messages and use write commands, select **On**; Otherwise, select **Off**.

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 this example, we assume that the domain name is adv.daqstation.com, the host name is dx1000, and the IP address is 192.168.1.100.)

Login

Enter the user name and login password. You do not have to enter these items if access control is set to **OFF** on the Web page setting.

• Contents on the monitor page

All channel display

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

Display the alarm summary

Displays the alarm summary in a separate window.

Refresh the screen

Automatically refresh the screen

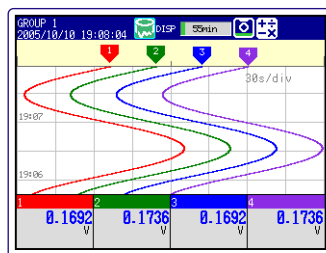
Turn this ON to automatically refresh the screen.

Log display

Displays each log in a separate window.

Zoom

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



DX screen image

The displayed contents are the same as shown on the DX.

1.5 Monitoring the DX on a PC Browser

- If the DX is in the setting mode* or basic setting mode*, the monitor page cannot be displayed. An error message is displayed.
 - * For a description on the modes, see the *Operation Guide (IM04L41B01-02E/IM04L42B01-02E)*.
The “∞” set on the DX is displayed as “^” on the Web browser.
- Refreshing the monitor page

The monitor page can be refreshed automatically or manually.

 - Auto Refresh ON
The monitor page is refreshed at a refresh rate of approximately 30 s.
 - Auto Refresh OFF
The monitor page is not automatically refreshed. You can refresh the page manually. Within approximately 30 s of the last refreshing, the page is not refreshed even if you attempt to refresh the page manually.
- Displaying the log

Displays the message summary, communication log, error log, FTP log, login log, Web operation log, e-mail log, SNTP log, DHCP log, and Modbus log in a separate window. From the **Log** list box, select the log you want to display. Click the **Refresh** to refresh the data. Messages can be displayed to 100 pieces and added messages can be displayed to 50 pieces.

Log display (example of a message log display)

LOG

MESSAGE

Refresh Close Creation date : 2005/10/10 17:18:53

Date	Message	Group	User
2005/10/10 17:18:51	POWER OFF	ALL	[Key]
2005/10/10 14:38:06	STOP	ALL	[Communication]
2005/10/10 13:17:12	DANGER	ALL	[Key]
2005/10/10 13:15:29	HIGH VOLTAGE	01	[Communication]
2005/10/10 12:14:37	BATTERY	ALL	[Key]
2005/10/10 10:13:15	POWER ON	ALL	[Communication]

- Displaying the alarm summary and refreshing the all channel display

Click the **Refresh** to refresh the data. Alarm summaries can be displayed to 400 pieces.

Example of an alarm summary display

Refresh Close Creation date : 2005/10/10 17:23:32

Status	Channel	Type	Alarm Time
OFF	1	1H	2005/10/10 17:23:30
ON	2	1L	2005/10/10 17:23:30
ON	1	2L	2005/10/10 17:23:30

Example of an all channel display

Refresh Close Creation date : 2005/10/10 17:25:12

Channel	Alarm status				Reading	Units
	1	2	3	4		
1	H	L			0.9131	V
2		L			0.7114	V
3					0.5895	V
4					0.4384	V

• Contents of the operator page

Refresh the screen

Display the alarm summary

All channel display

Log display

Automatically refresh the screen

Zoom

Enter a message
Opens a separate window for entering a message.

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

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

Select other displays
Select the overview display, numeric display, and bar graph display.

Arrow keys and DISP 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.

DX screen image
The displayed contents are the same as shown on the DX.

The following operations can be carried out on the operator page in addition to the operations available on the monitor page.

- Switching trend, historical trend, digital, bar graph, and overview displays
You can switch the screen on the DX by specifying the group that will display the trend, historical trend, digital, bar graph, or overview display.
- Operating the DX using the DISP/ENTER key, arrow keys, and Favorite key on the operator page
When the DX is in the operation mode, you can carry out the same operations as the DISP/ENTER key, arrow keys, and Favorite key on the DX.
- Setting and writing messages
You can set message strings for messages 1 through 10 on the DX (up to 32 alphanumeric characters) and, at the same time, write them to the specified group. Existing messages are overwritten. The following figure indicates an example in which the word “ALARM” is written to all groups in message number 9, and the Command Response box shows that the operation was successful.

Message entry example

Active Message

Message No.

Write message to

All Groups

Group Number

Input Characters

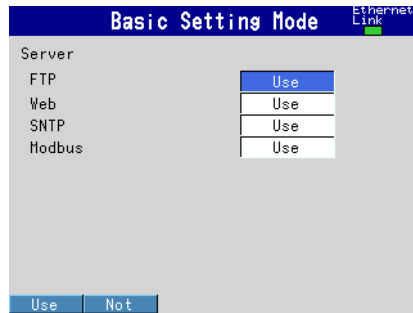
Command Response

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

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



- **FTP**

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

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://host name.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 "host name.domain name."

Login

If security is enabled, you are prompted to enter the login name and password. Enter the login name and password to establish the connection.

Port Number

The default value is 21. To change the setting,

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Environment > 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, and snapshot data 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.

File Type	Description
Display data file	Data files are automatically transferred at each file save interval.
Event data file	Files are automatically transferred when the data length of data is recorded.
Report data file	Data files are automatically transferred every time a report is created.
Snapshot data file	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.

Setting the FTP Client

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet) > FTP client**

FTP transfer file settings

Basic Setting Mode Ethernet Link

FTP transfer file

Disp&Event data	On
Report	On
Snapshot	On

On Off

FTP connection destination settings

Basic Setting Mode Ethernet Link

FTP connection Primary

FTP server ftp.dagstation.com

Port number 21

Login name dx1000

Password abc12345

Account

PASV mode Off

Initial path /data

Primary Second

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

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

If the file transfer to both primary and secondary destinations fails, the DX aborts the file transfer. When the connection recovers, the DX transfers the data that could not be transferred in addition to the new data file. However, since the data that is transferred resides in the internal memory of the DX, if the data is overwritten, the data that could not be transferred is lost.

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** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Communication(Ethernet) > SNTP client**

SNTP client settings	
Use/Not	Use
Server name	sntp.daqstation.com
Port number	123
Access interval	8h
Access reference time	00:00
Access timeout	30s
Time adjust on Start action	Off

- **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 file transfer destination 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

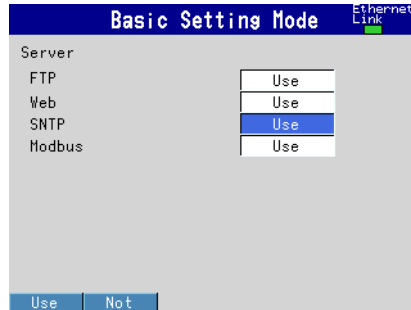
You can synchronize the time at any time by operating the FUNC key. The SNTP client setting must be enabled.

- ◇ Press **FUNC** and select **SNTP**

Setting the SNTP Server

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

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



- **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** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Environment > Service port**

For the selectable range of port numbers, see section 6.1.

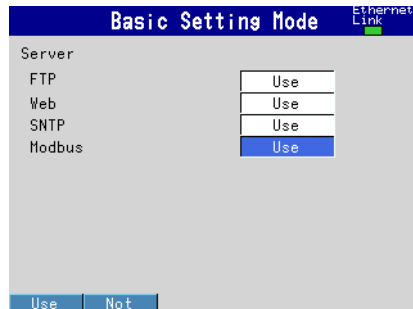
1.9 Loading the DX Data Using Modbus on Another Device

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 using Modbus.

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



- **Modbus**

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

For a description of the server function codes and register assignments, see section 6.3.

Port Number

The default value is 502. To change the setting,

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **Environment > Service port**

For the selectable range of port numbers, see section 6.1.

1.10 Reading the Data of Another Device Using Modbus on the DX

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 using Modbus.

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

Basic settings

Basic Setting Mode

Modbus client basic settings

Read cycle: 1s

Retry interval: 10min

125ms 250ms 500ms 1s Next 1/2

Destination server settings

Basic Setting Mode

Server number: 1-8

Port	Modbus server name	Unit	No.
502	modbus.dagstation.com	Auto	
502	192.168.1.80	Fixed	3
502		Auto	
502		Auto	
502		Auto	
502		Auto	
502		Auto	
502		Auto	

1-8 9-16

Transmitted command settings

Basic Setting Mode

Client command number: 1-8

	First	Last	Server	Regi.	Type
1	R-M	C01 - C08	← 1	30001	INT16
2	W	01 - 04	→ 1	40001	INT16
3	W-M	101 - 105	→ 2	40010	INT32_B
4		Off			
5		Off			
6		Off			
7		Off			
8		Off			

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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, 1, 2, 5, 10, 20, or 30 s.

Destination server settings

- **Server number**
Select 1-8 or 9-16 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

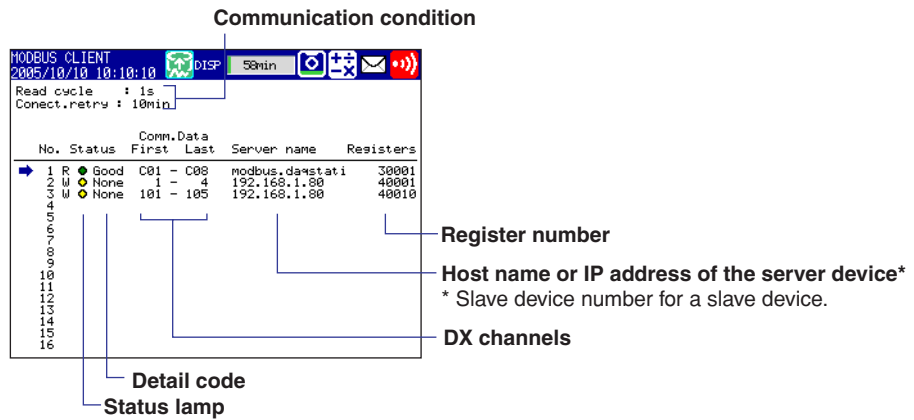
- **Client command number**
Select 1-8 or 9-16 for the transmitted command numbers to be configured.
- **Command type**
Set the command type to Off, R, R-M, W, or W-M. If you select a command type other than **Off**, the client channel, server number, register, and data type items are displayed.
 - R: Read to the external input channel (16-bit signed integer type) from the server.
 - R-M: Read to the communication input channel (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.

R can be selected on DX2000s with the external input option installed.
R-M and W-M can be selected on models with the math 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-W: C01 to C60, W: 1 to 48, W-M: 101 to 160
- **Server (server number)**
Select the server number from 1 to 16.
- **Regi.**
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.
- **Type**
Select INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT_L, FLOAT_B, or FLOAT_L.
The register numbers you can specify vary depending on the command type. See section 6.3.

Checking the Operating Status of the Modbus

Displaying the Modbus Operating Status

◇ Press **DISP/ENTER** and select **INFORMATION > Modbus client**



- **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.

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

* Does not illuminate for a Modbus master.

Resuming Command Transmission

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

1. Using the up and down arrow keys, select the command corresponding to the server (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 server.

1.10 Reading the Data of Another Device Using Modbus on the DX

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 during Command 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.

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.

Limitation of ModbusTCP

- The DX manages ModbusTCP connections using the combination of the Modbus server name and the unit number.
- The DX ModbusTCP is a connection-oriented protocol.
- The number of connections to the Modbus gateway* is limited by the number of connections to the ModbusTCP server function of the Modbus gateway.*
*Modbus gateway refers to a converter between ModbusTCP and Modbus (serial connection).

2.1 DX1000/DX2000 Features

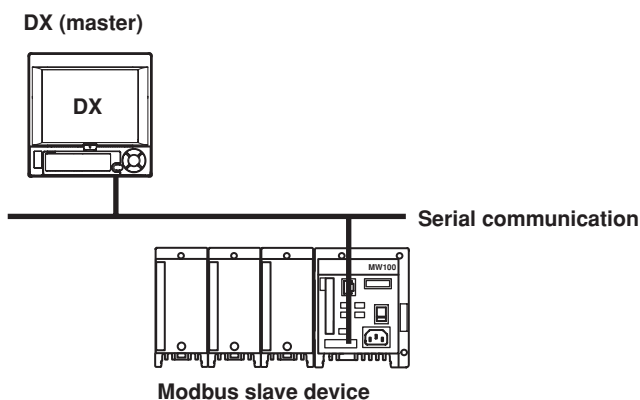
Serial Communication

Serial communication can be performed using RS-232 or RS-422A/485. In addition, communication using Modbus protocol is possible.

For the communication commands used to control the DX, see chapter 3.

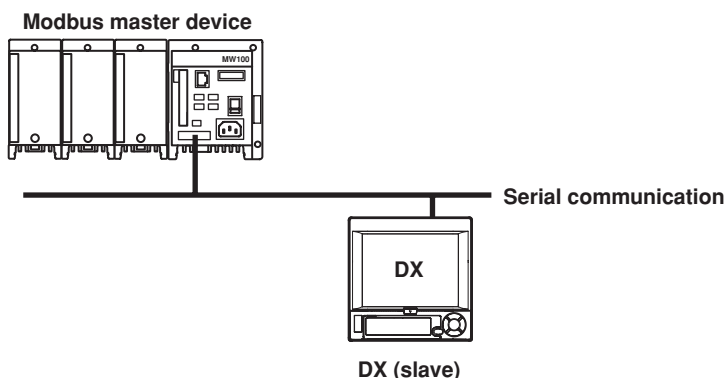
Modbus Master

- 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 (/M1 option) 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.
- 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.



Modbus Slave

- A Modbus master device can connect to the DX, the Modbus slave device, to read the measured/computed/external input data written in the input register or write/read communication input data and external input channel through the hold register of the DX.
- For details on the settings required to use this function and the Modbus function codes that the DX supports, see section 6.3.



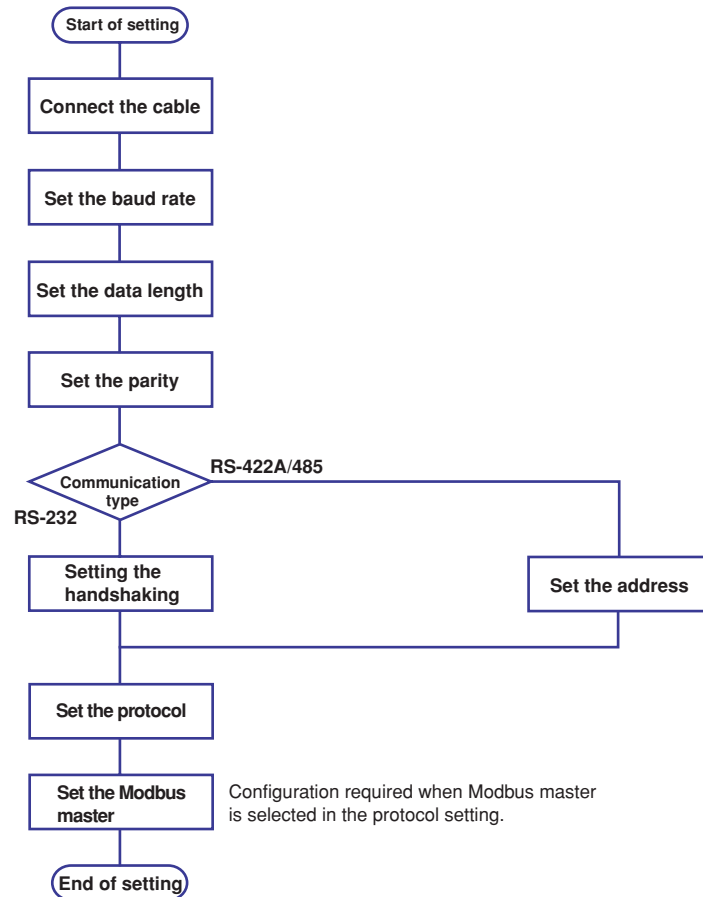
Setting/Measurement Server

- 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 on the settings required to use this function, see sections 2.3 and 6.2.

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-422A/RS-485.

The procedure varies for RS-232 and RS-422A/RS-485.



2.3 Connecting the DX

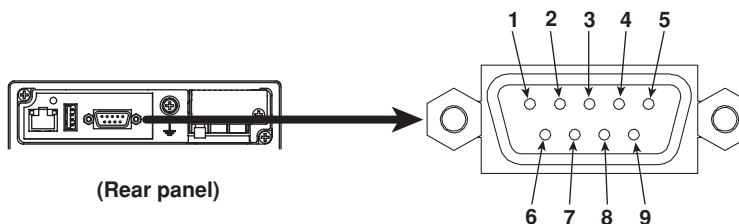
Connecting the cable

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.

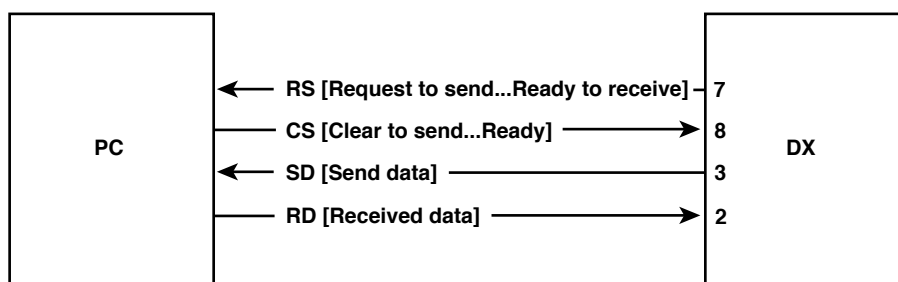
The following table shows the signal name, RS-232 standard, JIS, and ITU-T standard signals.

Pin	Signal Name			Name	Meaning
	JIS	ITU-T	RS-232		
2	RD	104	BB(RXD)	Received data	Input signal to the DX.
3	SD	103	BA(TXD)	Transmitted data	Output signal from the DX.
5	SG	102	AB(GND)	Signal ground	Signal ground.
7	RS	105	CA(RTS)	Request to send	Handshaking signal when receiving data from the PC. Output signal from the DX.
8	CS	106	CB(CTS)	Clear to send	Handshaking signal when receiving data from the PC. Input signal to the DX.

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

Connection

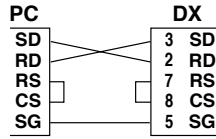
- Signal direction



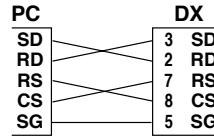
2.3 Connecting the DX

- Connection example

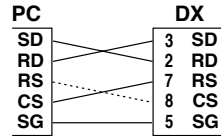
- **OFF-OFF/XON-XON**



- **CS-RS(CTS-RTS)**



- **XON-RS(XON-RTS)**



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 of Handshaking Methods (Yes indicates that it is supported)

Handshaking	Data transmission control (Control used when sending data to a computer)			Data Reception Control (Control used when receiving data from a computer)		
	Software Handshaking	Hardware Handshaking		Software Handshaking	Hardware Handshaking	
	Stops transmission when X-OFF is received. Resume when X-ON is received.	Stops sending when CS (CTS) is false. Resumes when it is true.	No handshaking	Sends X-OFF when the receive data buffer is 3/4 full. Sends X-ON when the receive data buffer is 1/4th 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.	No handshaking
OFF-OFF		Yes			Yes	
XON-XON	Yes			Yes		
XON-RS	Yes				Yes	
CS-RS		Yes			Yes	

- **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).

- **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 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).

- **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 sets “RS=False.” When the free area increases to 511 bytes, the DX sets “RS=True.”

- **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.

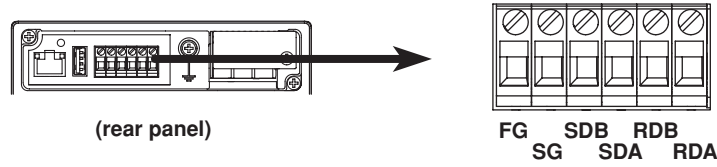
Note

- 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-422A/485 Connection Procedure

Terminal arrangement and signal names

Connect a cable to the clamp terminal.

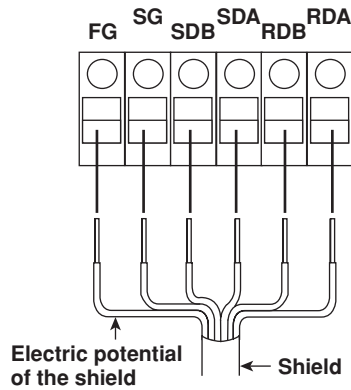


Each terminal corresponds to the signal indicated below.

Signal Name	Meaning
FG	Frame ground of the DX.
SG	Signal ground.
SDB	Send data B (+).
SDA	Send data A (-).
RDB	Receive data B (+).
RDA	Receive data A (-).

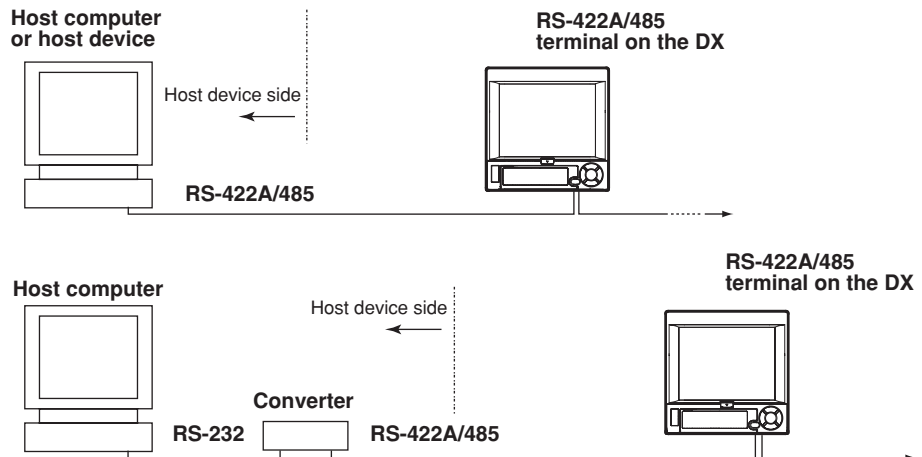
Connection

- 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

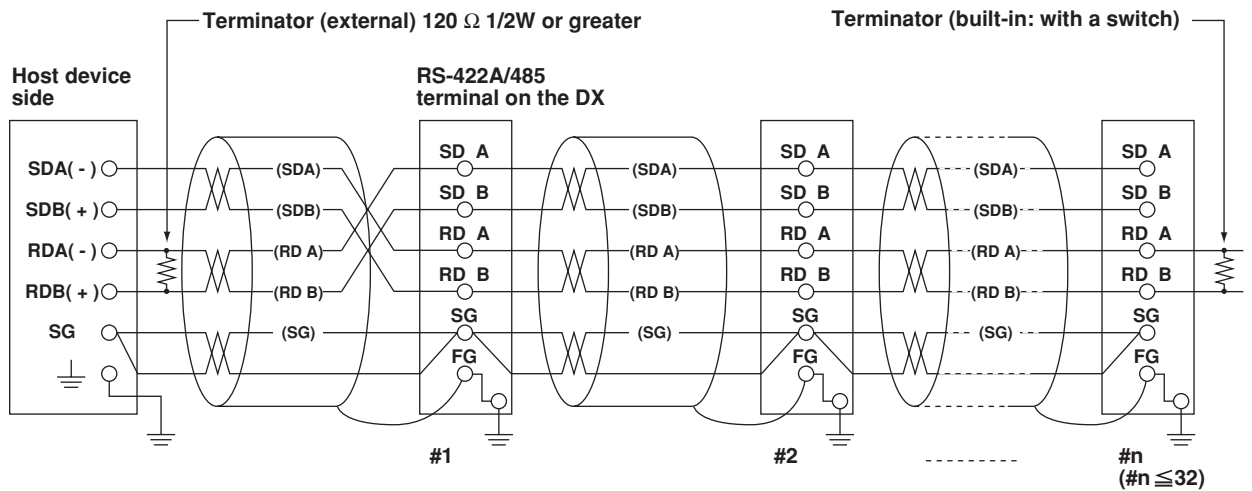
A connection can be made with a host device having a RS-232, RS422A, or RS-485 port.

In the case of RS-232, a converter is used. See the table below for a typical converter terminal. For details, see the manual that comes with the converter.

