User's Manual

XL100
Portable Data Station
Communication Function

IM XL100C-E

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM XL100C-E
1st Edition: October 2005 (MC)

Introduction

Thank you for purchasing our XL100 Portable Data Station.
This Communication Function Manual provides information necessary for using communication functions and creating communication programs. To ensure correct use, please read this manual thoroughly before beginning operation.
In addition to this manual, the User's Manual (contained in the CD-ROM as with this manual) and Quick Setup Manual are available separately.
The User's Manual provides detailed information regarding all of the functions and operations of the XL100 excluding the communication functions. The Quick Setup Manual briefly explains the basic operations such as measurement operation and setup. Use them together with this manual.
After reading this manual, keep it in an easily accessible place for later reference. This manual will come in handy when you are unsure of how to operate the product.

Notes

- The contents of this manual are subject to change without prior notice.
- Figures and illustrations representing display views in this manual may differ from actual views.
- Every effort has been made to ensure accuracy in the preparation of this manual. However, should any doubts arise or errors come to your attention, please contact the vendor from whom you purchased the product.
- The contents of this manual may not be transcribed or reproduced, in part or in their entirety, without prior permission.

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Revision Information

First Edition: October, 2005

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Safety Precautions

When operating the instrument, be sure to observe the cautionary notes given below to ensure correct and safe use of the instrument. If you use the instrument in any way other than as instructed in this manual, the instrument's protective measures may be impaired. Yokogawa Meters & Instruments Corporation is by no means liable for any damage resulting from use of the instrument in contradiction to these cautionary notes.
The following safety symbols are used on the instrument and in this manual.

Danger! Handle with Care. This symbol indicates that the operator must refer to an explanation in the User's Manual or this manual in order to avoid risk of injury or death of personnel or damage to the instrument.

This symbol indicates DC voltage/current.

This symbol indicates AC voltage/current.

This symbol indicates ON (power).

This symbol indicates OFF (power).

WARNING

Indicates a hazard that may result in the loss of life or serious injury of the user unless the described instruction is abided by.

CAUTION

Indicates a hazard that may result in an injury to the user and/or physical damage to the product or other equipment unless the described instruction is abided by.

Note

Indicates information that should be noted in order to familiarize yourself with the instrument's operating procedures and/or functions or gives supplementary information.

Description of Displays and Exemption from Responsibility

Description of Displays

- Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.
- Figures and illustrations representing the controller's displays may differ from the actual displays in regard to the positions and/or indicated characters (upper-case or lower-case, for example), to the extent that they do not impair correct understanding of the functions and the proper operation and monitoring of the system.

Exemption from Responsibility

- Yokogawa Meters & Instruments does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
- Yokogawa Meters & Instruments assumes no liability to any party for any loss or damage, direct or indirect, caused by the use of the product, or any unpredictable defect of the product.
- Be sure to use spare parts approved by Yokogawa Meters & Instruments when replacing parts or consumables.
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- Reverse engineering such as the disassembly or decompilation of software is strictly prohibited.
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Contents

1.1 Relationship between the Communication Function and the Ethernet and Serial Interfaces

The XL100 comes standard with an Ethernet interface for connecting a LAN cable and a serial interface (RS-232/RS-485 and USB). To use the communication function of the XL100, the Ethernet or serial communication settings must be configured in advance. The following figure shows the relationship between the communication function of the XL100 and the Ethernet and serial interfaces.

<table>
<tr><td></td><td colspan="9">XL100 communication function</td></tr>
<tr><td rowspan="2">Application</td><td rowspan="2">MODBUS slave</td><td rowspan="2">MODBUS master</td><td rowspan="2">Setting/Measurement server</td><td>Maintenance/ Test server</td><td>Web server</td><td>FTP server</td><td rowspan="2">FTP client</td><td rowspan="2">E-mail client</td></tr>
<tr><td colspan="3">Login
(User authentication/
access privileges granting)</td></tr>
<tr><td>Upper layer protocol</td><td colspan="2" rowspan="2">MODBUS protocol</td><td colspan="3">Dedicated protocol</td><td>HTTP</td><td colspan="2">FTP</td><td>SMTP</td></tr>
<tr><td>Lower layer protocol</td><td colspan="2">Serial communication control</td><td colspan="6">TCP</td></tr>
<tr><td>Upper interface</td><td colspan="3" rowspan="2">Serial
(RS-232/RS-485)</td><td rowspan="2">USB</td><td colspan="5">IP</td></tr>
<tr><td>Lower interface</td><td colspan="5">Ethernet</td></tr>
<tr><td></td><td colspan="5">10BASE-T/100BASE-TX</td></tr>
</table>

To use the communication function of the XL100 via the Ethernet or serial interface, communications must be performed according to the following protocols* that lie in between two.

- FTP (File Transfer Protocol)
- TCP (Transmission Control Protocol)
- IP (Internet Protocol)
- HTTP (Hyper Text Transfer Protocol)
- SMTP (Simple Mail Transfer Protocol)

To use the serial communication function, select one of the following protocols.

- XL100 standard protocol (dedicated protocol)
- Modbus protocol (slave)
- Modbus protocol (master)

1.2 Explanation of Functions

This section gives an overview of the communication function that can be used to control the XL100.

Modbus Communication

Modbus Slave

- The Modbus protocol can be used to read the measured/calculated data written to the input register of the XL100 from a PC or write/read communication input data from the hold register of the XL100.
- For details on the Modbus function codes that the XL100 supports, see section 4.1.
- This function can be used only when communicating via the serial interface.
- For a description on the settings required to use this function, see sections 4.2 and 4.3.

Modbus Master

- Loads the measured data and other types of data of other instruments using the Modbus protocol as communication channel input. The loaded data can be scaled and displayed with a unit that you assign. The data can also be used as a calculation channel.
- Function for writing data to other instruments is not supported.
- For details on the Modbus function codes that the XL100 supports, see section 4.1.
- This function can be used only when communicating via the serial interface.
- For a description on the settings required in using this function, see section 4.4.

Setting/Measurement Server

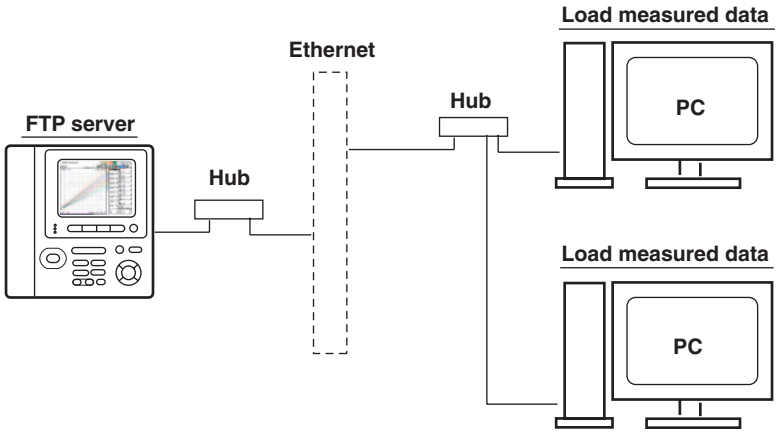
- This function can be used to set almost all of the settings that can be configured using the front panel keys. This function cannot be used to (1) turn the power switch ON/OFF, (2) set the user name/password for communications, (3) set the user name/password for key login, and (4) set the destination of the FTP client function.
- The following types of data can be output.
  - Measured/calculated data.
  - Data in the internal memory or files in the external storage medium.
  - Setup data.
  - Log data of operation errors and communications.
- The commands that can be used through this function are setting commands and output commands.
- This function can be used when communicating via the Ethernet or the serial interface.

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 through this function are maintenance/test commands.
- This function can be used only when communicating via the Ethernet interface.

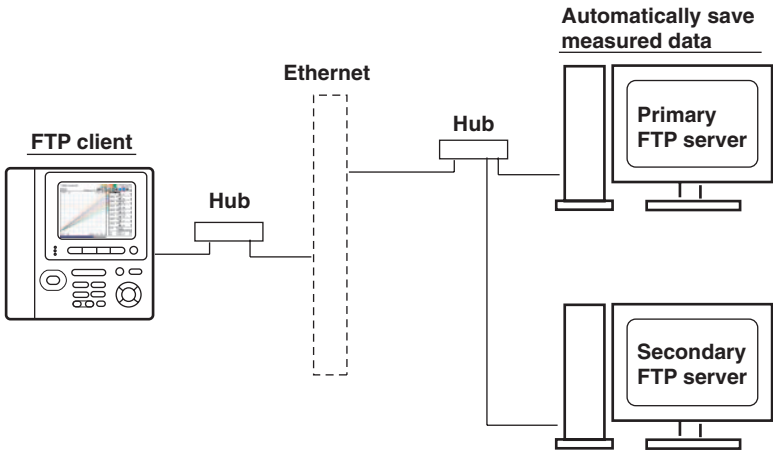
FTP Server

- You can use a PC to access the XL100 via FTP. You can perform operations such as retrieving directory and file lists from the internal memory or the external storage medium of the XL100 and transferring and deleting files.
- This function can be used only when communicating via the Ethernet interface.



FTP Client

- **Automatic File Transfer**
  - The display data file and log data file that are created in the internal memory of the XL100 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 XL100's display 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.
  - This function can be used only when communicating via the Ethernet interface.

- **FTP Test**
  - The file transfer can be checked by transferring a test file from the XL100 to a remote FTP server.
  - The result of the FTP test can be confirmed on the FTP log display.
  - This function can be used only when communicating via the Ethernet interface.

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.

- **User Authentication**
  This function allows only registered users to access the XL100 in order to prevent invalid access from the network.
  - Up to seven names can be registered. One of the names is fixed to administrator privilege. For the other six names, you specify the access privilege when you register the name.
  - There are limitations on the number of simultaneous connections and the number of simultaneous users accessing the XL100 from PCs (see section 2.1).

- **Granting Access Privileges**
  This function grants access privilege (user level) to operate the XL100 for the registered users. For example, this prevents user B (user level) from changing the measurement conditions that were set by user A (administrator level).
  - There are two user levels on the XL100, user and administrator.
    - Administrator
      An administrator has privileges to use all setting/measurement server functions, maintenance/test server functions, and FTP server functions.
    - User
      A user has limited privileges to use the setting/measurement server functions, maintenance/test server functions, and FTP server functions.
      - Limitations on the use of the setting/measurement server
        A user cannot change settings that would change the XL100 operation. A user can output measured data and setting data.
      - Limitations on the use of the maintenance/test server
        A user cannot disconnect a connection between another PC and the XL100. A user can disconnect the connection between the PC that the user is using and the XL100.
      - Limitations on the use of the FTP server
        You cannot save files to the external storage medium of the XL100 or delete files on it. You can load files.

- **Communication Timeout**
  This function drops the connection with the PC if there is no data transfer for a given time at the application level. For example, this function prevents a PC from being connected to the XL100 indefinitely which would prohibit other users from making new connections for data transfer.

Web Server

- This function can be used only when communicating via the Ethernet interface.
- The XL100 display can be shown on a Web browser (for Web browsers that have been tested for compatibility, see section 2.10).
  - The following two pages are available.
    - Monitor page: Monitoring screen (switching is possible among measurement data displays, alarm summary display, and log displays)
    - Operator page: This page allows you to switch the XL100 display. You can also switch to Setting mode or File Operation mode to control the XL100 in the respective mode.

    You can use access control (user name and password) to limit the access to each page.

- The display section of the XL100 can be updated periodically (select from 2, 5, 10, or 30 s).
- The following information can be displayed.
  - Measured data
  - Alarm summary
  - Logs (error log, communication command log, key login/logout log, FTP client log, e-mail log, and Web operation log)

E-mail Transmission

This function can be used only when communicating via the Ethernet interface.

- **Transmitting E-mail Messages**
  - E-mail can be automatically transmitted at the times indicated below. 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.
    - When an alarm is activated/released
      Notifies alarm information.
    - When the XL100 recovers from a power failure
      Notifies the time of the power failure and the time of recovery.
    - When an error related to the external storage medium and FTP client occurs
      Notifies the error code and message when an error is detected on the external storage medium or when the data cannot be stored due to insufficient free space on the external storage medium. In addition, notifies the error code and message when data transfer fails using the FTP client function.
  - At the specified time
    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.

- **E-mail Transmission Test**
  - You can send a test message from the XL100 to the destination to check e-mail transmissions.
  - You can confirm the result of the e-mail transmission test on the e-mail log screen.

Other Functions

- **SNTP (Simple Network Time Protocol) Connection**
  You can synchronize the standard clock by connecting to an SNTP server when using the Ethernet interface.

- **Checking the Connection Status of the Ethernet Interface**
  You can check the connection status of the Ethernet interface with the LAN port LED on the side panel of the XL100 and on the display of the XL100.

- **Keepalive (Extension Function of TCP)**
  This function drops the connection if there is no response to the test packet that is sent periodically at the TCP level.

- **Displaying the Error, Communication, FTP, Web Operation, and E-mail Logs**
  You can display the following operation logs on the log display.
  - Error log display: Log of operation errors.
  - Communication command display: Log of communication input/output.
  - FTP client log display: Log of file transfers carried out using the FTP client function.
  - Web operation log display: Log of operations using the Web server function.
  - E-mail log display: Log of e-mail transmissions.

2.1 Ethernet Interface Specifications

Basic Specifications

Item	Specifications
Number of ports	1
Electrical and mechanical specifications	Conforms to IEEE 802.3.
Transmission medium type	Ethernet (100BASE-TX/10BASE-T)
Data rate	100 Mbps maximum
Protocol	TCP/IP
Supported services	FTP server, FTP client, SMTP client (mail transmission), Web server, DHCP, DNS, and SNTP
Connector type	RJ-45

Maximum Number of Simultaneous Connections/Number of Simultaneous Users

The following table shows the maximum number of simultaneous connections, the number of simultaneous users, and the port number for each function.

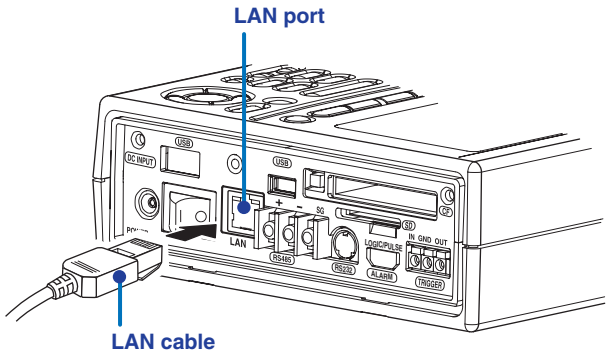
Function	Maximum Number of Connections	Number of Simultaneous Users		Port Number*1
		Administrator	User	
Setting/Measurement server	3	1	2*2	34339
Maintenance/Test server	1	1	1*2	34340
FTP server	2	2	2*2	21

*1 The port numbers are fixed.
*2 There are user limitations. For details, see “Granting Access Privileges” under “Login” in section 1.2.

2.2 Connecting of the Ethernet Interface

When Connecting Only the XL100 and the PC

Connect the LAN ports of the XL100 and the PC using a 10BASE-T or 100BASE-TX LAN cable.



If you are connecting the XL100 and the PC directly in a one-to-one configuration without using a hub, use a cross LAN cable.

When Connecting to an Existing Network

When connecting the XL100 or the PC to an existing network, communication parameters such as the data rate and connector type must be matched. For details, consult your system or network administrator.

Note

- **Depending on the reliability of the network or the volume of network traffic, all the transferred data may not be retrieved by the PC.**
- **Communication performance deteriorates if multiple PCs access a XL100 simultaneously.**
- **If the interface is not set to LAN, do not connect the LAN cable.**

2.3 Configuring of the Ethernet Interface

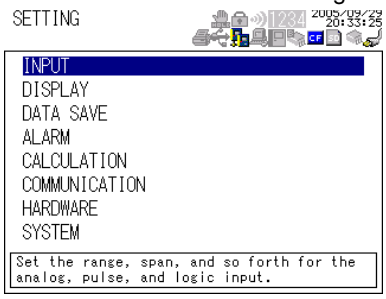
The following configurations must be made to use the Ethernet communication functions of the XL100.

Selecting the Communication Interface

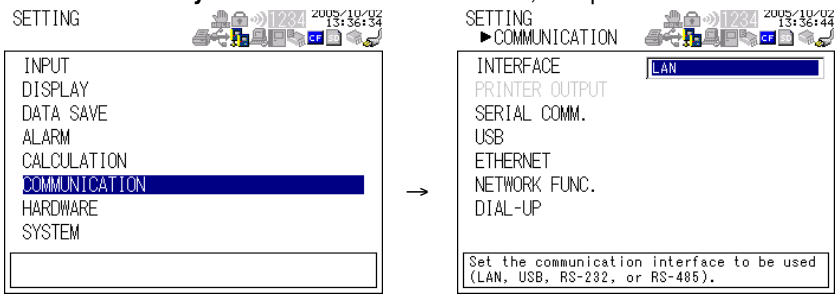
Communication can only be performed on a single interface at any given time. You must select the communication interface by carrying out the steps below. The default setting is LAN (Ethernet).

Procedure

1. Press **SETTING** to enter Setting Mode.



2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



3. With INTERFACE selected, press **SELECT**.
   An interface selection list is displayed.
4. Use the **arrow keys** to select a communication interface, and press **SELECT**.
5. Press **SET**.

Setting the Ethernet Parameters

- **Setting the Time Zone**
  Set the time difference from Greenwich Mean Time.
- **Setting the DHCP, IP Address, Subnet Mask, Default Gateway, and DNS**
  Consult your system or network administrator when setting parameters such as the IP address, subnet mask, default gateway, and DNS (domain name system).
  - **DHCP (Dynamic Host Configuration Protocol)**
    - The IP address, subnet mask, default gateway, and DNS can be automatically set by using DHCP.
    - To use DHCP, the network must have a DHCP server.
    - Consult your network administrator to see if DHCP can be used.
    - If you use DHCP, a different IP address may be assigned each time the XL100 is powered up. You must pay attention when using the FTP server function of the XL100.

- **IP Address**
  - Set the IP address to assign to the XL100. The default setting is 0.0.0.0.
  - The IP address is used to distinguish between the various devices connected to the Internet when communicating using the TCP/IP protocol. The address is a 32-bit value expressed using four octets (each 0 to 255), each separated by a period as in [192.168.111.24].
- **Subnet Mask**
  - Specify the mask that is used to determine the network address from the IP address. The default setting is 0.0.0.0.
  - Set the value according to the system or network to which the XL100 belongs. In some cases, this setting may not be necessary.
- **Default Gateway**
  - Set the IP address of the gateway (router, etc.) used to communicate with other networks. The default setting is 0.0.0.0.
  - Set the value according to the system or network to which the XL100 belongs. In some cases, this setting may not be necessary.
- **DNS (Domain Name System)**

  You must set the DNS if you are using a host name to specify the destination server of the file transfer on an FTP client or the server of the e-mail recipient.

  * DNS is a system used to associate names used on the Internet called host names and domain names to IP addresses. The host name/domain name can be used instead of the IP address when accessing the network. The DNS server manages the database that contains the host name/domain name and IP address correlation.

  - **DNS Server**
    - Set the IP address of the DNS server. The default setting is 0.0.0.0.
    - You can specify up to two DNS server IP addresses, primary and secondary. If the primary DNS server is down, the secondary DNS server is automatically looked up for the mapping of the host name/domain name and IP address.
  - **Host Name**

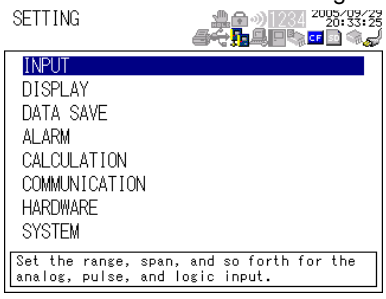
    Set the XL100's host name using up to 64 characters.
  - **Domain Name**
    - Set the network domain name that the XL100 belongs to using up to 64 characters.
    - When the destination server of the file transfer or the server of the e-mail recipient is looked up using the DNS server, this domain name is appended to the host name as a possible domain name if it is omitted. The recipient name (server name) is set to the name specified by FTP Server Name or SMTP Server Name.
  - **Domain Suffix**

    When the IP address corresponding to the server name with the domain name of the previous section is not found, the system may be set up to search using a different domain name. In such cases, set the domain name to be searched following the "domain name" of the previous section as a domain suffix.
    - Set the domain suffix using up to 64 characters.
    - You can specify up to two domain suffixes, primary and secondary.

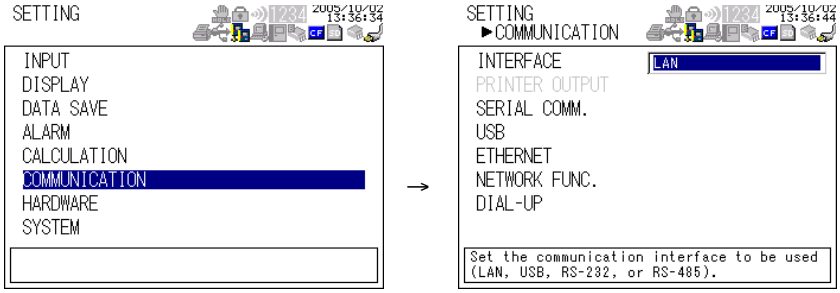
- **Setting the SNTP (Time Synchronization Function)**
  You can synchronize the standard clock by connecting to an SNTP server when using the Ethernet interface. The following items are set in addition to the Ethernet interface to use this function.
  - **SNTP ON/OFF**
    Select whether to enable (ON) or disable (OFF) SNTP.
  - **Server Name**
    Set the host name or IP address using up to 64 alphanumeric characters.
  - **Confirmation Time**
    Set the cycle for synchronizing the clock in the range of 1 to 24 hours.
- **Enabling/Disabling the Login Function of the XL100**
  If you enable the login function, only registered users can log in to the XL100.
- **Communication Timeout**
  - **Selecting ON or OFF**
    - ON
      If there is no data transmission for a specified time at the application level (see section 1.1), the connection is forcibly disconnected.
    - OFF
      Communication timeout is disabled.
  - **Setting the Timeout Value**
    If communication timeout is enabled, the connection is dropped if no data transfer is detected over a time period specified here.
    Selectable range: 1 to 120 minutes
- **Enabling/Disabling (On/Off) Keepalive**
  - ON
    If there is no response to the inspection packet that is periodically transmitted (every 30 s) at the TCP level, the connection is forcibly disconnected.
  - OFF
    Keepalive is disabled.
- **Saving the Settings**
  To activate the settings that have been changed in the basic setting mode, the settings must be saved. Otherwise, the settings that existed before the change are activated.

Procedure

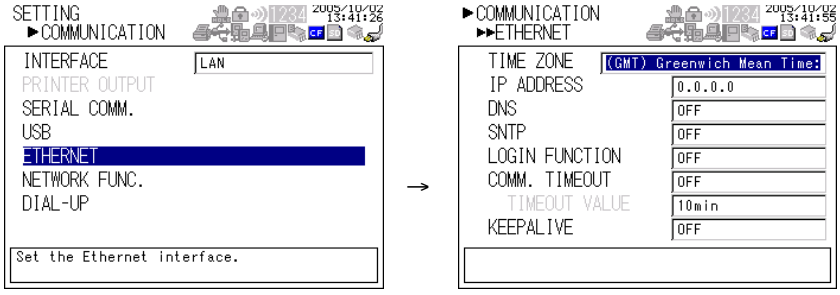
1. Press **SETTING** to enter Setting Mode.



2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.

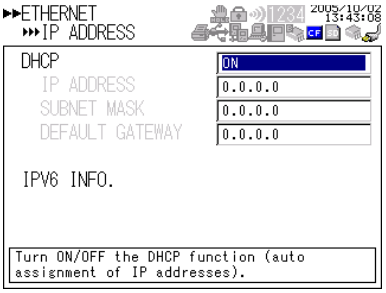


3. Use the **arrow keys** to select ETHERNET, and press **SELECT**.

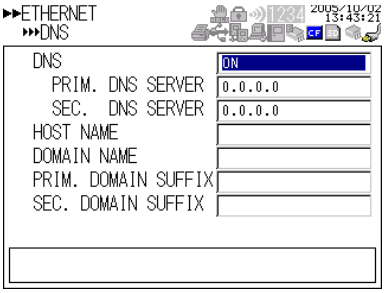


4. Use the **arrow keys** to select the desired item, and press **SELECT**.
   Press **SELECT** to show a selection list or display for setting the item.

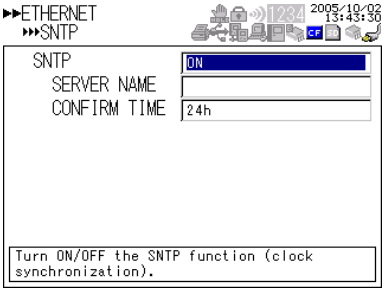
   - IP Address Setting display



   - DNS Setting display



   - SNTP Setting display



5. Select or enter the item on the displayed selection list or window.

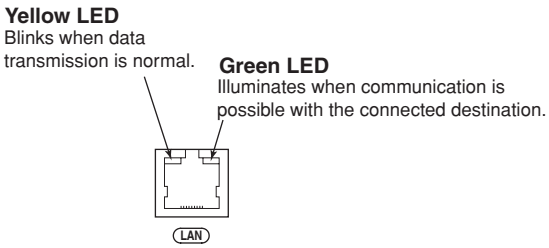
6. Press **SET**.

2.4 Checking the Connection Status of the Ethernet Interface

Checking the Connection Status on the XL100

You can check the connection status of the Ethernet interface with the LAN port LED of the XL100.

LED Status	Connection Status of the Ethernet Interface
Green LED illuminated	The Ethernet interface is electrically connected.
Yellow LED blinking	Transmitting data.
Off	The Ethernet interface is not electrically connected.