RS-422A/485 Port	Converter
SDA(-)	TD(-)
SDB(+)	TD(+)
RDA(-)	RD(-)
RDB(+)	RD(+)
SG	SHIELD
FG	EARTH

• **Four-wire system**

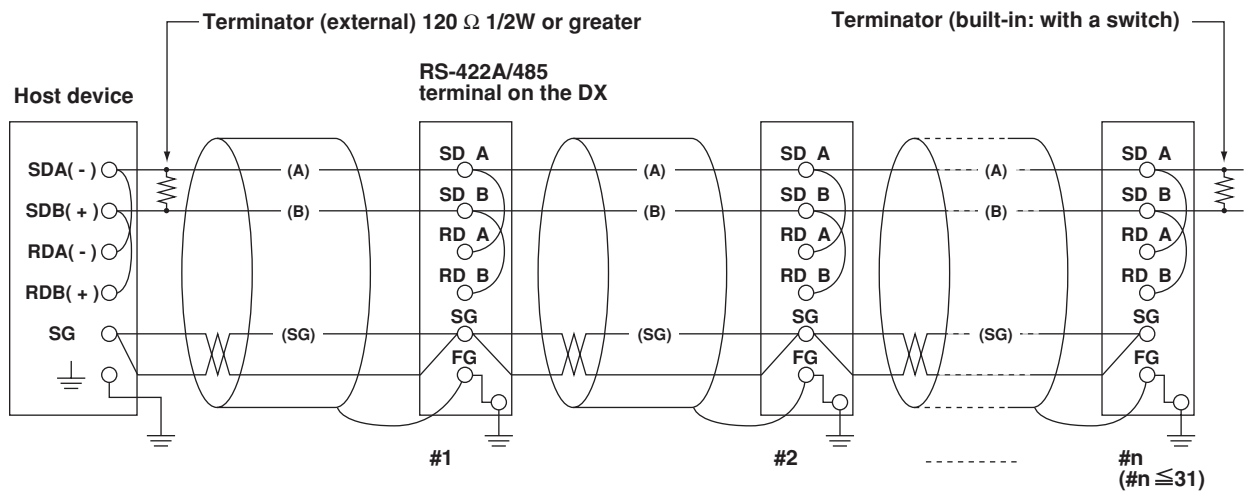
Generally, a four-wire system is used to connect to a host device. In the case of a four-wire system, the transmission and reception lines need to be crossed over.



Do not connect terminators to #1 through #n-1.

• **Two-wire system**

Connect the transmission and reception signals with the same polarity on the RS-422A/485 terminal block. Only two wires are used to connect to the external device.



Do not connect terminators to #1 through #n-1.

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.

RA SYSTEMS CORP./MODEL RC-77, 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-422A 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-422A interface exist in the system.

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

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

Note

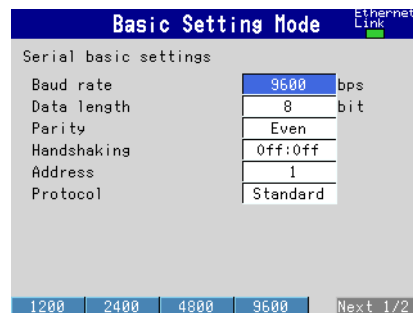
In the RS-422A standard, 10 is the maximum number of connections that are allowed on one port (for a four-wire system).

Terminator

The DX has a built-in terminator. When using a multidrop connection (including a point-to-point connection), turn ON the terminator switch (TERMN SW) if the DX is connected to the end of the chain. Otherwise, turn the switch OFF. 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.

Setting the Serial Communication

- ◇ Press **MENU** (switch to the setting mode), hold down **FUNC** for 3 s (switch to the basic setting mode), and select **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**
Select [Standard] for a general purpose communication protocol, [Modbus] for Modbus slave, and [Master-M] for Modbus master.
If Modbus master is selected, Modbus master settings must be entered.

For RS-422A/485

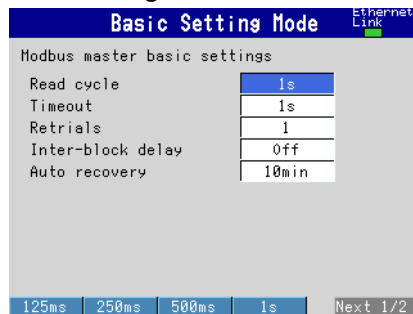
- **Baud rate**
Select 0, 1200, 2400, 4800, 9600, 19200, or 38400 (bps).
- **Data length**
Select 7 or 8 (bits). To output the data in binary format, select 8.
- **Parity**
Set the parity check method to Odd, Even, or None.
- **Handshaking**
Not specified.
- **Address**
Select a number from 1 to 99.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

2.4 Reading the Data of Another Device Using Modbus on the DX

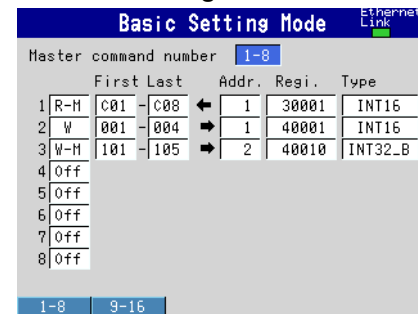
For the Modbus specifications, see section 6.3.

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

Basic settings



Command settings



Setting the Modbus Master

Basic settings

- **Read cycle**
Set the read cycle to 125ms, 250ms, 500ms, 1s, 2s, 5s, or 10s.
- **Timeout**
Set the command timeout value to 125ms, 250ms, 500ms, 1s, 2s, 5s, 10s, or 1min.
- **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 inter-block delay to Off, 5ms, 10ms, 15ms, 45ms, or 100ms.
- **Auto recovery**
Set the auto recovery time from communication halt. Select Off, 1min, 2min, 5min, 10min, 20min, 30min, or 1h.

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, or W-M.
 - R: Read to the external input channel (16-bit signed integer type) from the slave.
 - R-M: Read to the communication input channel (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.

R can be selected on DX2000s with the external input option installed.
R-M and **W-M** can be selected on models with the math option installed.
- **First/Last (master 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-W: 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, UINT_L, FLOAT_B, or FLOAT_L.
The register numbers you can specify vary depending on the command type. See section 6.3.

Checking the Modbus Operating Status

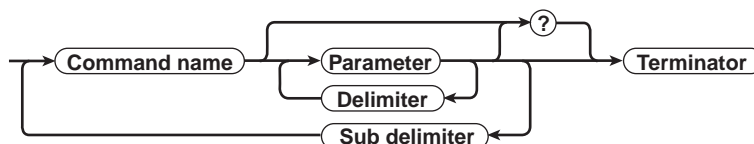
Displaying the Modbus Operating Status

- ◇ Press **DISP/ENTER** and select **INFORMATION > Modbus master**
The display is similar to that of the Modbus client. See section 1.10.
- **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.
See section 1.10.

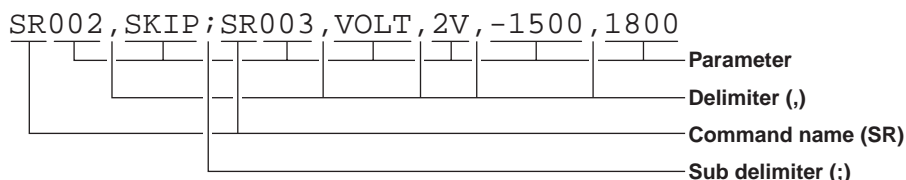
3.1 Command Syntax

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



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.

Example SR001,,2*terminator>

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

Example SR001,VOLT, <terminator> →SR001,VOLT<terminator>

- 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]\$#?, 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 , and IF
 - 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.
-

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-422A/485 (see section 3.9) and instrument information output commands (section 3.11) are exceptions.

3.2 A List of Commands

Setting Commands

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Setting	SR	Sets the input range	Operation mode	Yes	No	3.4
	SO	Sets the computing equation	Operation mode	Yes	No	3.4
	ER	Sets the range of the external input channel	Operation mode	Yes	No	3.4
	SA	Sets the alarm	Operation mode	Yes	No	3.4
	SW	Sets the display update rate/auto-save interval	Operation mode	Yes	No	3.4
	TI	Sets the circular display offset time	Operation mode	Yes	No	3.4
	TO	Sets the operation after 1 cycle on the circular display	Operation mode	Yes	No	3.4
	TW	Sets the secondary waveform display update rate	Operation mode	Yes	No	3.4
	TM	Sets manual sampling.	Operation mode	Yes	No	3.4
	TE	Sets the sampling conditions of the event data	Operation mode	Yes	No	3.4
	SZ	Sets the zone	Operation mode	Yes	No	3.4
	SP	Sets the partial expanded display	Operation mode	Yes	No	3.4
	ST	Sets the tag	Operation mode	Yes	No	3.4
	TJ	Sets the memory sample	Operation mode	Yes	No	3.4
	SX	Sets the group	Operation mode	Yes	No	3.4
	SL	Sets the trip line	Operation mode	Yes	No	3.4
	SG	Sets the message	Operation mode	Yes	No	3.4
	TH	Sets the directory of the external storage medium to save the data	Operation mode	Yes	No	3.4
	TZ	Sets the file header	Operation mode	Yes	No	3.4
	TF	Sets the data file name	Operation mode	Yes	No	3.4
	SD	Sets the date and time	Operation mode	Yes	No	3.4
	TD	Sets the daylight savings time	Operation mode	Yes	No	3.4
	TT	Sets the trend display	Operation mode	Yes	No	3.4
	SE	Sets the display direction, background color, trend line width, trip line width, number of grids, and scroll time	Operation mode	Yes	No	3.4
	TB	Sets the bar graph display	Operation mode	Yes	No	3.4
	SB	Sets the bar graph of each channel	Operation mode	Yes	No	3.4
	TN	Sets the scale	Operation mode	Yes	No	3.4
	SV	Sets the moving average of the measured channel	Operation mode	Yes	No	3.4
	SC	Sets the channel display color	Operation mode	Yes	No	3.4
	TA	Sets the alarm point mark	Operation mode	Yes	No	3.4
	TG	Sets the green band	Operation mode	Yes	No	3.4
	SQ	Sets the LCD brightness and the screen backlight saver	Operation mode	Yes	No	3.4
	TC	Sets the background color	Operation mode	Yes	No	3.4
	TP	Sets the auto group switching	Operation mode	Yes	No	3.4
	TR	Sets the auto monitor recovery	Operation mode	Yes	No	3.4
	TQ	Sets the timer.	Operation mode	Yes	No	3.4
	TK	Sets the match timer	Operation mode	Yes	No	3.4
	TU	Set the event action	Operation mode	Yes	No	3.4
	SK	Sets the computation constant	Operation mode	Yes	No	3.4
	SI	Sets the rolling average of the computation channel	Operation mode	Yes	No	3.4
	SJ	Sets the TLOG timer	Operation mode	Yes	No	3.4
	TX	Sets the ancillary operation of the start key	Operation mode	Yes	No	3.4
	FR	Sets the acquiring interval to the FIFO buffer	Operation mode	Yes	No	3.4
	BH	Sets the batch text field	Operation mode	Yes	No	3.4
	EH	Sets the calibration correction	Operation mode	Yes	No	3.4
	BD	Sets the alarm delay	Operation mode	Yes	No	3.4
	SM	Sets the custom menu	Operation mode	Yes	No	3.4
	SY	Sets the 4 screen display	Operation mode	Yes	No	3.4

Yes: Command usable

No: Command not usable

3.2 A List of Commands

Note

- 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.
- The administrator and user specifications in the table indicate the user level that is specified using the login function for Ethernet communications. For details, see section 1.2.

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Control						
	BT	Sets the batch name	Operation mode	Yes	No	3.5
	BU	Sets the batch comment	Operation mode	Yes	No	3.5
	UD	Switches the display	Operation mode	Yes	No	3.5
	PS	Starts/Stops measurements	Operation mode	Yes	No	3.5
	AK	Releases the alarm output (alarm acknowledge)	Operation mode	Yes	No	3.5
	EV	Manual trigger, manual sample, and forced timeout	Operation mode	Yes	No	3.5
	CL	Executes manual SNTP	Operation mode	Yes	No	3.5
	CV	Switches the display rate	Operation mode	Yes	No	3.5
	MS	Writes the message	Operation mode	Yes	No	3.5
	BJ	Writes the free message	Operation mode	Yes	No	3.5
	EJ	Changes the password of the login function	Operation mode	Yes	Yes	3.5
	TL	Starts/Stops the computation (MATH)	Operation mode	Yes	No	3.5
	DS	Switches the execution mode (operation/basic setting)	All modes	Yes	No	3.5
	LO	Loads the setup data for setting commands	Operation mode	Yes	No	3.5
	LI	Saves the setup data	Operation mode	Yes	No	3.5
	CM	Sets the communication input data	Operation mode	Yes	No	3.5
	CE	Sets the communication input of the external input channel	Operation mode	Yes	No	3.5
	EM	Starts/Stops the e-mail	Operation mode	Yes	No	3.5
	CU	Manually recovers the Modbus	Operation mode	Yes	No	3.5
	BV	Enters characters	Operation mode	Yes	No	3.5
	KE	Key operation command	All modes	Yes	No	3.5
	IR	Resets the relative timer	Operation mode	Yes	No	3.5

Yes: Command usable
No: Command not usable

Basic Setting Commands

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

Note

- The settings that are changed using the YA, YK, RU, YQ, YS, YB, YD, WS, and WW commands are activated after saving the new settings using the XE command and rebooting the DX.
- When the YE or YO command executed, the communication is disconnected.

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Setting	WO	Sets alarm and DO settings	Basic setting mode	Yes	No	3.6
	WH	Sets the alarm hysteresis	Basic setting mode	Yes	No	3.6
	XV	Sets the scan interval and A/D integral time	Basic setting mode	Yes	No	3.6
	XB	Sets the burn out detection	Basic setting mode	Yes	No	3.6
	XJ	Sets the RJC	Basic setting mode	Yes	No	3.6
	XM	Sets the memory sampling conditions	Basic setting mode	Yes	No	3.6
	WU	Sets the environment	Basic setting mode	Yes	No	3.6
	XT	Sets the temperature unit	Basic setting mode	Yes	No	3.6
	RF	Sets the key lock	Basic setting mode	Yes	No	3.6
	RN	Sets the basic key login	Basic setting mode	Yes	No	3.6
	RP	Sets user limitations	Basic setting mode	Yes	No	3.6
	RO	Sets the report type and generation time	Basic setting mode	Yes	No	3.6
	RM	Sets the report channel	Basic setting mode	Yes	No	3.6
	XG	Sets the time zone	Basic setting mode	Yes	No	3.6
	XN	Sets the date format	Basic setting mode	Yes	No	3.6
	YB	Sets the host information	Basic setting mode	Yes	No	3.6
	YD	Sets the network	Basic setting mode	Yes	No	3.6
	YA	Sets the IP address, subnet mask, and default gateway	Basic setting mode	Yes	No	3.6
	YK	Sets the keepalive	Basic setting mode	Yes	No	3.6
	RU	Sets the DNS	Basic setting mode	Yes	No	3.6
	WS	Sets the server	Basic setting mode	Yes	No	3.6
	WW	Sets the Web homepage	Basic setting mode	Yes	No	3.6
	YQ	Sets the application timeout	Basic setting mode	Yes	No	3.6
	YT	Sets the FTP transfer timing	Basic setting mode	Yes	No	3.6
	YU	Sets the contents to be sent via e-mail	Basic setting mode	Yes	No	3.6
	YV	Sets the e-mail recipient address	Basic setting mode	Yes	No	3.6
	YW	Sets the e-mail sender address	Basic setting mode	Yes	No	3.6
	YX	Sets the e-mail SMTP server name	Basic setting mode	Yes	No	3.6
	YJ	Sets destination server of the Modbus client	Basic setting mode	Yes	No	3.6
	YP	Sets basic Modbus client settings	Basic setting mode	Yes	No	3.6
	YR	Sets the transmitted command of the Modbus client	Basic setting mode	Yes	No	3.6
	WB	Sets the SMTP client	Basic setting mode	Yes	No	3.6
	WC	Sets the SMTP operation when memory start is executed	Basic setting mode	Yes	No	3.6
	YS	Sets the serial interface	Basic setting mode	Yes	No	3.6

3.2 A List of Commands

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Setting (continued)						
	YL	Sets the operation of the Modbus master function	Basic setting mode	Yes	No	3.6
	YM	Sets the command of the Modbus master function	Basic setting mode	Yes	No	3.6
	WR	Sets the instrument information output	Basic setting mode	Yes	No	3.6
	XE	Activates the basic setting mode	Basic setting mode	Yes	No	3.6
	YE	Activates the basic setting mode (cold reset)	Basic setting mode	Yes	No	3.6

Yes: Command usable
No: Command not usable

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Control						
	YO	Loads the setup file (for the basic setting mode)	Basic setting mode	Yes	No	3.6
	YC	Clears the setup data	Basic setting mode	Yes	No	3.6

Yes: Command usable
No: Command not usable

Output Commands

Group	Command Name	Function	Execution Mode	Administrator	User	Ref. Section
Control						
	BO	Sets the byte output order	All modes	Yes	Yes	3.7
	CS	Sets the check sum (usable only during serial communications)	All modes	Yes	Yes	3.7
	IF	Sets the status filter	All modes	Yes	Yes	3.7
	CC	Disconnects an Ethernet connection (usable only during Ethernet communications)	All modes	Yes	Yes	3.7
Setup, measurement, and control data output						
	FC	Outputs the screen image data	All modes	Yes	Yes	3.8
	FE	Outputs the setup data	All modes	Yes	Yes	3.8
	FD	Outputs the most recent measured/computed data	Operation mode	Yes	Yes	3.8
	FF	Outputs the FIFO data	Operation mode	Yes	Yes	3.8
	FL	Outputs log, alarm summary, and message summary	All modes	Yes	Yes	3.8
	IS	Outputs status information	All modes	Yes	Yes	3.8
	FU	Outputs the user level	All modes	Yes	Yes	3.8
	FA	Outputs the instrument information	All modes	Yes	Yes	3.8
	ME	Outputs the data stored on the external storage medium (usable through either Ethernet or serial communications)	Operation mode	Yes	No	3.8
	MO	Outputs the data stored in the internal memory.	Operation mode	Yes	No	3.8
Dedicated commands for RS-422A/485						
	Esc O	Opens the device	All modes	Yes	Yes	3.9
	Esc C	Closes the instrument	All modes	Yes	Yes	3.9
Common commands among instruments						
	*I	Outputs the instrument information	All modes	Yes	Yes	3.10

Yes: Command usable
No: Command not usable

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

Command Name	Function	Administrator	User	Ref. Section
close	Disconnects the connection between other devices	Yes	No	3.11
con	Outputs connection information	Yes	Yes	3.11
eth	Outputs Ethernet statistical information	Yes	Yes	3.11
help	Outputs help	Yes	Yes	3.11
net	Outputs network statistical information	Yes	Yes	3.11
quit	Disconnects the connection of the instrument being operated	Yes	Yes	3.11

Yes: Command usable

No: Command not usable

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

Parameter Name	Function	Ref. Section
serial	Outputs the serial number	3.12
host	Outputs the host name	3.12
ip	Outputs the IP address	3.12

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.

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

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*.

Input Type	Input Type Parameter	Range	Range Parameter	Required Option
DC Voltage	VOLT	20 mV	20MV	
		60 mV	60MV	
		200 mV	200MV	
		2 V	2V	
		6 V	6V	
		20 V	20V	
		50 V	50V	
Thermocouple	TC	R	R	
		S	S	
		B	B	
		K	K	
		E	E	
		J	J	
		T	T	
		N	N	
		W	W	
		L	L	
		U	U	
		Kp vs Au7Fe	KP	/N3
		PLATINEL	PLATI	/N3
		PR40-20	PR	/N3
NiNiMo	NIMO	/N3		
WRe	WRE			
W/WRe26	W/WRE	/N3		
TypeN(AWG14)	N2	/N3		
RTD	RTD	Pt	PT	
		JPt	JPT	
		Pt50	PT50	/N3
		Ni100(SAMA)	NI1	/N3
		Ni100(DIN)	NI2	/N3
		Ni120	NI3	/N3
		J263*B	J263	/N3
		Cu53	CU53	/N3

Setup Type	Input Type Parameter	Range	Range Parameter	Required Option
RTD	RTD	Cu100	CU100	/N3
		Cu10:GE	CU1	/N1
		Cu10:L&N	CU2	/N1
		Cu10:WEED	CU3	/N1
		Cu10:BAILEY	CU4	/N1
		Cu10:0.000392at20	CU5	/N1
		Cu10:0.000393at20	CU6	/N1
		Cu25:0.00425at0	CU25	/N1
	Pt25	PT25	/N3	
Contact input	DI	Level	LEVEL	
		Cont	CONT	
1-5V voltage	1-5V	1-5V	1-5V	

Channel Number Notations

The table below is a list of channel notations that are used.

Channel Type	Model	Channel Notation	Notes
Measurement channels	DX1000	001 to 012	Varies depending on the number of inputs
	DX2000	001 to 048	Varies depending on the number of inputs
Computation channels	DX1000	101 to 112	High-speed input model
		101 to 124	Medium-speed input model
	DX2000	101 to 112	High-speed input model
		101 to 160	Medium-speed input model
External input channels	DX1000	—	No setting
	DX2000	201 to 440	with the /MC1 option
Manual sample	DX1000	—	No setting
	DX2000	M001 to M120	with the /MC1 option
Report channels	DX1000	R01 to R24	
		R01 to R24	High-speed input model
		R01 to R60	Medium-speed input model
Internal switch	DX1000	S01 to S30	
	DX2000		
Output relay	DX1000	I01 to I06	
	DX2000	I01 to I06, I11 to I16, I21 to I26, I31 to I36	Varies depending on the options
Constants	DX1000	K01 to K60	
	DX2000		
Communication input channels	DX1000	C01 to C24	
	DX2000	C01 to C60	
Display groups	DX1000	1 to 10	
	DX2000	1 to 36	
Remote control terminals	DX1000	D01 to D08	
	DX2000		
Pulse inputs	DX1000	P01 to P08	
	DX2000	Q01 to Q08	
Flags	DX1000	F01 to F08	
	DX2000		
High-speed input model		DX1002, DX1004, DX1002N, DX1004N, DX2004, DX2008	
Medium-speed input model		DX1006, DX1012, DX1006N, DX1012N, DX2010, DX2020, DX2030, DX2040, DX2048	

3.4 Setting Commands (Setting)

SR Sets the 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 • This command cannot be specified while measurement or computation is in progress.
 • Measurements are not made on channels that are set to SKIP.
 • Set parameter p1 according 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<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 input type for channel 001 to TC type R, span lower limit to 0°C, and span upper limit to 1760.0°C.
 SR001,TC,R,0,17600

Description • This command cannot be specified while measurement or computation is in progress or while a report is being created.
 • Set parameters p1 and p3 according to the table in section 3.3.
 • For parameters p4 and p5, enter a value using 5 digits or less excluding the decimal point.

When Computing the Difference between Channels

Syntax SR p1,p2,p3,p4,p5,p6,p7<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 Set the setting type of channel 010 to the differential computation between channels with the reference channel set to 001 and set the input type to TC. Set the measurement range to R. Set the span lower limit to 10.0°C and span upper limit to 100.0°C.
 SR010,DELTA,TC,R,100,1000,001

Description • This command cannot be specified while measurement or computation is in progress or while a report is being created.
 • Set parameters p1 and p4 according to the table in section 3.3.
 • For parameters p5 and p6, enter a value using 5 digits or less excluding the decimal point.

When Setting Channels to Scaling

Syntax SR
 p1,p2,p3,p4,p5,p6,p7,p8,p9,p10<terminator>
 p1 Measurement channel number
 p2 Setting type (SCALE)
 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 Scaling lower limit (-30000 to 30000)
 p8 Scaling upper limit (-30000 to 30000)
 p9 Scaling decimal point position (0 to 4)
 p10 Unit (up to 6 characters)

Query SR[p1]?

Example Convert the DC voltage measured on channel 002 to DC current. Set the input 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 • This command cannot be specified while measurement or computation is in progress or while a report is being created.
 • Set parameters p1 and p4 according to the table in section 3.3.
 • For parameters p5 and p6, enter a value using 5 digits or less excluding the decimal point.
 • 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 <terminator> 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 point position (0 to 4) p9 Unit (up to 6 characters)
Query	SR[p1]?
Example	Convert the DC voltage measured on channel 001 to the amount of flow using the square root computation. Set the measurement range to 6 V, span lower limit to 1 V, span upper limit to 5 V, scaling lower limit to 10.0 m ³ /s, and scaling upper limit to 100.0 m ³ /s. SR001, SQRT, 6V, 1000, 5000, 100, 1000, 1, m3/s
Description	<ul style="list-style-type: none"> This command cannot be specified while measurement or computation is in progress or while a report is being created. Set parameters p1 and p3 according to the table in section 3.3. For parameters p4 and p5, enter a value using 5 digits or less excluding the decimal point. For parameters p6, p7, and p8, either set all three parameters or omit all three parameters.

For 1-5V DC Voltage Input

Syntax	SR p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9 , p10 <terminator> p1 Measurement channel number p2 Input type (1-5V) p3 Measurement range(1-5V) p4 Span lower limit (800 to 5200) p5 Span upper limit (800 to 5200) p6 Scaling lower limit (-30000 to 30000) p7 Scaling upper limit (-30000 to 30000) p8 Scaling decimal point position (0 to 4) p9 Unit (up to 6 characters) p10 Low-cut function ON/OFF
Query	SR[p1]?
Example	Set the input type of channel 005 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
Description	<ul style="list-style-type: none"> This command cannot be specified while measurement or computation is in progress. Set parameter p1 according to the table in section 3.3.

- For parameters p4 and p5, enter a value using 4 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 the computing equation

Syntax	SO p1 , p2 , p3 , p4 , p5 , p6 , p7 <terminator> 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 point position (0 to 4) p7 Unit (up to 6 characters)
Query	SO[p1]?
Example	Compute the sum of channels 001 and 002 on 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	<ul style="list-style-type: none"> This command can be used on models with the /M1 math option. This command cannot be specified while measurement or computation is in progress. For a description on the computing equations, see the <i>DX1000/DX2000 User's Manual</i>. Set parameter p1 according to the table in section 3.3. For parameters p4 and p5, enter a value using 7 digits or less, excluding the decimal, for negative numbers and 8 digits or less for positive numbers. For parameters p4, p5, and p6, either set all three parameters or omit all three parameters.