Checking the Connection Status on the XL100 Display

You can check the connection status with the icon that is shown in the status display section of the XL100 display. The  icon appears when the interface is set to LAN, the Ethernet parameters (IP address other than 0.0.0.0) are configured, and the cable is connected. For other cases, the icon is gray.

2.5 Setting the FTP Client (Setting the Auto Transfer of Measurement and Alarm Data Files)

By setting this function, the measurement and alarm data files created in the internal memory of the XL100 or an external storage medium can be automatically transferred using FTP at the time the files are created. To use this function, however, the Ethernet interface must be configured as described in section 2.3.

- **Selecting the Transferred Files**
  - You can select whether to automatically transfer the measurement and alarm data files. The default setting is OFF.
  - The data files are automatically transferred to the FTP destination explained in the next section at the end of the logging operation.

Note

If a file with the same name is detected at the destination, the file is transferred with the last character of the file name changed.

Example: If the file to be transferred named "050714130440.DLO" exists at the destination, the file name is changed to "050714130441.DLO" before it is transferred.

- **Setting the FTP Destination**
  Consult your system or network administrator when setting parameters such as the primary/secondary FTP servers, port number, login name, password, account, and availability of the PASV mode.
  - **Specifying Primary and Secondary**
    You can specify two destination FTP servers, primary and secondary. If the primary server is down, the file is transferred to the secondary 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 2.3, "Setting the Ethernet Interface."
    - 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 initial 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**
    Turn PASV mode ON when using the XL100 behind a firewall that requires the passive mode. The default setting is OFF. A firewall is furnished on a router (or a similar device) that has security features. It prevents intrusion from the outside into the network system.

- **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.

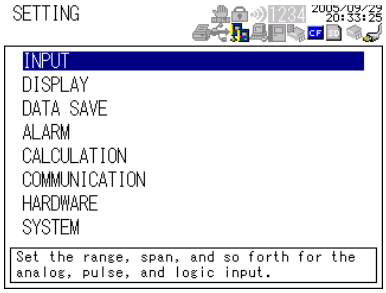
  Example When transferring files to the “data” directory in the “home” directory of an FTP server on a UNIX file system.
  /home/data

Note

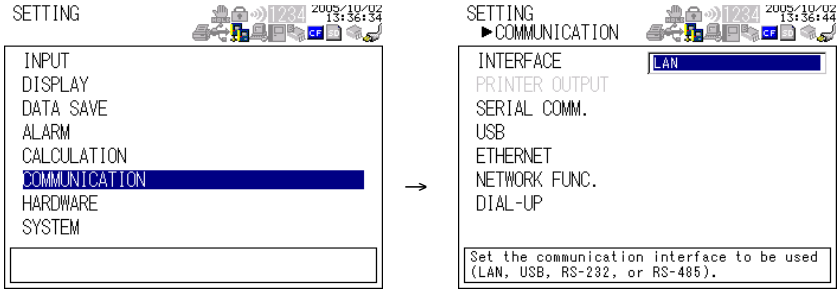
If the file transfer to both primary and secondary servers fails, the XL100 aborts the file transfer. When the connection to the destination recovers, the XL100 transfers the data files that failed to be transmitted in addition to the new data file.

Procedure

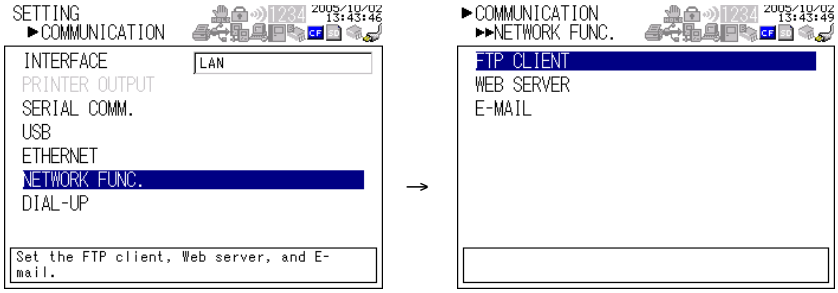
1. Press **SETTING** to enter Setting Mode.



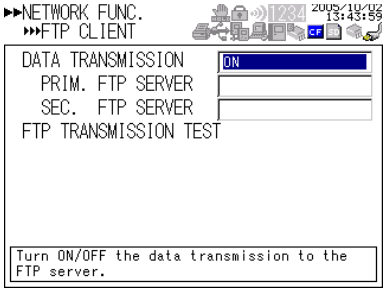
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



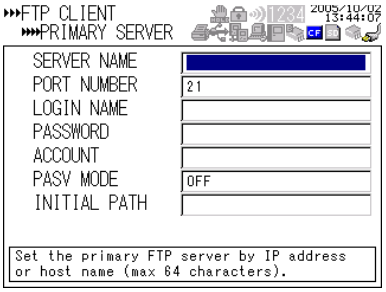
3. Use the **arrow keys** to select NETWORK FUNC., and press **SELECT**.



4. With FTP CLIENT selected, press **SELECT**.



5. Use the **arrow keys** to select the desired item, and press **SELECT**.
   Press **SELECT** to show a selection list or window for setting the item.
   - Primary server setting display



6. Select or enter the item on the displayed selection list or window.

7. Press **SET**.

2.6 FTP Test

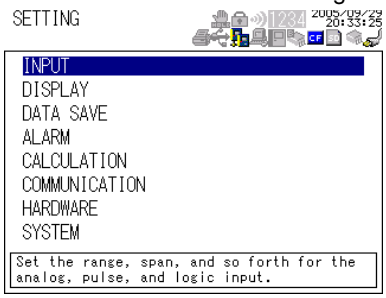
You can test whether files can be transferred via the Ethernet interface by transferring a test file from the XL100 to the FTP server specified in section 2.5.

- **Items to Check before Performing This Test**
  - Connect the Ethernet cable correctly. For the connection procedure, see section 2.2.
  - Check that the Ethernet interface settings are correct. For the procedure, see section 2.3 or 2.5.

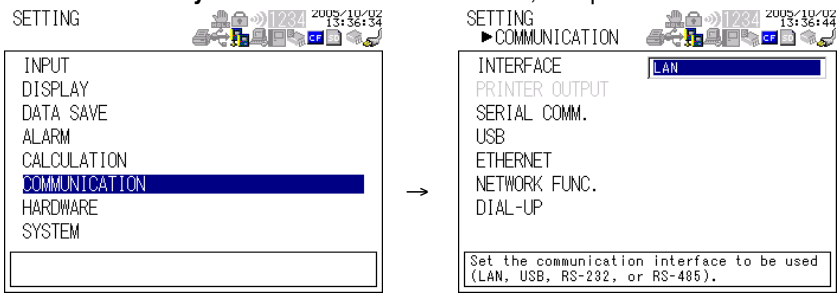
  When setting the Ethernet interface, check the settings with your system or network administrator.
- **Checking the Results of the FTP Test**
  - When an FTP test is executed, a test file named XL_FTPC.TXT is transferred to the directory indicated by the initial path at the FTP destination specified in section 2.5.
  - The result of the FTP test can be confirmed by displaying the FTP log (displayed on the XL100 (see section 2.8)) or Web screen (see section 2.10) or by outputting the result using the FL command (see section 4.8).

Procedure

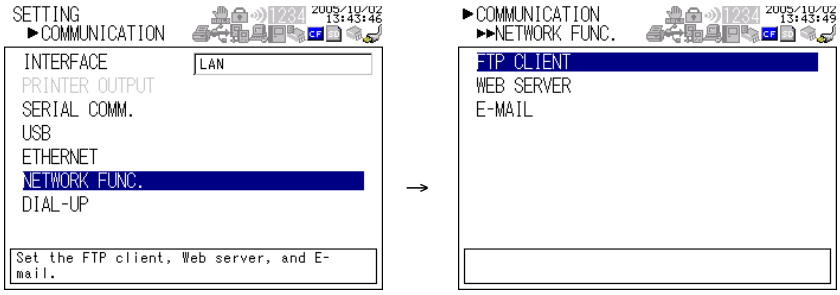
1. Press **SETTING** to enter Setting Mode.



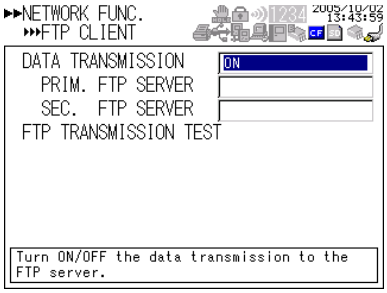
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



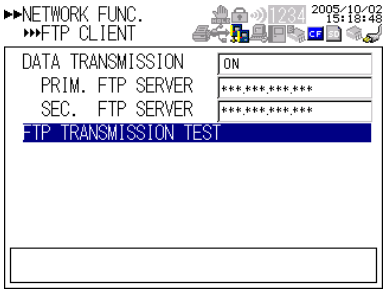
3. Use the **arrow keys** to select NETWORK FUNCTION SETTINGS, and press **SELECT**.



4. With FTP CLIENT SETTINGS selected, press **SELECT**.



5. Use the **arrow keys** to select FTP TRANSMISSION TEST, and press **SELECT**. Press **SELECT** to transfer the file.



2.7 Setting the Login and Timeout Functions of Ethernet Communications

By setting these functions, you can prohibit invalid access from the network to the XL100, authorize setup operations of the XL100 via the Ethernet network, and disconnect connections if there is no data transmission for a certain time. To use this function, however, the Ethernet interface must be configured as described in section 2.3.

Registering Users

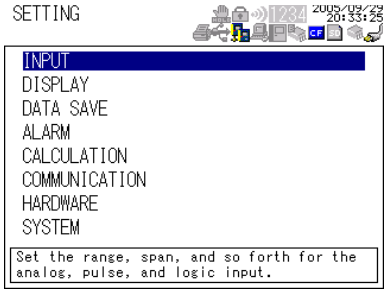
- **Selecting the User Level**
  Select either user level, administrator or user.
  - Administrator
    One administrator can be registered. The administrator has the privileges to use all the functions of the setting/measurement server, maintenance/test server, and FTP server.
  - User
    Certain limitations exist in using the setting/measurement server, maintenance/test server, and FTP server.
    - Limitations on the use of the setting/measurement server
      Users are not authorized to change the settings that would change the operation of the XL100. Users 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 XL100. A user can disconnect the connection between the PC that the user is using and the XL100.
    - Limitations on the use of the FTP server
      A user cannot save files to the external storage medium of the XL100 or delete files on it. A user can load files.
- **Selecting Whether to Register (ON/OFF) Users**
  - ON
    Registers users. You can set the user name and password for logging in.
  - OFF
    Not register users.
- **Setting the User Name**
  - Enter the user name using up to 16 alphanumeric characters.
  - You cannot register the same user names.
  - Since the word “quit” is reserved as a command on the XL100, the user name “quit” is not allowed.
- **Setting the Password**
  Set the password using up to six alphanumeric characters.

Note

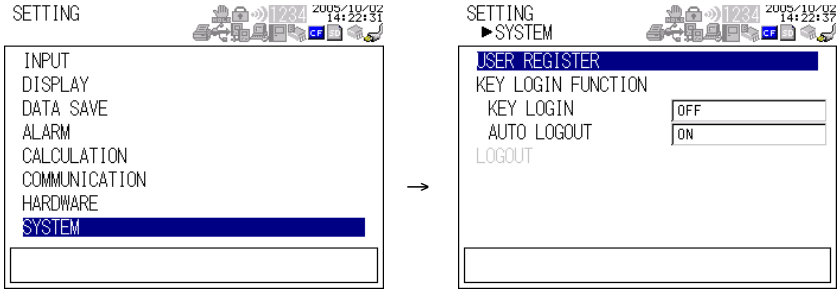
- **The relationship between the login function and the user name for accessing the XL100 is as follows:**
  - **When the login function is set to ON**
    - **You can log in to the XL100 using the registered user name and password.**
    - **The user level is the user level specified when the user name was registered.**
  - **When the login function is set to OFF**
    - **You can log in to the XL100 as an administrator by accessing the XL100 using the user name "admin." No password is necessary.**
    - **You can log in to the XL100 as a user by accessing the XL100 using the user name "user." No password is necessary.**
- **The user name "anonymous" has a special meaning only when the FTP server function of the XL100 is used.**
  - **When the login function is set to ON**
    - **If a user name "anonymous" is registered to the XL100, you can log in to the XL100 using the user name "anonymous".**
    - **No password is necessary (you can log in regardless of whether a password is entered).**
    - **The user level is set to the level of the user that registers "anonymous."**
  - **When the login function is set to OFF**
    - **You can login using the user name "anonymous".**
    - **No password is necessary (you can log in regardless of whether a password is entered).**
    - **The user level is set to user.**
- **There is a limitation on the number of simultaneous connections and the number of simultaneous users accessing the XL100 (see section 2.1).**
- **For a description of the login process of the Setting/Measurement server and Maintenance/Test server, see appendix 2, "Login Process."**

Procedure

1. Press **SETTING** to enter Setting Mode.



2. Use the **arrow keys** to select SYSTEM, and press **SELECT**.

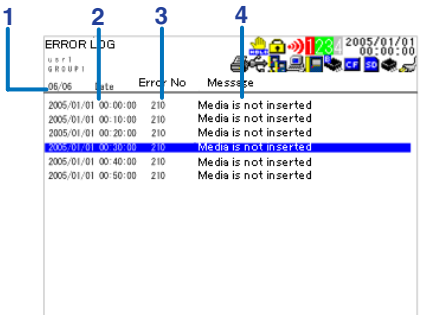


3. With USER REGISTER selected, press **SELECT**.
4. Use the **arrow keys** to select the desired user, and press **SELECT**.
5. In the window shown, set the items, and press **SELECT**.
6. Press **SET**.

2.8 Showing the Error, Communication, and FTP Log Displays

- **Showing the Error Log Display**

  The error log display shows a log of operation errors. Up to 50 operation error logs are retained. Logs that exceed 50 are cleared from the oldest data.



1. **Last line log No./total number of logs**

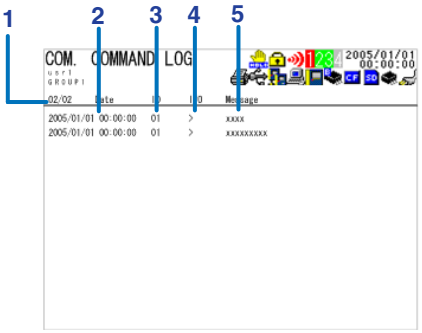
   Displays the log No. shown at the last line of the display and the total number of logs (up to 50*).

   * If the total number of logs exceeds 50, the log is deleted from the oldest one.
2. **Date/Time of error occurrence**

   Displays the date/time when the error occurred.
3. **Error code**
4. **Error Message**

- **Showing the Communication Log Display**

  The communication log display shows a log of communication interface I/O operations. Up to a total of 50 logs is retained. Logs that exceed 50 are cleared from the oldest data.



1. **Last line log No./total number of logs**

   Displays the log No. shown at the last line of the display and the total number of logs (up to 50*).

   * If the total number of logs exceeds 50, the log is deleted from the oldest one.
2. **Date/Time of access**

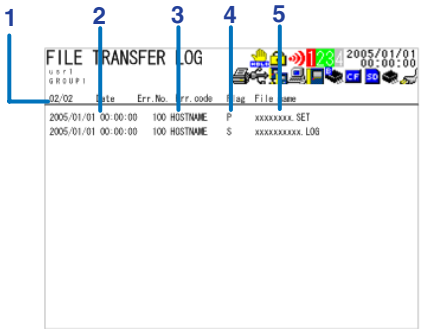
   Displays the date/time when the user connected and accessed the XL100.
3. **Connection user ID number**

   Displays the ID number (1 to 7) of the user connected to the XL100.
4. **Input or output**

   >: Input. <: Output.
5. **Message**

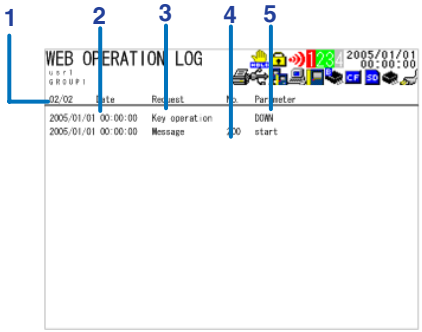
   Displays the message (up to 20 characters).

- **Showing the FTP Log Display**
  The FTP log display shows a log of file transfers. Up to 50 file transfer operation logs are retained. Logs that exceed 50 are cleared from the oldest data.



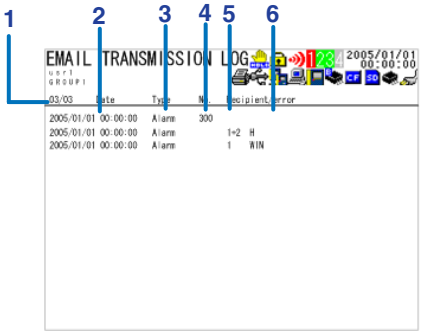
1. **Last line log No./total number of logs**
   Displays the log No. shown at the last line of the display and the total number of logs (up to 50*).
   * If the total number of logs exceeds 50, the log is deleted from the oldest one.
2. **Date/Time of the file transfer**
   Displays the date/time when the file was transferred to the FTP server.
3. **Error code**
   For a description of errors, see chapter 8, “Error Messages.”
4. **Destination FTP server**
   P: Primary. S: Secondary.
5. **File name**
   Displays the name of the transferred file (12 characters).

- **Showing the Web Browser Operation Log Display**
  You can display a log (record) of the operations carried out using the Web screen on the Web operation log display. Up to 50 previous operations are logged. Logs that exceed 50 are cleared from the oldest data.



1. **Last line log No./total number of logs**
   Displays the log No. shown at the last line of the display and the total number of logs (up to 50*).
   * If the total number of logs exceeds 50, the log is deleted from the oldest one.
2. **Date/Time of Web screen operation**
   Displays the date/time when a operation was carried out on the Web screen.
3. **Operation**
4. **Error code**
   For a description of errors, see chapter 8, “Error Messages.”
5. **Operation type**

- **Showing the E-mail Log Display**
  You can show a log (record) of e-mail transmissions on the e-mail log display. Up to 50 previous e-mail transmissions are logged. Logs that exceed 50 are cleared from the oldest data.



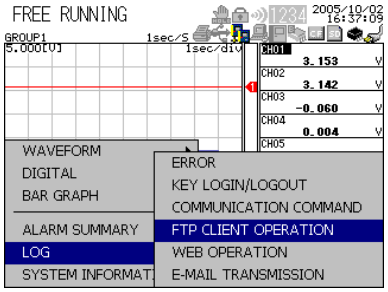
1. **Last line log No./total number of logs**
   Displays the log No. shown at the last line of the display and the total number of logs (up to 50*).
   * If the total number of logs exceeds 50, the log is deleted from the oldest one.
2. **Date/time of e-mail transmission**
   Displays the date/time of e-mail transmission.
3. **E-mail timing**
   Displays the e-mail transmission timing (periodic, power failure, alarm, etc.).
4. **Error code**
   For a description of errors, see chapter 8, “Error Messages.”
5. **Recipient No.**
   1: Recipient 1. 2: Recipient 2
6. **Error description**

Note

- **There is also a log display that shows a log of key login operations.**
- **You can also use commands to output the error, communication, FTP, Web operation, and e-mail log data.**

Procedure

1. Press **DISPLAY** to show a pop-up menu for switching the display.



2. Use the **arrow keys** to select the desired log display, and press **SELECT**.

2.9 Setting the Web Server Function

To use the Web server function, set the following parameters in addition to those described in section 2.3, “Setting the Ethernet Interface.”

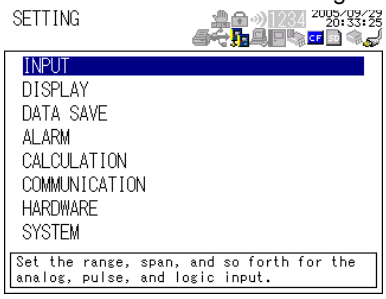
- **Enabling/Disabling the Web Server Function**
  Select ON (enable) or OFF (disable).
- **Page Type (Type of Screen to Be Displayed)**
  - **Monitor**
    - The screen displayed on the XL100 is displayed.
    - The following information can be displayed.
      - Alarm summary
      - Measured and calculated data of all channels
      - Logs (message log, error log, key login log, FTP log, e-mail log, and Web operation log)
    - For display examples, see section 2.10.
  - **Operator**
    The following operations can be carried out in addition to the functions available on the monitor page.
    - Switch the display on the XL100 by specifying the display type (trend, digital, or bar graph) and group.
    - All operations except the HOLD key operation can be carried out.
- **Monitor Page**
  - **Enabling/Disabling the Monitor Page**
    - ON
      The monitor page can be displayed on a Web browser.
    - OFF
      Disables the monitor page.
  - **Enabling/Disabling Access Control**
    - ON
      Enables access control. You must enter the user name and password to display the monitor page.
    - OFF
      Disables access control.
  - **Setting the User Name**
    Enter the user name using up to 16 characters.
  - **Setting the Password**
    Enter the password using up to six alphanumeric characters.
- **Operator Page**
  - **Enabling/Disabling the Operator Page**
    - ON
      The operator page can be displayed on the browser.
    - OFF
      Disables the operator page.
  - **Enabling/Disabling Access Control**
    - ON
      Enables access control. You must enter the user name and password to display the operator page.
    - OFF
      Disables access control.

- **Setting the User Name**
  Enter the user name using up to 16 characters.
- **Setting the Password**
  Enter the password using up to six alphanumeric characters.

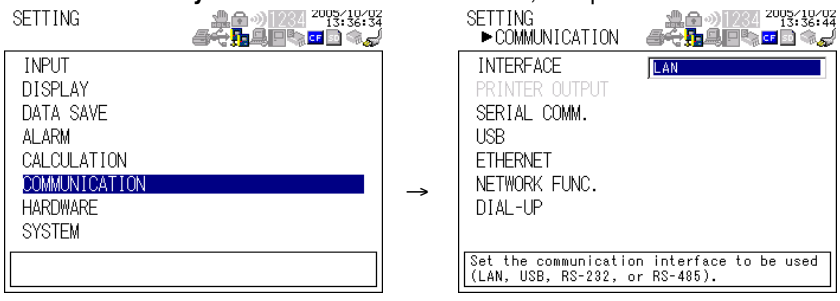
- **Saving the Settings**
  To activate the settings that have been changed in the basic setting mode, the settings must be saved. Otherwise, the settings that existed before the change are activated.

Procedure

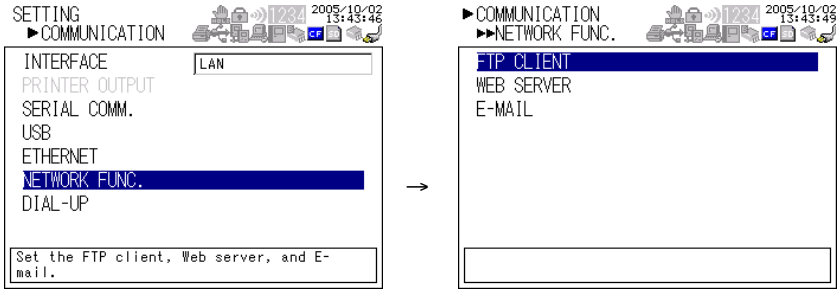
1. Press **SETTING** to enter Setting Mode.



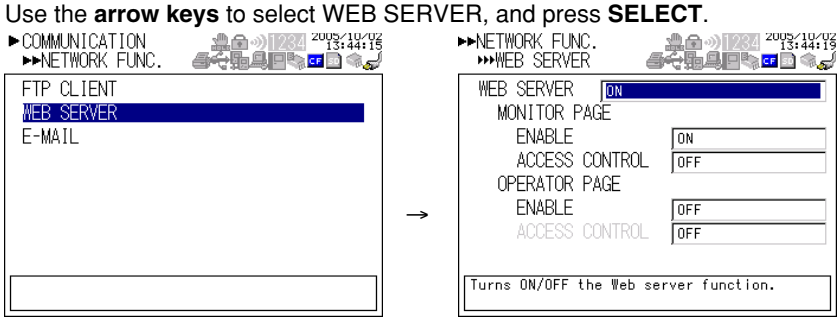
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



3. Use the **arrow keys** to select NETWORK FUNC., and press **SELECT**.



4. Use the **arrow keys** to select WEB SERVER, and press **SELECT**.



5. Use the **arrow keys** to select the desired item, and press **SELECT**.
   Press **SELECT** to show a selection list or window for setting the item.

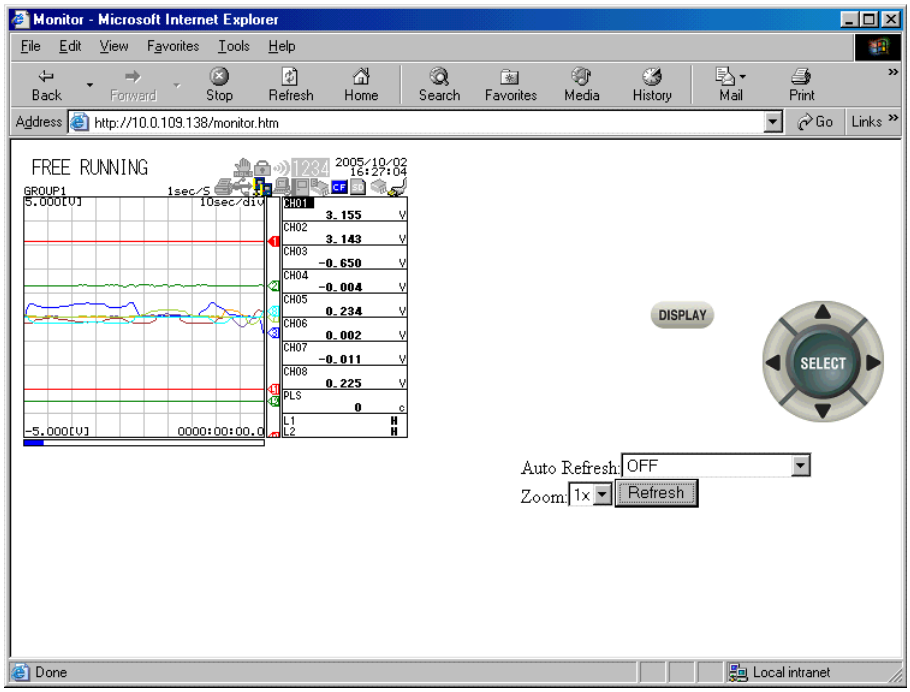
6. Select or enter the item on the displayed selection list or window.
7. Press **SET**.