ER Sets the range of the external input channel

Syntax	ER p1 , p2 , p3 , p4 , p5 , p6 <terminator> 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 point position (0 to 4) p6 Unit (up to 6 characters)
Query	ER[p1]?
Example	Set the span of external input channel 201 to - 150.00 to 150.00. ER201, ON, -15000, 15000, 2
Description	This command can be used on models with the / MC1 external input channel option.

3.4 Setting Commands (Setting)

SA Sets the alarm

When Not Using the Alarm

Syntax SA p1 , p2 , p3 <terminator>
 p1 Measurement/computation/external input channel number
 p2 Alarm number (1 to 4)
 p3 Alarm ON/OFF state (OFF)

Query SA[p1 [, p2]]?

Example Turn Off alarm number 1 of channel 010.
 SA010 , 1 , OFF

Description Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

When Using the Alarm

Syntax SA p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 <terminator>
 p1 Measurement/computation/external input channel number
 p2 Alarm number (1 to 4)
 p3 Alarm ON/OFF state (ON)
 p4 Alarm type
 H High limit alarm
 L Low limit alarm
 h Difference high limit alarm
 l Difference low limit alarm
 R High limit on rate-of-change alarm
 r Low limit on rate-of-change alarm
 T Delay high limit alarm
 t Delay low limit alarm
 (Characters are case-sensitive.)

p5 Alarm value

p6 Relay setting

ON Relay setting ON

OFF Relay setting OFF

p7 When p6 is ON Relay number

When p6 is OFF Space

p8 Detection of alarm (OFF, ON)

Query SA[p1 [, p2]]?

Example Set a high limit alarm (alarm value = 1000) in alarm number 1 of channel 002, and activate relay I01 when an alarm occurs.
 SA002 , 1 , ON , H , 1000 , ON , I01

Description

- When the input range setting (SR command) is set to SKIP, p3 cannot be turned ON.
- When the computation channel setting (SO command) is turned OFF, p3 cannot be turned ON.
- When the external input channel setting (ER command) is turned OFF, p3 cannot be turned ON.
- The alarm settings are all turned OFF for the following cases.
 - When the input type is changed (VOLT, TC, etc).
 - When the input range is changed.

- When the span and scaling values are changed during scaling display (includes changing the decimal position.)
- When the computation channel is turned ON/OFF or when the computing equation or the span value is changed on the computation channel.
- The h and l settings of p4 are valid only when the measurement range is set to 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 time for the delay high/low limit alarm using the BD command.
- Set the alarm value of p5 in the following range according to the alarm type of p4 or the target channel.
 - For Upper, Lower, Delay Upper and Delay Lower Alarms
 - When DC voltage, thermocouple, or RTD is applied
Value in the measurable range of the selected range
 - For contact input
0 or 1.
 - For scaling (1-5V, scaling, and square root)
-5 to 105% of span (except, within -30000 to 30000)
 - For difference high limit and difference low limit alarm
Value in the measurable range
 - For high limit on rate-of-change and low limit on rate-of-change alarm
Value greater than or equal to 1 digit. For example, 0.0001 for 2 V range.
The maximum value is within the measurable range (except within -30000 to 30000). For example, 3.0000 for 2 V range.
For contact input, only the value 1 can be specified.
- For computation channels
-9999999 to 99999999 (excluding the decimal point. Set using an integer.)
- For external input channels
-30000 to 30000
- An error occurs if a number of a relay that is not installed is specified in p7.
- Computation channels can be specified (including queries) on models with the /M1 math option.

- For computation channels and external input channels, the only alarm types that can be specified are H (high limit alarm), L (low limit alarm), T (delay high limit alarm), and t (delay low limit alarm).
- For computation channels, the alarm hysteresis is fixed to zero. Use the XA command to set the alarm hysteresis.

SW Sets the display update rate/ auto-save interval

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

For the T-Y Display

- p1 1
- p2 Waveform type (T-Y)
- p3 Display update rate (15S, 30S, 1MIN, 2MIN, 5MIN, 10MIN, 15MIN, 20MIN, 30MIN, 1H, 2H, 4H, 10H)
- p4 Auto-save interval (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 10DAY, 14DAY, 31DAY)

Query SW?

- Description
- This command cannot be specified while measurement is in progress.
 - The selectable auto-save interval (p4) varies depending on the display update rate (p3) setting. For details, see the *DX1000/DX2000 User's Manual*.
 - The display update rate (p3) of 15S and 30S can be applied in fast sampling mode (see the XV command).
 - Set the display update interval (p3) to an interval slower 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 (p1 of the XM command is set to AUTO).

For Circular Display

- p1 1
- p2 Waveform type (CIRCULAR)
- p3 Time of one cycle (20MIN, 30MIN, 1H, 2H, 6H, 8H, 12H, 16H, 1DAY, 2DAY, 1WEEK, 2WEEK, 4WEEK)
- p4 Auto-save interval (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 10DAY, 14DAY, 31DAY)

Query SW?

Example Set the waveform type to CIRCULAR, the time of one cycle to 20 minutes, and the auto-save interval to 1 hour.

SW1 , CIRCULAR , 20MIN , 1H

- Description
- This command cannot be specified while measurement is in progress.

- The selectable auto-save interval (p4) varies depending on the time of one cycle (p3) setting. 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 (p1 of the XM command is set to AUTO).
- Set the display update interval (p3) to an interval slower than the scan interval.

TI Sets the circular display offset time

Syntax TI p1 , p2 <terminator>

- p1 1
- p2 Offset time (OFF, 1H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H, 10H, 11H, 12H, 13H, 14H, 15H, 16H, 17H, 18H, 19H, 20H, 21H, 22H, 23H)

Query TI[p1]?

Example Set the offset time to 1 hour.

TI1 , 1H

TO Sets the operation after 1 cycle on the circular display

Syntax TO p1 <terminator>

- p1 Operation at one cycle
- ALLCLEAR After the waveform display makes a cycle, clear the entire waveform display and start drawing a new waveform.
- DIVCLEAR After the waveform display makes a cycle, clear a section of the waveform display and start drawing a new waveform.

Query TO?

Example Set the operation at one cycle to all clear.

TOALLCLEAR

TW Sets the display update rate of the second waveform

Syntax TW p1 <terminator>

- p1 Update rate (15S, 30S, 1MIN, 2MIN, 5MIN, 10MIN, 15MIN, 20MIN, 30MIN, 1H, 2H, 4H, 10H)

Query TW?

Example Set the update rate to 2 minutes.

TW2MIN

- Description Set the update interval (p1) to an interval slower than the scan interval.

TM Sets manual sampling

Syntax TM p1 , p2 , p3 <terminator>

- p1 Manual sampling channel number
- p2 Enable/Disable (ON, OFF)
- p3 Measurement/computation/external input channel number

3.4 Setting Commands (Setting)

Query TM[p1]?

Example Assign measurement channel 002 to manual sampling number 001.
TM001,ON,002

Description • This command can be used on models with the /MC1 external input channel option.

- Computation channels can be specified on models with the /M1 math option.

TE Sets the sampling conditions of the event data

Syntax TE p1,p2,p3,p4,p5,p6<terminator>
p1 1
p2 Sample rate (25MS, 125MS, 250MS, 500MS, 1S, 2S, 5S, 10S, 30S, 1min, 2min, 5min, 10min)
p3 Sample mode
FREE Start the data acquisition at memory start, and stop the data acquisition at memory stop.
SINGLETRIGGER Acquire the data for a specified time once after the trigger is activated and stop.
REPEATTRIGGER Acquire the data for a specified time after the trigger is activated, and enter the trigger-wait condition.

p4 Sample time (10MIN, 20MIN, 30MIN, 1H, 2H, 3H, 4H, 6H, 8H, 12H, 1DAY, 2DAY, 3DAY, 5DAY, 7DAY, 10DAY, 14DAY, 31DAY)

p5 Pretrigger length (0, 5, 25, 50, 75, 95, 100) percent

p6 Enable/disable the Key trigger source (OFF, ON)

Parameters p5 to p6 are valid when p3 is SINGLETRIGGER or REPEATTRIGGER.

Query TE[p1]?

Example Acquire the data at sampling rate of 125-ms for 10 minutes using a single trigger.
TE1,125MS,SINGLETRIGGER,10MIN

Description You cannot specify a sampling rate that is faster than the scan interval.

SZ Sets the zone

Syntax SZ p1,p2,p3<terminator>
p1 Measurement, computation, or external input channel number
p2 Zone lower position (0 to 95) [%]
p3 Zone upper position (5 to 100) [%]

Query SZ[p1]?

Example Display channel 002 in a zone between 30% and 50%.
SZ002,30,50

Description • Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

- The total display width of the screen in the direction of the amplitude is taken to be 100%.
- The zone width must be at least 5%.
- Set the parameters for the zone upper and lower limits so that the upper limit is greater than the lower limit.

SP Sets the partial expanded display

Syntax SP p1,p2,p3,p4<terminator>
p1 Measurement, computation, or external input channel number
p2 Partial expanded setting 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 • Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

- When the input range setting (SR command) is set to SKIP, p2 cannot be turned ON.
- When the computation channel setting (SO command) is turned OFF, p2 cannot be turned ON.
- When the external input channel setting (ER command) is turned OFF, p3 cannot be turned ON.
- The range of the span upper and lower limits (scale upper and low limits when scale is enabled) is taken to be 100% for parameter p3.
- Parameter p4 can be set in the range (span upper limit – 1) to (span lower limit + 1). If scaling is enabled, the range is (scaling upper limit – 1) to (scaling lower limit + 1).
- The decimal position and the number of digits are set to the same values as the span and scaling settings (see the SR command).
- This command (including a query) can be specified when the partial expanded display function of the XU command is set to USE.
- This command cannot be specified if the partial expanded display range does not exist (when the span width is set to 1, for example).

ST Sets the tag

- Syntax** ST p1 , p2 <terminator>
 p1 Measurement/computation/external input channel number
 p2 Tag (up to 16 characters)
- Query** ST[p1]?
- Example** Set the tag of channel 002 to TAG2.
 ST002 , TAG2
- Description**
- For the characters that can be used for the tags, see appendix 4, "ASCII Character Codes." Note that semicolons and commas cannot be used.
 - Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

TJ Sets the memory sample

- Syntax** TJ p1 , p2 <terminator>
 p1 Measurement/computation/external input channel number
 p2 Memory sample ON/OFF
- Query** TJ[p1]?
- Example** Save channel 002 to memory.
 TJ002 , ON
- Description** Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

SX Sets the group

- Syntax** SX p1 , p2 , p3 <terminator>
 p1 Group number
 p2 Group name (up to 16 characters)
 p3 Channel configuration
- Query** SX[p1]?
- Example** Set channels 001, 003, 004 to 006 to group number 1 using a group name GROUP2.
 SX1 , GROUP2 , 001 . 003 . 004 - 006
 Set the channel configuration by using periods to separate each channel or a hyphen to specify a range of channels.
- Description** For the characters that can be used for the group names, see appendix 4, "ASCII Character Codes." Note that semicolons and commas cannot be used.

SL Sets the trip line

- Syntax** SL p1 , p2 , p3 , p4 , p5 , p6 <terminator>
 p1 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, L.BROWN, L.GREEN, DARKGRAY, OLIVE, DARKCYAN, S.GREEN)
- p6 Line width (1, 2, 3)

- Query** SL[p1 [, p2]]?
- Example** Display trip line 1 in red at the 10% position of group 1. Set the line width to 1.
 SL1 , 1 , ON , 10 , RED , 1
- Description** The total display width of the screen in the direction of the amplitude is taken to be 100%.

SG Sets the message

- Syntax** SG p1 , p2 <terminator>
 p1 Message number (1 to 100)
 p2 Message (up to 32 characters)
- Query** SG[p1]?
- Example** Set character string "MESSAGE1" in message number 2.
 SG2 , MESSAGE1
- Description** For the characters that can be used for the messages, see appendix 1, "ASCII Character Codes." Note that semicolons and commas cannot be used.

TH Sets the directory of the external slot to save the data

- Syntax** TH p1 <terminator>
 p1 Directory name (up to 20 characters)
- Query** TH ?
- Example** Save to the DATA1 folder on the external storage medium.
 THDATA1

TZ Sets the file header

- Syntax** TZ p1 , p2 <terminator>
 p1 1
 p2 File header (up to 50 characters)
- Query** TZ[p1]?
- Example** Set the header to DX1000DATA.
 TZ1 , DX1000DATA

TF Sets the data file name

- Syntax** TF p1 , p2 , p3 <terminator>
 p1 1
 p2 Configuration
- BATCH File name by the batch function
- DATE User-assigned character string + date
- SERIAL User-assigned character string + serial number

3.4 Setting Commands (Setting)

p3 User-assigned name (up to 16 characters)
(valid when p2 is DATE or SERIAL)

Query TF[p1]?

Example Set the file name to serial number and set the user-assigned string to DX1DATA.
TF1 , SERIAL , DX1DATA

SD Sets the date and time

Syntax SD p1 , p2<terminator>

p1 Date (YY/MM/DD) fixed form
YY Year (00 to 79)
MM Month (01 to 12)
DD Day (01 to 31)

p2 Time (HH/MM/SS) fixed form
HH Hour (00 to 23)
MM Minute (00 to 59)
SS Second (00 to 59)

Query SD?

Example Set the internal clock to 13:00:00, October 1, 2005.
SD05/10/01 , 13:00:00

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

TD Sets the daylight savings time

Syntax TD
p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9<terminator>

p1 USE/NOT

p2 Summer time adjustment month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)

p3 Summer time adjustment nth day of the week (for example, the second Monday) (1ST, 2ND, 3RD, 4TH, LAST)

p4 Summer time adjustment day of week (SUN, MON, TUE, WED, THU, FRI, SAT)

p5 Summer time adjustment hour (0 to 23)

p6 Winter time adjustment month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC)

p7 Winter time adjustment nth day of the week (for example, the second Monday) (1ST, 2ND, 3RD, 4TH, LAST)

p8 Winter time adjustment day of week (SUN, MON, TUE, WED, THU, FRI, SAT)

p9 Winter time adjustment hour (0 to 23)

Query TD?

Example Switch to daylight savings (summer) time on hour 0 on the first Sunday of June, and switch to standard (winter) time on hour 0 on the first Sunday of December.
TDUSE , JUN , 1ST , SUN , 0 , DEC , 1ST , SUN , 0

TT Sets the trend display

Syntax TT p1 , p2 , p3 , p4 , p5<terminator>

p1 Display direction of the graph
HORIZONTAL Horizontal display
VERTICAL Vertical display
WIDE Horizontal wide display
SPLIT Horizontal split display

p2 Clear waveform at start (ON/OFF)

p3 Display direction of the message
HORIZONTAL
VERTICAL

p4 Scale digit display
NORMAL 3-digit display
FINE 4-digit display

p5 Current value display
MARK Display using a mark
BARGRAPH Display using a bar graph

Query TT?

Example Set the waveform to horizontal display, the message direction to vertical, and display the waveform by clearing the existing waveform at memory start.
TTHORIZONTAL , ON , VERTICAL

SE Sets the trend graph

Syntax SE p1 , p2<terminator>

p1 Line width of the trend (1 to 3) [dot]

p2 Number of grids (4 to 12, AUTO)

Query SE?

Example Set the line width of the trend waveform to 1 dot and the number of grids to 10.
SE1 , 10

TB Sets the bar graph display

Syntax TB p1<terminator>

p1 Display direction of the bar graph
HORIZONTAL
VERTICAL

Query TB?

Example Display the bar graph horizontally.
TBHORIZONTAL

SB Sets the bar graph for each channel

Syntax SB p1 , p2 , p3<terminator>

p1 Measurement/computation/external input channel number

p2 Base position of the bar graph display
NORMAL Lower limit
CENTER

p3 Number of scale divisions (4 to 12)

Query SB[p1]?

Example Set the number of scale divisions of the bar graph of channel 002 to 5, and display the bar graph from the span lower limit (scale lower limit if scale is enabled).

SB002, NORMAL, 5

- Description
- Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.
 - The base position (p2) is valid when the display direction of the bar graph is set to HORIZONTAL. Use the TB command to set the display direction of the bar graph.

TN Sets the scale

Syntax TN p1, p2, p3<terminator>
 p1 Measurement/computation/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 of channel 003 to 2, and the number of divisions to 10.
 TN003, 2, 10

SV Sets the moving average of the measured channel

Syntax SV p1, p2, p3<terminator>
 p1 Measurement channel number
 p2 Moving average OFF/ON
 p3 Number of samples for computing the moving average (2 to 400) [times]

Query SV[p1]?

Example Set the number of samples for computing the moving average of channel 002 to 12.
 SV002, 12

SC Sets the channel display color

Syntax SC p1, p2<terminator>
 p1 Measurement/computation/external input channel number
 p2 Display color (see SL (sets the trip line))

Query SC[p1]?

Example Set the display color of channel 002 to blue.
 SC002, BLUE

Description Computation channels can be specified (including queries) on models with the /M1 math option. External input channels can be specified (including queries) on models with the /MC1 external input channel option.

TA Sets the alarm point mark

Syntax TA p1, p2, p3, p4, p5, p6, p7<terminator>
 p1 Measurement/computation/external input channel number
 p2 Mark type
 ALARM Alarm mark
 FIXED Fixed mark

- p3 Scale board display ON/OFF
 p4 Alarm level 1 color (see SL (sets the trip line))
 p5 Alarm level 2 color (see SL (sets the trip line))
 p6 Alarm level 3 color (see SL (sets the trip line))
 p7 Alarm level 4 color (see SL (sets the trip line))

Query TA[p1]?

Example Set the alarm mark type of channel 004 to alarm and use the scale board.
 TA004, ALARM, ON

TG Sets the color scale band

Syntax TG p1, p2, p3, p4, p5<terminator>
 p1 Measurement/computation/external input channel number
 p2 Area (OFF, IN, OUT)
 p3 Display color (see SL (sets the trip line))
 p4 Display position lower limit
 p5 Display position upper limit

Query TG[p1]?

Example Set the range between -1.0000 and 0.5000 V (2 V range) on channel 005 as a green band area, and sets the display 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 Type of display backlight saver function
 OFF Disable the saver function
 DIMMER Dim
 TIMEOFF Turn OFF
 p3 Time to switch to saver mode
 1MIN, 2MIN, 5MIN, 10MIN, 30MIN, 1H
 p4 Event that causes the DX to recover from the saver mode
 KEY Pressing of a key
 KEY+ALARM Pressing of a key or an alarm occurrence

Query SQ?

Example Set the LCD brightness to 2 and the screen backlight saver function to dim. Set the time to switch to saver mode to 5 minutes and the event that causes the DX to recover from the saver mode to pressing of a key.
 SQ2, DIMMER, 5MIN, KEY

Description If p2 is OFF, p3 and p4 are not specified.

3.4 Setting Commands (Setting)

TC Sets the background color

Syntax TC p1 , p2<terminator>
 p1 Display screen (WHITE, BLACK)
 p2 Historical trend display (WHITE, CREAM, LIGHTGRAY, BLACK)

Query TC?

Example Set the display background to black and the historical display background to cream.
 TCBLACK , CREAM

TP Sets the auto group switching

Syntax TP p1<terminator>
 p1 Auto scroll time (5S, 10S, 20S, 30S, 1MIN)

Query TP?

Example Switch the group at 5-s intervals.
 TP5S

TR Sets the auto monitor recovery

Syntax TR p1<terminator>
 p1 Auto recovery time (OFF, 1MIN, 2MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H)

Query TR?

Example Set the auto recovery time to 5 minutes.
 TR5MIN

TQ Sets the timer

When p2 Is OFF (No Timer)

Syntax TQ p1 , p2<terminator>
 p1 Timer number (1 to 4)
 p2 Timer type (OFF)

When p2 Is ABSOLUTE (Absolute Time)

Syntax TQ p1 , p2 , p3 , p4<terminator>
 p1 Timer number (1 to 4)
 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 form)
 hh Hour (00 to 23)

When p2 Is RELATIVE (Relative Time)

Syntax TQ p1 , p2 , p3 , p4<terminator>
 p1 Timer number (1 to 4)
 p2 Timer type (RELATIVE)
 p3 Time (hh:mm fixed format)
 hh Hour (00 to 24)
 mm Minute (00 to 59)
 p4 Reset at computation start (OFF, ON)

Query TQ[p1]?

Example Set the timeout time of timer number 1 to 10 hours 30 minutes. Do not reset at start.
 TQ1 , 1 , RELATIVE , 10 : 30 , OFF

TK Sets the match timer

When p2 Is Set to OFF (Not Use the Match Timer)

Syntax TK p1 , p2<terminator>
 p1 Timer number (1 to 4)
 p2 Timer designation (OFF)

When p2 Is DAY (Time Designation)

Syntax TK p1 , p2 , p3 , p4 , p5<terminator>
 p1 Timer number (1 to 4)
 p2 Timer designation (DAY)
 p3 Day (1 to 28)
 p4 Time (hh:mm fixed format) (00:00 to 23:59)
 p5 Timer operation (SINGLE, REPEAT)

When p1 Is WEEK (Day of Week/Time Designation)

Syntax TK p1 , p2 , p3 , p4 , p5<terminator>
 p1 Timer number (1 to 4)
 p2 Timer designation (WEEK)
 p3 Designation of the day of the week to time out the memory (SUN, MON, TUE, WED, THU, FRI, SAT)
 p4 Time (hh:mm fixed format) (00:00 to 23:59)
 p5 Timer operation (SINGLE, REPEAT)

When p2 Is MONTH (Day/Time Designation)

Syntax TK p1 , p2 , p3 , p4 , p5<terminator>
 p1 Timer number (1 to 4)
 p2 Timer designation (MONTH)
 p3 Day (1 to 28)
 p4 Time (hh:mm fixed format) (00:00 to 23:59)
 p5 Timer operation (SINGLE, REPEAT)

Query TK[p1]?

Example Specify hour 21 every Thursday for timer number 2.

TK2 , WEEK , THU , 21 : 00 , REPEAT

TU Sets the event action

Syntax TU p1 , p2 , p3 , p4 , p5 , p6 , p7<terminator>
 p1 Logic number (1 to 4)
 p2 Event type

NONE	None
REMOTE	Remote
RELAY	Alarm output relay
SWITCH	Internal switch
ALARM	Alarm occurrence
TIMER	Timer expiry
MATCHTIMETIMER	Match time expiry
USERKEY	User key

p3 Event detail

p2=REMOTE Remote number (1 to 8)
 p2=RELAY Relay number
 p2=SWITCH Internal switch number
 p2=TIMER Timer number (1 to 4)
 p2=MATCHTIMETIMER Match timer number (1 to 4)
 p2=Other Space

p4	Operation type	
	MEMORYSTART/STOP	
	MEMORYSTART	
	MEMORYSTOP	
	TRIGGER	Event trigger
	ALARMACK	Alarm acknowledge
	MATHSTART/STOP	
	MATHSTART	
	MATHSTOP	
	MATHRESET	
	SAVEDISPLAY	Save display data to the external storage medium
	SAVEEVENT	Save event data to the external storage medium
	MESSAGE	Write the message
	SNAPSHOT	
	MANUALSAMPLE	
	TIMERRESET	Reset the relative timer
	DISPLAYRATE1/2	Switch the display update rate
	DISPLAYGROUPCHANGE	Switch the display group
	FLAG	Raise the flag
	TIMEADJUST	
	PANELLOAD	Load the settings
p5	Event detail 2	
	p4=TIMERRESET	Timer number (1 to 4)
	p4=DISPLAYGROUPCHANGE	Group number
	p4=FLAG	Flag number (1 to 8)
	p4=MESSAGE	Message number (1 to 100)
	p4=PANELLOAD	Setting file number (1 to 3)
p6	Event detail 3	
	p4=MESSAGE	Method of specifying the destination to write the message
	ALL	All display group designation
	SELECT	Display group designation
p7	Event detail 4	
	When p6 is SELECT	Group number
	Some of the p4 items (operation types) cannot be selected depending on p2 (event type).	
	Some of the p4 items (operation types) cannot be selected depending on the settings or the installation condition of options.	
Query	TU[p1]?	
Example	Execute memory start with the remote control input (terminal 1).	
	TUREMOTE, 1, MEMORYSTART	
Description	Set parameter p3 (relay number, internal switch) according to the table in section 3.3.	

SK Sets the computation constant

Syntax	SK p1, p2<terminator>
	p1 Constants 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 constant 1.0000E-10 for computation constant number K01. SKK01, 1.0000E-10
Description	<ul style="list-style-type: none"> This command can be used on models with the /M1 math option. This command cannot be specified while measurement or computation is in progress. Set parameter p1 according to the table in section 3.3.

SI Sets the rolling average of the 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, 4MIN, 5MIN, 6MIN, 10MIN, 12MIN, 15MIN, 20MIN, 30MIN, 1H)
	p4 Number of samples (1 to 1500)
Query	SI[p1]?
Example	Turn the rolling average of computation channel 107 ON, set the sampling interval to 1 minute, and the number of samples to 20. SI107, ON, 1MIN, 20
Description	<ul style="list-style-type: none"> This command can be used on models with the /M1 math option. If p2 is OFF, p3 and p4 are not specified. Set the sampling interval greater than or equal to the scan interval.