2.10 Showing and Using the Monitor or Operator Page

This section describes how to show the monitor page and operator page on the Web browser and the operation on each page.

- **Web Browsers That Can Be Used**
  Operations have been confirmed on the following Web browser.
  - Microsoft Internet Explorer 6.0
- **Setting the URL**
  Set the URL (Uniform Resource Locator) appropriately according to the network environment that you are using. You can access the XL100 by setting the URL as follows:
  http://host name.domain name/file name
  - http: Protocol used to access the server. HTTP stands for HyperText Transfer Protocol.
  - Host name.domain name: Host name and domain name of the XL100. 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 XL100.
    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 using Internet Explorer on a PC in the same domain as the XL100 (the domain name, host name, and IP address are assumed to be **good.com**, **XL**, and **123.45.67.89**, respectively).
  URL: **http://XL.good.com/operator.htm** or
  URL: **http://123.45.67.89/operator.htm**
- **Contents of the Monitor Page**
  - **Display Shown by the XL100**
    - The display shown on the XL100 (waveform, digital, bar graph, review, alarm summary, or log) is displayed on the monitor page.
    - If the XL100 is in the Setting Mode or File Operation Mode, the monitor page cannot be displayed. An error message is displayed.
  - **Refreshing the Monitor Page**
    The monitor page can be refreshed automatically or manually.
    - Auto refresh ON
      The monitor page is refreshed at the specified interval selected from 2, 5, 10, or 30 s.
    - Auto refresh OFF
      The monitor page is not automatically refreshed. You can refresh the page manually. Within 2 s of the last refreshing, the page is not refreshed even if you attempt to refresh the page manually.
  - **Zooming in or out of the Display**
    The display shown on the XL100 can be expanded to 200%.

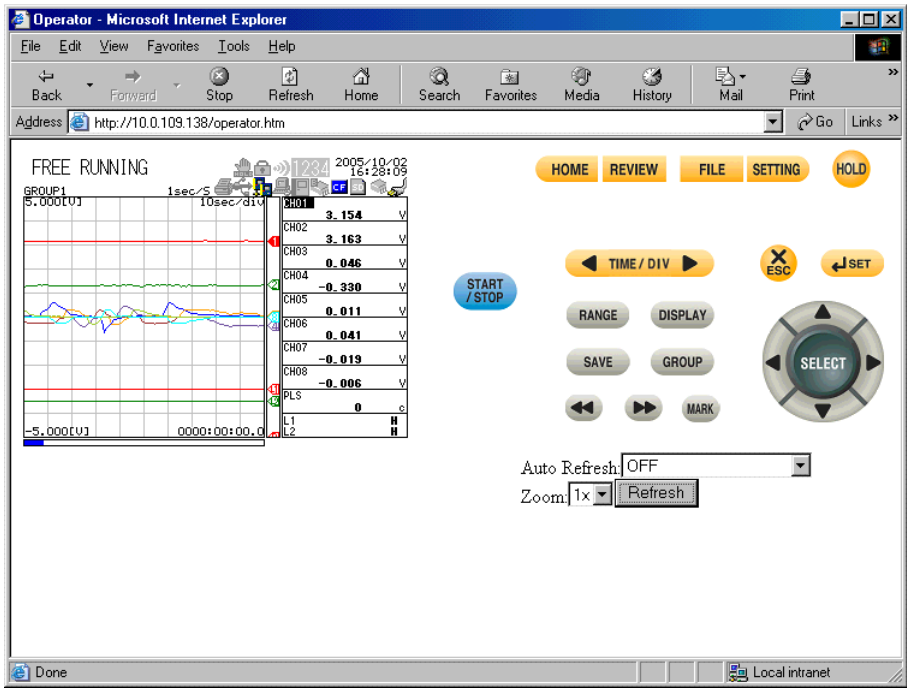


- **Contents of the Operator Page**

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

  Switching to Setting Mode or File Operation Mode

  You can switch the XL100 to Setting Mode or File Operation Mode, and carry out operations in the same fashion as when operating the XL100 directly using keys.



2.11 Setting the E-mail Transmission Function

To use the e-mail transmission function, set the following parameters in addition to those described in section 2.3, “Setting the Ethernet Interface.”

- **Basic Settings of E-mail Transmission**
  - **SMTP* Server Name**
    Set the SMTP server name (up to 64 alphanumeric characters) or the IP address of the SMTP server.
    * Simple Mail Transfer Protocol
  - **Port Number**
    Set the port number to be used. The default setting is 25.
  - **Recipient 1**
    Set the recipient of the e-mail message using up to 150 alphanumeric characters. You can specify multiple addresses. To specify multiple addresses, delimit the addresses using spaces.
  - **Recipient 2**
    Set the recipient of the e-mail message using up to 150 alphanumeric characters. You can specify multiple addresses. To specify multiple addresses, delimit the addresses using spaces.
  - **Sender**
    Set the e-mail address that has been provided by the network administrator using up to 64 alphanumeric characters. If omitted, the sender is set to the first address specified as the recipient.
- **Settings for Transmitting Alarm Information**
  - **Recipient 1, Recipient 2**
    You can turn ON/OFF the function for each recipient.
    - ON
      Transmits e-mail messages to the recipient.
    - OFF
      Does not transmit e-mail messages to the recipient.
  - **Contents of the Transmitted Mail**
    - **Add Inst. Data**
      - ON
        The instantaneous values of all channels are included in the e-mail message.
      - Off
        The instantaneous values are not included in the e-mail message.
    - **Add Source URL (Uniform Resource Locator)**
      - ON
        If the Web server function is specified on the XL100, the URL of the XL100 is attached to the e-mail.
      - OFF
        The URL of the XL100 is not attached to the e-mail.
    - **Subject**
      Set the subject of the e-mail message using up to 32 alphanumeric characters. The default setting is “(XL100)Alarm_summary.”
    - **Header 1**
      Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.
    - **Header 2**
      Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.

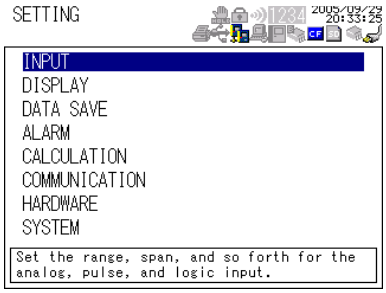
- **Settings When Transmitting E-mail Messages at the Specified Time**
  - **Recipient 1, Recipient 2**
    You can turn ON/OFF the function for each recipient.
    - ON
      Transmits e-mail messages to the recipient.
    - OFF
      Does not transmit e-mail messages to the recipient.
  - **Interval**
    Time interval used to repeat the e-mail transmission starting from the REFERENCE TIME. Select from the following:
    1h, 2h, 3h, 4h, 6h, 8h, 12h, or 24h
  - **REFERENCE TIME**
    The time when the e-mail message is to be transmitted. In addition, the e-mail transmission is repeated at the specified interval from this point. Specify the time in the following range for each recipient.
    00:00 to 23:59
    Example: If Reference time is 17:15 and Interval is 8h, e-mail messages are transmitted at 17:15, 01:15, and 09:15.
  - **Contents of the Transmitted Mail**
    - **Add Inst. Data**
      - ON
        Attaches to the e-mail message the instantaneous values of all channels existing at the time of e-mail transmission.
      - OFF
        The instantaneous values are not attached to the e-mail message.
    - **Add Source URL (Uniform Resource Locator)**
      - ON
        If the Web server function is specified on the XL100, the URL of the XL100 is attached to the e-mail.
      - OFF
        The URL of the XL100 is not attached to the e-mail.
    - **Subject**
      Set the subject of the e-mail message using up to 32 alphanumeric characters. The default value is “(XL100)Periodic_data.”
    - **Header 1**
      Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.
    - **Header 2**
      Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.

- **Settings When Transmitting E-mail Messages at the Time of Recovery from a Power Failure (System Error Settings)**
  For the transmitted contents of the system mail, see section 1.2.
  - **Recipient 1, Sender**
    You can turn ON/OFF the function for each recipient.
    - ON
      Transmits e-mail messages to the recipient.
    - OFF
      Does not transmit e-mail messages to the recipient.

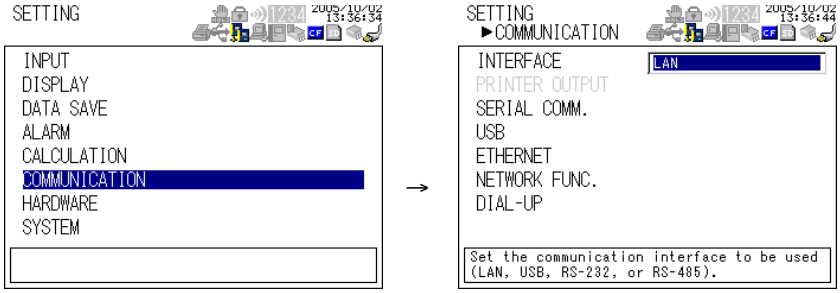
- **Contents of the Transmitted Mail**
  - **Include Source URL (Uniform Resource Locator)**
    - ON
      If the Web server function is specified on the XL100, the URL of the XL100 is attached to the e-mail.
    - OFF
      The URL of the XL100 is not attached to the e-mail.
  - **Subject**
    Set the subject of the e-mail message using up to 32 alphanumeric characters. The default setting is "(XL100)System_warning."
  - **Header 1**
    Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.
  - **Header 2**
    Set the string to be attached to the e-mail message using up to 64 alphanumeric characters.

Procedure

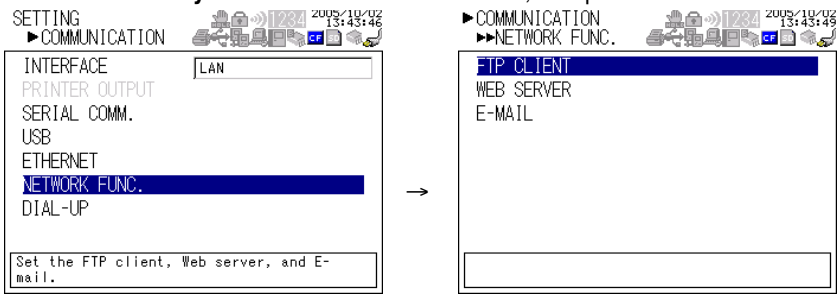
1. Press **SETTING** to enter Setting Mode.



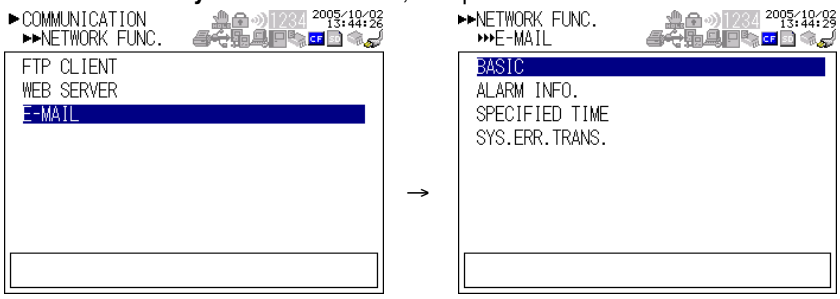
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



3. Use the **arrow keys** to select NETWORK FUNC., and press **SELECT**.

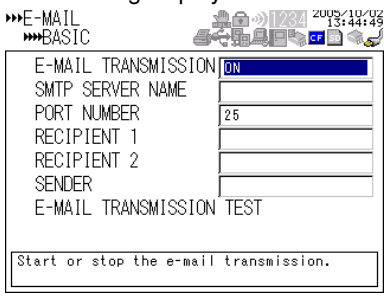


4. Use the **arrow keys** to select E-MAIL, and press **SELECT**.

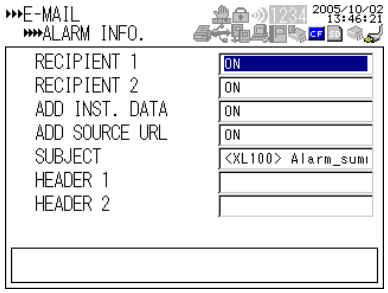


5. Use the **arrow keys** to select the desired item, and press **SELECT**.
   Press **SELECT** to show a window for setting the item.

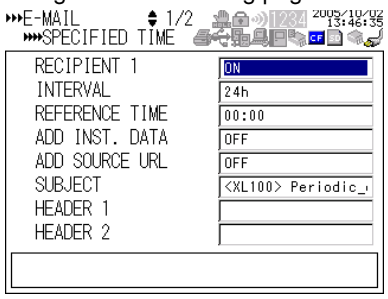
   - Basic setting display



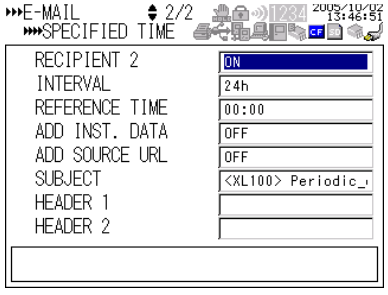
   - Alarm information transmission setting display



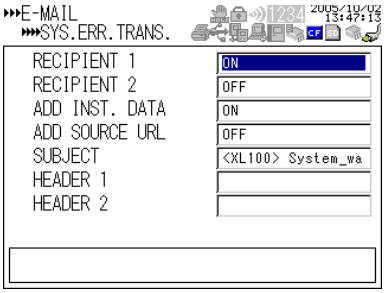
   - Designated time setting page 1/2



   - Designated time setting page 2/2



- System error transmission setting display



6. Select or enter the item on the displayed selection list or window.

7. Press **SET**.

2.12 E-mail Transmission Test

You can transmit test e-mail messages to recipient 1 or recipient 2 that you specified to confirm whether e-mail messages can be transmitted.

- **Items to Check before Performing This Test**
  - Connect the Ethernet cable correctly. For the connection procedure, see section 2.2.
  - Check that the Ethernet interface settings are correct. For the procedure, see section 2.3.
  - Check that the e-mail settings are correct. For the procedure, see section 2.11.

  When setting the Ethernet interface or e-mail, check the settings with your system or network administrator.
- **Checking the Results of the E-mail Transmission Test**
  - The result of the e-mail transmission test can be confirmed by displaying the e-mail log (displayed on the XL100 (see section 2.8)) or Web screen (see section 2.10) or by outputting the result using the FL command (see section 5.9).
  - If an error message is displayed on the XL100, see chapter 8, “Error Messages.”
- **Contents of the Test E-mail Message**

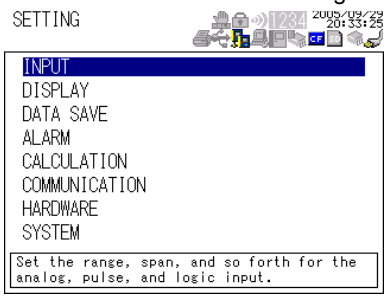
  The figure below shows the contents of the test e-mail message.

Test mail example

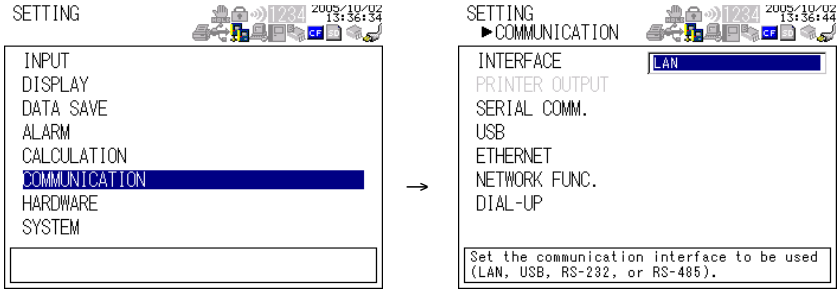
```
From: XL@good.co.jp
Date: Mon, 5 Dec 2005 07:15:41 +0900 (JST)
Subject: (XL) Test_mail
To: user1@good.co.jp

Test mail
<Host name>
XL
<Time of transmission>
12/05 07:15:35
```

Procedure

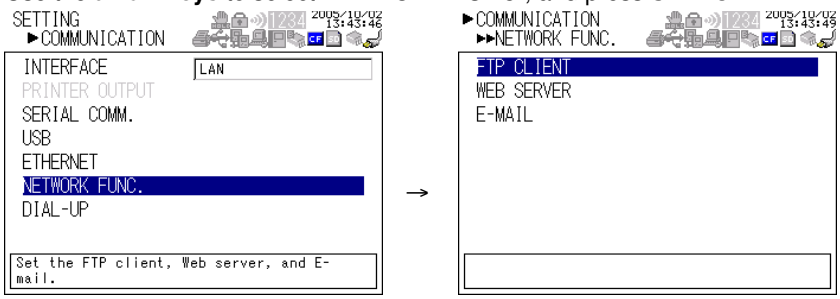
1. Press **SETTING** to enter Setting Mode.



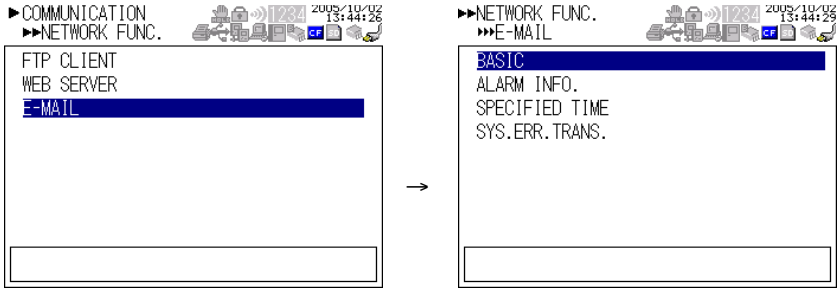
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



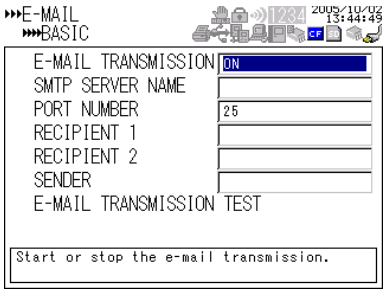
3. Use the **arrow keys** to select NETWORK FUNC., and press **SELECT**.



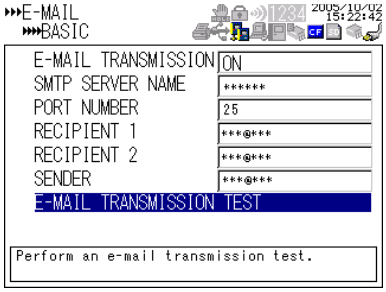
4. Use the **arrow keys** to select E-MAIL , and press **SELECT**.



5. With BASIC selected, press **SELECT**.



6. Use the **arrow keys** to select E-MAIL TRANSMISSION TEST, and press **SELECT**. Press **SELECT** to send the mail.



2.13 Starting/Stopping E-mail Transmissions

- **Starting/Stopping E-mail Transmissions**
  - If E-MAIL SETTINGS > BASIC SETTINGS > E-MAIL TRANSMISSION is turned ON, the e-mail transmission function is enabled.
  - If E-MAIL SETTINGS > BASIC SETTINGS > E-MAIL TRANSMISSION is turned OFF, the e-mail transmission function is disabled. Unsent e-mail messages are cleared.

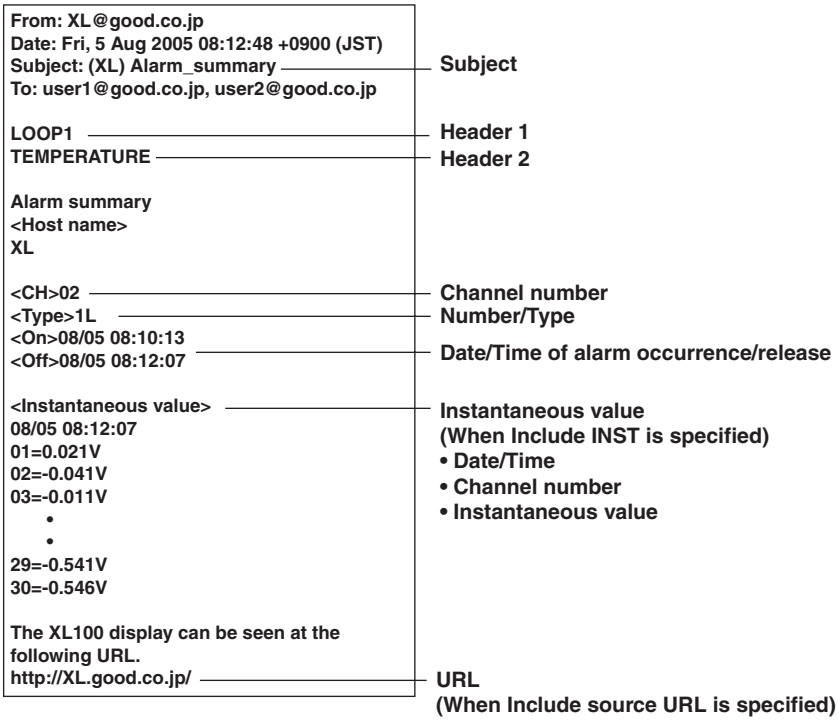
Note

- **If the XL100 enters the basic setting mode while the e-mail transmission is turned ON, the e-mail transmission is stopped. If the XL100 returns to the operation mode from the basic setting mode, the condition that existed before entering the basic setting mode is resumed.**
- **If e-mail transmission fails, the message is retransmitted up to twice at 30-s intervals. If retransmission fails, the e-mail message is discarded.**

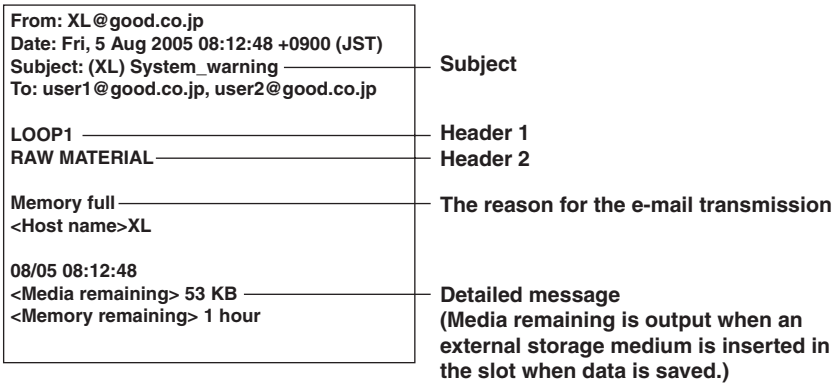
- **Contents of the E-mail Message**

  The figure below shows examples of an e-mail messages.

  - Alarm mail example



  - System mail example

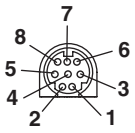


3.1 RS-232 Interface Specifications and Setup Procedure

The RS-232 serial interface specifications of the XL100 are given below.

Item	Specifications
Connector type	Mini DIN, 8 pins
Electrical and mechanical specifications	Conforms to EIA-232
Connection type	Point-to-point
Transmission mode	Full-duplex
Synchronization	Start-stop synchronization
Baud rate	Select 2400, 4800, 9600, 19200, or 38400 bps.
Start bit	Fixed to 1 bit
Data length	Select 7 or 8 bits
Parity	Select Odd, Even, or None (no parity).
Stop bit	Select 1 or 2 bits
Handshaking (Flow control)	Select XON/XOFF control or CS/RS control
Received buffer length	2047 bytes

- **RS-232 Connector Pin Arrangement and Signal Names**



Pin Number	Signal Name	Meaning
1	CS (Clear to Send)	Handshaking signal when transmitting data to the connected device. This is an input signal to the L100.
2	RD (Received Data)	Received data from the connected device. This is an input signal to the XL100.
3	RS (Request to Send)	Handshaking signal when receiving data from the connected device. This is an output signal from the XL100.
4	SD (Send Data)	Transmitted data to the connected device. This is an output signal from the XL100.
8	SG (Signal Ground)	Signal ground.

* Pins 5, 6, and 7 are not used.

- **Connection Procedure**

  Use the dedicated communication cable for the interface cable.
  - For the PC. D-sub 9-pin (91011)
  - For the PC. D-sub 25-pin (91009)
  - For the printer (91010)

Handshaking Method

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 XL100 and the PC, you must make sure that the same method is chosen by both the XL100 and the PC.

You can choose any of the three methods on the XL100 in the table below.

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

Handshaking	Data Sending Control (Control used when sending data to a PC)			Data Receiving Control (Control used when receiving data from a PC)		
	Software Handshaking	Hardware Handshaking		Software Handshaking	Hardware Handshaking	
	Stops transmission when X-OFF is received. Resume when X-ON is received.	Stops 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			○			○
XON/XOFF	○			○		
CS/RS		○			○	

- **OFF**
  - Data transmission control
    There is no handshaking between the XL100 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 XL100 and the PC. When the received buffer becomes full, all of the data that overflows are discarded.
    RS = True (fixed).

- **XON/XOFF**
  - Data transmission control
    Software handshaking is performed between the XL100 and the PC. When an “X-OFF” code is received while sending data to the PC, the XL100 stops the data transmission. When the XL100 receives the next “X-ON” code, the XL100 resumes the data transmission. The CS signal received from the PC is ignored.
  - Data reception control
    Software handshaking is performed between the XL100 and the PC. When the free area of the received buffer decreases to 1537 bytes, the XL100 sends an “X-OFF” code. When the free area increases to 511 bytes, the XL100 sends an “X-ON” code.
    RS = True (fixed).

- **CS/RS**
  - Data transmission control
    Hardware handshaking is performed between the XL100 and the PC. When the CS signal becomes False while sending data to the PC, the XL100 stops the data transmission. When the CS signal becomes True, the XL100 resumes the data transmission. The “X-OFF” and “X-ON” signals received from the PC are treated as data.
  - Data reception control
    Hardware handshaking is performed between the XL100 and the PC. When the free area of the received buffer decreases to 1537 bytes, the XL100 sets “RS=False.” When the free area increases to 511 bytes, the XL100 sets “RS=True.”

Precautions Regarding Data Reception Control

When handshaking is used to control the reception of data, data may still be sent from the PC even if the free space in the receive buffer drops below 256 bytes. In this case, after the receive buffer becomes full, the excess data will be lost, whether or not handshaking is in effect. Data storage of data resumes when there is free space in the buffer.

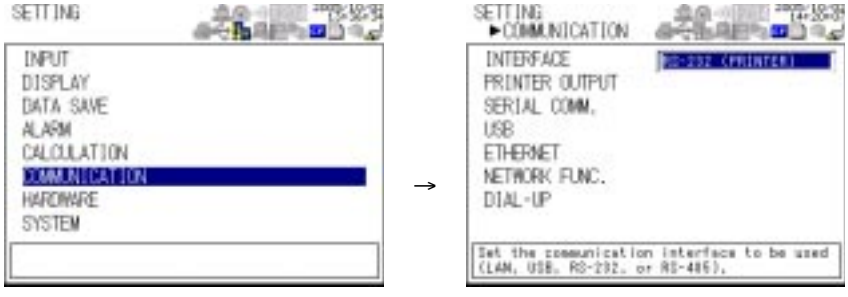
Setting the RS-232 Interface

- **Selecting the Slave Address**
  Select the address from the following values.
  1 to 32
- **Selecting the Baud Rate**
  Select the baud rate from the following:
  1200, 2400, 4800, 9600, 19200, or 38400
- **Setting the Data Length**
  Select the data length from below. To output data in binary format, be sure to set the data length to 8 bits.
  7 or 8
- **Setting the Stop Bit**
  Select the stop bit from the following:
  1 or 2
- **Selecting the Parity Check**
  Select the parity check from the following:
  ODD, EVEN, or NONE
- **Selecting the handshaking**
  Select the handshaking method from the following.
  OFF, XON/XOFF, or CS/RS

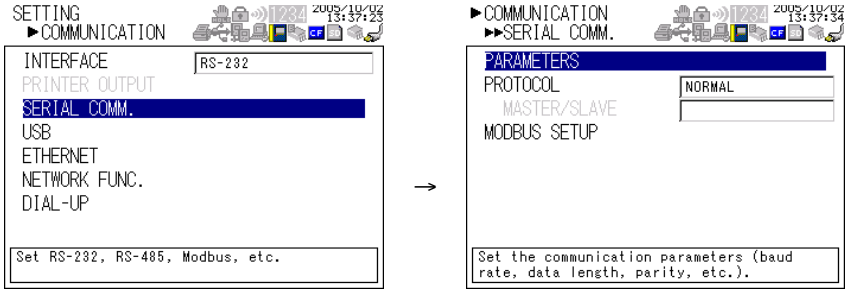
Procedure

1. Press **SETTING** to enter Setting Mode.

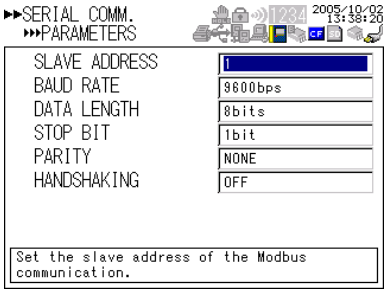
2. Use the arrow keys to select COMMUNICATION, and press SELECT.



3. Use the **arrow keys** to select SERIAL COMM., and press **SELECT**.



4. With PARAMETERS selected, press **SELECT**.
   Press **SELECT** to showPARAMETERS setting window.



5. Select or enter the item on the displayed selection list or window.

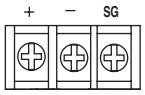
6. Press **SET**.

3.2 RS-485 Interface Specifications and Setup Procedure

Specifications

Item	Specifications
Terminal block type	Number of terminals: 6, terminal attachment screws: ISO M4/nominal length of 6 mm
Electrical and mechanical specifications	Conforms to the EIA-485 (RS-485)
Connection type	Multi-drop (1:32)
Transmission mode	Half-duplex
Synchronization	Start-stop synchronization
Baud rate	Select 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps
Start bit	Fixed to 1 bit
Data length	Select 7 or 8 bits
Parity	Select Odd, Even, or None (no parity).
Stop bit	Fixed to 1 bit
Received buffer length	2047 bytes
Escape sequence	Open and close
Electrical characteristics	Three terminals, SG, +, and –
Communication distance	Up to 1.2 km (when using two shielded twisted-pair cables, AWG 24)
Terminator	External: 120 Ω recommended, 1/2W (connect externally between the + and – terminals)

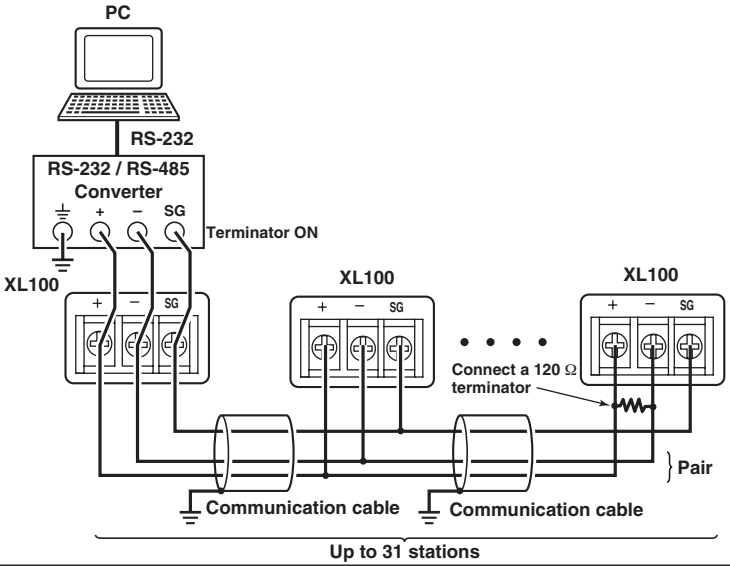
- **RS-485 Terminal Arrangement and Signal Names**



Signal Name	Meaning
+	Data (+).
–	Data (–).
SG (Signal Ground)	Signal ground.

Connection Procedure

Up to 31 stations can be connected to a host calculater. The following figure shows an example when connecting to a PC.

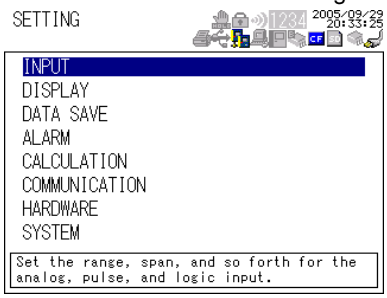


Setting the RS-485 Interface

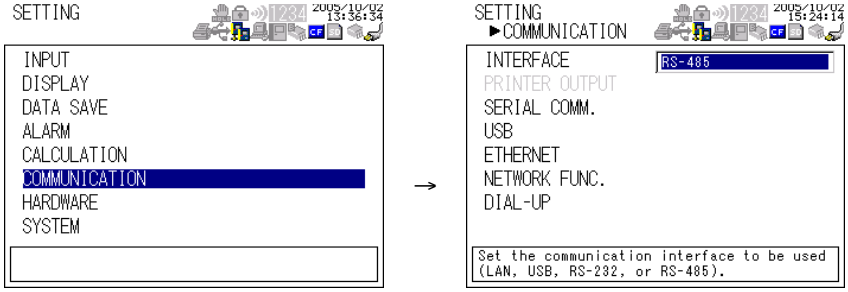
- **Selecting the Slave Address**
  Select the address from the following values.
  1 to 32
- **Selecting the Baud Rate**
  Select the baud rate from the following:
  1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
- **Setting the Data Length**
  Select the data length from below. To output data in binary format, be sure to set the data length to 8 bits.
  7 or 8
- **Selecting the Parity Check**
  Select the parity check from the following:
  ODD, EVEN, or NONE

Procedure

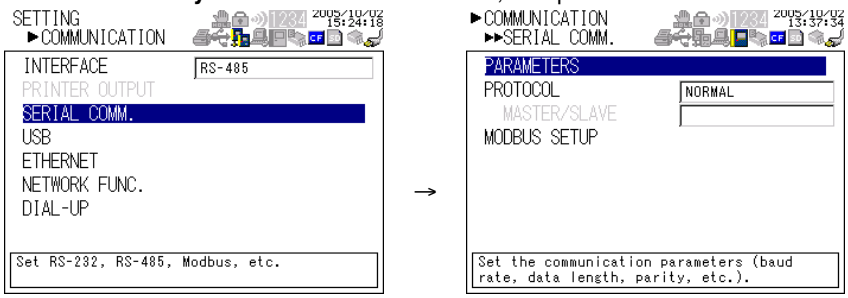
1. Press **SETTING** to enter Setting Mode.



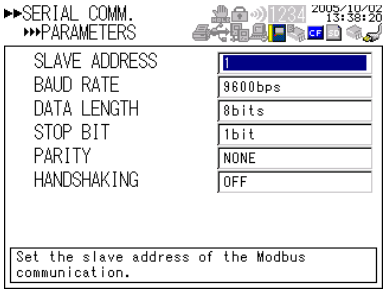
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



3. Use the **arrow keys** to select SERIAL COMM., and press **SELECT**.



4. Use the **arrow keys** to select the desired item, and press **SELECT**.



5. Select the item from the displayed list.

6. Press **SET**.

3.3 USB Communication Specifications and Setup Procedure

When using the USB for serial communication, the XL100 is connected as a device to a host calculater such as a PC.
The only communication protocol that can be used is normal protocol (Yokogawa Meters & Instruments proprietary protocol).

Client End

Item	Specifications
Number of ports	1
Electrical and mechanical specifications	Conforms to USB Rev.1.1
Connector	5-pin Mini-B receptacle
Power supply	Self-powered
PC system supported	A PC running Windows 98 SE, Windows Me, Windows 2000, or Windows XP that is equipped with a USB port as standard (a separate device driver is required for the connection with a PC)

Connection Procedure of the USB Communication Interface

Connect a USB cable to the Mini-B connector on the XL100 and a USB hub or a type A connector of a PC on the host calculater end.

Setting the USB Interface

Set the following item.

Setting the USB ID

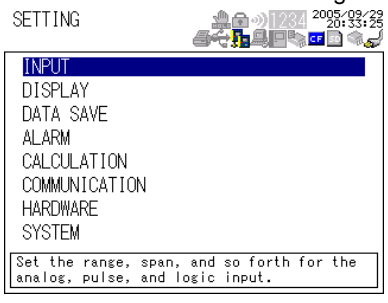
Set the USB ID number of the XL100 within the following range.
00 to 31
You can connect multiple devices to a host controller on the USB. If the XL100 is connected to multiple devices in a single USB system, the USB ID number is used by the host controller to identify each device. Therefore, unique ID numbers must be assigned to the XL100s within a single system.

Note

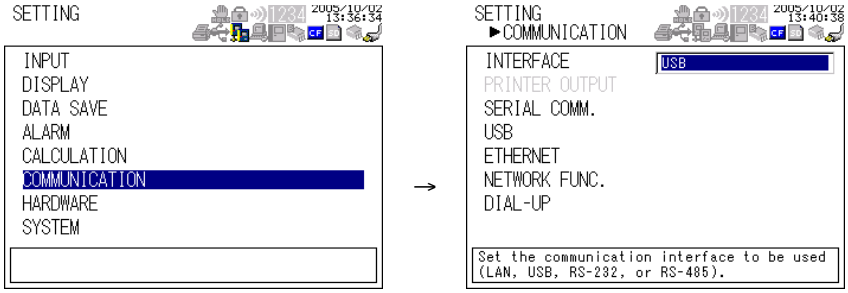
Do not change the USB ID number while using the USB.

Procedure

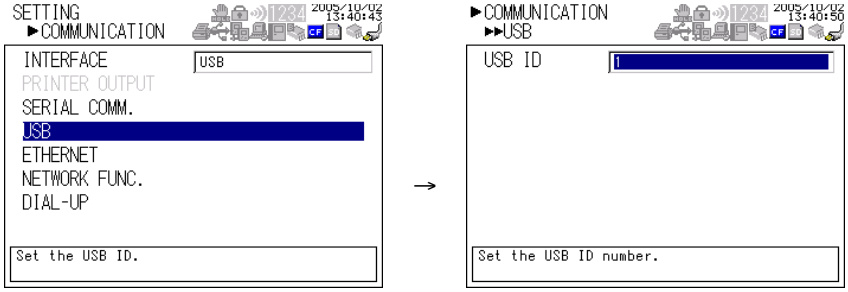
1. Press **SETTING** to enter Setting Mode.



2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



3. Use the **arrow keys** to select USB, and press **SELECT**.



4. Press **SELECT** to show the USB ID selection list.

5. Use the **arrow keys** to select the USB ID, and press **SELECT**.

6. Press **SET**.

4.1 Modbus Protocol Specifications and Function Codes

The Modbus protocol can be used only on the serial interface (RS-232 or RS-485).

Modbus Specifications

The Modbus specifications of the XL100 are as follows:

Specifications	Description
Transmission media	RS-232 or RS-485
Baud rate	Select 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps (57600 and 115200 are selectable only on the RS-485)
Start bit	Fixed to 1 bit
Stop bit	Select 1 or 2 bits
Parity	Select Odd, Even, or None (no parity).
Transmission mode	RTU (Remote Terminal Unit) mode or ASCII mode
Data length	RTU mode: 8 bits. ASCII mode: Select 7 or 8 bits
Error detection	RTU mode: Uses error detection CRC-16. ASCII mode: Uses LRC
Data interval	RTU mode: Determines message termination with a time interval equal to 3.5 characters or more. ASCII mode: Indicates message termination with CR+LF.
Slave address	RS-232: 1 to 247 RS-485: 1 to 247

Function Codes of the Modbus Protocol

The function codes of Modbus protocol that the XL100 supports are listed below.

Slave Function

The slave function of the XL100 does not support broadcast commands.

Function Code	Function	Operation
3	Read the hold register (4xxxx)	The master device can read the communication input data written using function codes 6 and 16.
4	Read the input register (3xxxx)	The master device loads the calculated, measured, and time data of the XL100.
6	Single write to hold register (4xxxx)	The master device writes to the communication input data of the XL100.
8	Loopback test	The master device performs a loopback test of the XL100. The XL100 only supports message return (test code 0x00*).
16	Write to the hold register (4xxxx)	The master device writes to the communication input data of the XL100.

* Hexadecimal 00.

Master Function

Function Code	Function	Operation
3	Read the hold register (4xxxx and 4xxxxx)	Read the hold register data of another device into communication input data (Cxx).
4	Read the input register (3xxxx and 3xxxxx)	Read the input register data of another device into communication input data (Cxx).

4.2 Register Assignments (for Modbus Slave)

The register assignments when operating as a Modbus slave are shown below. The register data does not contain unit and decimal place information. Set them on the Modbus master.
Binary values are stored to the register in order from the MSB.

Input Register	Data
30001	Measured data of analog input CH01
:	:
30024	Measured data of analog input CH24
30201	Measured data of pulse input CH
30301	Measured data of logic input CH1
30302	Measured data of logic input CH2 • Input registers 30001 to 30008 and 30001 to 30016 correspond to 8-ch input and 16-ch input, respectively. • The data is a 16-bit signed integer. The value is the same as the measured data in binary output format. • The data is set to an integer 1 and 0 when the logic input channel is high and low, respectively.
31001	Alarm status of the measured data of analog input CH01
:	:
31024	Alarm status of the measured data of analog input CH24
31201	Alarm status of the measured data of pulse input CH
31301	Alarm status of the measured data of logic input CH1
31302	Alarm status of the measured data of logic input CH2 • Input registers 30001 to 30008 and 30001 to 30016 correspond to 8-ch input and 16-ch input, respectively. • The data is a 16-bit integer. The value is the same as the alarm status in binary output format. The register contains the data in the order “A2A1A4A3.” The XL100 uses only A1. A2 to A4 are always set to zero.
32001	Calculated data of CA01 (higher 2 bytes)
32002	Calculated data of CA01 (lower 2 bytes)
32003	Calculated data of CA02 (higher 2 bytes)
:	:
32064	Calculated data of CA32 (lower 2 bytes) The data is a 32-bit signed integer. Two registers are assigned to each data value. The value is the same as the calculated data in binary output format.
33001	Alarm status of calculated data of CA01
:	:
33032	Alarm status of calculated data of CA32 Data type and value are the same as those of the alarm status of the measured data.
39001	Year (4 digits)
39002	Month
39003	Day
39004	Hour
39005	Minute
39006	Second
39007	Millisecond

Hold Register	Data
40001	Communication input data of C001
:	:
40032	Communication input data of C032
Values in the range of –32768 to 32767 can be written to the hold registers.	

4.3 Modbus Error Response (for Modbus Slave)

When using the Modbus slave function, the XL100 returns the error codes below to the master device. For the error messages related to communications that the XL100 displays, see chapter 8, “Error Messages.”

Code	Meaning	Cause
1	Bad function code	Unsupported function request. For a list of supported functions, see section 4.1, “Modbus Protocol Specifications and Function Codes.”
2	Bad register number	Attempted to read/write to a register that has no corresponding channel.
3	Bad number of registers	The specified number of registers is zero.

However, no response is returned in the following cases.

- CRC error
- Errors other than those in the above list.

4.4 Setting the Modbus Master Function

Set the items below to use the Modbus master function.

- **Communication Interval**
  The cycle at which data is read from other devices. Select the read cycle from the following:
  100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, or 10 s

- **Timeout Value**
  Timeout occurs if a response is not received from the specified slave device within the time specified here (timeout value) after a command is sent from the XL100. The XL100 repeats the operation of sending a command and waiting for a response for the number of times specified by the retrial value. If no response is received even after waiting the timeout value for all retrials, the XL100 stops sending commands to the slave device for a period equal to 10 times the timeout value. Then, the XL100 tries again. For details, see section 4.5, “Data Dropout Handling of the Modbus Master.”
  Select the timeout time from the following:
  100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, or 1 min

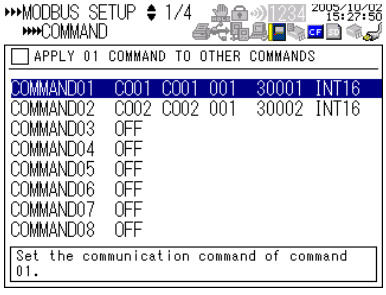
- **Retrials**
  This is the number of times to retransmit the command when there is no response from the specified slave device. If no response is received even after retrying the number of times specified here, the XL100 stops sending commands to the slave device for a period equal to 10 times the timeout value. Then, the XL100 tries again. For details, see section 4.5, “Data Dropout Handling of the Modbus Master.”
  Select the number of retrials from the following:
  OFF (0), 1, 2, 3, 4, 5, 10, or 20

- **Commands**
  The commands are used to read the data in the register of slave devices into the communication input data of the XL100 at the read cycle. Consecutive registers of the same data type in a slave device can be registered as a single command and read into consecutive communication input data.
  - Enabling/Disabling Commands
    Turn ON the command registration line to be used. Up to 32 commands can be registered.
  - Read channel (First CH, Last CH)
    Set the communication input data (CO01 to CO32) to which the data loaded from the slave device is to be assigned.
  - Address
    Specify the address of the slave device from the following:
    1 to 247
  - Register
    Specify the register number of the slave device. Since 32-bit data is assigned to two registers, specify the smaller register number (see “Type” below).
    Input register: 30001 to 39999, 300001 to 365535
    Hold register: 40001 to 49999, 400001 to 465535
  - Type
    Specify the data type assigned to the Modbus register of the slave device.
    - INT16
      Specify this type when a “16-bit signed integer” is assigned to the Modbus register.

- UINT16
  Specify this parameter when a “16-bit unsigned integer” is assigned to the Modbus register.
- INT32_B
  Specify this parameter when a “32-bit signed integer” is assigned to the Modbus register in the order upper 16 bits followed by the lower 16 bits.
  Specify the smaller register number (the higher register number in this case) in [Registers].
- INT32_L
  Specify this parameter when a “32-bit signed integer” is assigned to the Modbus register in the order lower 16 bits followed by the upper 16 bits.
  Specify the smaller register number (the lower register number in this case) in [Registers].
- UINT32_B
  Specify this parameter when a “32-bit unsigned integer” is assigned to the Modbus register in the order upper 16 bits followed by the lower 16 bits.
  Specify the smaller register number (the higher register number in this case) in [Registers].
- UINT32_L
  Specify this parameter when a “32-bit unsigned integer” is assigned to the Modbus register in the order lower 16 bits followed by the upper 16 bits.
  Specify the smaller register number (the lower register number in this case) in [Registers].
- FLOAT_B
  Specify this parameter when a “32-bit floating-point data” is assigned to the Modbus register in the order upper 16 bits followed by the lower 16 bits.
  Specify the smaller register number (the higher register number in this case) in [Registers].
- FLOAT_L
  Specify this parameter when a “32-bit floating-point data” is assigned to the Modbus register in the order lower 16 bits followed by the upper 16 bits.
  Specify the smaller register number (the lower register number in this case) in [Registers].

Example (Read multiple points of data using a single command)

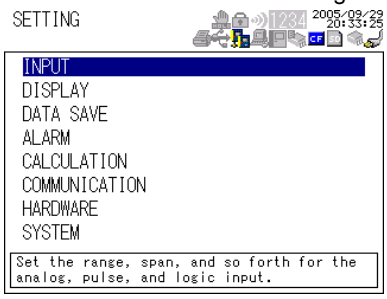
If you enter the following settings, the values of register 30001 and register 30002 (both INT16 type) are read into CO01 and CO02, respectively.



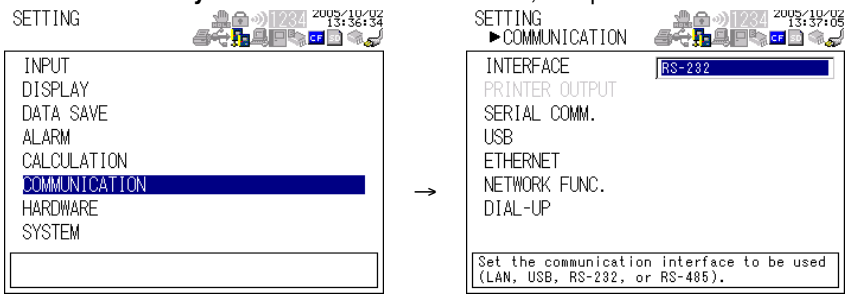
- **Displaying the Loaded Data**
  The loaded data can be specified using CO01 to CO32. The decimal place and the unit of the register data depend on the slave device. Correct the loaded data using the scaling function of the XL100.

Procedure

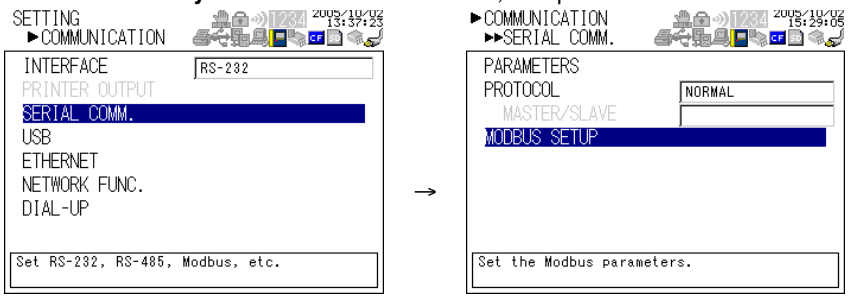
1. Press **SETTING** to enter Setting Mode.



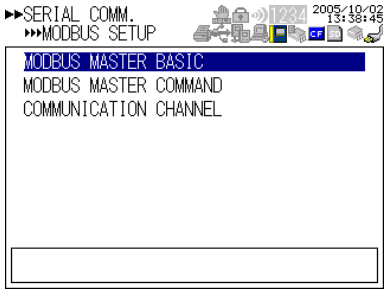
2. Use the **arrow keys** to select COMMUNICATION, and press **SELECT**.



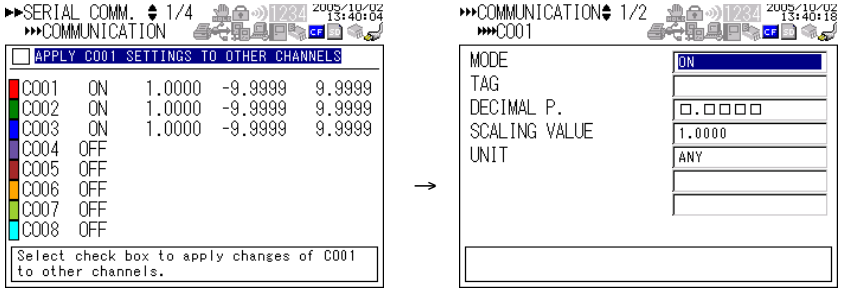
3. Use the **arrow keys** to select SERIAL COMM., and press **SELECT**.