SJ Sets the TLOG timer

Syntax	SJ p1, p2, p3, p4<terminator>
	p1 Computation channel number
	p2 Timer (1 to 4)
	p3 Conversion of the time unit for TLOG.SUM computation
	OFF No conversion.
	/S Convert as though the physical values are integrated in units of seconds.
	/MIN Convert as though the physical values are integrated in units of minutes.
	/H Convert as though the physical values are integrated in units of hours.
	p4 Reset ON/OFF
Query	SJ[p1]?

3.4 Setting Commands (Setting)

Example Set timer 1 to computation channel number 110. Not convert the unit time and enable the reset operation.

SJ110, 1, OFF, ON

Description

- This command can be used on models with the /M1 math option.
- Set parameter p1 according to the table in section 3.3.
- This command cannot be specified while computation is in progress.
- About p3
Because the sampled data are integrated over each scan interval, the physical value integrated over a given period may be different from the actual integrated value. This occurs if the given period is not equal to the scan interval. In these cases, set p3 to the unit of the integration time desired. The integrated value is found according to the following conversion equations that depend on the parameter.

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

The unit of the scan interval is seconds.

TX Sets the ancillary operation of the start key

Syntax TX p1<terminator>
 p1 Computation operation (OFF, START, RESET+START)

Query TX?

Example Configure the start key so that computation is also started.

TXSTART

FR Sets the interval for acquiring data to the FIFO buffer

Syntax FR p1, p2<terminator>
 p1 1 (fixed)
 p2 FIFO acquisition interval (25MS, 125MS, 250MS, 500MS, 1S, 2S, 5S)

Query FR?

Example Set the FIFO acquisition interval to 1 s.

FR1, 1S

Description

- Set the acquisition interval to a value greater than the scan interval.
- If the scan interval is set 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 measured/computed values are acquired to the internal memory at predetermined time intervals from the time the power is turned ON, and the data are output when a FF command is received. The previous output position is held for each connection and is updated when the next set of data is output with the FF command. This scheme compensates for the differences in the processing power of the measurement PC and the communication delay. This enables data to be retrieved without any dropouts if the measurement PC reads the data before the ring buffer is overwritten. For the output flow of FIFO data, see appendix 7.

BH Sets the batch text field

Syntax BH p1, p2, p3, p4<terminator>
 p1 1
 p2 Field number (1 to 8)
 p3 Field title (up to 20 characters)
 p4 Field characters (up to 30 characters)

Query BH[p1, [p2]]?

Example Set the title to "OPERATOR" and the text to "DAQSTATION" for field number 2.

BH1, 2, OPERATOR, DAQSTATION

Description For the characters that can be used, see appendix 4.

EH Sets the calibration correction

When p2 Is 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)
 OFF Calibration OFF
 2 to 16 Number of break points

When p2 Is SET

Syntax EH p1, p2, p3, p4, p5<terminator>
 p1 Measurement channel number
 p2 Type of operation (SET)
 p3 Break point designation (1 to 16)
 p4 Input value of the specified break point
 p5 Output value of the specified break point

Description

- Set parameter p1 according to the table in section 3.3.
- The selectable range of p4 and p5 vary depending on the current range.
- when set to scale range, the selectable range of p4 and p5 is -30000 to 30000.
- Set input value p4 so that the value increases as the break point p3 increases.

When p2 Is END

Syntax EH p1 , p2 <terminator>
 p1 Measurement channel number
 p2 Type of operation (END)

Example Example in which three break points are specified on CH2

```
EH002 , BEGIN , 3
EH002 , SET , 1 , 0 , 1
EH002 , SET , 2 , 50 , 49
EH002 , SET , 3 , 100 , 101
EH002 , END
```

- Description
- First, execute the BEGIN operation to specify the number of break points.
 - Set the values of the break points using the SET operation for the number of break points specified above.
 - Execute the END operation to complete the settings.
 - EH2? outputs the CH2 settings.
 - The output example is as shown in the example above.
 - This command cannot be executed while computation is started.

BD Sets the alarm delay

Syntax BD p1 , p2 <terminator>
 p1 Measurement/computation/external input channel number
 p2 Alarm delay (1 to 3600) [s]

Query BD [p1] ?

Example Set the alarm delay of channel 001 to 120 s.
 BD001 , 120

Description Set parameter p1 according to the table in section 3.3.

SM Sets the custom menu**Set the Main Menu**

Syntax SM
 p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9 <terminator>
 p1 Type (DISP_MAIN)
 p2 to p9 Menu to be displayed
 Displays the menu in the specified order.
 Menus that are not specified are not displayed.
 TREND
 DIGITAL
 BAR
 OVERVIEW
 INFORMATION
 TRENDHISTORY
 LOG
 4PANEL
 ESC
 SEPARATOR

Example Set the first menu to TREND and the second menu to TRENDHISTORY.

```
SMDISP_MAIN , TREND , TRENDHISTORY ,
```

- Description
- If parameters p2 and subsequent parameters are omitted, all menus are hidden.
 - A command error occurs if you specify the same menu multiple times.
 - Up to three separators can be specified. If you specify more than three, an error occurs.
 - Parameters cannot be omitted using delimiters (, .).
 - "4PANEL" is available only on the DX2000.

Set the Submenu

Syntax SM p1 , p2 , p3 , <terminator>

p1 Type (DISP_SUB)
 p2 Menu type (TREND, DIGITAL, BAR, TRENDHISTORY, OVERVIEW, INFORMATION, LOG, 4PANEL)

p3 and up Menu to be displayed in the submenu

Displays the menu in the specified order.

Menus that are not specified are not displayed.

When p2 is TREND [select from the 45 items below]

```
(GROUP1 to GROUP36,
CIRCULAR_KIND, ALL_CHANNEL,
SCALE, DIGITAL, MESSAGE_DISP,
TREND_SPACE, AUTO, EXPAND,
SEPARATOR)
```

When p2 is DIGITAL [select from the 39 items below]

```
(GROUP1 to GROUP36, AUTO,
EXPAND, SEPARATOR)
```

When p2 is BAR [select from the 39 items below]

```
(GROUP1 to GROUP36, AUTO,
EXPAND, SEPARATOR)
```

When p2 is TRENDHISTORY [select from the 37 items below]

```
(GROUP1 to GROUP36, SEPARATOR)
```

When p2 is OVERVIEW [select from the 7 items below]

```
(CURSOR, TO_ALARM, TO_TREND,
TO_DIGITAL, TO_BAR, EXPAND,
SEPARATOR)
```

When p2 is INFORMATION [select from the 22 items below]

```
(ALARM, MESSAGE, MEMORY,
MODBUS_CLIENT, MODBUS_MASTER,
RELAY, REPORT, TO_HISTORY,
TO_HISTORY_D, TO_HISTORY_E,
TO_OVERVIEW, SORT_KEY,
SORT_ORDER, DISP_ITEM,
DATA_KIND, DATE/FILE,
REPORT_CHANNEL, SELECT_SAVE,
```


3.4 Setting Commands (Setting)

ALL_SAVE, MANUAL_SAVE,
REPORT_SAVE, EXPAND,
SEPARATOR)
When p2 is LOG [select from the 10 items
below]
(LOGIN_LOG, ERROR_LOG,
COMMU_LOG, FTP_LOG, WEB_LOG,
MAIL_LOG, SNTP_LOG, DHCP_LOG,
MODBUS_LOG, SEPARATOR)
When p2 is 4PANEL [select from the 5 items
below]
(4PANEL1 to 4PANEL4, SEPARATOR)

Trend

GROUP1 to GROUP36 Group selection
CURCULAR_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
SEPARATOR

Digital

GROUP1 to GROUP36 Group selection
AUTO Auto switching
EXPAND
SEPARATOR

Bar graph

GROUP1 to GROUP36 Group selection
AUTO Auto switching
EXPAND
SEPARATOR

Historical trend

GROUP1 to GROUP36 Group selection
SEPARATOR

Overview

CURSOR Cursor display
TO_ALARM To alarm summary
TO_TREND
TO_DIGITAL
TO_BAR
EXPAND
SEPARATOR

Information

ALARM Alarm summary
MESSAGE , Message summary
MEMORY Memory summary
MODBUS_CLIENT ModbusTCP status
display
MODBUS_ MASTER ModbusRTU status
display
RELAY Relay status display
REPORT Report display
TO_HISTORY
TO_HISTORY_D To historical (display)
TO_HISTORY_E To historical (event)

TO_OVERVIEW
SORT_KEY Sort key switch
SORT , _ORDER Sort order switch
DISP_ITEM Date/Username switch
DATA_KIND Data type switch
DATE/FILE Date/Filename switch
SELECT_SAVE Select save
REPORT_CHANNEL Switch the report
channel display
ALL_SAVE All save
MANUAL_SAVE Save manual sample
REPORT_SAVE Save report
EXPAND
SEPARATOR

Log

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
SEPARATOR

Four panel

4PANEL1 to 4PANEL4 Four panel selection
SEPARATOR

Example Display SCALE and DIGITAL for the first and
second submenus of the trend main menu.
SM DISP_SUB , TREND , SCALE , DIGITAL

- Description • Selectable items for p3 and subsequent
parameters are limited by the p2 setting.
- If parameters p3 and subsequent parameters
are omitted, all menus are hidden.
 - A command error occurs if you specify the
same menu multiple times.
 - Up to three separators can be specified. If you
specify more than three, an error occurs.
 - EXPAND cannot be specified in log and four
panel.
 - Parameters cannot be omitted using
delimiters (, ,).
 - If SM DISP_SUB? is specified, submenus of
main menus that are turned OFF are also
output.

Set the Function Menu

p1 Type (FUNC)
p2 to p24 Menu to be displayed
Displays the menus of the functions selected
among the 29 items below in the specified
order.
Menus that are not specified are not
displayed.
ALARMACK Alarm acknowledge
MESSAGE

FREE_MESSAGE	
TRIGGER	Event trigger
SAVE_DISPLAY	Save the display data
SAVE_EVENT	Save the event data
MANUAL_SAMPLE	
SNAPSHOT	
BATCH	
MATH_START/STOP	
MATH_RESET	
MATH_ACK	Math data dropout acknowledge
KEYLOCK	Enable/disable key lock
LOGOUT	
PASSWORD_CHANGE	
EMAIL_START/STOP	
EMAIL_TEST	
FTP_TEST	
Sntp	
MEDIA_EJECT	Eject the storage medium
SYSTEM_INFO	System information
NETWORK_INFO	Network information
TEXT_FIELD	Text field display
4PANEL	Four panel
JUMP_DISPLAY	Register the home display
RATE_CHANGE	Display rate 1/display rate 2
FAVORITE_REGIST	Register as favorite
SAVE_STOP	Stop the save operation
TIMER_RESET	Reset the timer

Example Display FREE MESSAGE and SNAPSHOT for the first and second function menus.
SMFUNC , FREE_MESSAGE , SNAPSHOT

Description A command error occurs if you specify the same menu multiple times.
“SEPARATOR” cannot be specified.
Parameters cannot be omitted using delimiters (, ,).
“LOGOUT” cannot be hidden. If it is not included in the parameters, it is displayed at the end.

Query

SM ?	When querying all menus
SM DISP_MAIN?	When querying all main menus
SM DISP_SUB?	When querying all submenus
SM DISP_SUB, TREND?	When querying the trend submenu
SM FUNC?	When querying all function menus

SY Sets the four panel display

Syntax SY p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9 , p10 , p11 <terminator>

p1	1
p2	Screen number (1 to 4)
p3	Screen group name (up to 16 characters)
p4	Screen 1 type (TREND, DIGITAL, BAR, OVERVIEW, ALARM, MESSAGE, MEMORY, MODBUS-M, MODBUS-C, RELAY)
TREND	Trend display
DIGITAL	Digital display
BAR	Bar graph display
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
p5	Group number to be displayed at screen 1
p6	Screen 2 type (see p4)
p7	Group number to be displayed at screen 2
p8	Screen 3 type (see p4)
p9	Group number to be displayed at screen 3
p10	Screen 4 type (see p4)
p11	Group number to be displayed at screen 4

About the screen group designation (p5, p7, p9, and p11)

- The screen group designation is invalid when the respective screen type (p4, p6, p8, and p10) is not {TREND, DIGITAL, or BAR}.

Query SY[p1 , [p2]] ?

Example Set the following to screen number 1.
Four panel name: TEMP
Screen 1: Trend display, group 1
Screen 2: Digital display, group 3
Screen 3: Alarm summary
Screen 4: Overview

SY1 , 1 , TEMP , TREND , 1 , DIGITAL , 3 , ALARM , 1 , OVERVIEW

3.5 Setting Commands (Control)

BT Sets the batch name

Syntax BT p1 , p2 , p3 <terminator>
 p1 1
 p2 Batch number (up to 32 characters)
 p3 Lot number (up to 8 digits)

Query BT [p1]?

Example Set the batch name configuration to batch number PRESS5LINE and lot number 007.
 BT1 , PRESS5LINE , 007

BU Sets the batch comment

Syntax BU p1 , p2 , p3 <terminator>
 p1 1
 p2 Comment number (1 to 3)
 p3 Comment character sting (up to 50 characters)

Query BU [p1 , [p2]]?

Example Set the comment "THIS_PRODUCT_IS_COMPLETED" in comment number 2.
 BU1 , 2 , THIS_PRODUCT_IS_COMPLETED

UD Switches the screen

When Switching the Screen Back to the Screen That Existed before Settings Were Changed Using Communication Commands

Syntax UD p1 <terminator>
 p1 Screen switching (0)

Example Switch the display back to the display that existed before settings were changed using communication commands.
 UD0

When Changing to One Screen Display

Syntax UD p1 , p2 , p3 <terminator>
 p1 Screen switching (1)
 p2 Display item
 TREND Trend display
 DIGITAL Digital display
 BAR Bar graph display
 OVERVIEW Overview display (Alarm indicator)
 ALARM Alarm summary display
 MESSAGE Message summary display
 MEMORY Memory summary display
 p3 Group number (1 to 4)

Example Set the display to one screen trend and set the number of the group to be displayed to 4.
 UD1 , TREND , 4

When Changing to Four Panel Display

Syntax UD p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9 <terminator>
 p1 Screen switching (2)
 p2 Screen 1 type (See SY (Sets the four panel display))
 p3 Group number to be displayed at screen 1
 p4 Screen 2 type (See SY (Sets the four panel display))
 p5 Group number to be displayed at screen 2
 p6 Screen 3 type (See SY (Sets the four panel display))
 p7 Group number to be displayed at screen 3
 p8 Screen 4 type (See SY (Sets the four panel display))
 p9 Group number to be displayed at 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 all screen types to trend display.
 UD2 , TREND , 1 , TREND , 2 , TREND , 3 , TREND , 4

Description This setting is valid on the DX2000.

Display the Specified Four Panel Number

Syntax UD p1 , p2 <terminator>
 p1 Display type (3)
 p2 Four panel configuration number
 0 Display the specified four panel configuration screen.
 1 to 4 Display the four panel configuration specified by SY (Sets the four panel display).

When Setting the Switching of the Operation Screen

Syntax UD p1 , p2 , p3 , p4 , p5 , p6 , p7 <terminator>
 p1 Screen switching (4)
 p2 Automatic display switching ON/OFF
 p3 Switch between all channel display and group display (ALL, GROUP)
 p4 Scale display ON/OFF
 p5 Digital display ON/OFF
 p6 Message display method
 1 Normal display
 2 List display
 p7 Trend space ON/OFF

Example Enable the 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, or bar graph displays. Use the SE command to set the scroll interval.
- Parameters p3 to p7 are valid for the trend display.

PS Starts/Stops measurements

Syntax PS p1<terminator>
 p1 Measurement start/stop
 0 Start
 1 Stop

Example Start the measurement.
 PS0

Description When measurement is started, the display, event, and report data is recorded to the internal memory.

AK Releases the alarm output (alarm acknowledge)

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

Example Release the alarm output (execute alarm acknowledge).
 AK0

EV Manual sample, manual trigger, snapshot, and forced timeout

Syntax EV p1<terminator>
 p1 Operation type
 0 Execute manual sampling.
 1 Activate manual trigger.
 2 Take a snapshot.
 3 Forced timeout of the display data.
 4 Forced timeout of the event data.

Example Execute manual sampling.
 EV1

Description • EV1 is valid only when the key trigger is set to ON in the memory settings. It is equivalent to a key trigger.

CL Executes manual SNTP

Syntax CL p1<terminator>
 p1 Execute manual SNTP (0)

Example Synchronize the clock at an arbitrary time.
 CL0

CV Switches the display rate

Syntax CV p1<terminator>
 p1 Display rate (0, 1)
 0 Switch to the first rate (standard rate)
 1 Switch to the second rate

Example Change the display rate to the second rate.
 CV1

MS Writes the message (display and save)

Syntax MS p1,p2,p3<terminator>
 p1 Message number (1 to 100)
 p2 Designation of the destination to write the message
 GROUP Specify a single group

ALL All groups
 p3 Group number

Example Write the message of message number 8 to group 1.

MS8, GROUP, 1

Description • This command displays the message to the screen and writes the message in the display data and event data.
 • If p2 is omitted, the message is written to all groups.

BJ Writes arbitrary messages

Syntax BJ p1,p2,p3,p4<terminator>
 p1 Message number (1 to 10)
 p2 Message (up to 32 characters)
 p3 Designation of the destination to write the message
 GROUP Single group designation
 ALL All Groups
 p4 Destination to write the message
 When p3 is GROUP
 Group number

Example Use message number 3 and write the word "ALARM" to all groups.

BJ3, ALARM, ALL

Description If p3 is omitted, the message is written to all groups.

EJ Changes the password of the login function.

Syntax EJ p1,p2,p3<terminator>
 p1 Old password (up to 8 characters)
 p2 New password (up to 8 characters)
 p3 New password (up to 8 characters)

Example Change the old password "PASS001" to a new password "WORD005."

EJPASS001, WORD005, WORD005

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

Syntax TL p1<terminator>
 p1 Operation type
 0 Computation start
 1 Computation stop
 2 Computation reset
 3 Clear the computation dropout status display

Example Start the computation.

TL0

Description • This command cannot be executed while setup data are being saved or loaded.
 • This command can be used on models with the /M1 math option.

3.5 Setting Commands (Control)

DS Switches execution modes (operation/basic setting)

Syntax DS p1<terminator>

p1 Mode type

0 Operation mode

1 Basic setting mode

Example Set the mode to basic setting mode.

DS1

- Description
- Parameter p1 cannot be set to 1 while measurement/computation is in progress, while the external storage medium is being formatted, or while data are being saved to the external storage medium.
 - Parameter p1 cannot be set to 0 while the external storage medium is being formatted or while data is being saved to the external storage medium.
 - In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.

LO Loads the setup data for setting commands

Syntax LO p1<terminator>

p1 File name (up to 32 characters)

p2 Media designation

0 CF slot

1 USB

Example Load the setting data of setting commands from the setup file SETFILE1 (.pdl extension).

LOSETFILE1

- Description
- Do not specify the extension when specifying the file name.
 - This command can be used with p2 set to 1 on models with the /USB1 USB interface option.
 - If p2 is omitted, the media designation is CF slot.
 - This command cannot be used to load the setting data of the basic setting commands. To load the setup data of both setting and basic setting commands, use the YO command.
 - This command cannot be executed on models that do not have an external storage device or when a medium is not inserted into the drive.

LI Saves the setting data

Syntax LI p1<terminator>

p1 File name (up to 32 characters)

p2 Media designation

0 CF slot

1 USB

Example Save the setting data of both setting and basic setting commands to the file SETFILE2 on the CF card.

LISETFILE2

- Description
- Do not specify the extension when specifying the file name.
 - This command can be used with p2 set to 1 on models with the /USB1 USB interface option.
 - If p2 is omitted, the media designation is CF slot.
 - A ".pdl" extension is attached to the saved file. This command is equivalent to the YI command.
 - This command cannot be executed on models that do not have an external storage device or when a medium is not inserted into the drive.

CM Sets the communication input data

Syntax CM p1, p2<terminator>

p1 Communication input channel 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.

Five significant digits.

Query CM?

Example Set communication input data 1.0000E-10 to communication input channel C01.

CMC01, 1.0000E-10

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

CE Sets the communication input of the external input channel

Syntax CE p1, p2<terminator>

p1 External input channel number

p2 Setting data (-30000 to 30000)

Query CE[p1]?

Example Set data 12345 to external input channel number 440.

CE440, 12345

Description This command can be used on models with the /MC1 external input channel option.

EM Starts/stops the e-mail transmission function

Syntax EM p1<terminator>
 p1 Operation type
 0 Start
 1 Stop

Example Start the e-mail transmission function.
 EM0

Description To use the e-mail transmission function, you must set the Ethernet interface, e-mail address, and contents to be transmitted.

CU Manually recovers the Modbus

Syntax CU p1<terminator>
 p1 Communication type
 0 Modbus client (Ethernet)
 1 Modbus master (serial)

BV Enters characters

Syntax BV p1,p2<terminator>
 p1 0
 p2 Character string (up to 100 characters)

Example Enter user123.
 BV0,user123

KE Key operation command

Syntax KE p1<terminator>
 p1 Key type

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 0 to 9 keys
MINUS	Number minus key
DOT	Number decimal key
DISP	DISP/ENTER key
UP	UP arrow key
DOWN	DOWN arrow key
RIGHT	RIGHT arrow key
LEFT	LEFT arrow key

Example Press the DISP/ENTER key.
 KEDISP

Description Operates in the same fashion as the key operation on the DX. For consecutive key operations, transmit the commands in the same order as the key operation on the DX.

YO Loads the setting file (for the basic setting mode)

Syntax YO p1,p2<terminator>
 p1 Name of the file to be loaded (up to 32 characters)
 p2 Media designation
 0 CF slot
 1 USB

Description • Do not include the extension in the file name.
 • This command can be used with p2 set to 1 on models with the /USB1 USB interface option.
 • If p2 is omitted, the media designation is CF slot.

YC Clears the measured/computed data, initializes setup data

Syntax YC p1<terminator>
 p1 Type of data to be cleared

- 0 Clear all measured/computed data and initialize the setting data of the setting mode and basic setting mode.
- 1 Clear measured/computed data and initialize the setting data of the setting mode.
- 2 Clear measured/computed data.

IR Resets the relative timer

Syntax IR p1<terminator>
 p1 Timer number to be reset

0	All timers
1 to 4	Timer number 1 to 4

3.6 Basic Setting Commands

WO Sets alarm and DO settings

Set Alarm and DO Settings

Syntax WO p1 , p2 , p3 , p4 , p5<terminator>
 p1 Alarm setting
 p2 Reflash operation ON/OFF
 p3 Interval for the high limit on the rate-of-change (1 to 32)
 p4 Interval for the low limit on the rate-of-change (1 to 32)
 p5 Hold/Not hold the alarm status display
 HOLD
 NONHOLD

Set the Internal Switch

Syntax WO p1 , p2<terminator>
 p1 DO type (SWITCH)
 p2 AND switch number
 NONE No AND setting
 S01 Specify only S01
 S01-Sxx Specify S01 to Sxx
 xx={02 to 30}

Set the Output Relay

Syntax WO p1 , p2 , p3 , p4<terminator>
 p1 DO type (RLY)
 p2 Relay number
 NONE No AND setting
 I01 Specify only I01
 I01-Ixx Specify I01 to Ixx
 xx={02 to 36}
 p3 Energize/De-energize the relay
 DE_ENERGIZE
 ENERGIZE
 p4 Hold/Not hold the relay
 NONHOLD
 HOLD

Description Set parameter p2 according to the table in section 3.3.

Query WO[p1]?

Example Turn the reflash alarm ON, set the interval for the high and low limits on the rate-of-change to 10, and set the status display to non-hold.
 WOALARM, ON, 10, 10, NONHOLD

WH Sets the alarm hysteresis

For Measurement Channels

Syntax WH p1 , p2 , p3<terminator>
 p1 Channel type (MEASURE)
 p2 Hysteresis of the high and low limit alarms (0 to 50)
 p3 Hysteresis of the difference high and low limit alarms (0 to 50)

For Computation Channels

Syntax WH p1 , p2<terminator>
 p1 Channel type (MATH)
 p2 Hysteresis of the high and low limit alarms (0 to 50)

For External Input Channels

Syntax WH p1 , p2<terminator>
 p1 Channel type (EXTERNAL)
 p2 Hysteresis of the high and low limit alarms (0 to 50)

Query WH[p1]?

Example Set the high and low limit alarm hysteresis of measurement channels to 4.0%, and the difference high and low limit alarm hysteresis to 0.0%.
 WHMEASURE, 40, 0

Description Alarm settings on computation channels can be specified on models with the /M1 math option. Alarm settings on external input channels can be specified on models with the /MC1 external input channel option.

XV Sets the scan interval

Syntax XV p1 , p2 , p3 , p4<terminator>
 p1 1 (fixed)
 p2 Scan interval mode
 NORMAL Normal mode
 FAST Fast sampling mode
 p3 Scan interval (25MS, 125MS, 250MS, 1S, 2S, 5S)
 p4 A/D integration time (AUTO, 600Hz, 50Hz, 60Hz, 100ms)

Query XV?