4. Use the **arrow keys** to select MODBUS SETUP, and press **SELECT**.
   - Modbus setup display



   - Modbus settings > communication channel settings display

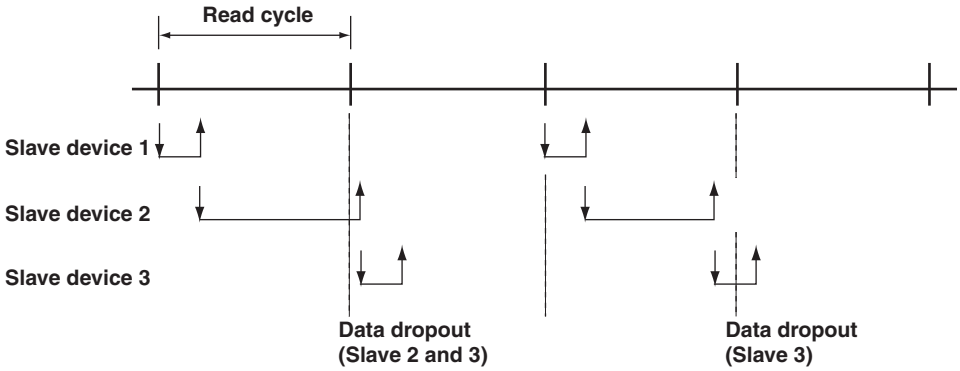


5. Select or enter the item on the displayed selection list or window, and press **SET**.

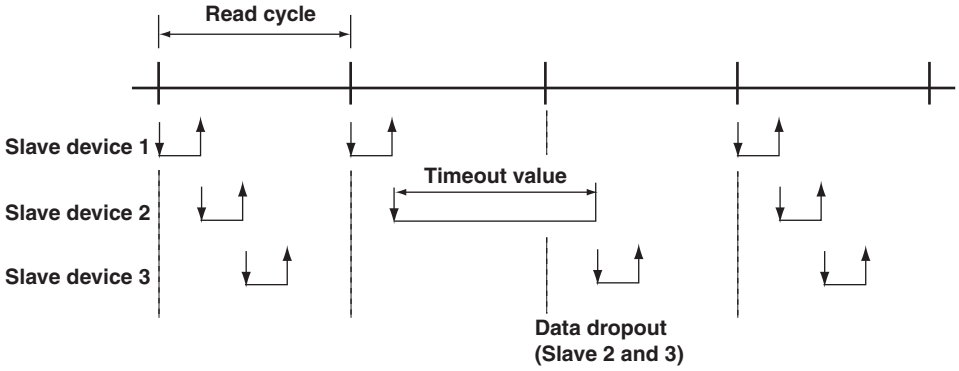
4.5 Data Dropout Handling of the Modbus Master

If the read cycle is exceeded before the response to the previous command is completed when the XL100 is communicating with multiple slave devices, a data dropout occurs from not being able to send the command within the read cycle.
If this happens, change the read cycle, timeout value, and retrials to appropriate settings by referring to the figure below.

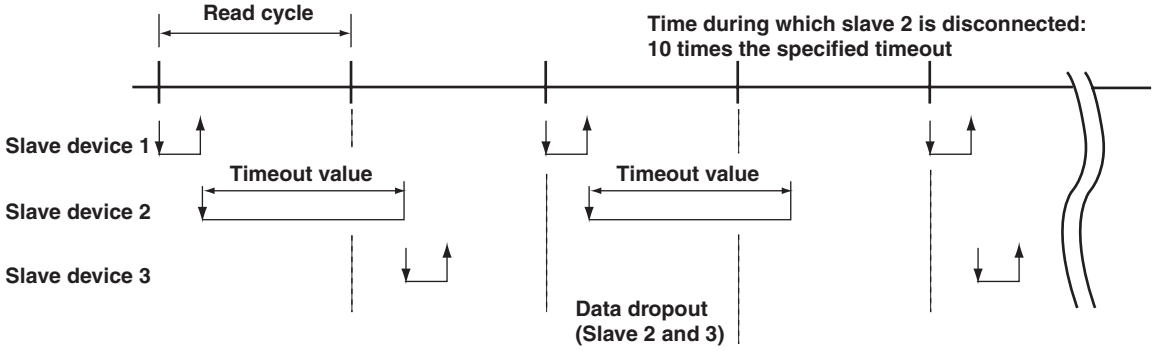
1. When the response from the slave device takes a long time



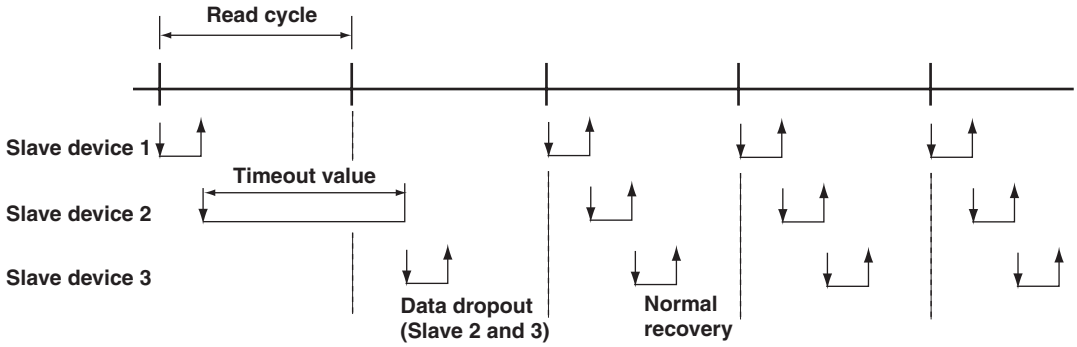
2. When there is no response from the slave device (retrials = 1)



3. When the XL100 disconnects the relevant slave device for a period equal to 10 times the timeout value and makes a normal recovery at the retrial (disconnects the relevant slave device for a period equal to 110 times the timeout value and makes a normal recovery at the retrial

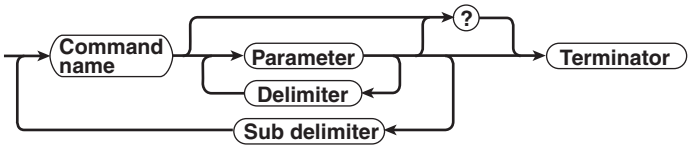


After disconnecting slave 2, retry at the first read cycle after a period equal to 10 times the specified timeout value

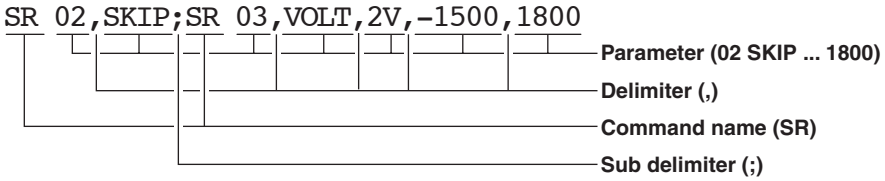


5.1 Command Syntax

The syntax of the setting/basic setting/output commands (see sections 5.3 to 5.10) of the XL100 is given below. ASCII codes (see appendix 1) are used for the character codes. For the maintenance/test command syntax, see section 5.11.



Command example



- **Command Name**
  Defined using two alphabet characters.
- **Parameters**
  - Command parameters.
  - Set using alphabet characters or numerical values.
  - Parameters are separated by delimiters (commas).
  - All numerical values are specified using integers.
  - When the parameter is a numerical value, the valid range of the value varies depending on the command.
  - Spaces around the parameter are discarded. (However, spaces are valid for parameters specified using an ASCII character string.)
  - You can omit the parameters that do not need to be changed from their current settings. However, delimiters cannot be omitted.
    Example `SR 01,,2V<Terminator>`
    If multiple parameters are omitted and delimiters occur at the end of the command, those delimiters can be omitted.
    Example `SR 01,VOLT,,,<Terminator>` → `SR 01,VOLT<Terminator>`
  - The number of digits of the following parameters is fixed. If the number 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: 2 characters
    - Alarm output number: 3 characters

- **Query**
  - A question mark is used to specify a query.
  - By placing a query after a command or parameter, the setting information of the corresponding command can be queried. Some commands cannot execute queries. For the query syntax of each command, see section 5.2.
- **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 commands and queries cannot be specified one after another. Use them independently.
    * If there are consecutive sub delimiters, they are considered to be single. In addition, sub delimiters at the front and at the end are ignored.

    Example ;SR01,VOLT;;;SR02,VOLT;<terminator> is taken to be SR01,VOLT;SR02,VOLT<terminator>.
- **Terminator**

  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 alarm output number that is not available on the XL100. 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 any of the commands in the middle 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.**

5.2 Response Syntax

The following table shows the types of responses for various commands.
The XL100 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.

Function	Command		Response	
		Group	Affirmation	Negation
Setting/ Measurement server	Setting command	Setting	Affirmative response and ASCII output response	Negative response
		Control		
	Basic setting command			
	Output command	Control	Affirmative response	
		Setup, measurement, and control data output	ASCII output response	
			BINARY output response	
		RS-485 and USB	RS-485 and USB response	No response

The syntax of each response is indicated below.

Affirmative Response Syntax

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

- **Syntax**

  E0<*CRLF*>

- **Example**

  E0<*CRLF*>

Negative Response Syntax

Single Negative Response Syntax

When the command is not processed correctly, a single negative response is returned. For a description of error numbers and error messages, see chapter 8, “Error Messages.”

- **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 Response Syntax

- 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.

For a description of error numbers and error messages, see chapter 8, “Error Messages.”

- **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 Response Syntax

The basic ASCII output syntax is indicated below.

- **Syntax**

```
EA<CRLF>
.....<CRLF>
   :
.....<CRLF>
.....<CRLF>
EN<CRLF>
```

The following types of ASCII data are available.
Query response, decimal place/unit information, measured/calculated data, communication log, FTP log, operation error log, key login log, Web operation log, e-mail log, alarm summary, status information, file list, and user level
Each type of ASCII data is described below.

Query Response

The response syntax of the setting corresponding to a command or parameter with a question mark is indicated below. For the query syntax of each command, see sections 5.4 to 5.11.

- **Syntax**

```
EA<CRLF>
...<CRLF>
...
...<CRLF>
EN<CRLF>
```

- Example

```
Command     UE?<CRLF>
Response    EA<CRLF>
            UE OK<CRLF>
            EN<CRLF>
```

Decimal Place/Unit Information

- The FE command is used to output the data.
- The measured/calculated data that are output using the FD command contains only the mantissa. By combining with the binary display data or the decimal place obtained with the FE command, the correct measured/calculated data can be derived.
- **Syntax**

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

```
EA<CRLF>
s_kccuuuuuu,pp<CRLF>
.....
EN<CRLF>
```

  s Data status (N, S)
  N: Normal
  S: Skip (when the input range is set to SKIP for a measurement channel)

k Channel type
0: Measurement channel
P: Pulse channel
A: Calculation channel
C: Communication channel
cc Channel number
01 to 32
uuuuuu Unit information (6 characters, left-justified)
mV____:mV / V_____:V / ^C____:°C / Mc____:Mc / kc___:kc / rpm__:rpm /
xxxxxx: (User-defined character string)
pp Decimal place (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/Calculated Data

- The FD command is used to output the data.
- The measured/calculated data that are output using the FD command contains only the mantissa. By combining with the binary display data or the decimal place obtained with the FE command, the correct measured/calculated data can be derived.
- **Syntax**

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

```
EA<CRLF>
DATE_yy/mo/dd<CRLF>
TIME_hh:mi:ss.mmmt<CRLF>
s_kcca1a2a3a4uuuuuufdddddE-pp<CRLF>
.............
EN<CRLF>
```

yy year (00 to 99);mo month (01 to 12);dd day (01 to 31);hh hour (00 to 23);mi minute (00 to 59);ss second (00 to 59);mmm millisecond (000 to 999. A period is placed between seconds and milli-seconds);t reserved (space)
s Data status (N, S, O, E)
N: Normal/ S: Skip/O: Over/E: Error
k Channel type
0: Measurement analog channel/P: Pulse channel/D: Logic input channel/A: Calculation channel/
C: Communication channel
cc Channel number
01 to 32

a1a2a3a4
a1 Alarm status
a2 Reserved (space character at all times)
a3 Reserved (space character at all times)
a4 Reserved (space character at all times)
(H, L, I, O, or space)
(H(High limit alarm)/L(Lower limit alarm)/ I(Window IN alarm)/O(Window OUT alarm))
Reserved (h, l, T, t, R, and r)
Space (no alarm)
uuuuuu Unit information (6 characters, left-justified)
mV____:mV/V_____:V/^C____:°C/Mc____:Mc/kc___:kc/rpm__:rpm/xxxxxx: (User-defined character string)
f Sign (+, -)
ddddd Mantissa (00000 to 99999, 5 digits)
- Eight digits for calculated 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 calculated data).

pp Exponent (00 to 04)
_ Space

- **Example**

```
EA
DATE 05/10/23
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 50 logs are retained. Logs that exceed 50 are cleared from the oldest data.
- **Syntax**

EA<*CRLF*>
yy/mo/dd_hh:mi:ss_n_uuu...ufd_mmm...m<*CRLF*>
.....
EN<*CRLF*>

yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)
mi Minute (00 to 59)
ss Second (00 to 59)

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 16 characters)
f Multiple command flag
Space: Single
*: Multiple
(If multiple commands are separated by sub delimiters and output at once, "*" is displayed. The multiple commands are divided at each sub delimiter and stored as individual logs (1 log for 1 command and 1 log for 1 response.)
d I/O
>: Input
<: Output
mmm...m Message (up to 20 characters)

- The communication log contains only the error number and not the error message section.
- Normally, the transfer data are transmitted as they are, but in some cases, a special message is output. Special messages are indicated below.

Receive
(Over length): Command length exceeded.
(Over number): Command numbers exceeded.
(Serial error): Received an error character through serial communications.
Send
(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, "BO1;???;CS1," are transmitted. The commands are separated and output in order with the multiple command flag "*."

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

FTP Log

- The FL command is used to output the data.
- The FTP client log is output. Up to 50 file transfer logs are retained. Logs that exceed 50 are cleared from the oldest data.
- **Syntax**

```
EA<CRLF>
yy/mo/dd_hh:mi:ss_nnn_xxxxxxxxx_k_ffffffff_eee<CRLF>
.................
EN<CRLF>
```

yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)
mi Minute (00 to 59)
ss Second (00 to 59)
nnn Error code (001 to 999)
xxxxxxxxx Detailed code (9 characters)
k Server type (FTP destination)
P: Primary
S: Secondary
ffffffff File name (8 characters)
eee Extension (3 characters)
_ Space

- **Example**

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

Error Message 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.
- **Syntax**

```
EA<CRLF>
yy/mo/dd_hh:mi: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)
mi Minute (00 to 59)
ss Second (00 to 59)
nnn Error code (001 to 999)
uuu...u Error message (up to 80 characters)

_ Space

- **Example**

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

Key Login Log

- The FL command is used to output the data.
- A log of users that have logged in and logged out is output. Up to 50 login/logout logs are retained. Logs that exceed 50 are cleared from the oldest 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.
- User number and user name are not output at the time of the logout.
- **Syntax**

```
EA<CRLF>
yy/mo/dd_hh:mi:ss_xxx_nn_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)
mi Minute (00 to 59)
ss Second (00 to 59)
xxx Login or log out (In_ or Out). Output left-justified.
nn User number (01 to 07)
uuu...u User name (up to 16 characters)
_ Space

- **Example**

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

Web Operation Log

- The FL command is used to output the data.
- The log of operations on the Web screen is output. Up to 50 operations are retained. Logs that exceed 50 are cleared from the oldest data.
- Syntax

```
EA<CRLF>
yy/mo/dd_hh:mm:ss_ffffff_eee_???...?<CRLF>
..........
EN<CRLF>
```

yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)
mi Minute (00 to 59)
ss Second (00 to 59)
ffffff Requested operation
SCREEN: Screen change
KEY: Key operation
eee Error code when executing the requested operation
All spaces: Success
001 to 999: Error code
???...? Parameter for each cause (see below)

- When ffffff = SCREEN
  yy/mo/dd_hh:mm:ss_ffffff_eee_ddddd_nnCRLF
  ddddd Screen type
  TREND: Waveform & digital display
  DIGIT: Digital display
  BAR: Bar graph display
  nn Group number (01 to 04)
- When ffffff = KEY
  yy/mo/dd_hh:mm:ss_ffffff_eee_kkkkkCRLF
  kkkkk Type of key that was operated
  ESC: ESC key
  HOME: HOME key
  REVIEW: REVIEW key
  FILE: FILE key
  SETTING: SETTING key
  HOLD: HOLD key
  TIMEDIVSHORT: TIME/DIV left key
  TIMEDIVLONG: TIME/DIV right key
  RANGE: RANGE key
  SAVE: SAVE key
  DISP: DISPLAY key
  GROUP: GROUP key
  MARK: MARK key
  MARKLEFT: MARK left key
  MARKRIGHT: MARK right key
  SET : SET key
  STARTSTOP: START/STOP key
  HOLD: HOLD key
  UP: Up arrow key
  DOWN: Down arrow key
  RIGHT: Right arrow key
  LEFT: Left arrow key
  SELECT: SELECT key

– Space

- **Example**

```
EA
01/02/11 12:20:00 SCREEN 275 TREND 01
01/02/11 12:21:00 SCREEN BAR 01
01/02/11 12:30:00 KEY UP
01/02/11 12:31:00 KEY RIGHT
01/02/11 12:40:00 MSG 05 Hello-Hello
01/02/11 12:41:00 MSG 05 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**

EA<*CRLF*>
yy/mo/dd_hh:mm:ss_ffffff_eee_n_uuu...u<*CRLF*>
.....
EN<*CRLF*>

yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 59)
mi Minute (00 to 59)
ss Second (00 to 59)
ffffff Factor
ALARM: Alarm mail
TIME: Scheduled mail
REPORT: Reserved
FAIL: Power failure recovery mail
FULL: Memory full mail
TEST: Test mail
ERROR: Error message mail
eee Error code
All spaces: Success
001 to 999: Error code
n Recipient list
1: List 1
2: List 2
+: List 1 and list 2
uuu...u Array of recipient e-mail addresses (up to 30 characters)
_ Space

- **Example**

```
EA
01/05/11 12:20:00 ALARM + notice
01/05/11 12:30:00 REPORT 375 1 user1 user2
EN
```

Alarm Summary

- The FL command is used to output the data.
- The alarm summary is output. Up to 120 alarm information sets are retained. Alarm information sets that exceed 120 are cleared from the oldest data.
- **Syntax**

```
EA<CRLF>
yy/mo/dd_hh:mi:ss_kcc_ls_YY/MO/DD_HH:MM:SS<CRLF>
.........
EN<CRLF>
```

yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)
mi Minute (00 to 59)
ss Second (00 to 59)
k Channel type
0: Analog measurement channel
P: Pulse measurement channel
D: Logic input channel
A: Calculation channel
C: Communication channel
cc Channel number
01 to 32
l Alarm level (fixed to 1)
s Alarm type (H, L, I, or O)
YY/MO/DD HH:MM:SS Alarm release time (alarm release time is not output if the alarm has not been released)
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)
_ Space

- **Example**

```
EA
01/05/11 12:20:00 001 1L 01/05/11 12:25:00
01/05/11 12:30:00 A31 3t
EN
```

Status Information

- The IS command is used to output the data.
- The operation status of the XL100 is output.
- For details on the status information, see section 6.2, “Bit Structure of the Status Information.”
- **Syntax**

```
EA<CRLF>
ddd.ccc.bbb.aaa<CRLF>
EN<CRLF>
```

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

- **Example**

```
EA
000.000.032.000
EN
```

File List

- The ME command is used to output the data.
- The file list and the file data sizes of the specified directory on the XL100's external storage medium are output.
- **Syntax**

```
EACRLF
ffffffff_eee_ssssssss_yy/mo/dd_hh:mi:ss_llllllllll<CRLF>
.................
zzzzzzz Kbyte free<CRLF>
EN<CRLF>
```

ffffffff File name (8 characters)
If this is a directory, the characters <DIR> are shown at the position displaying the file data size.
eee Extension (3 characters)
ssssssss Data size of the file (_____0 to 99999999) [byte(s)]
yy Year (00 to 99)
mo Month (01 to 12)
dd Day (01 to 31)
hh Hour (00 to 23)
mi Minute (00 to 59)
ss Second (00 to 59)
zzzzzzz Free space on the medium (_____0 to 9999999)
llllllllll ID number (_____0 to 9999999999)

- The ID number is set to a space.
- The output is a "0" if the file was saved using another instrument.

_ Space

- **Example**

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

User Level

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

  EA<*CRLF*>
  p_l_uuu···u<*CRLF*>
  EN<*CRLF*>

  p Physical layer
  - E: Ethernet
  - S: RS-232, RS-485, or USB

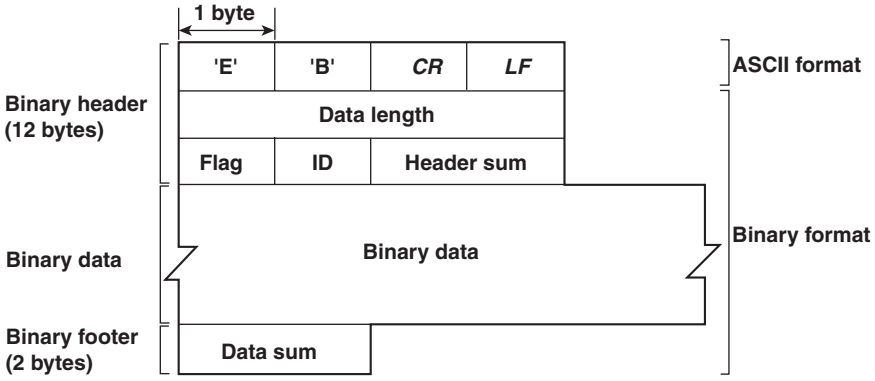
  l User level
  - A: Administrator privileges
  - U: User privileges

  uuu...u User name (up to 16 characters)
  _ Space
- **Example**

  EA
  E A admin
  EN

Binary Output Syntax

- **Basic Syntax**



- **EB*CRLF***
  Indicates that the data is binary.
- **Data Length**
  The byte value of “flag + identifier + header sum + binary data + data sum.”
- **Header Sum**
  The sum value of “data length + flag + identifier.”
- **Binary Data**
  For the output format of various data types, see section 5.3.
- **Data Sum**
  The sum value of binary data.

- **Flag**

Bit	Name (Abbreviation)	Flag 0	1	Meaning of the Flag
7	BO	MSB	LSB	Output byte order
6	CS	No	Yes	Existence of a 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 MSB is output first. When the BO flag is “1,” the LSB is output first.
  - If the check sum is enabled (parameter = 1) using the CS command parameter, each sum value is inserted in the header sum and data sum sections in the “Basic Syntax” on the previous page. If the check sum is disabled (parameter = 0), a zero is inserted in the header sum and data sum sections.
  - If the amount of data output in response to a ME 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.

- **Identifier**

ID Number	Binary Data Type	Type	Format
0	Undefined file	File (*.*)	–
1	Measured/calculated data	Data	X
2	–	–	–
3	–	–	–
4	Manual sampled data file	File (*.*)	X
5	–	–	–
6	–	–	–
7	–	–	–
8	–	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	–	–	–
13	Screen image data	File (*.*)	–

X: Disclosed. –: Common format

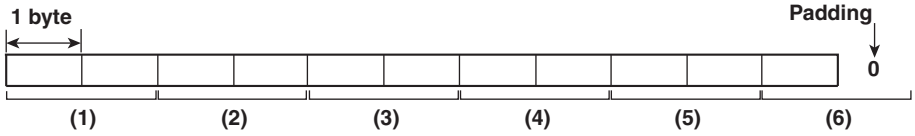
  - Binary data can be classified by the ID number shown in the table above.
  - Binary data comes in two types, data and file.
    - Data
      - Measured/calculated data can be output using the FD command.
      - The data format is disclosed. See the next and subsequent pages.
    - File
      - Display data, event data, TLOG data, and setting data files can be used on the software program that came with the XL100.
      - Files that are in common formats can be opened using software programs that are sold commercially.
      - Other formats are written in ASCII code. A text editor can be used to open these types of files.
      - The identifier section in the “Basic Syntax” on the previous page contains the ID number that indicates the binary data type.

Note

Binary data that is not indicated in the above table is considered undefined files.

- **Calculating the Sum Value**
  If you set the parameter of the CS command to “1 (enabled),” the checksum value is output only during serial communications. The check sum is the same as that used in the TCP/IP and is derived according to the following algorithm.

  Buffer on Which the Sum Value Is Calculated
  - For the header sum, it is calculated from “data length + flag + identifier” (fixed to 6 bytes).
  - The data sum is binary data.



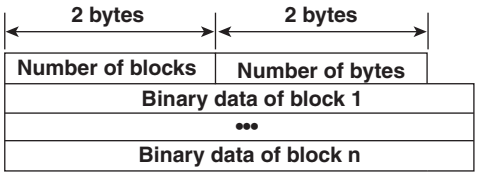
  If the data length of the buffer is odd, a “0” is padded so that it is even. (1) through (6) are summed as unsigned two-byte integers (unsigned short). If the digit overflows a “1” is added. Finally, the result is bit-wise inverted.

Measured/Calculated Binary Data Syntax
- The FD command is used to output the measured/calculated data.
- The ID number of the output format is 1.
- The measured data is output using signed 16-bit integer; the calculated data is output using signed 32-bit integer. 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.

Example of Deriving Physical Values from Binary Data

Binary Data	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

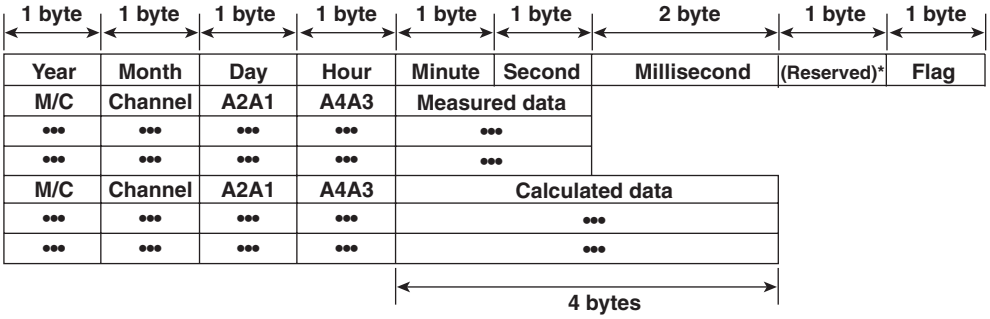
- **Binary Data Format**



- **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.

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
Measurement/Calculation	00H: measurement, 80H: calculation
Channel	01 to 60
Alarm status A1 (Bits 0 to 3)	0 to 11*
Alarm status A2 (Bits 4 to 7)	Undefined
Alarm status A3 (Bits 0 to 3)	Undefined
Alarm status A4 (Bits 4 to 7)	Undefined

* A binary value 0 to 11 is entered in the upper and lower 4 bits of a byte (8 bits) for the alarm status. The binary value 0 to 11 correspond to different alarm types, H (high limit alarm), L (low limit alarm, I (window In), and O (window Out) as follows:
0: no alarm, 1: H, 2: L, 10: I, and 11: O

- **Special Data Values**

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

Special Data Value	Measured Data	Math Data
+Over	7FFFH	7FFF7FFFH
–Over	8001H	80018001H
Skip (OFF)	8002H	80028002H
Error	8004H	80048004H
Undefined	8005H	80058005H

Note

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

Manual Sampled Data

- The ME or MO command is used to output the data.
- The ID number of the output format is 4.
- The data format is shown below.

Setup data	MODEL,XL100,T004 VERSION,1.00 . . TEMP_UNIT,degC
Blank line	
Data header	DATE,TIME,CH01,CH02, ·····
Unit header	,,V,V,V,V,V,degC, ·····
Measured data	2005/03/27,14:30:00,0.000 ···· 2005/03/27,14:31:00,0.000 ···· . . .

Screen Image Data

The screen image data is output to a bitmap file in BMP format.

RS-485 and USB Communication Dedicated Syntax

The following table shows dedicated commands for the RS-485 interface and their responses when Yokogawa Meters & Instruments proprietary protocol is specified.

Command Syntax	Meaning	Response
<ESC>O<SPC>xx*<CRLF>*	Open the device	• Response from the device with the specified address <ESC>O<SPC>xx*<CRLF>* • Response when the device with the specified address does not exist* None
<ESC>C<SPC>xx*<CRLF>*	Close the device.	• Response from the device with the specified address <ESC>C<SPC>xx*<CRLF>* • Response when the device with the specified address does not exist* None

* 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.

Note

- **<ESC> denotes ASCII code 1BH.**
- **<CRLF> denotes ASCII codes 0DH and 0AH.**
- **<SPC> denotes a space and its ASCII code is 20H.**
- **xx indicates the device address. An address in the range of 01 to 99 can be specified here.**

- Only one device can be opened at any one 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.

5.3 A List of Commands

Setting Commands

Type	Command	Function	Usable State	Administrator	User	Page
Setting						
	SR	Sets the input range and span.	Logging stopped/Logging*	Yes	No	5-25
	SO	Sets the differential calculation.	Logging stopped/Logging*	Yes	No	5-26
	SA	Sets the alarm.	Logging stopped	Yes	No	5-27
	SD	Sets the date and time.	Logging stopped	Yes	No	5-27
	SW	Sets the sampling interval.	Logging stopped	Yes	No	5-27
	SZ	Reserved				
	SP	Reserved				
	ST	Sets the tag.	Logging stopped	Yes	No	5-28
	SX	Sets the group.	Logging stopped	Yes	No	5-28
	SL	Sets the alarm line	All	Yes	No	5-28
	SG	Reserved				
	SH	Reserved				
	SE	Sets the background color, waveform line width, and alarm line width.	All	Yes	No	5-28
	SB	Sets the base position of the bar graph display.	All	Yes	No	5-28
	SV	Sets the average.	Logging stopped	Yes	No	5-28
	SF	Reserved				
	SC	Sets the channel color and waveform line width.	All	Yes	No	5-29
	SQ	Sets the backlight auto save of the display.	All	Yes	No	5-29
	SY	Reserved				
	SU	Reserved				
	SK	Reserved				
	SI	Reserved				
	SJ	Reserved				
	FR	Reserved				
	BA	Reserved				
	BB	Reserved				
	BC	Reserved				
	BD	Sets the alarm delay.	Logging stopped	Yes	No	5-29
	BY	Sets automated measurement and beep sound.	Logging stopped	Yes	No	5-29

* Only a portion of the parameters such as the span settings can be changed while logging. Yes: Command usable No: Command not usable

Note

- **The operation of the XL100 can be divided into two states, logging stopped state and logging state. The logging stopped state includes Free Running Mode, File Operation Mode, Setting Mode, and Review Mode. The logging state includes Logging Mode and Logging & Review Mode.**

  A syntax error will occur if you attempt to execute a command in the wrong operation state. If this happens, stop the logging operation with the PS command to switch to the Free Running state, and then execute the command. Query commands can be executed regardless of the operation state.
- **Logging stopped state**

  The settings can be changed in this state.
- **Logging state**

  As a general rule, commands other than those used in the logging stopped state are used in this state.
- **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 2.7.

Type	Command	Function	Usable State	Administrator	User	Page
Control						
	UD	Switches the display.	All	Yes	No	5-30
	PS	Starts/Stops logging.	All	Yes	No	5-30
	AK	Confirms the alarm status (alarm acknowledge).	All	Yes	No	5-30
	EV	Saves the manual sampled or screen image data to the external storage medium.	Logging stopped	Yes	No	5-30
	MS	Reserved				
	TL	Reserved				
	DS	Reserved				
	LO	Loads the setting data.	Logging stopped	Yes	No	5-30
	LI	Saves the setting data.	Logging stopped	Yes	No	5-30
	CM	Sets the communication input data.	Logging stopped	Yes	No	5-30
	EM	Starts/Stops e-mail messages.	All	Yes	No	5-31
	KE	Key operation command	All	Yes	No	5-31
			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 basic settings must be saved using the XE command. Be sure to save the settings with the XE command before starting the logging operation from a logging stopped state. If you do not, the settings before the change are activated.
- The settings that are returned in response to a query while logging is stopped will contain the new settings even if they are not saved with the XE command. However, the new settings will not be activated until they are saved. In order to activate the new settings, the XE command must be issued as described earlier. If you discard the settings with the XE command or start the logging operation from a logging stopped state before saving the settings with the XE command, the settings that are returned in response to a query are those before the change.

Type	Command	Function	Usable State	Administrator	User	Page
Setting						
	XA	Sets the alarm.	Logging stopped	Yes	No	5-31
	XI	Reserved				
	XB	Burnout (query only)	All	Yes	Yes	5-31
	XJ	RJC (query only)	All	Yes	Yes	5-32
	XV	Sets the sampling interval.	Logging stopped	Yes	No	5-32
	XS	Reserved				
	XM	Reserved				
	XU	Sets the language.	Logging stopped	Yes	No	5-32
	XR	Reserved				
	XQ	Reserved				
	RO	Reserved				
	RM	Reserved				
	XD	Sets the external storage medium.	Logging stopped	Yes	No	5-32
	XO	Selects the communication method.	Logging stopped	Yes	No	5-32
	XT	Selects the trigger.	Logging stopped	Yes	No	5-32
	XK	Selects the start trigger.	Logging stopped	Yes	No	5-32
	XL	Selects the end trigger.	Logging stopped	Yes	No	5-33
	XH	Sets the key login and auto logout functions.	Logging stopped	Yes	No	5-34
	XE	Sets whether or not to store the basic settings.	Logging stopped	Yes	No	5-34
	XG	Sets the time zone.	Logging stopped	Yes	No	5-34
	XP	Reserved				
	XY	Sets the statistical calculation.	Logging stopped	Yes	No	5-34
	YA	Sets the IP address, subnet mask, and default gateway.	Logging stopped	Yes	No	5-34
	YB	Shows the IPV6 settings (query only).	Logging stopped	Yes	Yes	5-34
	YK	Sets the keepalive.	Logging stopped	Yes	No	5-34
	YN	Sets the DNS.	Logging stopped	Yes	No	5-35
	YE	Sets the SNTP (time synchronization function).	Logging stopped	Yes	No	5-35
	YQ	Sets the communication timeout.	Logging stopped	Yes	No	5-35
	YS	Sets the serial interface.	Logging stopped	Yes	No	5-35
	YO	Loads the setting data.		Yes	No	5-36
	YI	Saves the setting data.	Logging stopped	Yes	No	5-36
	YC	Resets the system (clears the measured/calculated data and initializes the setting data) .	Logging stopped	Yes	No	5-36
	YT	Sets the FTP transfer timing.	Logging stopped	Yes	No	5-36
	YG	Sets whether to use the Web server function.	Logging stopped	Yes	No	5-36
	YL	Sets the operation of the Modbus master function.	Logging stopped	Yes	No	5-36
	YM	Sets the command of the Modbus master function.	Logging stopped	Yes	No	5-36
			Yes: Command usable	No: Command not usable		

Type	Command	Function	Usable State	Administrator	User	Page
Basic settings						
	YU	Sets the contents to be sent via e-mail.	Logging stopped	Yes	No	5-37
	YV	Sets the e-mail recipient address.	Logging stopped	Yes	No	5-38
	YW	Sets the e-mail sender address.	Logging stopped	Yes	No	5-38
	YX	Sets the e-mail SMTP server name.	Logging stopped	Yes	No	5-38
			Yes: Command usable	No: Command not usable		

Output Commands

Type	Command	Function	Usable State	Administrator	User	Page
Control						
	BO	Sets the byte output order.	All	Yes	Yes	5-38
	CS	Sets the check sum. (can be used only during serial communication)	All	Yes	Yes	5-38
	IF	Sets the status filter.	All	Yes	Yes	5-38
	CC	Disconnects Ethernet connection.	All	Yes	Yes	5-38
	ID	Outputs the system data.	All	Yes	Yes	5-39
Setting, measurement, and control data output						
	FC	Outputs the screen image data.	Logging stopped	Yes	Yes	5-39
	FE	Outputs the setting data.	Logging stopped	Yes	Yes	5-39
	FD	Outputs the most recent measured/calculated data.	All	Yes	Yes	5-40
	FF	Reserved				
	FL	Outputs the log and alarm summary.	All	Yes	Yes	5-40
	IS	Outputs status information.	All	Yes	Yes	5-40
	FU	Outputs the user level	All	Yes	Yes	5-40
	ME	Outputs the data saved to the external storage medium (can be used with Ethernet or serial communication).	Logging stopped	Yes	No	5-40
	MI	Reserved				
	MO	Reserved				
RS-485 and USB dedicated commands						
	Esc O	Opens the device.	All	Yes	Yes	5-41
	Esc C	Closes the device.	All	Yes	Yes	5-41
			Yes: Command usable	No: Command not usable		

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

Type	Command	Function	Administrator	User	Page
Maintenance/Test					
	close	Disconnects the connection between other devices	Yes	No	5-42
	con	Outputs connection information.	Yes	Yes	5-42
	eth	Outputs Ethernet statistical information.	Yes	Yes	5-42
	help	Outputs help.	Yes	Yes	5-42
	net	Outputs network statistical information.	Yes	Yes	5-42
	quit	Disconnects the connection of the device being operated.	Yes	Yes	5-43
			Yes: Command usable	No: Command not usable	

5.4 Input Range Parameters

The following tables show which input ranges of the instrument correspond to the channel modes of the SR command (input range setting command), VOLT, TC, RTD, pulse, and logic. The tables also show the ranges for the upper and lower limits of the span.

- **DC voltage (VOLT)**

Input Range	Range Parameter of the SR Command	Selectable Range of Span Upper and Lower Limits of the Input Range	Range of Span Parameter of the SR Command
100 mV	100mV	-100.00 to 100.00 mV	-10000 to 10000
500 mV	500mV	-500.0 to 500.0 mV	-5000 to 5000
1 V	1V	-1.0000 to 1.0000 V	-10000 to 10000
5 V	5V	-5.000 to 5.000 V	-5000 to 5000
10 V	10V	-10.000 to 10.000 V	-10000 to 10000
30 V	30V	-30.00 to 30.00 V	-3000 to 3000
1-5 V	1-5V	1.000 to 5.000 V	1000 to 5000

- **Thermocouple (TC)**

Input Range	Range Parameter of the SR Command	Selectable Range of Span Upper and Lower Limits of the Input Range	Range of Span Parameter of the SR Command
R	R	0.0 to 1768°C	0 to 1768
S	S	0.0 to 1768°C	0 to 1768
B	B	600 to 1800°C	600 to 1800
K	K	-200.0 to 1372.0°C	-2000 to 13720
E	E	-200.0 to 1000.0°C	-2000 to 10000
J	J	-200.0 to 1200.0°C	-2000 to 12000
T	T	-200.0 to 400.0°C	-2000 to 4000
N	N	0.0 to 1300.0°C	0 to 13000
W	W	0 to 2315°C	0 to 2315
L	L	-200.0 to 900.0°C	-2000 to 9000
U	U	-200.0 to 400.0°C	-2000 to 4000

- **RTD**

Input Range	Range Parameter of the SR Command	Selectable Range of Span Upper and Lower Limits of the Input Range	Range of Span Parameter of the SR Command
Pt100	PT	-200.0 to 850.0°C	-2000 to 8500
JPt100	JPT	-200.0 to 500.0°C	-2000 to 5000

- **Logic**

Input Range	Range Parameter of the SR Command	Selectable Range of Span Upper and Lower Limits of the Input Range	Range of Span Parameter of the SR Command
None	NONE	0 or 1	0 or 1

- **Pulse**

Input Range	Range Parameter of the SR Command of the Input Range	Selectable Range of Span Upper and Lower Limits	Range of Span Parameter of the SR Command
Instantaneous			
None	NONE	0.000 to 50.000	0 to 50000
Integrated value			
50 Kc	50KC	0.000 to 50.000	0 to 50000
500 Kc	500KC	0.00 to 500.00	0 to 50000
5 Mc	5MC	0.0000 to 5.0000	0 to 50000
50 Mc	50MC	0.000 to 50.000	0 to 50000
500 Mc	500MC	0.00 to 500.00	0 to 50000
Number of revolutions			
500 rpm	500RPM	0 to 500	0 to 500
5 krpm	5KRPM	0 to 5.000	0 to 5000
50 krpm	50KRPM	0.000 to 50.000	0 to 50000
500 krpm	500KRPM	0.00 to 500.00	0 to 50000

- **Calculation Channels and Communication Channels**

Input Range	Range Parameter of the SR Command	Selectable Range of Span Upper and Lower Limits of the Input Range	Range of Span Parameter of the SR Command
None	NONE	-99999 to 99999	-99999 to 99999

5.5 Setting Commands (Setting)

SR Sets the input range

When setting the channel to skip

Syntax `SR p1,p2<terminator>`

`p1` Channel number

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Pulse CH	`PL01`	
Logic CH	`DI01`, `DI02`	
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	

`p2` Channel mode `SKIP`

Query `SR[ p1]?`

Example Set channel 01 to OFF (SKIP).

```
SR 01,SKIP
```

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

When setting the channel to voltage, thermocouple, RTD, pulse input, calculation channel, or communication channel without scaling

Syntax `SR p1,p2,p3,p4,p5<terminator>`

`p1` Channel number

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Pulse CH	`PL01`	
Logic CH	`DI01`, `DI02`	
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	

`p2` Input type

DC voltage:	`VOLT`
Thermocouple:	`TC`
RTD:	`RTD`
None:	`NONE`

`p3` Input Range

`p4` Span lower limit

`p5` Span upper limit

Query `SR[ p1]?`

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

```
SR 01,TC,R,0,17600
```

Description
- Only span parameters p4 and p5 can be specified while logging is in progress.
- Set parameters p3, p4, and p5 according to the tables in section 5.4, “Input Range Parameters.”
- For parameters p4 and p6, enter a value using 5 digits or less excluding the decimal point. The decimal position is fixed to the position indicated in the tables in section 5.4, “Input Range Parameters.”
- Select “None” for parameter p2 for pulse CH, logic CH, calculation CH, and communication CH.

When calculating the difference between channels (no scaling)

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

`p1` Channel number

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	

`p2` Setting type `DELTA`

`p3` Input type

DC voltage:	`VOLT`
Thermocouple:	`TC`
RTD:	`RTD`
None:	`NONE`

`p4` Input Range

`p5` Span lower limit

`p6` Span upper limit

`p7` Reference channel

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	
Constant	–9.9999E+29 to 1.0000E – 30,0,1.0000E – 30 to 9.9999E+29	

Query `SR[ p1]?`

Example Set the channel 10 setting type to differential calculation with respect to channel 01 (reference channel), the input type to TC, the input range to R, the span lower limit to 10.0°C, and the span lower limit to 100.0°C.

```
SR 10,DELTA,TC,R,100,1000,01
```

Description
- Only span parameters p5 and p6 can be specified while logging is in progress.
- Set parameters p4, p5, and p6 according to the tables section 5.4, “Input Range Parameters.”
- For parameters p5 and p6, enter a value using 5 digits or less excluding the decimal point. The decimal position is fixed to the position indicated in the tables in section 5.4, “Input Range Parameters.”

When setting the channel to voltage, thermocouple, RTD, pulse input, calculation channel, or communication channel with scaling

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

p1 Channel number

Analog CH 8-CH input: 01 to 08

16-CH input: 01 to 16

Pulse CH PL01

Logic CH DI01, DI02

Calc. CH CA01 to CA32

Comm. CH CO01 to CO32

p2 Setting type SCALE

p3 Input type

DC voltage: VOLT

Thermocouple: TC

RTD: RTD

None: NONE

p4 Input range

p5 Span lower limit

p6 Span upper limit

p7 CH other than communication CH

Scaling lower limit: –30000 to 30000

Comm. CH

Span decimal place

x.xxxx: 0

xx.xxx: 1

xxx.xx: 2

xxxx.x: 3

xxxxx: 4

p8 CH other than communication CH

Scaling lower limit: –30000 to 30000

Comm. CH

Scaling factor: –99999 to 99999

p9 Scaling decimal place

x.xxxx: 0

xx.xxx: 1

xxx.xx: 2

xxxx.x: 3

xxxxx: 4

p10 Unit (up to 6 characters)

Query SR[p1]?

Example Convert the DC voltage measured on channel 02 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 scale lower limit to 1.00 A, and the scale upper limit to 5.00 A.

SR 02,SCALE,VOLT,6V,1000,5000,100, 500,2,A

Description
- Only span parameters p5 and p6 can be specified while logging is in progress.
- Set parameters p4, p5, and p6 according to the tables in section 5.4, “Input Range Parameters.”
- For parameters p5 and p6, enter a value using 5 digits or less excluding the decimal point. The decimal position is fixed to the position indicated in the tables in section 5.4, “Input Range Parameters.”
- For parameters p7, p8, and p9, either set all three parameters or omit all three parameters when the channel is not set to communication channel.

SO Sets the calculating equation

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

p1 Calculation channel number CA01 to CA32

31 to 42(*)

p2 Calculation ON/OFF ON, OFF

p3 Calculating equation (up to 40 characters, differential calculation only)

p4 Span lower limit –9999999 to 99999999

p5 Span upper limit –9999999 to 99999999

p6 Span decimal place

x.xxxx: 0

xx.xxx: 1

xxx.xx: 2

xxxx.x: 3

xxxxx: 4

p7 Unit (up to 6 characters)

Query SO[p1]?

Example Set the calculation channel to 31, the calculation to ON, the calculating equation to “the sum of channel 01 and 02”, the span lower limit to –10.0000, the span upper limit to 15.0000, and the unit to V.

SO 31,ON,01+02,–100000,150000,4,V

Description
- Only span parameters p4 and p5 can be specified while logging is in progress.
- 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.
- Setting parameter p1 to 31 to 42 is equivalent to specifying CA21 to CA32.
- The parameters that can be used in the equation of p3 are as follows.

8-CH input: CH01 to CH08

16- CH input: CH01 to CH16

Calc. CH: CA01 to CA32

Comm. CH: CO01 to CO32

Constant: –9.9999E+29 to – 1.0000E –30,
0,
1.0000E–30 to 9.9999E+ 29

SA Sets the alarm

When not using the alarm

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

`p1` Channel number

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Pulse CH	`PL01`	
Logic CH	`DI01`, `DI02`	
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	

`p2` Alarm number `1`

`p3` Alarm ON/OFF `OFF`

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

Example Turn OFF alarm number 1 of channel 10.

```
SA 10,1,OFF
```

Description This command cannot be issued while logging is in progress.

When using the alarm

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

`p1` Channel number

Analog CH	8-CH input:	`01` to `08`
	16-CH input:	`01` to `16`
Pulse CH	`PL01`	
Logic CH	`DI01`, `DI02`	
Calc. CH	`CA01` to `CA32`	
Comm. CH	`CO01` to `CO32`	

`p2` Alarm number `1`

`p3` Alarm ON/OFF `ON`

`p4` Alarm type

High limit alarm: `H`
Low limit alarm: `L`
Window IN: `I`
Window OUT: `O`
Reserved `h`, `l`, `R`, `r`, `T`, and `t`
(Characters are case-sensitive.)

`p5` Alarm value `1`

`p6` Relay setting

Relay ON: `ON`
Relay OFF: `OFF`

`p7` Alarm output number `101` to `104`

`p8` Alarm value 2

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

Example Set a high limit alarm (alarm value = 1000) in alarm number 1 of channel 02, and activate relay number 1 when an alarm occurs.

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

Description
- This command cannot be issued while logging is in progress.
- When the input range setting (SR command) is set to OFF, p3 cannot be turned ON.
- All alarm settings are 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 calculating equation is changed or the span value is changed for a calculation channel (CA01 to CA32).
- For the range of alarm values of p5, see the tables in section 5.4, “Input Range Parameters.”
- Set the alarm value of a calculation channel (CA01 to CA32) within the range of the span.
- For the alarm values of p5 and p6, enter a value using 5 digits or less, excluding the decimal. For calculation channels (CA01 to CA32), enter a value using 5 digits or less, excluding the decimal.

SD Sets the data and time

Syntax `SD p1,p2<terminator>`

`p1` Date (YY/MM/DD fixed form)

YY (year):	`00` to `99`
MM (month):	`01` to `12`
DD (day):	`01` to `31`

`p2` Time (HH/MM/SS fixed form)

HH (hour):	`00` to `23`
MM (min):	`00` to `59`
SS (s):	`00` to `59`

Query `SD?`

Example Set the internal clock to 13:00:00, October 1, 2005.

```
SD 05/10/01,13:00:00
```

Description
- The form of p1 and p2 is fixed to 8 characters. Use the following form. Do not enter spaces 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)
- This command cannot be issued while logging is in progress.

SW Sets the sampling interval

Syntax `SW p1,p2<terminator>`

`p1` Sampling Interval

For 8 ch input:
`100ms`, `200ms`, `500ms`, `1s`, `2s`, `5s`, `10s`, `20s`, `30s`, `1min`, `2min`, `5min`, `10min`, `20min`, `30min`, `60min`, or `1h`

For 16 ch input:
`200ms`, `500ms`, `1s`, `2s`, `5s`, `10s`, `20s`, `30s`, `1min`, `2min`, `5min`, `10min`, `20min`, `30min`, `60min`, or `1h`

`p2` Reserved

Query `SW?`

Example Sets the sampling interval to 10 s.

```
SW 10S
```

Description
- This command cannot be issued while logging is in progress.
- Parameter p2 is undefined.

ST Sets the tag

Syntax `ST p1,p2<terminator>`
- `p1` Channel number
  - Analog CH 8-CH input: `01` to `08`
  - 16-CH input: `01` to `16`
  - Pulse CH `PL01`
  - Logic CH `DI01`, `DI02`
  - Calc. CH `CA01` to `CA32`
  - Comm. CH `CO01` to `CO32`
- `p2` Tag (up to 16 characters)

Query `ST[ p1]?`

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

Description
- This command cannot be issued while logging is in progress.
- For the characters that can be used for the tags, see appendix 1, “ASCII Character Codes.” Note that semicolons and commas cannot be used.

SX Sets the group

Syntax `SX p1,p2,p3<terminator>`
- `p1` Group number `1` to `4`
- `p2` Group name (up to 16 characters)
- `p3` Channel configuration (up to eight channels from below)
  - Analog CH 8-CH input: `01` to `08`
  - 16-CH input: `01` to `16`
  - Pulse CH `PL01`
  - Logic CH `DI01`, `DI02`
  - Calc. CH `CA01` to `CA32`
  - Comm. CH `CO01` to `CO32`

Query `SX[ p1]?`

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

Description
- This command cannot be issued while logging is in progress.
- Alphanumeric characters can be used for the group name.

SL Sets the alarm line

Syntax `SL p1,p2,p3,p4,p5<terminator>`
- `p1` Reserved
- `p2` Reserved
- `p3` Alarm line display ON/OFF `ON`, `OFF`
- `p4` Reserved
- `p5` Display Color
  `RED`, `GREEN`, `BLUE`, `B.VIOLET`, `BROWN`, `ORANGE`, `Y.GREEN`, `LIGHTBLUE`, `VIOLET`, `GRAY`, `LIME`, `CYAN` (blue green), `DARKBLUE`, `YELLOW`, `LIGHTGRAY` (olive), `PURPLE`

Query `SL[ p1[,p2]]?`

Example Display the alarm line in red for group 1.
`SL ,,ON,,RED`

Description Parameters p1, p2, and p4 are not used.