Example Set the scan interval to 1 second in normal mode.
 XV1, NORMAL, 1

Description The combinations of scan interval mode and the scan intervals vary depending on the model. See the *DX1000/DX2000 User's Manual*.

XB Sets the burn out detection

Syntax XB p1 , p2<terminator>
 p1 Measurement channel number
 p2 Burnout procedure
 OFF Not process
 UP Set the measured result to +over.
 DOWN Set the measured result to -over.

Query XB[p1]?

Example Set the measured result to UP (+ overflow) when channel 001 burns out.
 XB001, UP

Description Set parameter p1 according to the table in section 3.3.

XJ Sets the RJC.**When Using the Internal Compensation Circuit**

Syntax XJ p1,p2<terminator>
 p1 Measurement channel number
 p2 Reference junction compensation selection (INTERNAL)

Query XJ[p1]?

Example Set the RJC of channel 001 to the internal compensation circuit.
 XJ001, INTERNAL

When Using an External RJC

Syntax XJ p1,p2,p3<terminator>
 p1 Measurement channel number
 p2 Reference junction compensation selection (EXTERNAL)
 p3 External RJC value (-20000 to 20000)

Query XJ[p1]?

Example Set the reference junction compensation of channel 002 to external and set the compensation value to 0 μ V.
 XJ002, EXTERNAL, 0

Description • Set parameter p1 according to the table in section 3.3.
 • The unit of parameter p3 is μ V.

XM Sets the memory sampling conditions

Syntax XM p1<terminator>
 p1 Data type
 DISPLAY Display data
 EVENT Event data
 E+D Display data and event data

Query XM?

Example Set the memory sampling condition to display data.
 XMDISPLAY

WU Sets the environment

Setting items GENERAL, BATCH, DISPLAY, MESSAGE, INPUT, ALARM, SECURITY, MEDIA, MATH, REPORT, and SERVICEPORT are available.

Operating Environment

Syntax WU p1,p2,p3,p4<terminator>
 p1 Setting type (GENERAL)
 p2 Tag name/channel number selection
 TAG Tag name
 CHANNEL Channel number
 p3 Language
 ENGLISH
 JAPANESE
 CHINESE
 p4 Remote control ID (OFF, 0 to 31)

Sets the batch function

Syntax WU p1,p2,p3,p4<terminator>
 p1 Setting type (BATCH)
 p2 Batch function ON/OFF
 p3 Number of digits of the lot number (OFF, 4, 6, 8)
 p4 Auto increment ON/OFF

Sets the display

Syntax WU p1,p2,p3,p4<terminator>
 p1 Setting type (DISPLAY)
 p2 Trend type
 T-Y T-Y display
 CIRCULAR Circular display
 p3 Partial expansion OFF/ON
 p4 Display update rate switching OFF/ON

Sets the message

Syntax WU p1,p2,p3,p4<terminator>
 p1 Setting type (MESSAGE)
 p2 Method of writing messages from the keys
 COMMON Applied to all display groups
 SEPARATE Applied to a specified display group
 p3 Power failure message OFF/ON
 p4 Change message OFF/ON

Set the input

Syntax WU p1,p2<terminator>
 p1 Setting type (INPUT)
 p2 Detection of values exceeding the scale
 FREE When the measurement range is exceeded
 OVER When $\pm 105\%$ of the scale is exceeded

Set the alarm

Syntax WU p1,p2<terminator>
 p1 Setting type (ALARM)
 p2 Alarm suppression function??? (OFF, ON)

Set the security

Syntax WU p1,p2,p3<terminator>
 p1 Setting type (SECURITY)
 p2 Keys
 OFF Disable the security
 KEYLOCK Lock the keys
 LOGIN Enable the login function
 p3 Communication
 OFF Disable the security
 LOGIN Enable the login function

Set the media

Syntax WU p1,p2<terminator>
 p1 Setting type (MEDIA)
 p2 Auto save function OFF/ON

3.6 Basic Setting Commands

Set the computation

Syntax WU p1 , p2 , p3 , p4 <terminator>
p1 Setting type (MATH)
p2 Display on error
+OVER
-OVER
p3 Data when the SUM or AVE value overflows
ERROR Set the computed result to computation error
SKIP Discard the data that overflowed and continue the computation
LIMIT Process the data as follows:
• For measurement channels that do not have linear scaling specified, set the data to the upper or lower limit of the measurement range.
• For measurement channels that have linear scaling specified, set the data to the specified scan upper or lower limit.
• For computation channels, set the data to the specified span upper or lower limit.
p3 Data when the MAX, MIN, or P-P value overflows
OVER Compute using the overflow data
SKIP Discard the data that overflowed and continue the computation

Set the report

Syntax WU p1 , p2 , p3 , p4 <terminator>
p1 Setting type (REPORT)
p2 Report computation type 1
MAX Maximum value
MIN Minimum value
AVE Average value
SUM Integrated value
INST Instantaneous value
p3 Report computation type 2
OFF Disable report computation
MAX Maximum value
MIN Minimum value
AVE Average value
SUM Integrated value
INST Instantaneous value
p4 Report computation type 3
Same as p3.
p5 Report computation type 4
Same as p3.
p6 Creation of "hourly+daily," "daily+weekly," and "daily+monthly" files
COMBINE Output to a single file.
SEPARATE Output to separate files.
For parameters p2 to p5, the same computation type cannot be specified except for OFF.

Auto service port

Syntax WU p1 , p2 , p3 , p4 , p5 <terminator>
p1 Setting type (SERVICEPORT)
p2 FTP service port (0 to 65535)
p3 Web service port (0 to 65535)
p4 SNTP service port (0 to 65535)
p5 Modbus service port (0 to 65535)
Query WU[p1]?
Example Set to tag display, English display, and remote control OFF.
WUGENERAL , TAG , ENGLISH , OFF

XT Sets the temperature unit

Syntax XT p1 <terminator>
p1 Temperature unit (C, F)
Query XT?
Example Set the temperature unit to Celsius.
XTC

RF Sets the key lock

p1=KEY

Syntax RF p1 , p2 , p3 , p4 , p5 , p6 , p7 <terminator>
p1 Type (KEY)
p2 START key (FREE, LOCK)
p3 STOP key (FREE, LOCK)
p4 MENU key (FREE, LOCK)
p5 USER key (FREE, LOCK)
p6 DISP/ENTER key (FREE, LOCK)
p7 FAVORITE key (FREE, LOCK)

p1=FUNC (function keys)

Syntax RF p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 <terminator>
p1 Type (FUNC)
p2 AlarmACK (FREE, LOCK)
p3 Message/Batch (FREE, LOCK)
p4 Math (FREE, LOCK)
p5 Data save (FREE, LOCK)
p6 E-mail/FTP (FREE, LOCK)
p7 Time set (FREE, LOCK)
p8 Display Function (FREE, LOCK)

p1=MEDIA (external storage media)

Syntax RF p1 , p2 <terminator>
p1 Type (MEDIA)
p2 External storage media operation (FREE, LOCK)
Query RF[p1]?
Example Lock the MENU key (leave other keys unlocked).
RFKEY , FREE , FREE , LOCK , FREE , FREE , FREE

RN Sets the basic key login

Syntax RN p1 , p2 <terminator>
p1 Auto logout (OFF, 1MIN, 2MIN, 5MIN, 10MIN)
p2 Operation when logged out
OFF Disable the DX operation
DISPLAY Only display operations are possible

Query RN?
 Example Set the auto logout time to 1 minute, and disable the DX operation when logged out.
 RN1MIN,OFF

RP Sets user limitations

Syntax RP p1 , p2 , ***<terminator>
 p1 User limit number (1 to 10)
 p2 User limit item (KEY, FUNC, MEDIA)
 Parameters p3 and subsequent parameters vary depending on p2 as follows:

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=FUNC (function keys)

p3 AlarmACK (FREE, LOCK)
 p4 Message/Batch (FREE, LOCK)
 p5 Math (FREE, LOCK)
 p6 Data save (FREE, LOCK)
 p7 E-mail/FTP (FREE, LOCK)
 p8 Time set (FREE, LOCK)
 p9 Display Function (FREE, LOCK)

p2=MEDIA (external storage media)

p3 External storage media operation (FREE, LOCK)

Query RP[p1 , [p2]]?
 Example Lock the START, STOP, and DISP/ENTER keys.
 RP1,KEY,LOCK,LOCK,,LOCK

RO Sets the report type and generation time

When the Report Type Is Set to None

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

For Hourly, Daily, Hourly + Daily and Daily + Monthly Reports

Syntax RO p1 , p2 , p3 , p4<terminator>
 p1 Report type
 HOUR Hourly report
 DAY Daily report
 HOUR+DAY Hourly and daily reports
 DAY+MONTH Hourly and monthly reports
 p2 Date of creation (dd) fixed form
 dd Day (01 to 28)
 p3 Hour of creation (hh) fixed form

hh Hour (00 to 23)

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 • This command can be used on models with the /M1 math option.
 • Parameter p2 is discarded even if it is specified for reports other than monthly and daily reports.

For Daily+Weekly Reports

Syntax RO p1 , p2 , p3 , p4<terminator>
 p1 Report type (DAY+WEEK)
 p2 Day of creation (SUN, MON, TUE, WED, THU, FRI, SAT)
 p3 Hour of creation (hh) fixed form
 hh Hour (00 to 23)

Query RO?
 Example Create a daily report at 9 O'clock every day and a weekly report at 9 O'clock every Tuesday.
 RODAY+WEEK, TUE, 09
 Description This command can be used on models with the /M1 math option.

RM Sets the report channel

When not using the report channel

Syntax RM p1 , p2<terminator>
 p1 Report channel number
 p2 Enable/Disable the report channel (OFF)

Query RM[p1]?
 Example Disable the channel 001 report channel.
 RM001,OFF

Description • This command can be used on models with the /M1 math option.
 • Set parameter p1 according to the table in section 3.3.

When Using the Report Channel

Syntax RM p1 , p2 , p3 , p4<terminator>
 p1 Report channel number
 p2 Enable/Disable the report channel (ON)
 p3 Measurement, computation, or external input channel number on which to report
 p4 Summation conversion of the waveform on which integration is to be performed
 OFF No conversion.
 /S Convert as though the physical values are integrated in units of seconds.
 /MIN Convert as though the physical values are integrated in units of minutes.
 /H Convert as though the physical values are integrated in units of hours.

3.6 Basic Setting Commands

/DAY Convert as though the physical values are integrated in units of days.

Query RM[p1]?

Example Use the report channel number R01. Set the channel number on which reports are to be made to 001, and the summation conversion of the waveform on which integration is to be performed to unit of seconds.

RMR01, ON, 001, /S

Description • This command can be used on models with the /M1 math option.

- Set parameters p1 and p3 according to the table in section 3.3.
- About p4
Because the sampled data are integrated over each scan interval, the physical value integrated over a given period may be different from the actual integrated value. This occurs if the given period is not equal to the scan interval. In these cases, set p4 to the unit of the integration time desired. The integrated value is found according to the following conversion equations that depend on the parameter.

OFF Σ (measured value)

/S Σ (measured value) \times scan interval

/MIN Σ (measured value) \times scan interval/60

/HOUR Σ (measured value) \times scan interval/3600

/DAY Σ (measured value) \times scan interval/86400

The unit of the scan interval is seconds.

XG Sets the time zone

Syntax XG p1, p2<terminator>

p1 Offset time from GMT (-1300 to 1300)
Upper 2 digits: Hour (00 to 13)
Lower 2 digits: Minute (00 to 59)

p2 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.

XG0900, 30S

XN Sets the date format

Syntax XN p1<terminator>

p1 Date format (Y/M/D, M/D/Y, D/M/Y, D.M.Y)

Query XN?

Example Set the date format to Y/M/D.

XNY/M/D

YB Sets the host information

Syntax YB p1, p2<terminator>

p1 Host name (up to 64 characters)

p2 Domain name (up to 64 characters)

Query YB?

Example Set the host name to dx1000 and the domain name to dxadv.daqstation.com.

YBdx1000, dxadv.daqstation.com

YD Sets the network

When Not Automatically Allocating the IP Address

Syntax YD p1<terminator>

p1 Automatic allocation (NOT)

When Automatically Allocating the IP Address

Syntax YD p1, p2, p3<terminator>

p1 Automatic allocation (USE)

p2 DNS accession (USE, NOT)

p3 Host-name register (USE, NOT)

Query YD?

Example Set the IP address to auto allocation, retrieve 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

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

YK Sets the keepalive

Syntax YK p1<terminator>

p1 Enable/Disable keepalive (ON, OFF)

Query YK?

Example Disable keepalive.

YKOFF

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

RU Sets the DNS

Set the Server

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)

Set the Suffix

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.

```
RUSUFFIX,rec1.daqstation.com,rec2.daqstation.com
```

WS Sets the server

Syntax WS p1 , p2 <terminator>
 p1 Server type (FTP, WEB, MODBUS, SNTP)
 p2 Enable/Disable the server (USE, NOT)

Query WS[p1]?

Example Enable the Web server.
 WSWEB, USE

WW Sets the Web homepage

Syntax WW p1 , p2 , p3 , p4 <terminator>
 p1 Home page type
 OPERATOR Operator page
 MONITOR Monitor page
 p2 Enable/Disable the homepage (ON, OFF)
 p3 Enable/Disable authentication
 OFF No authentication
 ADMIN Administrator privileges
 USER User privileges
 p4 Enable/Disable command input (USE, NOT)

Query WW[p1]?

Example Enable the operator page, disable the authentication, and enable command input.
 WWOOPERATOR, USE, OFF, USE

Description Parameters p3 and p4 are valid when p2 is ON. Parameter p4 is valid when p1 is set to OPERATOR.

YQ Sets the communication timeout**When Not Using the Timeout**

Syntax YQ p1 <terminator>
 p1 Enable/Disable communication timeout (OFF)

Query YQ?

Example Disable timeout.
 YQOFF

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

When Using the Timeout

Syntax YQ p1 , p2 <terminator>
 p1 Enable/Disable communication timeout (ON)

p2 Timeout value [minutes] (1 to 120)

Query YQ?

Example Enable the communication timeout and set the timeout value to 3 min.
 YQON, 3

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

YT Sets the FTP transfer timing

Syntax YT p1 , p2 , p3 <terminator>
 p1 Auto transfer when display and event data files are created (ON, OFF)
 p2 Auto transfer when report data files are created (ON, OFF)
 p3 Auto transfer when snapshot data files are created (when snapshot is executed) (ON, OFF)

Query YT?

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

Description When the method to save the data to the external storage medium is set to "Auto," the data files are automatically transferred when they are created. For the settings to save to the storage medium, see the DX1000/DX2000 User's Manual.

YU Sets the contents to be sent via e-mail**When Sending the Changes in the Alarm Status**

Syntax YU p1 , p2 , p3 , p4 , p5 , p6 , p7 , p8 , p9 , p10 , p11 , p12 <terminator>
 p1 Transmitted content (ALARM)
 p2 Enable/Disable recipient 1 (ON, OFF)
 p3 Enable/Disable recipient 2 (ON, OFF)
 p4 Enable/disable alarm transmission of alarm number 1 (ON, OFF)
 p5 Enable/disable alarm transmission of alarm number 2 (ON, OFF)
 p6 Enable/disable alarm transmission of alarm number 3 (ON, OFF)
 p7 Enable/disable alarm transmission of alarm number 4 (ON, OFF)
 p8 Enable/disable the attachment of instantaneous data (ON, OFF)
 p9 Enable/disable the attachment of the 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]?

3.6 Basic Setting Commands

Example Transmit alarms of alarm numbers 1 to 4 including instantaneous data but not including the source URL to recipient 1. The subject is "ALM", and the header 1 is "LP2."
`YUALARM, ON, OFF, ON, ON, ON, ON, OFF, ALM, LP2`

When Sending E-mail at Scheduled Times

Syntax `YU p1, p2, p3, p4, p5, p6, p7, p8, p9, p10, p11, p12<terminator>`
 p1 Transmitted content (TIME)
 p2 Enable/Disable recipient 1 (ON, OFF)
 p3 Interval for sending e-mail to recipient 1 (1H, 2H, 3H, 4H, 6H, 8H, 12H, 24H)
 p4 Time when sending e-mail to recipient 1 (00:00 to 23:59)
 p5 Enable/Disable recipient 2 (ON, OFF)
 p6 Interval for sending e-mail to recipient 2 (1H, 2H, 3H, 4H, 6H, 8H, 12H, 24H)
 p7 Time when sending e-mail to recipient 2 (00:00 to 23:59)
 p8 Enable/disable the attachment of instantaneous data (ON, OFF)
 p9 Enable/disable the attachment of the 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. The subject is "GOOD", and the header 1 is "LP2."
`YUTIME, ON, 24H, 17:15, OFF, , , OFF, ON, GOOD, LP2`

When Sending System Notifications

Syntax `YU p1, p2, p3, p4, p5, p6, p7<terminator>`
 p1 Transmitted content (SYSTEM)
 p2 Enable/Disable recipient 1 (ON, OFF)
 p3 Enable/Disable recipient 2 (ON, OFF)
 p4 Enable/disable the attachment of the 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 messages including the source URL to recipient 1. The subject is "SystemAlert", and the header is "LP2."
`YUSYSTEM, ON, OFF, ON, SystemAlert, LP2`

When sending report generation notifications

Syntax `YU p1, p2, p3, p4, p5, p6, p7<terminator>`
 p1 Transmitted content (REPORT)
 p2 Enable/Disable recipient 1 (ON, OFF)
 p3 Enable/Disable recipient 2 (ON, OFF)

p4 Enable/disable the attachment of the 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 report generation notification e-mail messages including the source URL to recipient 1. The subject is "Report", and the header is "LP2."
`YUREPORT, ON, OFF, ON, Report, LP2`

Description

- For the contents of the system notification, see section 1.4.
- Report generation notification can be used on models with the /M1 math option.
- For details on the settings of e-mail, see section 1.4.

YV Sets the e-mail recipient address

Syntax `YV p1, p2<terminator>`
 p1 Recipient selection
 1: Recipient 1
 2: Recipient 2
 p2 Recipient address (up to 150 alphanumeric characters)
Query `YV[p1]?`
Example Set recipient 1 to "dxuser1@daqstation.com" and "dxuser2@daqstation.com."
`YV1, dxuser1@daqstation.com dxuser2@daqstation.com`
Description

- To set multiple recipients, separate each recipient with a space.
- For details on the settings of e-mail, see section 1.4.

YW Sets the e-mail sender address

Syntax `YW p1<terminator>`
 p1 Sender address (up to 64 alphanumeric characters)
Query `YW?`
Example Set the sender address to "dxadv."
`YWdxadv`
Description For details on the settings of e-mail, see section 1.4.

YX Sets the e-mail SMTP server name

Syntax `YX p1, p2<terminator>`
 p1 SMTP server name (up to 64 characters)
 p2 Port number (0 to 65535)
Query `YX?`
Example Set the SMTP server to "smtp.daqstation.com" and port number to "25."
`YX smtp.daqstation.com, 25`
Description For details on the settings of e-mail, see section 1.4.

YJ Sets destination server of the Modbus client

Syntax	YJ p1 , p2 , p3 , p4 , p5 <terminator>
	p1 Server number (1 to 16)
	p2 Port number (0 to 65535)
	p3 Host name (up to 64 characters)
	p4 Unit number registration
	AUTO Not use the unit number
	FIXED Use a fixed unit number
	p5 Unit number (0 to 255)
Query	YJ[p1]?
Example	Set the port number of server number 3 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

Syntax	YP p1 , p2 <terminator>
	p1 Read cycle (125MS, 250MS, 500MS, 1S, 2S, 5S, 10S)
	p2 Retry interval (OFF, 1MIN, 2MIN, 5MIN, 10MIN, 20MIN, 30MIN, 1H)
Query	YP?
Example	Set the read cycle to 500 ms and the retry (reconnection) interval to 10 min.
	YP500MS , 10MIN

YR Sets the transmitted command of the Modbus client

Syntax	YR p1 , p2 , p3 *** <terminator>
	p1 Command number (1 to 16)
	p2 Command type (OFF, R, R-M, W, W-M)
	Parameters p3 and subsequent parameters vary depending on p2 as follows:

When p2 Is OFF

There are no parameters after p2.

When p2 Is R [Read the External Input Channel]

- p3 First channel (external input channel number)
- p4 Last channel (external input channel number)
- p5 Server number (1 to 16)
- p6 First register number (30001 to 39999, 40001 to 49999, 300001 to 365536, 400001 to 465536)
- p7 Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L)

When p2 Is R-M [Read the Communication Input Channel]

- p3 First channel (communication input channel number)

- p4 Last channel (communication input channel number)
- p5 Server number (1 to 16)
- p6 First register number (30001 to 39999, 40001 to 49999, 300001 to 365536, 400001 to 465536)
- p7 Register data type (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_L, F LOAT_B, FLOAT_L)

When p2 Is W [Write to the Measurement Channel]

- 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)

When p2 Is W-M [Write to the Computation Channel]

- 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)

Query YR[p1]?

Example Set the command type of command number 5 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

Note

Parameter p3 must be less than or equal to p4.
Parameters p3, p4, and p7 determine the number of registers to be read or written. An error occurs if the valid range of registers of p6 is exceeded.

WB Sets the SNTP client

Syntax	WB p1 , p2 , p3 , p4 , p5 , p6 <terminator>
	p1 Enable/Disable the 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)
	If p1 is NOT, p2 to p6 are invalid.
Query	WB?

3.6 Basic Setting Commands

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 by SNTP at memory start (ON/OFF)

Query WC?

Example Enable the time adjustment by SNTP at memory start.

```
WCON
```

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-422A/485 address (01 to 99)
`p6` Protocol (NORMAL, MODBUS, MODBUS-M)

Query YS?

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

```
YS9600 , 8 , ODD , OFF : OFF , 02 , NORMAL
```

Description

- The settings specified by this command and saved using the XE command take effect after the DX is power cycled.
- This command can be used on models with the /C2 or /C3 serial interface option.

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, 5S, 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 retrials to 2, the command wait time to 10 ms, and the auto recovery time to 5 min.

```
YL500MS , 250MS , 2 , 10MS , 5MIN
```

Description

- This command can be used on models with the /C2 or /C3 serial interface option.
- This command is valid when the serial interface protocol is set to "Master." For the procedure to set the serial interface, see section 4.4.
- The settings specified by this command and saved using the XE command take effect after the DX is power cycled.

YM Sets the transmitted command of the Modbus master function

When Not Setting a Command

Syntax YM `p1 , p2`<terminator>
`p1` Registration number (1 to 16)
`p2` Enable/Disable the command (OFF)

Query YM[`p1`]?

Example Do not set a command to command registration number 1.

```
YM1 , OFF
```

When Setting a Read to the External Input Channel

Syntax YM `p1 , p2 , p3 , p4 , p5 , p6 , p7`<terminator>
`p1` Registration number (1 to 16)
`p2` Command type (R)
`p3` First channel number (external input channel number)
`p4` Last channel number (external input channel number)
`p5` Slave device address (1 to 247)
`p6` First register number (30001 to 39999, 40001 to 49999, 30001 to 365535, 40001 to 465535)
`p7` Type of data assigned to the register (INT16, UINT16, INT32_B, INT32_L, UINT32_B, UINT32_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) of the slave device at address 5 into 201 to 203 of the DX.

```
YM2 , R , 201 , 203 , 5 , 30002 , INT32_B
```

When Setting a Read to the Communication Input Channel

Syntax YM `p1 , p2 , p3 , p4 , p5 , p6 , p7`<terminator>
`p1` Registration number (1 to 16)
`p2` Command type (R-M)
`p3` First channel number (communication input channel number)
`p4` Last channel number (communication input channel 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 register (INT16, UINT16, INT32_B, INT32_L, UUINT32_B, UUINT32_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 30003 (upper 16 bits) and 30004 (lower 16 bits) of the slave device at address 5 into C02 to C05 of the DX.

```
YM2,R-M,C02,C05,5,30003,INT32_B
```

When Setting a Write to the Measurement Channel

Syntax YM p1,p2,p3,p4,p5,p6,p7<terminator>

p1 Registration number (1 to 16)

p2 Command type (W)

p3 First channel number (measurement channel number)

p4 Last channel number (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 register (INT16)

Query YM[p1]?

Example Register the following command in command registration number 3: Write the measured data of channels 003 to 006 in registers 40003 to 40006 of the slave device at address 7.

```
YM3,W,003,006,7,40003,INT16
```

When Setting a Write to the Computation Channel

Syntax YM p1,p2,p3,p4,p5,p6,p7<terminator>

p1 Registration number (1 to 16)

p2 Command type (W-M)

p3 First channel number (computation channel number)

p4 Last channel number (computation channel 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 register (INT16, UUINT16, INT32_B, INT32_L)

Query YM[p1]?

Example Register the following command in command registration number 2: Write the computed data of 16-bit signed integer type of channels 101 to 105 to the first register 40003 of the slave device at address 5.

```
YM2,W-M,101,105,5,40003,INT16
```

Description

- This command can be used on models with the /C2 or /C3 serial interface option.
- This command is valid when the serial interface protocol is set to "Master." For the procedure to set the serial interface, see section 2.3.
- The settings specified by this command and saved using the XE command take effect after the DX is power cycled.