SE Sets the background color, waveform line width, and alarm line width

Syntax `SE p1,p2,p3,p4,p5,p6,p7,p8<terminator>`
- `p1` Reserved
- `p2` Reserved
- `p3` Background color `WHITE`, `BLACK`
- `p4` Waveform line width of all channels [dots] `1` to `3`
- `p5` Alarm line width [dots] `1` to `3`
- `p6` Reserved
- `p7` Reserved
- `p8` Reserved

Query `SE?`

Example Set the background color to white, waveform line width to 1 dot, and alarm line width to 2 dots.
`SE ,,WHITE,1,2`

SB Sets the base position of the bar graph display

Syntax `SB p1,p2,p3,p4<terminator>`
- `p1` Reserved
- `p2` Reserved
- `p3` Base position of the bar graph display
  `NORMAL`, `CENTER`, `RIGHT`
- `p4` Reserved

Query `SB[ p1]?`

Example Set the base position of the bar graph display to the left.
`SB ,,NORMAL,`

Description Parameters p1, p2, and p4 are not used.

SV Sets the average

Syntax `SV p1,p2<terminator>`
- `p1` Reserved
- `p2` Number of samples for calculating the moving average
  `OFF`, `1`, `2`, `5`, `10`, or `20`

Query `SV[ p1]?`

Example Set the number of samples for calculating the moving average to 10.
`SV,10`

Description
- This command cannot be issued while logging is in progress.

- If parameter p2 is set in the range of 2 to 20, it is actually set to the closest of the values 1, 2, 5, 10, and 20.
- Parameter p1 is not used.

SC Sets the channel display color and waveform line width

Syntax `SC p1,p2,p3<terminator>`
`p1` Channel number
Analog CH 8-CH input: `01` to `08`
16-CH input: `01` to `16`
Pulse CH `PL01`
Logic CH `DI01`, `DI02`
Calc. CH `CA01` to `CA32`
Comm. CH `CO01` to `CO32`
`p2` Display color
`RED`, `GREEN`, `BLUE`, `B.VIOLET`, `BROWN`, `ORANGE`, `Y.GREEN`, `LIGHTBLUE`, `VIOLET`, `GRAY`, `LIME`, `CYAN` (blue green), `DARKBLUE`, `YELLOW`, `LIGHTGRAY` (olive), `PURPLE`
`p3` Waveform line width [dots] `1` to `3`
Query `SC[ p1]?`
Example Set the channel 02 display color to blue and the waveform line width to 3 dots.
`SC 02,BLUE,3`

SQ Sets the display backlight auto off

When the display backlight auto off function is OFF

Syntax `SQ p1,p2<terminator>`
`p1` Reserved
`p2` Display backlight auto off function
ON: `ON`
OFF: `OFF`
`p3` Reserved
Query `SQ?`
Example Turn the display backlight auto off function OFF.
`SQ ,OFF`
Description Parameter p1 is not used.

When the display backlight auto off function is ON

Syntax `SQ p1,p2,p3,p4<terminator>`
`p1` Reserved
`p2` Display backlight auto off function ON/OFF
`ON`
`p3` Time until turning OFF the backlight
`10S`, `1MIN`, `2MIN`, `5MIN`, `10MIN`, `30MIN`, `60MIN`, or `1H`
`p4` Reserved
Query `SQ?`
Example Turn the display backlight auto off function ON and set the time until the backlight is turned OFF to 1 minute.
SQ ,ON,1MIN
Description Parameter p1 and p4 are not used.

BD Sets the delay sampling count

Syntax `BD p1,p2<terminator>`
`p1` Reserved
`p2` Delay sampling count [s] `1` to `3600`
Query `BD[ p1]?`
Example Set the delay sampling count to 120 s.
`BD ,120`
Description Parameter p1 is not used.

BY Sets the automated measurement and beep sound.

Syntax `BY p1,p2<terminator>`
`p1` Auto measurement OFF: `OFF`
Auto measurement ON: `ON`
`p2` Beep sound OFF: `OFF`
Beep sound ON: `ON`
Query `BY?`
Example Turn the automated measurement and beep sound OFF.
`BY ON,OFF`
Description This command cannot be issued while logging is in progress.

5.6 Setting Commands (Control)

UD Switches the display

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

Syntax `UD p1<terminator>`
`p1` Display switching 0

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

When switching the display using communication commands

Syntax `UD p1,p2,p3<terminator>`
`p1` Display switching 1
`p2` Display item
Waveform & digital display: `TREND`
Digital display: `DIGITAL`
Bar graph display: `BAR`
Alarm summary display: `ALARM`
Review display: `REVIEW`
Reserved: `OVERVIEW`
`p3` Group number 1 to 4

Example Set the display to waveform & digital, and set the number of the group to be displayed to 4.
`UD 1,TREND,4`

PS Starts/Stops logging

Syntax `PS p1<terminator>`
`p1` Logging start/stop
Start: 0
Stop: 1

Example Start logging.
`PS 0`

Description If the logging start trigger is set to manual and logging does not start immediately, the GS610 enters logging standby until the trigger condition is met.

AK Acknowledges the alarm status (alarm acknowledge)

Syntax `AK p1<terminator>`
`p1` Execute alarm acknowledge 0

Example Confirm the current hold condition of the alarm (execute alarm acknowledge).
`AK 0`

EV Saves manual sampled data and screen image data to the external storage medium

Syntax `EV p1<terminator>`
`p1` Operation type
Saves manual sampled data to the external storage medium: 0
Saves screen image data to the external storage medium: 2
Reserved: 1, 3, 4

Example Save manual sampled data to the external storage medium.
`EV 1`

Description
- Data cannot be saved while logging.
- 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.

LO Loads the setup data

Syntax `LO p1<terminator>`
`p1` File name (up to 8 characters)

Example Load the setting data of setting commands from the setup file SETFILE1 (.pnl extension).
`LO SETFILE1`

Description
- This command is the same as the YO command. To apply the functions of the basic setting commands, the settings must be saved using the XE command.
- This command can be issued only when the external storage medium is specified and the external storage medium is inserted.

LI Saves the setting data

Syntax `LI p1<terminator>`
`p1` File name (up to 8 characters)

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

Description
- A ".set" extension is attached to the saved file. This command is equivalent to the YI command.
- The settings are not saved with this command if an external storage media error occurs such as the external storage medium not inserted at the save destination.

CM Sets the communication input data

Syntax `CM p1,p2<terminator>`
`p1` Communication input data number
`C01` to `C32` (same as CO01 to CO32)
`CO01` to `CO32`
`p2` Communication input data
Selectable range: `-9.9999E+29` to `-1.0000E-30`, `0`, `1.0000E-30` to `9.9999E+29`
(The + sign of "E+" can be omitted.)

Query `CM?`

Example Set 1.0000E-10 to communication input data number CO01.
CM CO01,1.0000E-10

EM Starts/stops the e-mail transmission function

Syntax M p1<terminator>
p1 Operation type
Start: 0
Stop: 1

Example Start the e-mail transmission function.
EM 0

Description To use the e-mail transmission function, you must set the Ethernet interface, e-mail address, and contents to be transmitted. For the procedure to set each item, see section 2.11 “Setting the E-mail Transmission function”.

KE Key operation command

Syntax KE p1<terminator>
p1 Key type

ESC key:	ESC
HOME key:	HOME
REVIEW key:	REVIEW
FILE key:	FILE
SETTING key:	SETTING
HOLD key:	HOLD
TIME/DIV left key:	TIMEDIVSHORT
TIME/DIV right key:	TIMEDIVLONG
RANGE key:	RANGE
SAVE key:	SAVE
DISPLAY key:	DISP
GROUP key:	GROUP
MARK key:	MARK
MARK left key:	MARKLEFT
MARK right key:	MARKRIGHT
SET key:	SET
START/STOP key:	STARTSTOP
HOLD key:	HOLD
Up arrow key:	UP
Down arrow key:	DOWN
Right arrow key:	RIGHT
Left arrow key:	LEFT
SELECT key:	SELECT

Example Press the DISPLAY key.
KE DISP

Description Operates in the same fashion as the key operation on the XL100. For consecutive key operations, transmit the commands in the same order as the key operation on the XL100.

5.7 Basic Setting Commands

- In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command.
  The settings that are returned in response to a query after issuing a basic setting command are the new settings even if the settings have not been saved with the XE command. However, the new settings only take effect after saving the settings using the XE command.
  If you discard the settings with the XE command or start the logging operation before saving the settings with the XE command, the settings that are returned in response to a query are reset to those before the change.
- Basic setting commands cannot be used to change settings while logging is in progress.

XA Sets the alarm

Syntax XA
p1,p2,p3,p4,p5,p6,p7,p8,p9<terminator>
p1 Reserved
p2 Output number to be set to AND

For all ORs:	NONE
Independent setting:	I01, I02, I03, or I04
Range setting:	Ixx-Ixy (Ixx,Ixy: I01 to I04)

p3 Reserved
p4 Output hold/non-hold

Hold:	HOLD
Non-hold:	NONHOLD

p5 Hold/Not hold the alarm status display

Hold:	HOLD
Non-hold:	NONHOLD

p6 Reserved
p7 Reserved
p8 Alarm hysteresis ON/OFF: ON or OFF
p9 Alarm buzzer ON/OFF: ON, OFF

Query XA?

Example Set output numbers I01 to I04 to AND, hold the output, hold the alarm status display, turn the alarm hysteresis ON, and turn the alarm buzzer ON.
XA ,I01-I12,HOLD,HOLD,,,ON,ON

Description Parameters p1, p3, p6, and p7 are not used.

XB Burnout setting (query only)

Syntax XB p1,p2<terminator>
p1 Reserved (NULL)
p2 Burnout procedure UP

Query XB[p1]?
Description Only a query is available for this command.

XJ RJC setting (query only)

Syntax XJ p1,p2<terminator>
p1 Channel number
For 8 ch input: 01 to 08
For 16 ch input: 01 to 16
p2 Reference junction compensation selection
INTERNAL
Query XJ[p1]?
Example Only a query is available for this command.

XV Sets the sampling interval

Syntax XV p1<terminator>
p1 Sampling Interval
For 8 ch input:
100, 200, 500ms, 1, 2, 5, 10, 20, 30s, 1, 2, 5, 10, 20, 30min, 60min, 1h
For 16 ch input:
200, 500ms, 1, 2, 5, 10, 20, 30s, 1, 2, 5, 10, 20, 30min, 60min, 1h
Query XV?
Example Set the sampling interval to 1 s.
XV 1S
Description This command is the same as the SW setting command.

XU Sets the language

Syntax XU p1,p2,p3,p4,p5<terminator>
p1 Reserved
p2 Reserved
p3 English: ENGLISH
Japanese: JAPANESE
p4 Reserved
p5 Reserved
Query XU?
Example Set the language to Japanese.
XU ,,JAPANESE
Description Parameters p1, p2, p4, and p5 are undefined.

XD Sets the external storage medium.

Syntax XD p1 <terminator>
p1 External storage media
Internal memory: 0
CF card: 1
SD card: 2
USB memory: 3
Query XD 1
Example Set the data save and load destination to the CF card.
XD 1

XO Selects the communication method

When switching to Ethernet communications

Syntax XO p1<terminator>
p1 ETHERNET Ethernet communications
Query XO?
Example Set the communication method to Ethernet.
XO ETHERNET

When switching to serial communications (RS-232, RS-485, or USB)

Syntax XO p1,p2<terminator>
p1 SERIAL Serial communications
p2 Serial communication type
RS232, RS485, or USB
Query XO?
Example Set the communication method to RS-232.
XO SERIAL,RS232

XT Selects the trigger

Syntax XT p1,p2<terminator>
p1 Trigger mode
Single: 0
Continuous: 1
p2 Normal trigger, pre-trigger, and delay trigger setting
Normal: 0
Pre-trigger: 1
Delay trigger: 2
p3 Pre-trigger or delay trigger count
0 to 600
Query XT?
Example Set the trigger to single and the pre-trigger count to 10.
XT 0,1,10

XK Selects the start trigger

When setting the start trigger to OFF

Syntax XK p1 <terminator>
p1 Start trigger type
None: 0
Query XK?
Example Set the start trigger to none.
XK 0

When setting the start trigger to external input

Syntax XK p1<terminator>
p1 Start trigger type
External input: 1
Query XK?
Example Set the start trigger to external input.
XK 1

When setting the start trigger to analog input level

Syntax XK p1,p2,p3,p4,p5 <terminator>
p1 Start trigger type
Analog input level: 2
p2 Analog channel to be used as the start trigger

For 8 ch input: 01 to 08
For 16 ch input: 01 to 16
p3 Start trigger level type
High limit trigger: H
Low limit trigger: L
Window IN: I
Window OUT: O
p4 High limit value -99999 to 99999
p5 Low limit value -99999 to 99999

Query XK?

Example Set the start trigger to Window IN of analog input CH3, and set the high and low limits to 2000 and 1000, respectively.
XK 2,03,I,2000,1000

Description Set the high and low limits using a five-digit integer without a decimal point. The decimal place is the same as the span and scale settings of the analog input channel.
Be sure to set the high limit greater than or equal to the low limit.

When setting the start trigger to an alarm

Syntax XT p1,p2<terminator>
p1 Start trigger type
Alarm: 3
p2 Alarm output number to be used as the start trigger
1 to 4

Query XK?

Example Set the start trigger to alarm output number 4.
XK 3,4

When setting the start trigger to a specific time

Syntax XK p1,p2,p3
p1 Start trigger type
Time: 4
p2 Start date (YY/MM/DD fixed form)
YY (year): 00 to 99
MM (month): 01 to 12
DD (day): 01 to 31
p3 Start time (HH/MM/SS fixed form)
HH (hour): 00 to 23
MM (min): 00 to 59
SS (s): 00 to 59

Query XK?

Example Set the start trigger to 3:45:6 on January 2, 2006.
XK 4,06/01/02,03:45:06

XL Selects the end trigger

When setting the end trigger to OFF

Syntax XL p1<terminator>
p1 End trigger type
None: 0

Query XL?

Example Set the end trigger to none.
XL 0

When setting the end trigger to external input

Syntax XL p1<terminator>
p1 End trigger type
External input: 1

Query XL?

Example Set the end trigger to external input.
XL 1

When setting the end trigger to analog input level

Syntax XLp1,p2,p3,p4,p5<terminator>
p1 End trigger type
Analog input level: 2
p2 Analog channel to be used as the end trigger
For 8 ch input: 01 to 08
For 16 ch input: 01 to 16
p3 End trigger level type
High limit trigger: H
Low limit trigger: L
Window IN: I
Window OUT :O
p4 High limit value -99999 to 99999
p5 Low limit value -99999 to 99999

Query XL?

Example Set the end trigger to low limit 500 of analog input CH3.
XL 2,03,L,500

Description Set the high and low limits using a five-digit integer without a decimal point. The decimal place is the same as the span and scale settings of the analog input channel.
Be sure to set the high limit greater than or equal to the low limit.

When setting the end trigger to an alarm

Syntax XL p1,p2
p1 End trigger type
Alarm: 3
p2 Alarm output number to be used as the end trigger
1 to 4

Query XL?

Example Set the end trigger to alarm output number 1.
XL 3,1

When setting the end trigger to a specific time

Syntax XL p1,p2,p3
p1 End trigger type
Time: 4
p2 End date (YY/MM/DD fixed form)
YY (year): 00 to 99
MM (month): 01 to 12
DD (day): 01 to 31
p3 End time (HH/MM/SS fixed form)
HH (hour): 00 to 23
MM (min): 00 to 59
SS (s): 00 to 59

Query XK?

Example Set the end trigger to 4:56:7 on February 3, 2030.
XL 4,30:02:03,04:56:07

When setting the end trigger to a timer

Syntax XL p1,p2

p1 End trigger type
Timer: 5
p2 End timer (s)
1 to 31622400

Query XL?

Example Set the end trigger to a 600-s timer.
XL 5,600

XH Sets the key login and auto logout functions

Syntax XH p1,p2,p3<terminator>
p1 Key login function
Enable: USE
Disable: NOT
p2 Timeout function
Enable: USE
Disable: NOT
p3 Reserved

Query XH?

Example Enable the key login and auto logout functions.
XH USE,ON,

Description Parameter p3 is not used.

XE Sets whether to save or discard the settings specified by a basic setting command

Syntax XE p1<terminator>
p1 Save or discard settings
Save: STORE
Discard: ABORT

Example Save the settings of the basic setting command.
XE STORE

Description In order to activate the settings that are changed using the basic setting commands, the settings must be saved using the XE command. If you do not, the settings before the change are activated if logging is started.

XG Sets the time zone

Syntax XG p1<terminator>
p1Offset time from the Greenwich Mean Time
-1200 to 1200
Upper two digits (hour): 00 to 12
Lower two digits (minutes): Fixed to 00

Example Set the offset time from the GMT to 9 hours ahead.
XG 0900

XY Sets the statistical calculation

Syntax XY p1,p2,p3,p4,p5<terminator>
p1 Calculation of the maximum value
Enable: ON
Disable: OFF
p2 Calculation of the minimum value
Enable: ON
Disable: OFF
p3 Calculation of the average value
Enable: ON
Disable: OFF
p4 Calculation of the peak (P-P) value
Enable: ON
Disable: OFF
p5 Calculation of the rms value
Enable: ON
Disable: OFF

Query XY?

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.
YA 192.168.111.24,255.255.255.0,
0.0.0.0

Description The settings changed with this command are applied when they are saved using the XE command.

YB Queries the IPV6 information

Syntax YB p1,p2,p3<terminator>
p1 Default Gateway
OFF,xxxx::xxxx::xxxx::xxxx%6
p2 Global
OFF,xxxx::xxxx::xxxx::xxxx%6
p3 Site-local
OFF,xxxx::xxxx::xxxx::xxxx%4
p4 Link local
OFF,xxxx::xxxx::xxxx::xxxx%4
p5 6to4
OFF,xxxx::xxxx::xxxx::xxxx%6
p6 Automatic tunnel 1
OFF,xxxx::xxxx::xxxx::xxxx%6
p7 Automatic tunnel 2
OFF,xxxx::xxxx::xxxx::xxxx%6
p8 Automatic tunnel 3
OFF,xxxx::xxxx::xxxx::xxxx%6

Query YB?

YK Sets the keepalive

Syntax YK p1<terminator>
p1 Enable/Disable keepalive
Enable: ON
Disable: OFF

Query YK?

Example Disable keepalive.
YK OFF
Description The setting changed with this command is applied when it is saved using the XE command.

YN Sets the DNS

When not using the DNS

Syntax YNp1<terminator>
p1 Disable DNS OFF
Query YN?
Example Do not use the DNS.
YN OFF
Description The setting changed with this command is applied when it is saved using the XE command.

When using the DNS

Syntax YN p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Enable DNS ON
p2 Address of the primary DNS server
0.0.0.0 to 255.255.255.255
p3 Address of the secondary DNS server
0.0.0.0 to 255.255.255.255
p4 Host name (up to 64 characters)
p5 Domain name (up to 64 characters)
p6 Domain suffix 1 (up to 64 characters)
p7 Domain suffix 2 (up to 64 characters)
Query YN?
Example Use the DNS server at 192.168.0.1.
YN ON,192.168.0.1
Description The settings changed with this command are applied when they are saved using the XE command.

YE Sets the SNTP (time synchronization function)

When not using the SNTP

Syntax YE p1<terminator>
p1 Disable 0
Query YE?
Example Disable SNTP.
YE 0

When using the SNTP

Syntax YE p1,p2,p3<terminator>
p1 Enable 1
p2 Server name (up to 64 alphanumeric characters)
p3 Confirmation time interval (hh) 1 to 24
Query YE?
Example Use the SNTP server named MCC at six-hour intervals.
YE 1,MCC,6

YQ Sets the Ethernet communication timeout

When not using the timeout

Syntax YQ p1<terminator>
p1 Enable/Disable communication timeout
Enable: ON
Disable: OFF
Query YQ?
Example Disable timeout.
YQ OFF
Description The setting changed with this command is applied when it is saved using the XE command.

When using the timeout

Syntax YQ p1,p2<terminator>
p1 Enable/Disable communication timeout
Enable: ON
Disable: OFF
p2 Timeout value (min) 1 to 120
Query YQ?
Example Enable the communication timeout and set the timeout period to 3 min.
YQ ON,3
Description The settings changed with this command are applied when they are saved using the XE command.

YS Sets the serial interface

Syntax YS p1,p2,p3,p4,p5,p6,p7<terminator>
p1 Baud rate [bps]
1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
p2 Data length (number of bits) 7 or 8
p3 Parity check
None: NONE
Odd: ODD
Even: EVEN
p4 Handshaking
OFF: OFF:OFF
XON/XOFF: XON:XON
CS/RS: CS:RS
p5 Protocol
Normal: NORMAL
Modbus RTU (slave): MODBUS
Modbus RTU (master): MODBUS-M
Modbus ASCII (slave): MODBUSASCII
Modbus ASCII (master): MOSBUSASCII-M
p6 Stop bit
1 bit: 1
2 bits: 2
Query YS?
Example Set the baud rate to 9600, the data length to 8, the parity check to ODD, the handshaking to OFF, the protocol to NORMAL, and the stop bit to 1.
YS 9600,8,ODD,OFF:OFF,NORMAL,1

Description
- The settings changed with this command are applied when they are saved using the XE command.
- Parameter p2 (data length) when Modbus RTU is selected is fixed to 8 bits.

YO Loads the setting data

Syntax `YO p1<terminator>`
`p1` File name (up to 8 characters)

Example Load the setting data from the setup file SETFILE1 (.set extension).
`YO SETFILE1`

Description This command can be specified only when an external storage medium is inserted.

YI Saves the setting data

Syntax `YO p1<terminator>`
`p1` File name (up to 8 characters)

Example Save the setting data to a file named SETFILE2.
`YI SETFILE2`

Description
- A ".set" extension is attached to the saved file. This command is equivalent to the LI command.
- This command can be specified only when an external storage medium is inserted.

YC Resets the system (clears the measured/calculated data and initializes the setting data)

Syntax `YC p1<terminator>`
`p1` Type of data to be cleared or initialized
Clear the measured/calculated data and initializes setup data `0`, `1`
Clear the measured/calculated data `2`

Example Clear the measured/calculated data.
`YC 2`

Description
- The measured/calculated data indicates the data residing in the internal memory of the XL100.
- This command cannot be specified while the external storage medium is being formatted.
- The date settings, communication settings, language setting, device address setting, slave device address, and USB ID are not initialized.

YT Sets the FTP transfer timing

Syntax `YT p1,p2<terminator>`
`p1` Auto transfer at the end of logging
`ON` or `OFF`
`p2` Reserved

Query `YT?`

Example Automatically transfer the data files and log file at the end of logging.
`YT ON`

Description Parameter p2 is not used.

YG Enables/Disables the Web server function

Syntax `YG p1<terminator>`
`p1` Web server function enable/disable
Enable: `USE`
Disable: `NOT`

Query `YG?`

Example Use the Web server function.
`YG USE`

Description
- For details on the settings of the Ethernet, the types of Web pages that can be displayed, and access control, see "Web Server" in section 1.2, "Explanation of Functions."
- The settings changed with this command are applied when they are saved using the XE command.

YL Sets the operation of the Modbus master function

Syntax `YL p1,p2,p3<terminator>`
`p1` Read cycle
`125MS`, `250MS`, `500MS`, `1S`, `2S`, `5S`, or `10S`
`p2` Communication timeout value
`25MS`, `250MS`, `500MS`, `1S`, `2S`, `5S`, `10S`, or `1MIN`
`p3` Retrials
`OFF`, `1` to `5`, `10`, or `20`

Query `YL?`

Example Set the read cycle to 500 ms, timeout to 250 ms, and retrials to 2.
`YL 500MS,250MS,2`

Description
- This command is valid when the serial interface protocol is set to "Master." For serial interface settings, see chapter 3, "Serial Interface."
- The settings changed with this command are applied when they are saved using the XE command.

YM Sets the command of the Modbus master function

When not setting a command

Syntax `YM p1,p2<terminator>`
`p1` Registration number `1` to `32`
`p2` Presence or absence of the command
`OFF`

Query `YM[ p1]?`

Example Do not set a command to command registration number 1.
`YM 1,OFF`

When setting a command

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

- `p1` Registration number
  `1` to `32`
- `p2` Presence or absence of the command
  `ON`
- `p3` First channel number
  `C01` to `C30` (corresponds to CO01 to CO30),
  `CO01` to `CO32`
- `p4` Last channel number
  `C01` to `C30` (corresponds to CO01 to CO30),
  `CO01` to `CO32`
- `p5` Slave device address (1 to 247)
- `p6` First register number
  `30001` to `39999`,
  `40001` to `49999`
- `p7` Type of data assigned to the register
  `INT16`, `UINT16`, `INT32_B`, `INT32_L`, `UINT32_B`, `UINT32_L`, `FLOAT_B`, or `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 of the CX2000.

```
YM 2,ON,C02,C02,5,30003,INT32_B
```

Description
- This command is valid when the serial interface protocol is set to “Master.” For serial interface settings, see chapter 3, “Serial Interface.”
- The settings changed with this command are applied when they are saved using the XE command.