WR Sets the instrument information output

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

p1 Memory/Media state (OFF, ON)

p2 Self diagnosis (OFF, ON)

p3 Communication error (OFF, ON)

p4 Memory stop (OFF, ON)

Query WR?

Example Output various information.

```
WRON,ON,ON,ON
```

XE Activates the basic setting mode.

Syntax XE p1<terminator>

p1 Store or discard the settings (STORE, ABORT)

Example Save the setup data of the basic setting commands.

```
XESTORE
```

Description In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. Make sure to save the settings with the XE command before changing from the basic setting mode to the operation mode. Otherwise, new settings will not be activated.

YE Activates the basic setting mode (cold reset).

Syntax YE p1<terminator>

p1 Setting activation

STORE Save the basic settings and start

ABORT Start without saving basic settings

Example Save the basic settings and start.

```
YESTORE
```


3.7 Output Commands (Control)

BO Sets the byte output order

Syntax BO p1<terminator>
 p1 Byte order
 0: Outputs the data MSB first.
 1: Outputs the data LSB first.

Query BO?

Example Output the data MSB first.
 BO0

Description This command applies to the byte order of numeric data during BINARY output.

CS Sets the check sum

Syntax CS p1<terminator>
 p1 Enable/Disable the checksum
 0: Not calculate (value fixed to zero)
 1: Calculate

Query CS?

Example Enable (Calculate) the checksum.
 CS1

Description Can be used only during serial communications.

IF Sets the status filter

Syntax IF p1 , p2<terminator>
 p1 Filter value of status information 1 to 4
 (0.0.0.0 to 255.255.255.255)
 p2 Filter value of status information 5 to 8
 (0.0.0.0 to 255.255.255.255)

Query IF?

Example Set the status filter value 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.

CC Disconnects the Ethernet connection

Syntax CC p1<terminator>
 p1 Disconnect the connection (0)

Example Disconnect the connection.
 CC0

Note

Initialization of BO/CS/IF command settings

- **For serial communications**
 Settings entered using the BO/CS/IF commands revert to their initial values when the DX is reset (when the DX is power cycled, or the user exits the basic setting mode).
 - Byte output order, checksum: 0
 - Status filter: 255.255.255.255
 If you reset the DX, you must restore these settings.
- **For Ethernet communications**
 Settings entered using the BO/IF commands revert to their initial values when the connection to the DX is cut. After reconnecting the DX, you must reenter the settings.

3.8 Output Commands (Setting/Measured/Computed Data Output)

FC Outputs the screen image data

Syntax FC p1<terminator>
 p1 GET (Output the screen image data)

Example Output the screen image data from the DX.
 FCGET

Description Captures the current displayed screen on the DX and outputs the data in PNG format.

FE Outputs the setup data

Syntax FE p1 , p2 , p3<terminator>
 p1 Output data type
 0 Setup data of setting commands
 1 Decimal point position and unit information
 2 Setup data of basic setting commands
 4 Setup data file
 5 Setup channel information output
 6 Alarm information output
 p2 First channel number (measurement/computation/external input channel)
 p3 Last channel number (measurement/computation/external input channel)

Example Output the setup data of setting commands of channels 001 to 005 from the DX.
 FE0 , 001 , 005

Description

- Set the first channel number and last channel number parameters so 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, 1, 2, 5, or 6. All channels are specified if parameters p2 and p3 are omitted.
- Set parameters p2 and p3 according to the table in section 3.3.

FD Outputs the most recent measured/computed data.

Syntax FD p1 , p2 , p3<terminator>
 p1 Output data type
 0 Output the most recent measured/computed data in ASCII format
 1 Output the most recent measured/computed data in binary format
 6 Relay output status
 p2 First channel number (measurement/computation/external input channel)
 p3 Last channel number (measurement/computation/external input channel)

Example Output the most recent measured/computed data of channels 001 to 005 from the DX in ASCII format.

FD0,001,005

- Description**
- The most recent measured/computed data corresponds to the most recent measured/computed data in the internal memory when the DX receives the FD command.
 - Set the first channel number and last channel number parameters so that the last channel number is greater than or equal to the first channel number.
 - The settings of p2 and p3 are valid when p1 = 0 or 1. All channels are specified if parameters p2 and p3 are omitted.
 - Set parameters p2 and p3 according to the table in section 3.3.

FF Outputs the FIFO data

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

- p1** Operation type
- GET Output the data starting from the next to the previous read position
 - RESEND Retransmit the previous output
 - RESET Set the most recent data position (block) to the read position of the FIFO buffer (block)
- p2** First channel number (measurement/computation/external input channel)
- p3** Last channel number (measurement/computation/external input channel)
- p4** Maximum number of blocks that are to be loaded
- | | |
|------|--|
| 1200 | DX1002/DX1004/DX2004/DX2008 |
| 240 | DX1006/DX1012/DX2010/
DX2020/DX2030/DX2040/DX2048 |
| 30 | Models with the /MC1 external input channel option |
- If the measured/computed data is less than the specified number of blocks, the available amount of data is transmitted.

Example Output 2 blocks of FIFO data of channels 1 to 10.

FFGET,001,010,2

- Description**
- The FIFO buffer is a cyclic buffer in which the oldest data is overwritten. Use the FR command to set the acquisition period.
 - The specified number of blocks (p4) of FIFO data starting from the next to the previous read position (block) is output. Make sure to read the data within the following buffer period to prevent data dropouts.
 - For the DX1004
FIFO buffer size 240 cycles (scan interval)
Maximum buffer period
240 × (acquisition interval)

- Parameters p2 and p4 are valid when p1 is set to GET.
- If p4 is omitted, all the data of all blocks acquired in the FIFO buffer are output.
- Set the first channel number and last channel number parameters so that the last channel number is greater than or equal to the first channel number.
- For the output flow of FIFO data, see appendix 4.
- Set parameters p2 and p3 according to the table in section 3.3.

FL Outputs log, alarm summary, and message summary

Syntax FL p1,p2<terminator>

- p1** Log type
- | | |
|--------|--------------------------|
| COM | Communication |
| FTPC | FTP client |
| ERR | Operation error |
| 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 |
- p2** Maximum read length of the log
- | | |
|-----------|---|
| 1 to 200 | Parameter p1 is COM or MODBUS |
| 1 to 1000 | Parameter p1 is ALARM |
| 1 to 450 | Parameter p1 is MSG |
| 1 to 50 | When p1 is some type other than the above |

Example Output the 10 most recent operation error logs.

FLERR,10

- Description**
- Outputs the log that is stored in the DX.
 - If p2 is omitted, all written logs are output.

IS Outputs status information

Syntax IS p1<terminator>

- p1** Status information output
- | | |
|---|---------------------------|
| 0 | Status information 1 to 4 |
| 1 | Status information 5 to 8 |

Example Output status information 1 to 4.

IS0

- Description** The output status can be masked using the status filter (IF command). For details on the status information, see chapter 5.

FU Outputs the user level

Syntax FU p1<terminator>

- p1** User information output
- | | |
|---|--|
| 0 | View the information of the user currently logged in |
|---|--|

3.8 Output Commands (Setting/Measured/Computed Data Output)

1 View the information of the user logged into a general-purpose service

Example Output the information of the user logged into a general-purpose service.

```
FU1
```

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

FA Outputs the instrument information

Syntax FA p1<terminator>

p1 Information type

IP Address information including the IP address, subnet mask, default gateway, and DNS server address as well as the host name and domain name

ME Outputs the data stored on the external storage medium

Syntax ME p1 , p2 , p3<terminator>

p1 Operation type

DIR Output the file list

GET Output (first time)

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 Outputs 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 with the DIR or LIST command. If this command is executed after all lists have been output, only the free space of the storage medium is output.

CHKDSK Checks the disk. Outputs the free space information.

p2 Path name (up to 100 characters) Specify using a full path.

p3 Maximum number of file lists to be output (1 to 1000) If omitted, all the file lists in the specified directory are output.

Example

- Output the list of all files in the root directory.


```
MEDIR, /
```
- Output 10 files of the file list of the root directory.


```
MEDIR, / , 10
```
- Output the list of all files in the DATA0 directory.

```
MEDIR, /DATA0 / * . *
```

- Output the list of all display data files in the DATA0 directory.


```
MEDIR, /DATA0 / * . DDS
```
- Output the data in the file 72615100.DDS in the DATA0 directory.


```
MEGET, /DATA0 / 72615100 . DDS
```

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 parameter p1 is set to LIST, the ID numbers of the file list to be output are set to all spaces.
- If an error occurs during data transmission, p1 can be set to RESEND to retransmit the data.

Path Name Specifications

- The first level directories are as follows:
 - Path that starts with /MEM0/DATA/ Internal memory
 - Path that starts with /DRV0/ CF card
- Path names are case-sensitive.
- Files whose name is less than or equal to 48 characters can be accessed up to three directory levels.
- Wild cards have the following limitations.
 - When parameter p1 is DIR, * can be specified for parameter p2.
 - If the path ends with a slash, it is equivalent to specifying * for the path.

Example) /DRV0/DATA0/ and /DRV0/DATA0/* are equivalent.
 - For the file name and extension, characters starting with * are considered to be arbitrary.

Example) Let us assume that there are five files: ab001.ef1, ab002.ef1, ab001.ef2, ab002.ef2, and ab001.yyy.

If ab*01.ef1 is specified, ab001.ef1 and ab002.ef1 are selected.

If ab001.e* is specified, ab001.ef1 and ab001.ef2 are selected.

MO Operates and outputs the data 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 Output data type

MANUAL Manual sample data

REPORT Report

p3 Specified file name

Example Output the report data from the DX.

```
MOGET, REPORT
```

Description

- Parameter p3 is valid when p1 is set to GET or SIZE.

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

ESC O Opens the instrument

The ASCII code of **ESC** is 1BH. See appendix 1.

Syntax **ESC O** p1<terminator>

p1 Instrument address (001 to 247)

Example Open the instrument at address 127, and enable all commands.

ESC O127

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

ESC C Closes the instrument

The ASCII code of **ESC** is 1BH. See appendix 1.

Syntax **ESC C** p1<terminator>

p1 Instrument address (01 to 99)

Example Close the device whose address is 77.

ESC C77

- Description
- Clears the current connection with the device.
 - When this command is received correctly, the DX transmits the data "**ESC C**□□".
 - Normally, either CR+LF or LF can be used as a terminator for communication commands. However, the terminator for this command must be set to CR+LF.

3.10 Output Commands (Special Response Commands)

***I** Outputs the instrument information

Syntax ***I**<terminator>

Description Outputs the maker, model, serial number, and firmware version in a comma-separated ASCII string with a terminator at the end.

Example YOKOGAWA,DX1000,99AA0123,F1.01

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

close Disconnects the connection between other instruments.

Syntax `close,p1,p2:p3<terminator>`
 p1 Port on the DX side (0 to 65535)
 p2 IP address on the PC side (0.0.0.0 to 255.255.255.255)
 p3 Port on the PC side (0 to 65535)
 Example `close,34159,192.168.111.24:1054`
 E0

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

con Outputs the connection information

Syntax `con<terminator>`

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

Active connections

Proto	Local Address	Foreign Address	State
TCP	192.168.111.24:34159	192.168.111.24:1053	ESTABLISHED
TCP	0.0.0.0:0:34155	0.0.0.0:0	LISTEN
TCP	0.0.0.0:0:34159	0.0.0.0:0	LISTEN
TCP	0.0.0.0:0:34150	0.0.0.0:0	LISTEN

EN

TCP
 Protocol used.
 Local Address
 The DX's socket address.
 Displays "IP address:port number."
 Foreign Address
 The destination socket address.
 Displays "IP address:port number."
 State
 Connection state.
 ESTABLISHED
 Connection established.

eth Outputs Ethernet statistical information.

Syntax `eth<terminator>`

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

Ethernet Statistics

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

EN

help Outputs help.

Syntax `help [,p1]<terminator>`
 p1 Command name
 (close, con, dump, eth, help, ip, mbuf, net, quit, reg, tcp, wlog)

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 statistical information.

Syntax `net<terminator>`

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

Network Status

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

TCP: keepalive
 Keepalive check cycle.
 TCP: connects
 Total number of connections established.
 TCP: closed
 Total number of dropped connections.

TCP: timeoutdrop
 Total number of dropped connections due to TCP retransmission timeout. When the transmitted packet (the unit of transmitted data) is not received, the packet is automatically retransmitted at a predetermined time interval. If the packet is not received after 14 retransmissions, timeout occurs and the connection is dropped.

TCP: keepdrops
 Total number of dropped connections due to TCP keepalive timeout.

TCP: sndtotal
 Total number of transmitted packets.

TCP: sndbyte
 Total number of transmitted bytes.

TCP: sndremitpack
 Total number of retransmitted packets.

TCP: sndremitbyte
 Total number of retransmitted bytes.

TCP: rcvtotal
 Total number of received packets.

TCP: rcvbyte
 Total number of received bytes.

DLC: 16 collisions
 Number of collision incidents. A collision occurs when two or more instruments on the network attempt to transmit simultaneously. The tendency for collisions to occur increases when the network is congested. 16 collisions would mean 16 consecutive collision incidents.

quit Disconnects the connection of the instrument being operated

Syntax quit<terminator>

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

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

Port number	34264/udp (see section 2.1)
Transfer data	ASCII
Received buffer size	128
Transmit buffer size	512
Maximum number of parameters	32

In the command packet, parameters corresponding to the desired information are placed one after another.

Parameter	Description
serial	Outputs the serial number.
host	Outputs the host name (specified in section 2.3).
ip	Outputs the IP address (specified in section 2.3).

Example Query the IP address and host name. (Of the two frames below, the top frame represents the command packet, and the bottom frame represents 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, line feed).
 - Parameters are not case sensitive.
 - Undefined parameters are ignored.
 - Parameters beyond 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.

Commands	Group	Response	
		Affirmation	Negation
Setting commands	Setting	Affirmative response	Single negative response or multiple negative responses
	Control		
Basic Setting commands			
Output commands	Control		
	Setup, measurement, and control data output	ASCII output	
		Binary output	
	RS-422-A/485 dedicated	Dedicated response	No response
	Special response commands	Dedicated response	

* 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...m CRLF`

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.

- **Syntax**

`E2_ee:nnn CRLF` (When there is only one error)

`E2_ee:nnn, ee:nnn, ..., ee:nnn CRLF` (When there are multiple errors)

ee Error position (01 to 10)

nnn Error number (001 to 999)

– Space

- **Example**

`E2 02:001`

ASCII Output

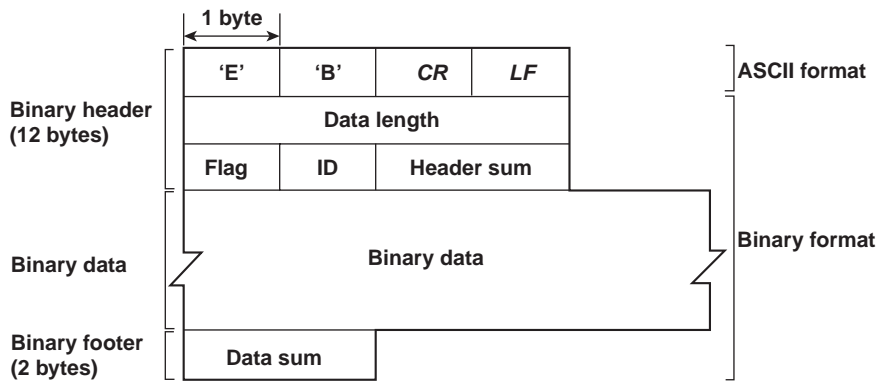
The following types of ASCII data are available. For the data formats, see section 4.2. Setting data, basic setting data, decimal point position/unit information, measured/computed data, communication log, FTP log, operation error log, login log, Web operation log, e-mail log, alarm summary, message summary, status information, file list, data list, and user level

• **Syntax**

```
EA CRLF
..... CRLF
:
..... CRLF
..... CRLF
EN CRLF
```

Binary Output

Conceptual Diagram



EBCRLF

Indicates that the data is binary.

Data Length

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

Header Sum

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

Binary 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.

Flag

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

- When the BO flag is “0,” the 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.

ID Number	Binary Data Type	Type	Format	Corresponding Output Command
0	Undefined file	file (* . *)	–	ME
1	Instantaneous data	Data	Yes	FD
1	FIFO data	Data	Yes	FF
13	Screen data file	File (* . PNG)	–	ME , FC
15	Display data file	File (* . DAD)	No	ME
16	Event data file	File (* . DAE)	No	ME
17	Manual sample file	File (* . DAM)	Yes	ME , MO
18	Report file	File (* . DAR)	Yes	ME , MO
19	Setup data file	File (* . PDL)	No	ME , FE4
25	Setup channel information output	Data	Yes	FE5
26	Configured alarm information output	Data	Yes	FE6

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.
 - **File**
 - Display data, event data, and setup data files can be used on the DXA120 Standard Software that comes with the package. For details, see the *DXA120 Standard Software User's Manual IM04L42B01-61E*.
 - Files that are in common formats can be opened using software programs that are sold commercially.
 - Other formats are written in ASCII code. A text editor can be used to open these types of files.

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.

```

/*
 * 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-422A/485 Dedicated Responses

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

Command Syntax	Meaning	Response
<i>ESC O_xx CRLF</i> (_ space)	Opens the device.	<ul style="list-style-type: none"> Response from the device with the specified address <i>ESC O xx CRLF</i> No response when the device with the specified address does not exist*
<i>ESC C_xx CRLF</i> (_ space)	Closes the instrument.	<ul style="list-style-type: none"> Response from the device with the specified address <i>ESC C xx CRLF</i> 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.

Data Type	Corresponding Output Command
Setting data/basic setting data	FE0 , FE2
Decimal position/unit information	FE1
Measured, computed, and external input data	FD0
Output the relay or internal switch status	FD6
Communication log	FLCOM
FTP client log	FLFTPC
Operation error log	FLERR
Login log	FLLOGIN
Web operation log	FLWEB
E-mail log	FLEMAIL
Alarm summary	FLALARM
Message summary	FLMSG
SNTP access log	FLSNTP
DHCP access log	FLDHCP
Modbus communication log	FLMODBUS
Status information	IS0 , IS1
File list	MEDIR
Check disk output	MECHKDSK
Manual sampled/report data information	MODIR
User information	FU0 , FU1
Ethernet status output	FAIP

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.

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

```
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.
- By combining with the decimal position information obtained with the FE command in binary format, the correct measured/computed data can be derived.

- **Syntax**

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

```
EACRLF
s_cccuuuuuu,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 (000.00) for 02. Three digits to the right of the decimal (00.000) for 03. Four digits to the right of the decimal (0.0000) for 04.
—	Space

- **Example**

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

Measured/Computed Data

- The FD command is used to output the data.
- **Syntax**

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

```
EACRLF
DATE_YY/mo/ddCRLF
TIME_hh:mm:ss.mmmtCRLF
s_ccca1a2a3a4uuuuufdddddE-ppCRLF
.....
ENCRLF
```

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	a1 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 (+, -)

dddd	Mantissa (00000 to 99999, 5 digits)
	<ul style="list-style-type: none"> • 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.

Communication Log

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

- **Syntax**

```
EACRLF
YY/mo/dd_hh:mm:ss_n_uuu...ufd_mmm...mCRLF
.....
ENCRLF
```

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.)

4.2 Output Format of ASCII Data

d	Input/Output
	>: Input
	<: Output
mmm•••m	Message (up to 20 characters)
	<ul style="list-style-type: none">• The communication log contains only the error number and not the error message section.• Normally, the transfer data are transmitted as they are, but in some cases, a special message is output. The special messages are shown below.
	Reception
	(Over length): Command length exceeded.
	(Over number): Number of commands exceeded.
	(Serial error): Received an error character through serial communications.
	Transmission
	(ddd byte): Data output (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)
—	Space

- **Example**

The following example shows the log when multiple commands separated by sub delimiters, "B01;???;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*> B01
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**

EACRLF

yy/mo/dd_hh:mm:ss_nnn_XXXXXXXX_k_ffffffffff_...CRLF

.....

ENCRLF

<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>nnn</i>	Error code (001 to 999)
<i>XXXXXXXX</i>	Detailed code (9 characters)
<i>k</i>	Server type (P, S)
	P: Primary
	S: Secondary
<i>fff...</i>	File name (up to 48 characters including the extension)
<i>—</i>	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
.....
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)
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
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      OM user
99/05/11 12:30:00 Logout    COM user
EN
```

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**

```
EACRLF
yy/mo/dd_hh:mm:ss_ffffff_eee_???...?CRLF
.....
ENCRLF
```

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

4.2 Output Format of ASCII Data

eee Error code when executing the requested operation
All spaces: Success
001 to 999: Failure (error code)

???...? Parameter for each event (see below)

- When fffffff = SCREEN
yy/mo/dd_hh:mm:ss_ffffff_eee_dddnnCRLF
dddnn 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 fffffff = 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 fffffff = MSG
yy/mo/dd_hh:mm:ss_ffffff_eee_mmm...mCRLF

mmm...m Message (up to 32 characters)
_ 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
```

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**

EACRLF

yy/mo/dd_hh:mm:ss_ffffff_eee_n_uuu...uCRLF

.....

ENCRLF

<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>ffffff</i>	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
<i>eee</i>	Error code
	All spaces: Success
	001 to 999: Error code
<i>n</i>	Recipient list
	1: List 1
	2: List 2
	+: List 1 and list 2
<i>uuu...u</i>	Series of recipient e-mail addresses (up to 30 characters)
<i>-</i>	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 adv1 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**

EACRLF

YY/mo/dd_hh:mm:ss_nnn_XXXXXXXXXXCRLF

.....

ENCRLF

<i>YY</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>nnn</i>	Error number (000 to 999)
<i>XXXXXXXXXX</i>	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
<i>—</i>	Space

- **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**

EACRLF

yy/mo/dd_hh:mm:ss_nnn_XXXXXXXXX CRLF

.....

ENCRLF

<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>nnn</i>	Error number (000 to 999)
	Description given in the table.
<i>XXXXXXXXX</i>	Detailed code (9 characters)
	Description given in the table.
<i>_</i>	Space

The table below shows the contents of the log during normal operation.

Error Number	Detail Code	Description
562	ON	Detected that an Ethernet cable was connected.
	OFF	Detected that an Ethernet cable was disconnected.
563	RENEW	Requesting address renewal to the DHCP server.
	RELEASE	Requesting address release to the DHCP server.
564	RENEWED	Address renewal complete.
	EXTENDED	Address release extension request complete.
	RELEASED	Address release complete.
565	IPCONFIG	IP address configured.
566	NOREQUEST	Configured not to register the host name.
567	UPDATE	Registered the host name to the DNS server.
568	REMOVE	Removed the host name from the DNS server.

4.2 Output Format of ASCII Data

The table below shows the contents of the log during erroneous operation.

Error Number	Detail Code	Description	
295	REJECT	Address obtained by DHCP is inappropriate.	
296	ESEND	Failed to send to the DHCP server.	
	ESERVER	DHCP server not found	
	ESERVFAIL	No response from the DHCP server.	
	ERENEWED	Address renewal rejected by the DHCP server.	
	EEXTENDED	Address lease extension request rejected by the DHCP server.	
	EEXPIRED	Address lease period expired by the DHCP server.	
297	INTERNAL	Host name registration failure (transmission error reception timeout, etc.)	
	FORMERR	Host name registration failure (format error: DNS message syntax error)	
	SERVFAIL	Host name registration failure (server failure: DNS server processing error)	
	NXDOMAIN	Host name registration rejection (non existent domain)	
	NOTIMP	Host name registration rejected (not implemented)	
	REFUSED	Host name registration rejected (operation refused)	
	YXDOMAIN	Host name registration rejected (name exists)	
	YXRRSET	Host name registration rejected (RR set exists)	
	NXRRSET	Host name registration rejected (RR set does not exist)	
	NOTAUTH	Host name registration rejection (not authoritative for zone)	
	NOTZONE	Host name registration rejection (different from zon section)	
	NONAME	Host name not entered on the DX.	
	298	INTERNAL	Host name removal failure (transmission error, reception timeout, etc.)
		FORMERR	Host name removal failure (format error: DNS message syntax error)
SERVFAIL		Host name removal failure (server failure: DNS server processing error)	
NXDOMAIN		Host name removal rejection (non existent domain)	
NOTIMP		Host name removal rejected (not implemented)	
REFUSED		Host name removal rejected (operation refused)	
YXDOMAIN		Host name removal rejected (name exists)	
YXRRSET		Host name removal rejected (RR set exists)	
NXRRSET		Host name removal rejected (RR set does not exist)	
NOTAUTH		Host name removal rejection (not authoritative for zone)	
NOTZONE		Host name removal rejection (different from zone section)	
NOTLINKED		Physical layer was disconnected when removing the host name.	

- **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**

EACRLF

yy/mo/dd_hh:mm:ss_c_XXXXXXX_kkkk_nn_dCRLF

.....

ENCRLF

<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>c</i>	Communication type (C or M)
	C Modbus client (Ethernet)
	M Modbus master (serial)
<i>XXXXXXX</i>	Event that occurred (7 characters)
	DROPOUT Communication could not keep up and drop out occurred.
	ACTIVE Activated.
	READY Command ready state.
	CLOSE Disconnected.
	HALT Command halted.
<i>kkkk</i>	Detail (4 characters)
	GOOD Normal operation
	NONE No response from the slave device.
	FUNC Received a function error.
	REGI Received a register error.
	ERR Received a packet error.
	LINK Ethernet cable disconnected (Modbus client).
	HOST Unable to result the IP address from the host name (Modbus client).
	CNCT Failed to connect to the server (Modbus client).
	SEND Failed to send the command (Modbus client).
	BRKN Failed to receive the command.
	Space At command start
<i>nn</i>	Command number (1 to 16, space)
<i>d</i>	Command type (R, W, space)
	R Read
	W Write
<i>_</i>	Space

- **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**

EACRLF

yy/mo/dd_hh:mm:ss_kkk_ccc_ls_nnnnnnnnnnCRLF

.....

ENCRLF

<i>yy/mo/dd</i>	<i>hh:mm:ss</i>	Time when the alarm occurred
<i>yy</i>		Year (00 to 99)
<i>mo</i>		Month (01 to 12)
<i>dd</i>		Day (01 to 31)
<i>hh</i>		Hour (00 to 23)
<i>mm</i>		Minute (00 to 59)
<i>ss</i>		Second (00 to 59)
<i>kkk</i>		Alarm cause
	<i>OFF</i>	Alarm release
	<i>ON</i>	Alarm occurrence
	<i>ACK</i>	Alarm acknowledge
<i>ccc</i>		Measurement, computation, or external input channel number
<i>l</i>		Alarm level (1 to 4)
<i>s</i>		Alarm type (H, h, L, l, R, r, T, or t)
<i>nnnnnnnnnn</i>		Alarm sequence
<i>—</i>		Space

For all-channel alarms, the channel number, alarm level, and alarm status items are all set to asterisk.

- **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**

EACRLF

yy/mo/dd_hh:mm:ss_mmm..._ggg..._zzz_uuu..._nnn...CRLF

.....

ENCRLF

<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>mmm...</i>	Message (32 characters. Spaces are embedded when the number of characters is less than 32 characters.)
<i>ggg...</i>	Message write destination group (11 characters) <i>xx,xx,xx,xx</i> The groups in which the message is written are delimited by commas and displayed. (Up to four groups)
	<i>ALL</i> All groups
<i>zzz</i>	Operation property
	<i>KEY</i> Key operation
	<i>COM</i> Communication
	<i>REM</i> Remote
	<i>ACT</i> Event action
	<i>SYS</i> System
<i>uuu...</i>	User name (up to 20 characters)
<i>nnn...</i>	Message sequence number (0 for add messages)
<i>-</i>	Space

- **Example**

EA

```
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
01/05/1112:20:00*0123456789abcdefg    01,02,03,04 KEY admin 12
```

EN

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

ddd.ccc.bbb.aaa CRLF

EN CRLF

<i>aaa</i>	Status information 1 (000 to 255)
<i>bbb</i>	Status information 2 (000 to 255)
<i>ccc</i>	Status information 3 (000 to 255)
<i>ddd</i>	Status information 4 (000 to 255)

- **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

<i>aaa</i>	Status information 1 (000 to 255)
<i>bbb</i>	Status information 2 (000 to 255)
<i>ccc</i>	Status information 3 (000 to 255)
<i>ddd</i>	Status information 4 (000 to 255)
<i>eee</i>	Status information 5 (000 to 255)
<i>fff</i>	Status information 6 (000 to 255)
<i>ggg</i>	Status information 7 (000 to 255)
<i>hhh</i>	Status information 8 (000 to 255)

- **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**

```
EACRLF
IP_Address_____:xxx.xxx.xxx.xxxCRLF
Subnet_mask____:xxx.xxx.xxx.xxxCRLF
Default_Gateway_:xxx.xxx.xxx.xxxCRLF
Primary_DNS____:xxx.xxx.xxx.xxxCRLF
Secondary_DNS___:xxx.xxx.xxx.xxxCRLF
Host_____ :yyy.....CRLF
Domain_____ :zzz.....CRLF
ENCRLF
```

xxx	IP address number (000 to 255)
yyy...	Host name (up to 64 characters)
zzz...	Domain name (up to 64 characters)

File List

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

- Syntax**

```
EACRLF
yy/mo/dd_hh:mm:ss_ssssssss_fff..._1_xxx...CRLF
.....
ENCRLF
```

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)
sssssssss	Data size of the file (_____0 to 99999999) [byte(s)]
fff...	File name (48 characters including the extension. If it is less than 48, spaces are entered.) If this is a directory, the characters <DIR> are shown at the position displaying the file data size.
xxx...	Data serial number (16-digit hexadecimal)
-	Space

The data serial number are included for files in the DATA directory in the internal memory. For all other cases, they are spaces.

4.2 Output Format of ASCII Data

- **Example 1**

File list output of an external storage medium

```
EA
05/02/24 20:07:12    1204 setting.pn1
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 setting.pn1    1    1ABCDE123
05/02/24 20:07:12    1204 set123.pn1    1 1234567890123456
EN
```

Check Disk

The ME command is used to output the free space on the storage medium.

- **Syntax**

```
EACRLF
zzz..._Kbyte_freeCRLF
ENCRLF
```

```
    zzz...    Free space on the storage medium (16 digits)
    _        Space
```

- **Example**

```
EA
12345678 Kbyte free
EN
```

Manual Sampled/Report Data Information

The MO command is used to output the data.

- **Syntax**

EACRLF

slll..._yy/mo/dd_hh:mm:ss_bbbb_fff...CRLF

.....

ENCRLF

<i>s</i>	Data flag
	Space Confirmed data
	+ Data that was overwritten
	* Data being added
<i>lll...</i>	File number (10 digits)
<i>yy</i>	Year (00 to 99)
<i>mo</i>	Month (01 to 12)
<i>dd</i>	Day (01 to 31)
<i>hh</i>	Hour (00 to 23)
<i>mm</i>	Minute (00 to 59)
<i>ss</i>	Second (00 to 59)
<i>bbbb</i>	Number of events (4 characters)
<i>fff...</i>	File name (up to 48 characters including the extension)
<i>_</i>	Space

- **Example**

EA

+ 6 05/03/04 00:00:00 20 aaaa30312345.REP

7 05/03/05 00:00:00 20 30400005.REP

8 05/03/06 00:00:00 20 30500005.REP

** 9 05/03/06 13:00:00 20 uuuu0005.REP*

EN

User Information

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

- **Syntax**

EA*CRLF*

p_l_uuu...*CRLF*

EN*CRLF*

p	Login method
E	Ethernet
S	RS-232 or RS-422A/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

Relay/Internal Switch Status Output

The FD command is used to output the DO status and internal switch status.

- **Syntax**

```
EACRLF
I01-I06:aaaaaaCRLF
I11-I16:aaaaaaCRLF
I21-I26:aaaaaaCRLF
I31-I36:aaaaaaCRLF
S01-S30:aaa...CRLF
ENCRLF
```

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-I30:000000000000000000000000000000000000
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.

Typical Examples to Obtain Physical Values from Binary Data

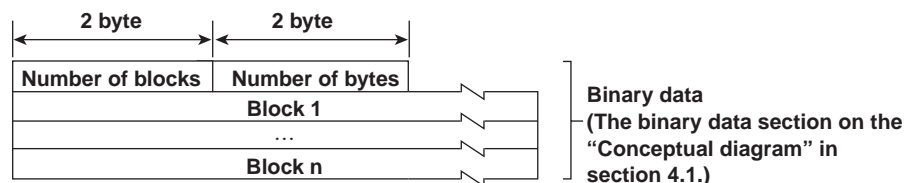
Binary Value	Decimal Position Code	Physical Value (Measured Value)
10000	0	10000
10000	1	1000.0
10000	2	100.00
10000	3	10.000
10000	4	1.0000

Note

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

Measured/Computed Data and FIFO Data

- The FD command is used to output the measured/computed data.
- The FF command is used to output the FIFO data.
- The ID number of the output format is 1. See “ID” in section 4.1.



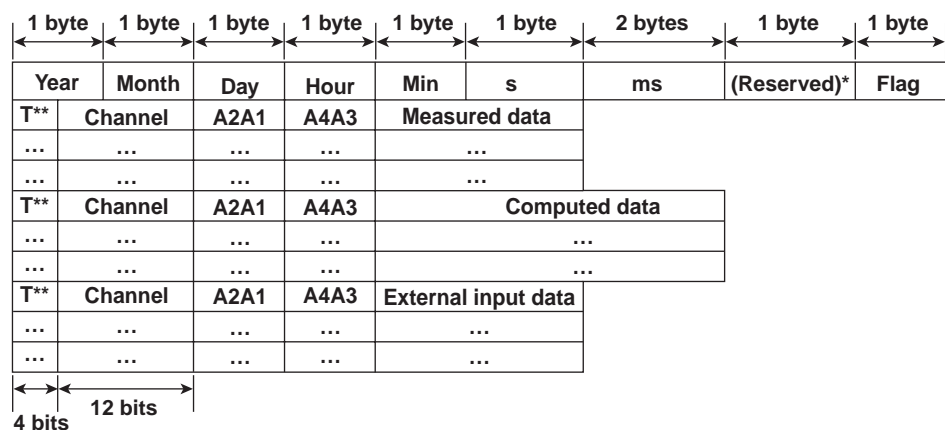
Number of Blocks

This is the number of blocks.

Number of Bytes

This is the size of one block in bytes.

Block



* 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.

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

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

- **Block Member**

Name	Binary Value
Year	0 to 99
Month	1 to 12
Day	1 to 31
Hour	0 to 23
Minute	0 to 59
Second	0 to 59
Millisecond	0 to 999
(Reserved)	Undefined
Type	0x0: 16-bit integer (measurement channel/external input channel) 0x8: 32-bit integer (computation channel)
Channel	1 to 48, 101 to 160, or 201 to 440
Alarm status*	
A1 (Bit 0 to 3)	
A2 (Bit 4 to 7)	0 to 8
A3 (Bit 0 to 3)	
A4 (Bit 4 to 7)	
Measured data/external input data	0 to 0xFFFF
Computed data	0 to 0xFFFFFFFF

* 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, and 8: t.

Special Data Values

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

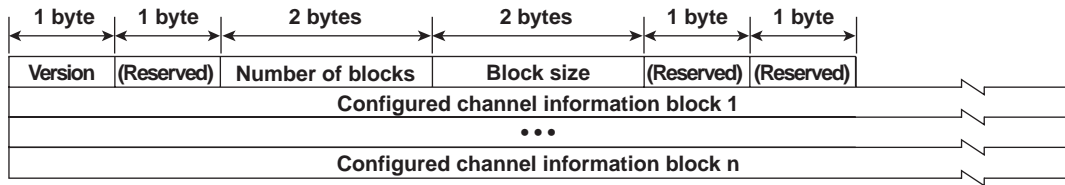
Special Data Value	Measured Data	Computed Data
+ Over	7FFFH	7FFF7FFFH
– Over	8001H	80018001H
Skip	8002H	80028002H
Error	8004H	80048004H
Undefined	8005H	80058005H
Power failure data	7F7FH	7F7F7F7FH
Burnout (up setting)	7FFAH	7FFF7FFFH
Burnout (down setting)	8006H	80018001H

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.
- The figure below indicates the format.



Format Details

Item	Description	Output Value
Version	Format version	1
Number of blocks*	Number of configured channel information blocks	Up to 348
Block size*	Size of the of configured channel information blocks	72
Block 1 to n	Configured channel information blocks	Up to 25056 bytes See Block Details.

* Output in the byte order specified by the BO command.

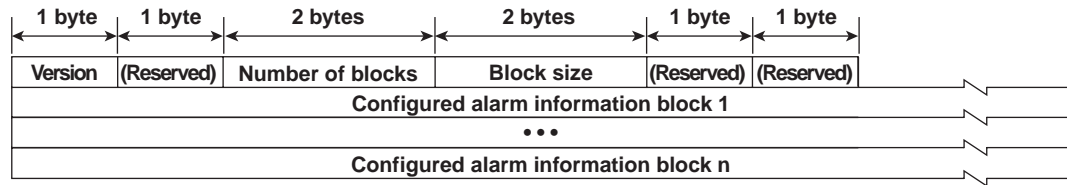
Block Details

Item	Number of Bytes	Description
Channel number*	2	1 to 440
Decimal place	1	0 to 4
(Reserved)	1	0
Channel type*	4	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.
Unit information	8	The terminator is '\0.'
Tag information	24	The terminator is '\0.'
Minimum input value*	4	Measurement channels: Allowable input range under the current setting
Maximum input value*	4	Computation channels: -9999999, +99999999 (fixed) External input channels: -30000, +30000 (fixed)
Span lower limit*	4	Measurement channels (when scaling is not used): Same value as the DX span setting
Span upper limit*	4	Measurement channels (when scaling is used): Same value as the DX scale setting Computation and external input channels (when scaling is not used): Same value as the DX span setting
Scale lower limit*	4	Measurement channels: Same value as the span
Scale upper limit*	4	Computation and external input channels: Same value as the span
FIFO type*	2	1
Area in the FIFO*	2	Indicates the position of its own channel in the FIFO block of one sample. The value starts from zero.
(Reserved)	4	0

* Output in the byte order specified by the BO command.

Configured Alarm Information Data

- The FE6 command is used to output the data.
- The ID number of the output format is 26.
- The figure below indicates the format.



Format Details

Item	Description	Output Value
Version	Format version	1
Number of blocks*	Number of configured alarm information blocks	Up to 348
Block size*	Size of the of configured alarm information blocks	24
Block 1 to n	Configured alarm information blocks	Up to 8352 bytes See Block Details.

* Output in the byte order specified by the BO command.

Block Details

Item	Number of Bytes	Notes
Channel number*	2	1 to 440
Decimal place	1	0 to 4
(Reserved)	1	0
Alarm type	4	The following settings are entered in order from level 1 to 4. 0: Setting off, 1: H (high limit), 2: L (low limit), 3: h (difference high limit), 4: l (difference low limit), 5: R (high limit on rate-of-change), 6: r (low limit on rate-of-change), 7: T (delay high limit), 8: t (delay low limit)
Alarm value*	4×4	The alarm values are entered in order from level 1 to 4.

* 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.

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

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

The following table shows the parameter types.

Parameter	Output Information
serial	Serial number
host	Host name
ip	IP address

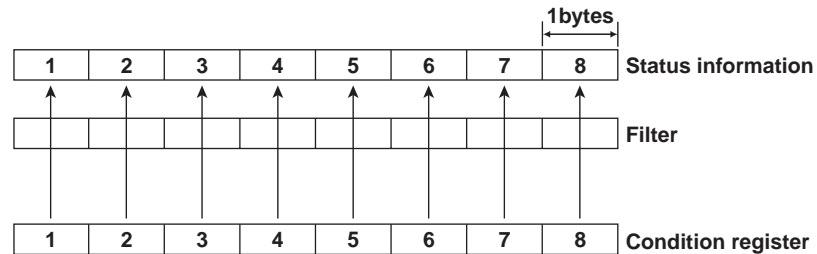
Output Example

Several output examples are indicated below.

Packet Parameter Sent as Commands	Response
Parameters are not case sensitive. ip HoSt	EA ip = 192.168.111.24 host = DX2000 EN
Even if the same parameters are specified numerous times, only the first occurrence is output. host ip host ip host	EA host = DX2000 ip = 192.168.111.24 EN
Undefined parameters will be ignored. (Space)	EA EN

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

Bit	Name	Description
0	Basic setting	Set to 1 during basic setting mode.
1	Memory sampling	Set to 1 while data are being acquired to the internal memory.
2	Computing	Set to 1 while computation is in progress.
3	Alarm activated	Set to 1 while the alarm is activated.
4	Accessing medium	Set to 1 while the display, event, manual sampled, report, or screen image data file are being saved to the external storage medium.
5	E-mail started	Set to 1 while the e-mail transmission is started.
6	–	–
7	–	–

Status Information 2

Bit	Name	Description
0	–	–
1	–	–
2	Memory end	Set to 1 while the free space in the internal memory or external storage medium is low.
3	Logged in through keys	Set to 1 while logged in through keys.
4	–	–
5	–	–
6	Detecting measurement error	Set to 1 while error is being detected in the A/D converter or a burnout is being detected.
7	Detecting communication error	Set to 1 if any command is stopping the communication on the Modbus master or Modbus client.

Status Information 3

Bit	Name	Description
0	Measurement dropout	Set to 1 when the measurement process could not keep up.
1	Decimal point/unit information change	Set to 1 when the decimal point/unit information is changed.
2	Command error	Set to 1 when there is a command syntax error.
3	Execution error	Set to 1 when an error occurs during command execution.
4	SNTP error when memory start is executed	Set to 1 when the time could not be adjusted using SNTP when memory start is executed.
5	–	–
6	–	–
7	–	–

Status Information 4

Bit	Name	Description
0	A/D conversion complete	Set to 1 when the A/D conversion of the measurement is complete.
1	Medium access complete	Set to 1 when the display, event, manual sampled, report, 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.
2	Report generation complete	Set to 1 when report generation is complete.
3	Timeout	Set to 1 when the timer expires.
4	–	–
5	–	–
6	USER key detection	Set to 1 when the USER key is pressed.
7	–	–

Status Information 5 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.

Function	Maximum Number of Connections	Number of Simultaneous Uses		Port Number
		Administrator	User	
Setting/measurement server	3	1	2 ^{*1}	34260/tcp ^{*2}
Maintenance/test server	1	1	1 ^{*1}	34261/tcp ^{*2}
FTP server	2	2	2 ^{*1}	21/tcp ^{*3}
HTTP server	–			80/tcp ^{*3}
SNTP server	–			123/udp ^{*3}
Modbus server	2			502/tcp ^{*3}
Instrument information server	–	–	–	34264/udp ^{*2}

*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 0 to 65535. Use the default port number unless there is a special reason not to do so.

6.3 Modbus Protocol Specifications

Modbus Client Function

- Communicate via ModbusTCP
- Communication media: Ethernet 10Base-T
- Read cycle: Select from the following:
125, 250, 500 ms, 1, 2, 5, and 10 s
- Connection retry: Select the reconnection interval after disconnecting the connection after the connection wait time has elapsed from the following:
OFF, 1, 2, 5, 10, 20, 30 min, and 1 h
- Connection timeout value: 1 min
- Command timeout value: 10 s
- Server: Set up to 16 servers
- Command setting: Set up to 16 commands
- Command items: Read channel 201 to 440, C01 to C60
Write channel 001 to 060, 101 to 160 (varies depending on the model)
Server (specified by the registration number): 1 to 16
Input register: Same as the Modbus master function
Hold register: Same as the Modbus master function
Type: Same as the Modbus master function
- Access method: The access methods are as follows:
OFF: Not use transmitted commands.
R: Read to the external input channel (16-bit signed integer type) from the slave (/MC1 external input channel option)
R-M: Read to the communication input channel (32-bit floating point type) from the slave (/M1 math option)
W: Write the measurement channel (16-bit signed integer type) to the slave
W-M: Write the computation channel (32-bit signed integer type) to the slave (/M1 math option)
- Supported functions: Supported Modbus client functions are as follows:

Function Code	Function	Operation
3	Read the hold register (4XXXX)	The DX reads the hold register of the server device into the communication input data or external input channel.
4	Read the input register (3XXXX)	The DX reads the input register of the server device into the communication input data or external input channel.
16	Write to the hold register (4XXXX)	The DX writes the measured or computed data to the hold register of the server device.

Register type:

Type	Description
INT16	16-bit signed integer
UINT16	16-bit unsigned integer
INT32_B	32-bit signed integer (higher and lower order)
INT32_L	32-bit signed integer (lower and higher order)
UINT32_B	32-bit unsigned integer (higher and lower order)
UINT32_L	32-bit unsigned integer (lower and higher order)
FLOAT_B	32-bit floating point (higher and lower order)
FLOAT_L	32-bit floating point (lower and higher order)

6.3 Modbus Protocol Specifications

Command setting item:

Type	Channel	Register	Register Type
R	External input channel	30001 to 39999 300001 to 365536 40001 to 49999 400001 to 465536	INT16, UINT16, INT32_B, INT32_L UINT32_B, UINT32_L
R-W	Communication input channel	30001 to 39999 300001 to 365536 40001 to 49999 400001 to 465536	INT16, UINT16, INT32_B, INT32_L UINT32_B, UINT32_L FLOAT_B, FLOAT_L
W	Measurement channel	40001 to 49999 400001 to 465536	INT16
W-M	Computation channel	40001 to 49999 400001 to 465536	INT16, UINT16, INT32_B, INT32_L

Modbus Server Function

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

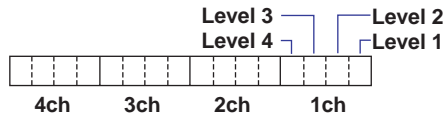
Supported functions: The functions that the DX supports are listed below.

Function Code	Function	Operation
3	Read the hold register (4XXXX)	The client device reads the communication input data.
4	Read the input register (3XXXX)	The client device reads the computed, measured, alarm, and time data of the DX.
6	Single write to hold register	The client device writes to the communication (4XXXX) input data or external input channel of the DX.
8	Loopback test	The client device performs a loopback test of the DX.
16	Write to the hold register (4XXXX)	The master device writes to the communication input data or external input channel of the DX.

Register assignments (shared with the Modbus server function)

Input Register	Data	Data Type										
30001	Measured data of measurement channel 001	Int16										
30048	Measured data of measurement channel 048 • There is no decimal position information.											
31001	Alarm status of measurement channel 001	Bit string										
31048	Alarm status of measurement channel 048 • Register structure and alarm status values											
	<table border="1"> <thead> <tr> <th>Alarm level</th> <th>2</th> <th>1</th> <th>4</th> <th>3</th> </tr> </thead> <tbody> <tr> <td></td> <td>4 bits</td> <td>4 bits</td> <td>4 bits</td> <td>4 bits</td> </tr> </tbody> </table>	Alarm level	2	1	4	3		4 bits	4 bits	4 bits	4 bits	
Alarm level	2	1	4	3								
	4 bits	4 bits	4 bits	4 bits								
	0: No alarm 1: High limit alarm 2: Low limit alarm 3: Difference high limit alarm 4: Difference low limit alarm 5: High limit on rate-of-change alarm 6: Low limit on rate-of-change alarm 7: Delay high limit alarm 8: Delay low limit alarm											

32001	Lower byte of the computed data of computation channel 101	Int 32
32002	Higher byte of the computed data of computation channel 101	
32119	Lower byte of the computed data of computation channel 160	Int 32
32120	Higher byte of the computed data of computation channel 160	
• There is no decimal position information.		
33001	Alarm status of computation channel 101	Bit string
33060	Alarm status of computation channel 160	
• Register structure and alarm status values: Same as the alarm status of the measurement channels.		
34001	Measured data of external input channel 201	Int16
34240	Measured data of external input channel 440	
• There is no decimal position information.		
35001	Alarm status of external input channel 201	Bit string
35240	Alarm status of external input channel 440	
• Register structure and alarm status values: Same as the alarm status of the measurement channels.		
36001	List of alarms of measurement channels 001 to 004	Bit string
36012	List of alarms of measurement channels 045 to 048	
• Register structure		



Indicates the alarm status of four channels in one register. Set to 1 when alarm is activated. The figure is an example of register 36001 (measurement channels 001 to 004).

36021	List of alarms of computation channels 101 to 104	Bit string
36035	List of alarms of computation channels 157 to 160	
• Register structure: Same as the list of alarms of measurement channels.		
36041	List of alarms of external input channels 201 to 204	Bit string
36100	List of alarms of external input channels 437 to 440	
• Register structure: Same as the list of alarms of measurement channels.		
39001	Year	Int 16
39002	Month	
39003	Day	
39004	Hour	
39005	Minute	
39006	Second	
39007	Millisecond	
39008	DST	

* Input registers 36001 to 36100 can be accessed consecutively. All unassigned register bits are read as zeroes.

Hold Register	Data	Data Type	
40001	Communication input channel C01	Int16	R/W
40060	Communication input channel C60		
• There is no decimal position information.			
41001	External input channel write register 201	Int16	R/W
41240	External input channel write register 440		
• There is no decimal position information.			

6.3 Modbus Protocol Specifications

Modbus error response: The DX returns the following error codes to the master device.

Code	Function	Operation
1	Bad function code	Unsupported function request.
2	Bad register number	Tried to read or write to the register without a corresponding channel.
3	Bad number of registers	When writing, the specified number of registers is less than or equal to zero or greater than or equal to 124. When reading, the specified number of registers is less than or equal to zero or greater than or equal to 126.

However, no response is returned in the following cases.

- CRC error
- Errors other than those shown above.

Specifications Common to the Modbus Master and Modbus Slave Functions

Communicate via ModbusRTU	
Communication media:	RS-232, RS-422A, 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
Slave address:	1 to 99 (slave only)

Modbus Master Function

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, 500ms, 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 setting:	Set up to 16 commands
Command items:	Read channel 201 to 440, C01 to C60 Write channel 001 to 060, 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.
Register type:	Same as the Modbus client.

Modbus Slave Function

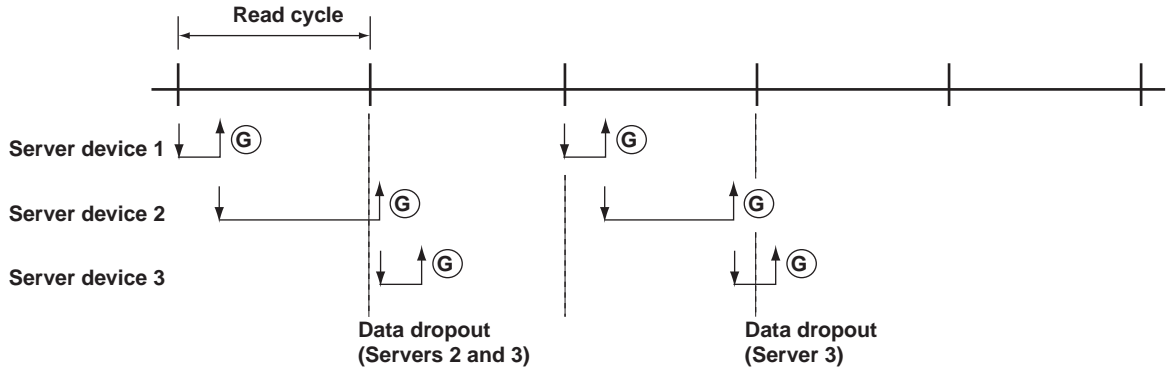
Slave address:	1 to 99.
Supported functions:	Same as the Modbus server.
Register assignments:	Same as the Modbus server.
Modbus error response:	Same as the Modbus server.

Appendix 1 Data Dropout during Modbus Communication

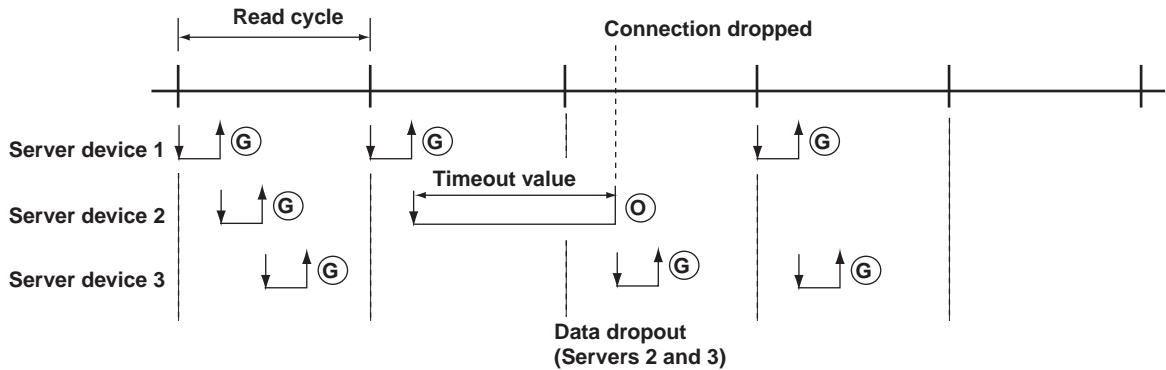
Data Dropout during Modbus Client

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.

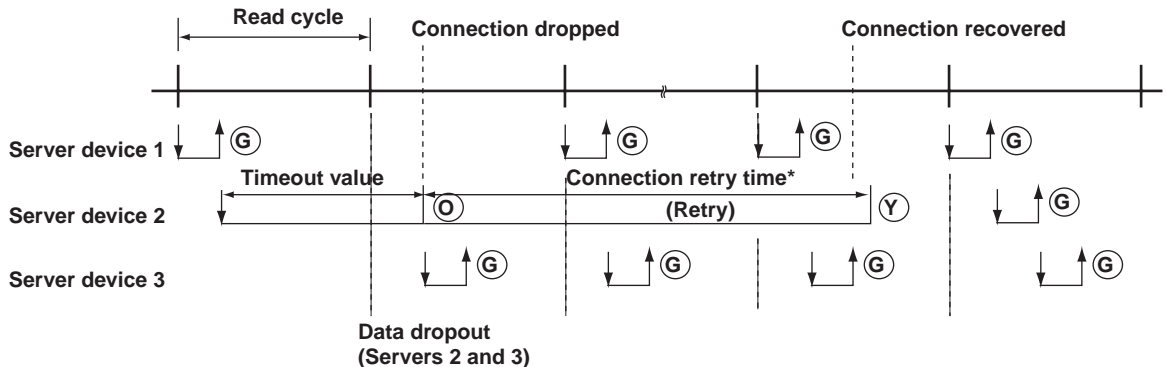
1. When the response from the server device takes a long time



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

↓ : Command from the DX

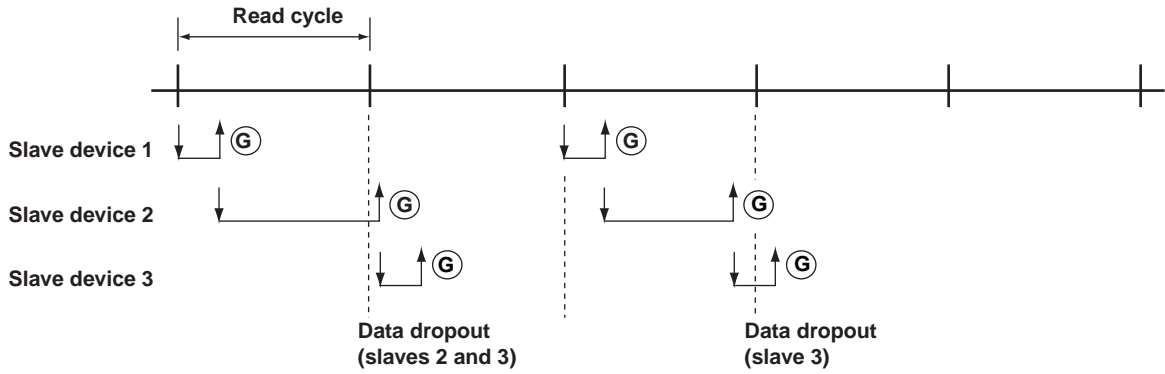
↑ : Response from the server device

* 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.

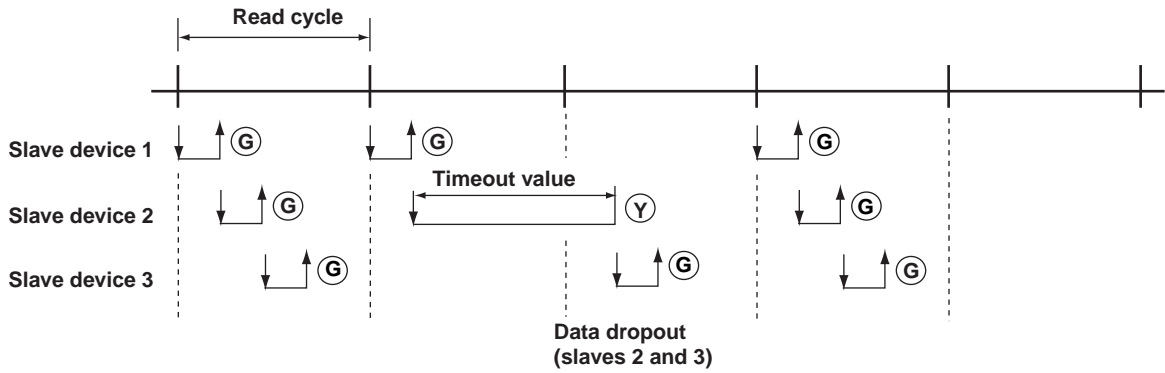
Data Dropout during Modbus Master

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.

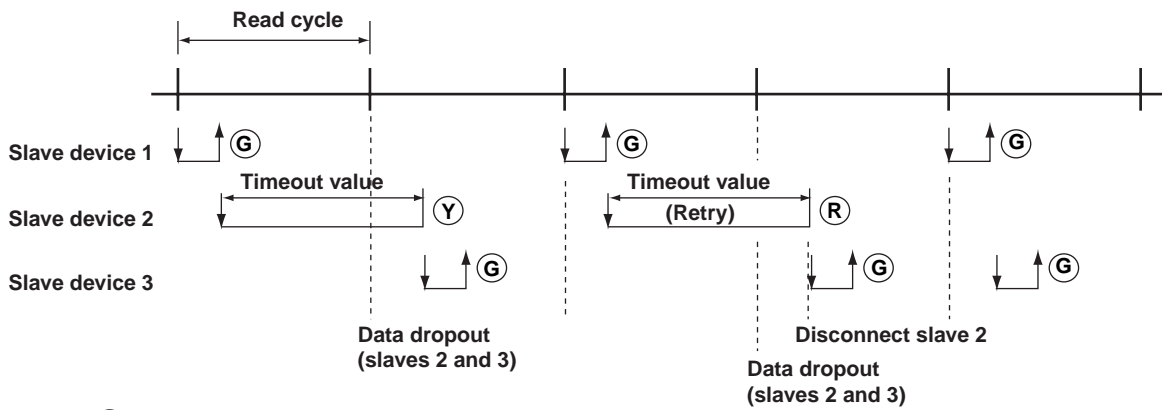
1. When the response from the slave device takes a long time



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)

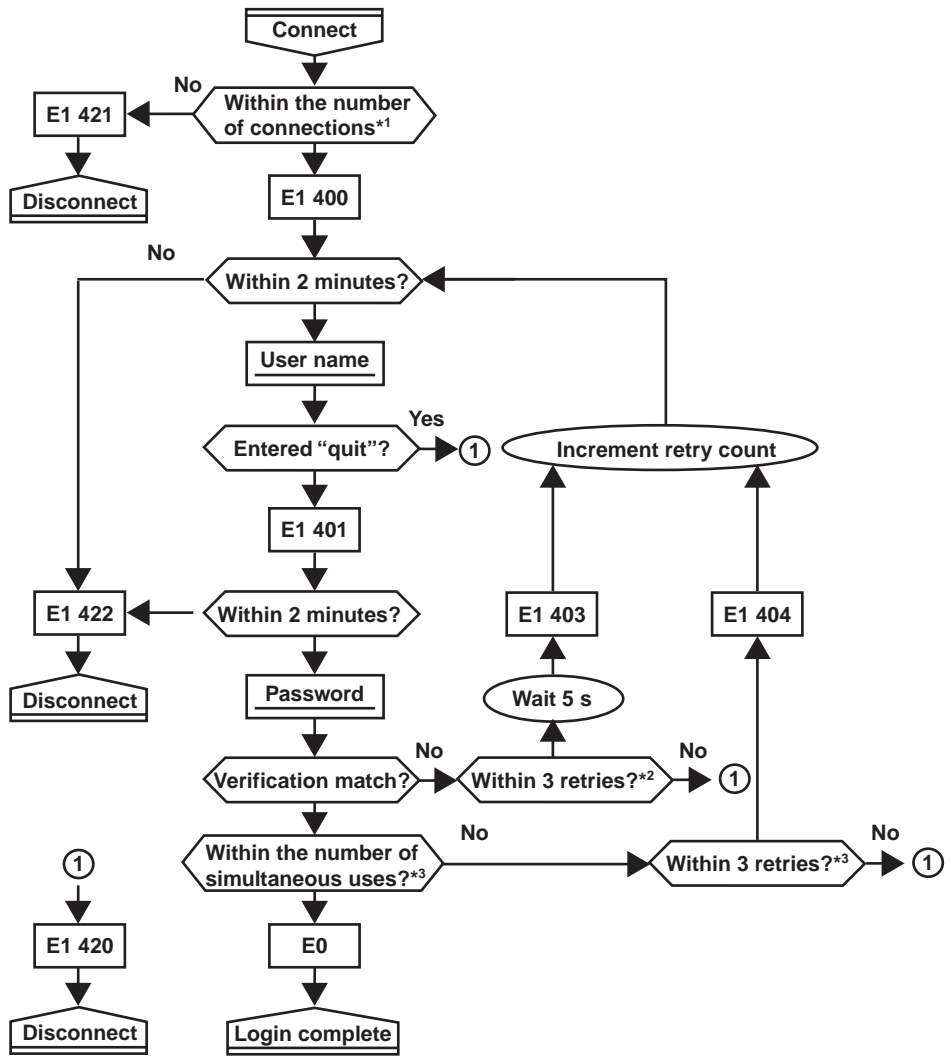


(G) (Y) (R): Status lamp
 ↓ : Command from the DX
 ↑ : Response from the slave device

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 Ethernet Login Function of the DX



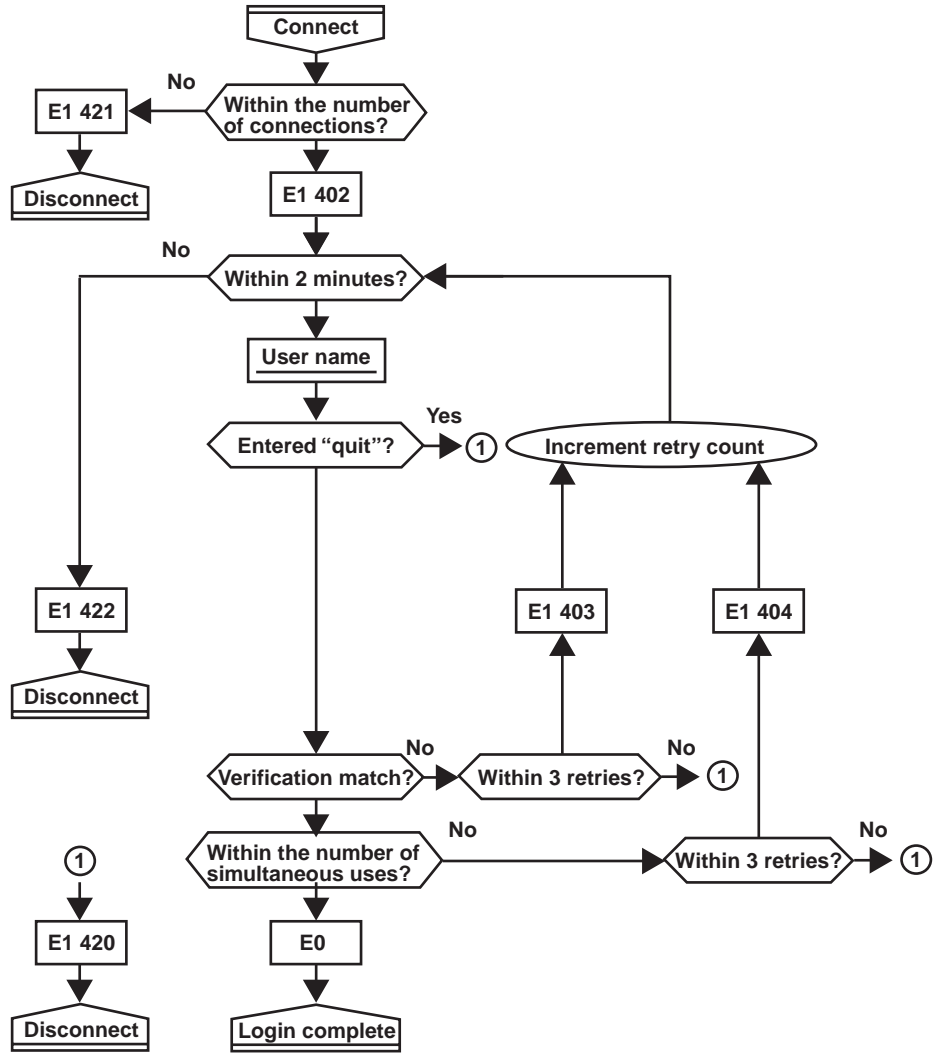
E1 403 Response from the DX (message omitted)
 For a description of the response format, see section 6.1.
 Code (for a description of codes and messages, see page App-17)

- *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.



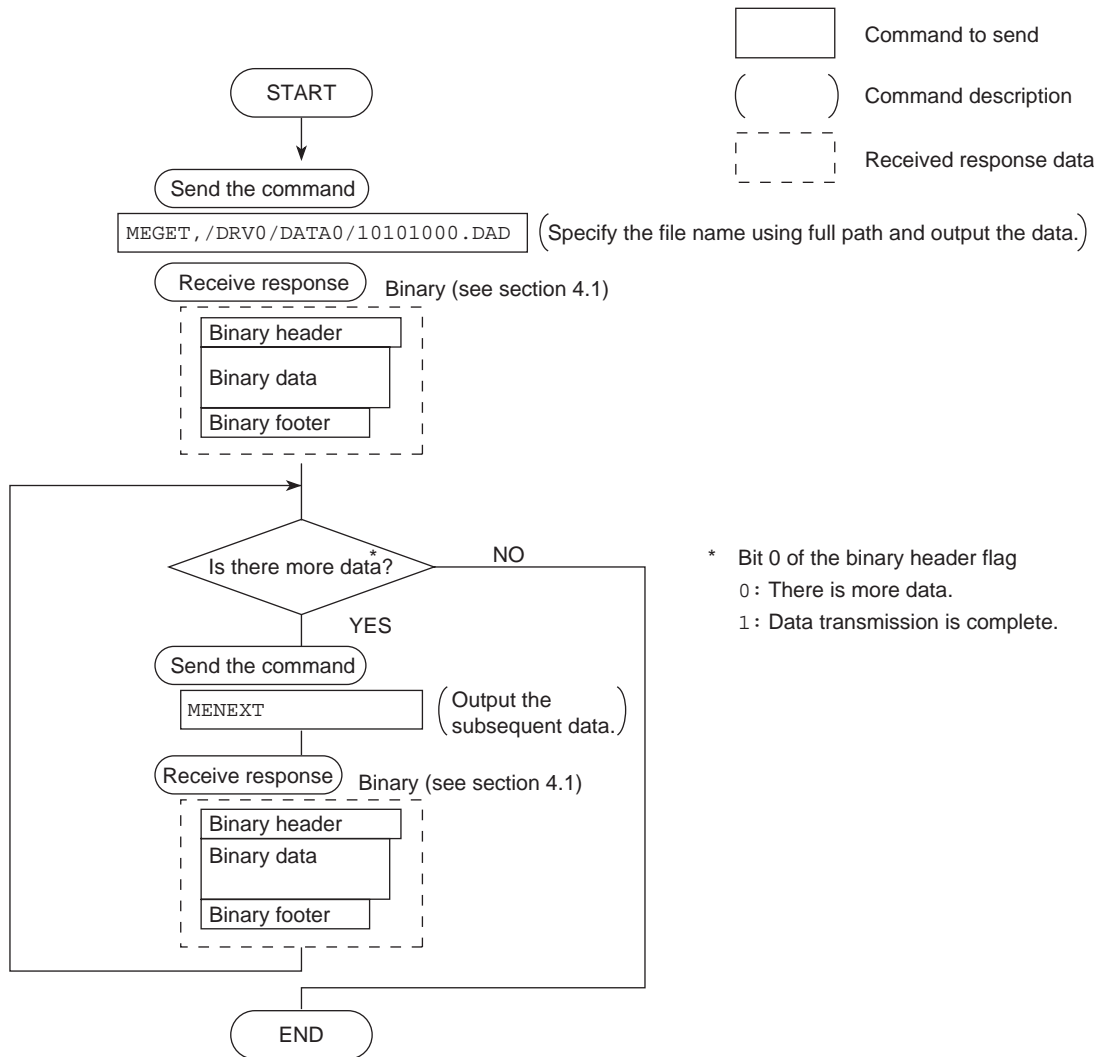
Appendix 3 ASCII Character Codes

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

Appendix 4 Output Flow of the File or the File List on the External Storage Medium and Internal Memory

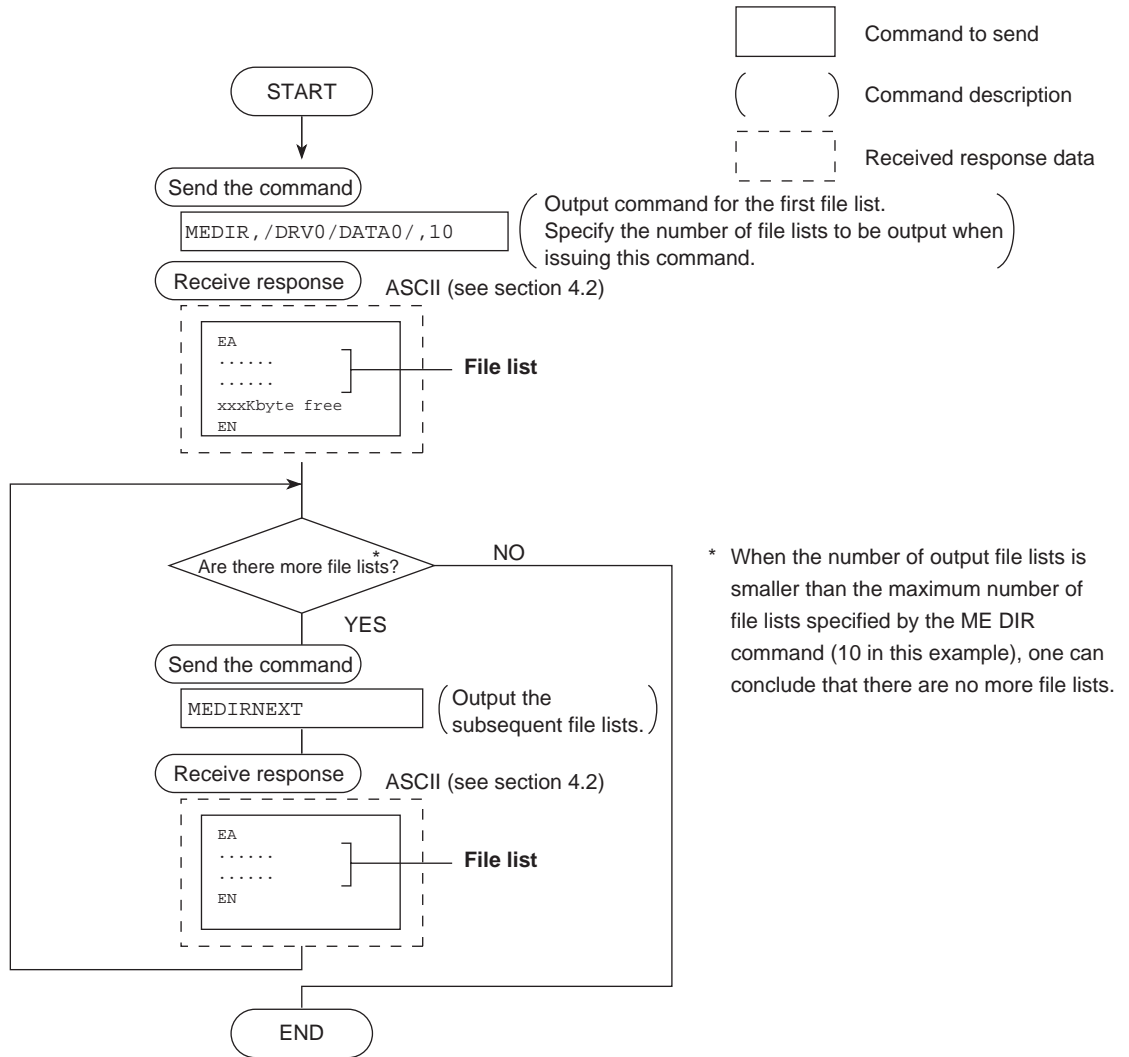
Example in Which the File 10101000.DAD Is Output

The figure below shows the output flow of the file 10101000.DAD in the DATA0 directory of the external storage medium.



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.

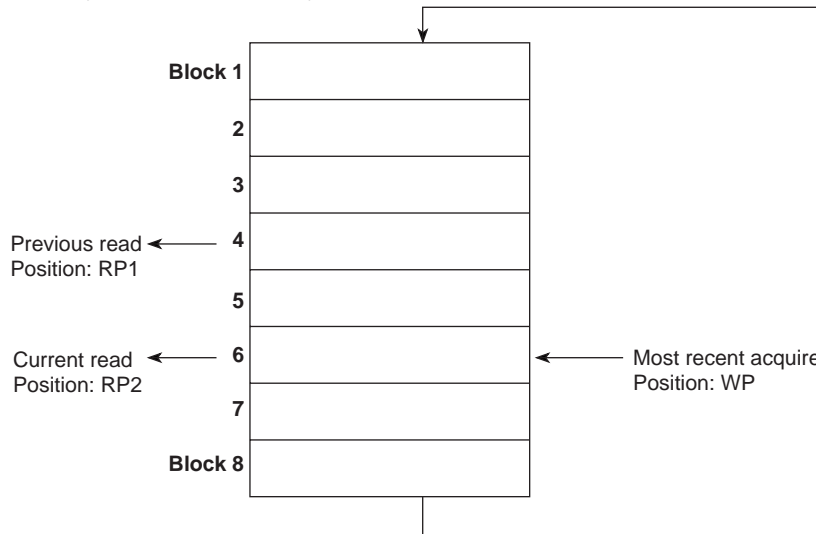


Appendix 5 Flow Chart of the FIFO Data Output

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.

Model	Data size
DX1002, DX1004, DX2004, and DX2008	1200 intervals (30 s at the fastest acquisition interval of 25 ms)
DX1006, DX1012, DX2010, DX2020, DX2030, DX2040, and DX2048	240 intervals (30 s at the fastest acquisition interval of 125 ms)
Models with the external channel input option	60 intervals (60 s at the fastest acquisition interval of 1 s)

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