YU Sets the contents to be transmitted by 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` Content to be sent `ALARM`
- `p2` Enable/Disable recipient 1 `ON` or `OFF`
- `p3` Enable/Disable recipient 2 `ON` or `OFF`
- `p4` Alarm transmission ON/OFF `ON` or `OFF`
- `p5` Reserved
- `p6` Reserved
- `p7` Reserved
- `p8` Enable/disable attachment of instantaneous data `ON`, `OFF`
- `p9` Enable/disable attachment of source URL `ON` or `OFF`
- `p10` Subject (up to 32 alphanumeric characters)
- `p11` Header 1 (up to 64 alphanumeric characters)
- `p12` Header 2 (up to 64 alphanumeric characters)

Query `YU[ p1]?`

Example Transmit alarms including instantaneous data but not including the source URL to recipient 1. The subject is “ALM”, and the header 1 is “LP2”.

```
YU ALARM,ON,OFF,ON,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` Content to be sent `TIME`
- `p2` Enable/Disable recipient 1 `ON` or `OFF`
- `p3` Interval for sending e-mail to recipient 1
  `1H`, `2H`, `3H`, `4H`, `6H`, `8H`, `12H`, or `24H`
- `p4` Time when sending e-mail to recipient 1
  `HH:MM`
- `p5` Enable/Disable recipient 2 `ON` or `OFF`
- `p6` Interval for sending e-mail to recipient 2
  `1H`, `2H`, `3H`, `4H`, `6H`, `8H`, `12H`, or `24H`
- `p7` Time when sending e-mail to recipient 2
  `HH:MM`
- `p8` Enable/disable attachment of instantaneous data `ON` or `OFF`
- `p9` Enable/disable attachment of source URL
  `ON` or `OFF`
- `p10` Subject (up to 32 alphanumeric characters)
- `p11` Header 1 (up to 64 alphanumeric characters)
- `p12` Header 2 (up to 64 alphanumeric 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”.

```
YU TIME,ON,24H,17:15,OFF,,,OFF,ON,
GOOD,LP2
```

When sending system notifications

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

- `p1` Content to be sent
  `SYSTEM`
- `p2` Enable/Disable recipient 1 `ON` or `OFF`
- `p3` Enable/Disable recipient 2 `ON` or `OFF`
- `p4` Enable/disable attachment of source URL `ON` or `OFF`
- `p5` Subject (up to 32 alphanumeric characters)
- `p6` Header 1 (up to 64 alphanumeric characters)
- `p7` Header 2 (up to 64 alphanumeric characters)

Query `YU[ p1]?`

Example Send system notification e-mail messages including the source URL to recipient 1. The subject is “SystemAlert”, and header 1 is “LP2”.
YU SYSTEM,ON,OFF,ON,SystemAlert,LP2

YV Sets the e-mail transmission recipient address

Syntax `YV p1,p2<terminator>`
`p1` Recipient selection
Recipient 1: `1`
Recipient 2: `2`
`p2` Recipient address (up to 150 alphanumeric characters)
Query `YV[p1]?`
Example Set recipient 1 to “Cont@good.com” and “Adm@good.com”.
`YV 1,Cont@good.com Adm@good.com`
Description
- To set multiple recipients, separate each recipient with a space.
- For e-mail settings, see section 2.11, “Setting the E-mail Transmission Function” and 2.13, “Starting/Stopping E-mail Transmissions.”

YW Sets the e-mail transmission sender address

Syntax `YW p1<terminator>`
`p1` Sender address (up to 64 alphanumeric characters)
Query `YW?`
Example Set the sender address to “XL100.”
`YW XL100`
Description For e-mail settings, see section 2.11, “Setting the E-mail Transmission Function” and 2.13, “Starting/Stopping E-mail Transmissions.”

YX Sets the e-mail SMTP server name

Syntax `YX p1,p2<terminator>`
`p1` SMTP server name (up to 64 alphanumeric characters)
`p2` Port number `0` to `65535`
Query `YX?`
Example Set the SMTP server to “mhs.good.com” and port number to “25”.
`YX mhs.good.com,25`
Description For e-mail settings, see section 2.11, “Setting the E-mail Transmission Function” and 2.13, “Starting/Stopping E-mail Transmissions.”

5.8 Output Commands (Control)

BO Sets the byte output order

Syntax `BO p1<terminator>`
`p1` Byte order
Output the data MSB first: `0`
Output the data LSB first: `1`
Query `BO?`
Example Output the data MSB first.
`BO 0`
Description This command applies to the byte order of numerical data during binary output.

CS Sets the checksum

Syntax `CS p1<terminator>`
`p1` Checksum enable/disable
Disable: `0`
Enable: `1`
Query `CS?`
Example Enable the checksum.
`CS 1`
Description Can be used only during serial communications.

IF Sets the status filter

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

CC Disconnects the Ethernet connection

Syntax `CC p1<terminator>`
`p1` Connection disconnect `0`
Query `IF?`
Example Disconnect the Ethernet connection.
`CC 0`
Description Can be used only during Ethernet communications.

Note

Initialization of BO/CS/IF command settings
- For serial communication
  Settings entered using the BO/CS/IF commands revert to their initial values when the XL100 is reset, when the XL100 is power cycled, or when the XE command is executed normally.
- Byte output order, checksum: 0
- Status filter: 000.000.000.000

If the XL100 is reset, you must reconfigure these settings.
- For Ethernet communications

Settings entered using the BO/IF commands revert to their initial values when the connection to the XL100 is cut. After reconnecting the XL100, you must reconfigure the settings.

ID Outputs the system data (query only)

Syntax `ID p1, p2, p3, p4<terminator>`
- `p1` Maker name `YOKOKGAWA`
- `p2` Model `XL100`
- `p3` XL100 serial number
  16 alphanumeric characters
- `p4` Terminal block serial number
  16 alphanumeric characters
- `p5` Firmware revision
  `Verx.xx`
  (where `x.xx` are alphanumeric characters)

Query `ID?`

Description Parameter p4, the terminal block serial number, is undefined if the terminal block unit is not connected.

5.9 Output Commands (Setting/ Measurement/Data Output)

FC Outputs the screen image data

Syntax `FC p1<terminator>`
- `p1` Screen image data output `GET`

Example Output the screen image data from the XL100.
`FC GET`

Description Captures the current displayed screen on the XL100 and outputs the data in BMP format.

FE Outputs the setting data

Syntax `FE p1,p2,p3,p4,p5,p6,p7,p8,p9,p10, p11<terminator>`
- `p1` Output data type
  Setting data of setting commands: `0`
  Decimal place and unit information: `1`
  Setting data of basic setting commands: `2`
  Reserved: `3`
  Setting data file: `4`
- `p2` First channel number
  For 8 ch input: `01` to `08`,
  For 16 ch input: `01` to `16`
  <Numeric value> `00`(OFF)
- `p3` Last channel number
  For 8 ch input: `01` to `08`,
  For 16 ch input: `01` to `16`
  <Numeric value> `00`(OFF)
- `p4` First pulse measurement channel number:
  `PL01`, `PL00`(OFF)
- `p5` Last pulse measurement channel number:
  `PL01`, `PL00`(OFF)
- `p6` First logic input channel number
  `DI01` to `DI02`, `DI00`(OFF)
- `p7` Last logic input channel number
  `DI01` to `DI02`, `DI00`(OFF)
- `p8` First calculation channel number
  `CA01` to `CA32`, `CA00`(OFF)
- `p9` Last calculation channel number
  `CA01` to `CA32`, `CA00`(OFF)
- `p10` First communication channel number
  `CO01` to `CO32`, `CA00`(OFF)
- `p11` Last communication channel number
  `CO01` to `CO32`, `CA00`(OFF)

Example Get the decimal place and unit for channels 01 to 12 and pulse channel.
`FE 1,01,12,PL01,PL01`

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, p3, p4, p5, p6, p7, p8, p9, p10, and p11 are valid when p1 is set to 0, 1, 2, or 3.

FD Outputs the most recent measured/calculated data

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

`p1` Output data type
- Output the most recent measured/calculated data in ASCII format: `0`
- Output the most recent measured/calculated data in BINARY format: `1`
- Reserved: `4, 5`

`p2` First channel number
- For 8 ch input: `01` to `08`,
- For 16 ch input: `01` to `16`
- <Numeric value> `00`(OFF)

`p3` Last channel number
- For 8 ch input: `01` to `08`,
- For 16 ch input: `01` to `16`
- <Numeric value> `00`(OFF)

`p4` First pulse measurement channel number: `PL01`, `PL00`(OFF)

`p5` Last pulse measurement channel number: `PL01`, `PL00`(OFF)

`p6` First logic input channel number `DI01` to `DI02`, `DI00`(OFF)

`p7` Last logic input channel number `DI01` to `DI02`, `DI00`(OFF)

`p8` First calculation channel number `CA01` to `CA32`, `CA00`(OFF)

`p9` Last calculation channel number `CA01` to `CA32`, `CA00`(OFF)

`p10` First communication channel number `CO01` to `CO32`, `CA00`(OFF)

`p11` Last communication channel number `CO01` to `CO32`, `CA00`(OFF)

Example Output from the XL100 the most recent measurement of channels 1 to 5, pulse measurement data, and logic measurement data 1 and 2 and the calculated data of channels 1 to 5 in ASCII data format.

```
FD 0,01,05,PL01,PL01,DI01,DI02,CA01,
CA05,CO00,CO00
FD 0,01,05
```

Description
- The most recent measured/calculated data corresponds to the most recent measured/calculated data in the internal memory when the XL100 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.

FL Outputs the log and alarm summary

Syntax `FL p1,p2<terminator>`

`p1` Log type
- Communication: `COM`
- FTP client: `FTPC`
- Error message: `ERR`
- Key login: `KEY`
- Web operation: `WEB`
- E-mail: `EMAIL`
- Alarm summary: `ALARM`
- Reserved: `MSG`

`p2` Maximum read length of the log
- When p1 is COM: `1` to `200`
- When p1 is ALARM: `1` to `120`
- When p1 is some type other than the above: `1` to `50`

Example Output the 10 most recent error message logs.

```
FL ERR,10
```

Description
- Outputs the log that is stored in the XL100.
- If p2 is omitted, all written logs are output.

IS Outputs status information

Syntax `IS p1<terminator>`

`p1` Status information output `0`

Example Output status information.

```
IS 0
```

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

FU Outputs the user level

Syntax `FU p1<terminator>`

`p1` User information output `0`

Example Output user information.

```
FU 0
```

Description Outputs the information of the user currently connected to the XL100.

ME Outputs the data stored on the external storage medium

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

`p1` Operation type
- Output the file list: `DIR`
- Output (first time): `GET`
- Output (subsequent times). This parameter is used to output the remaining data when the first output operation is not adequate: `NEXT`
- Retransmit the previous output: `RESEND`
- Delete: `DEL`

Outputs the subsequent file list after the file list is output using the DIRNEXT DIR command. The number of output lists is the p3 value specified with the DIR command. If this command is executed after all lists have been output, only the free space of the storage medium is output.

`p2` File name (26 alphanumeric characters)
Specify using a full path.

`p3` Maximum number of output file lists
`1` to `100`

If omitted, all the file lists in the specified directory are output.

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

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

5.10 Output Commands (RS-485 and USB Dedicated Commands)

ESC O Opens the device

The ASCII code of ESC is 1BH.
See appendix 1, “ASCII Character Codes.”

Syntax `ESC O p1<terminator>`
`p1` Device address `01` to `99`

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

Description
- Specifies the address of the device with which to communicate.
- Only one device can be opened at any given time.
- When a device is opened with the ESC O command, another device that is currently open is automatically closed.
- When this command is received correctly, the XL100 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 device

The ASCII code of ESC is 1BH.
See appendix 1, “ASCII Character Codes.”

Syntax `ESC C p1<terminator>`
`p1` Device address `01` to `99`

Example Close the device whose address is 01.
`ESC C 001`

Description
- Clears the current connection with the device.
- When this command is received correctly, the XL100 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.

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

close Disconnects the connection between other devices

Syntax `close,p1,p2:p3<terminator>`

`p1` Port on the XL100 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,349,192.168.111.24:1054
E0
```

Description This command cannot be used to disconnect a server port. Also, it cannot disconnect the XL100 being operated. Use the quit command for this purpose.

con Outputs connection information

Syntax `con<terminator>`

Example

```
con
EA
00/00/00 12:34:56
Active connections
Proto Local Address Foreign Address
State
TCP 192.168.111. 24:34159
192.168.111. 24:1053 ESTABLISHED
TCP 0. 0. 0. 0:34155 0. 0. 0. 0: 0
LISTEN
TCP 0. 0. 0. 0:34159 0. 0. 0. 0: 0
LISTEN
TCP 0. 0. 0. 0:34150 0. 0. 0. 0: 0
LISTEN
EN
```

TCP: Protocol used
Local Address: The XL100 socket address. Displays “IP address:port number”
Foreign Address: The destination socket address. Displays “IP address:port number”
State: Connection status
ESTABLISHED: Connection established

eth Outputs Ethernet statistical information

Syntax `eth<terminator>`

Example

```
eth
EA
00/00/00 12:34:56
Ethernet Statistics
Name In Pkt In Err Out Pkt Out Err
16 Coll
lo0 0 0 0 0 0
mb0 74 0 64 0 0
EN
```

help Outputs help

Syntax `help [,p1]<terminator>`

`p1` Command name
(close, con, eth, help, net, quit)

Example

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

net Outputs network 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: sndrexmitpack = 0
TCP: sndrexmitbyte = 1
TCP: rcvtotal = 0
TCP: rcvbyte = 0
DLC: 16 collisions = 0
EN
```

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

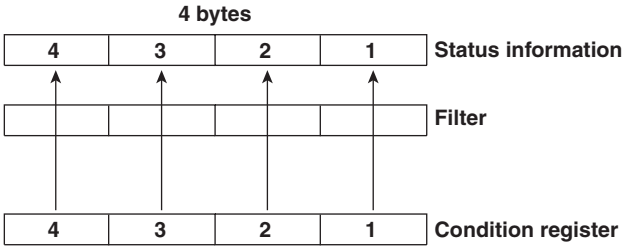
TCP: closed: Total number of dropped connections
TCP: timeoutdrop: Total number of dropped connections due to TCP retransmission timeout. When the transmitted packet (the unit of transmitted data) is not received, the packet is automatically retransmitted at a predetermined time interval. If the packet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

quit Disconnects the connection of the device being operated

Syntax `quit<terminator>`

6.1 Status Information andFilter

The following figure illustrates the status information and filter on the XL100.



- The IF command can be used to set the filter.
- When a status indicated on the following page is entered, the corresponding bit in the condition register is set to “1.” The logical AND of the condition register and the filter becomes the status information.
- The IS command is used to output the status information. Status information 1 and 2 are cleared when they are output. Status information 3 and 4 are not cleared when it is output, and remains at “1” while the event is occurring.
- When multiple connections are up, filters can be specified for the individual connection. Therefore, the status information can be held for each connection.

6.2 Bit Structure of the Status Information

The four groups of status information described below are output in response to a status information output request using the IS command. For the output format, see “ASCII Output Response Syntax” in section 5.2, “Response Syntax.”

Status Information 1

Bit	Name	Description
0	–	–
1	Medium access complete	Set to 1 when the display, manual sampled, or screen image data file is finished being saved to the external storage medium. Set to 1 when setting data is successfully saved or loaded.
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–

Status Information 2

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

Status Information 3

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	Execution error	Set to 1 when an error occurs during command execution.
4	–	–
5	–	–
6	–	–
7	–	–

Status Information 4

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

7.1 Error Messages Related to Settings

This section gives a list of error codes and messages of the XL100 and their corrective action. Error responses to communication commands are output in English.

Setting Errors

Code	Message	Description/Corrective Action
1	System error.	Contact the vendor from which you purchased the product.
2	Incorrect date or time setting.	–
3	A disabled channel is selected.	–
4	Incorrect function parameter.	–
5	The input numerical value exceeds the set range.	Enter a correct value.
6	Incorrect input character string.	Enter a correct character string.
7	Too many characters.	Enter the correct number of characters.
8	Incorrect input mode.	–
9	Incorrect input range code.	–
21	Cannot set an alarm for a skipped channel.	–
22	The upper and lower span limits are equal.	–
22	The upper and lower scale limits are equal.	–
40	Incorrect group set character string.	–
41	There is no specified input channel.	–
42	Exceeded the number of channels which can be set.	–
43	A channel number cannot repeat in a group.	–
61	There is no channel specified by the MATH expression.	–
62	MATH expression grammar is incorrect.	–
63	MATH expression sequence is incorrect.	–
64	MATH upper and lower span values are equal.	–
70	The range of the MATH constant is exceeded.	–
71	Set range of the MATH constant is exceeded.	–
81	All space or ‘quit’ string cannot be specified.	–
83	Duplicate used combination of user ID and password.	–
85	The login password is incorrect.	–
86	The key-lock release password is incorrect.	–
87	This key is locked.	–
88	This function is locked.	–
89	Press [FUNC] key to login.	–
90	No permission to enter to the SETUP mode.	–
91	Password is incorrect.	–
92	Press [ESC] key to change to the operation mode.	Press ESC.
93	String including space or all space cannot be specified.	Spaces are not allowed in the Web browser user name and password.
94	More than one address cannot be specified.	Only one sender address is allowed.
100	IP address doesn’t belong to class A, B, or C.	–
101	The result of the masked IP address is all 0s or 1s.	–
102	SUBNET mask is incorrect.	–
103	The net part of default gateway is not equal to that of IP address.	–
104	FTP client failed because the memory mode is ‘manual’.	–

Execution Errors

Code	Message	Description/Corrective Action
150	This action is not possible because sampling is in progress.	–
151	This action is not possible during sampling or calculating.	–
152	This action is not possible because saving is in progress.	Wait for the data save operation to complete.
153	This action is not possible because formatting is in progress.	Wait for the format operation to complete.
155	The message is not written while sampling is stopped.	–
160	Cannot load the specified data. Change the memory setting.	–

7.2 Error Messages Related to Operation

This section gives a list of error codes and messages of the XL100 and their corrective action. Error responses to communication commands are output in English.

External Storage Media Operation Errors

Code	Message	Description/Corrective Action
200	Operation aborted because an error was found in media.	Check the external storage medium.
201	Not enough free space on media.	Replace the external storage medium.
202	Media is read-only.	Set the external storage medium to enable writing.
210	Media has not been inserted.	Insert an external storage medium.
211	Media is damaged or not formatted.	Replace the external storage medium or format it.
212	Format error.	Format the external storage medium again.
213	The file is read-only.	Access another file or make the file write-enable.
214	There is no file or directory.	–
215	Exceeded the allowable number of files.	Replace the external storage medium. Delete unneeded files.
216	The file or directory name is incorrect.	–
217	Unknown file type.	Specify another file.
218	Directory exists. Delete the directory or change directory name.	–
219	Invalid file or directory operation.	Tried to delete multiple directory levels.
220	The file is already in use. Try again later.	Wait until the file is accessible.
230	There is no setting file.	Specify another file.
231	Abnormal setting exists in file.	Specify another file.

Review Display Errors

Code	Message	Description/Corrective Action
232	There is no available data.	Displayed when showing the review display. Specify another file.
233	The specified review data do not exist.	Displayed when showing the review display.
234	The specified channel is not assigned to the display group.	–

E-mail and Web Server Errors

Code	Message	Description/Corrective Action
260	IP address is not set or ethernet function is not available.	An IP address has not been assigned to the XL100. Check the IP address.
261	SMTP server is not found.	Occurs when the SMTP server is specified by name. • Check the DNS setting. • Check the SMTP server name.
262	Cannot initiate E-mail transmission.	• The host name of the XL100 is not correct. Check the host name. • The port number setting of the SMTP server is not correct. Check the port number.
263	Sender's address rejected by the server.	Check the sender's address.
264	Some recipients' addresses are invalid.	Check the recipient's address.
265	SMTP protocol error.	May occur if a network failure (cable problems, duplicate addresses, network device failure, and so on) occurs in the middle of the e-mail transmission.
266	Ethernet cable is not connected.	Check the cable connection.
267	Could not connect to SMTP server. to the network.	• Check to see that the SMTP server is connected • If the SMTP server name is specified using an IP address, check to see that the IP address is correct.
268	E-mail transmission request failed.	Contact the vendor from which you purchased the product.
269	E-mail transfer error.	May occur if a network failure (cable problems, duplicate addresses, network device failure, and so on) occurs in the middle of the e-mail transmission.
275	The current image cannot be output to the Web.	The setup display cannot be output to the Web browser. This message is displayed on the Web browser.
276	Image data currently being created. Unable to perform key operation.	Try again a little later. This message is displayed on the Web browser.
277	Could not output screen to Web.	This message is displayed on the Web browser.

FTP Client Errors

The detail code does not appear in the error message on the screen. You can view the code on the FTP log display of the XL100 or using the FTP log output via communications.

Code	Message
280	IP address is not set or FTP function is not available. Further details are provided by the character string that appears after error code 280.

Character String and Details	
HOSTADDR	An IP address has not been assigned to the XL100. Check the IP address.
DORMANT	Internal processing error.*1
LINK	Data link is disconnected. Check the cable connection.

Code	Message
281	FTP mail box operation error. Further details are provided by the character string that appears after error code 281.

Character String and Details	
MAIL	Internal processing error.*1
STATUS	Internal processing error.*1
TIMEOUT	Internal processing error.*1
PRIORITY	Internal processing error.*1
NVRAM	Internal processing error.*1

Code	Message
282	FTP control connection error. Further details are provided by the character string that appears after error code 282.

Character String and Details	
HOSTNAME	Failed the DNS lookup (search the IP address corresponding to the host name). Check the DNS setting and the destination host name.*1
TCPIP	Internal processing error.*1
UNREACH	Failed to connect to a control connection server. Check the address setting and that the server is running.
OOBINLINE	Internal processing error.*1
NAME	Internal processing error.*1
CTRL	The control connection does not exist. Check that the server does not drop the connection and that it responds within the proper time period.
IAC	Failed to respond in the TELNET sequence. Check that the server does not drop the connection and that it responds within the proper time period.
ECHO	Failed to transmit data on the control connection. Check that the server does not drop the connection and that it responds within the proper time period.
REPLY	Failed to receive data on the control connection. Check that the server does not drop the connection and that it responds within the proper time period.
SERVER	The server is not in a condition to provide the service. Check that the server is in a condition in which service can be provided.

Code	Message
283	FTP command was not accepted. Further details are provided by the character string that appears after error code 283.

Character String and Details	
USER	
	Failed user name verification. Check the user name setting.
PASS	
	Failed password verification. Check the password setting.
ACCT	
	Failed account verification. Check the account setting.
TYPE	
	Failed to change the transfer type. Check that the server supports the binary transfer mode.
CWD	
	Failed to change the directory. Check the initial path setting.
PORT	
	Failed to set the transfer connection. Check that the security function is disabled.
PASV	
	Failed to set the transfer connection. Check that the server supports PASV commands.
SCAN	
	Failed to read the transfer connection settings. Check that proper response to the PASV command is received from the server.

Code	Message
284	FTP transfer setting error. Further details are provided by the character string that appears after error code 284.

Character String and Details	
MODE	
	Internal processing error.*1
LOCAL	
	Internal processing error.*1
REMOTE	
	The destination file name is not correct. Check that you have the authority to create or overwrite files.
ABORT	
	File transfer abort was requested by the server. Check the server for the reason for the abort request.

Code	Message
285	FTP data connection error. Further details are provided by the character string that appears after error code 285.

Character String and Details	
SOCKET	
	Failed to create a socket for the transfer connection.*2
BIND	
	Failed the transfer connection command.*2
CONNECT	
	Failed the transfer connection.*2
LISTEN	
	Failed the transfer connection reception.*2
ACCEPT	
	Failed to accept the transfer connection.*2
SOCKNAME	
	Internal processing error.*2
RECV	
	Failed to receive data over the transfer connection.*2
SEND	
	Failed to send data over the transfer connection.*2

Code	Message
286	FTP file transfer error.

Further details are provided by the character string that appears after error code 286.

Character String and Details
READ Internal processing error.*1
WRITE Internal processing error.*1

*1 Contact the vendor from whom you purchased the product.
*2 These errors may occur if the network experiences trouble during the data transmission (bad cable connection, duplicate addresses, network equipment failure).

Note

The FTP client function on the XL100 has a timer function that drops the connection if there is no data transfer for two minutes. If the server does not respond within this time period, the transfer fails.

7.3 Communication Error Messages

This section gives a list of error codes and messages of the XL100 and their corrective action. Error responses to communication commands are output in English.

Setting/Basic Setting/Output Communication Command and Setting Data Load Errors

Code	Message
300	Command is too long.
301	Too many number of commands delimited with ';'.
302	This command has not been defined.
303	Data request command can not be enumerated with sub-delimiter.
350	Command is not permitted to the current user level.
351	This command cannot be specified in the current mode.
352	The option is not installed.
353	This command cannot be specified in the current setting.
354	This command is not available during sampling or calculating.

Memory Access Errors Using Setting/Basic Setting/Output Communication Commands

An English error message is returned via the communication interface. It is not shown on the XL100 display.

Code	Message
360	Output interface must be chosen from Ethernet or RS by using 'XO' command.
362	There are no data to send 'NEXT' or 'RESEND'.
363	All data have already been transferred.

Maintenance/Test Communication Command Errors

An English error message is returned via the communication interface. It is not shown on the XL100 display.

Code	Message
390	Command error.
391	Delimiter error.
392	Parameter error.
393	No permission.
394	No such connection.
395	Use 'quit' to close this connection.
396	Failed to disconnect.
397	No TCP control block.

Other Communication Messages+

An English error message is returned via the communication interface. It is not shown on the XL100 display.

Code	Message
400	Input username.
401	Input password.
402	Select username from 'admin' or 'user'.
403	Login incorrect, try again!
404	No more login at the specified level is acceptable.
410	Login successful. (The special user level)
411	Login successful. (The general user level)

Code	Message
420	Connection has been lost.
421	The number of simultaneous connection has been exceeded.
422	Communication has timed-out.

ModBus Master Error Log

An English error message is returned via the communication interface. It is not shown on the XL100 display.

Code	Message
700	Data could not be received within communication loop time.
701	Connection to some slave is suspended.
702	Connection to slave(s) has recovered.

Appendix 1 ASCII Character Codes

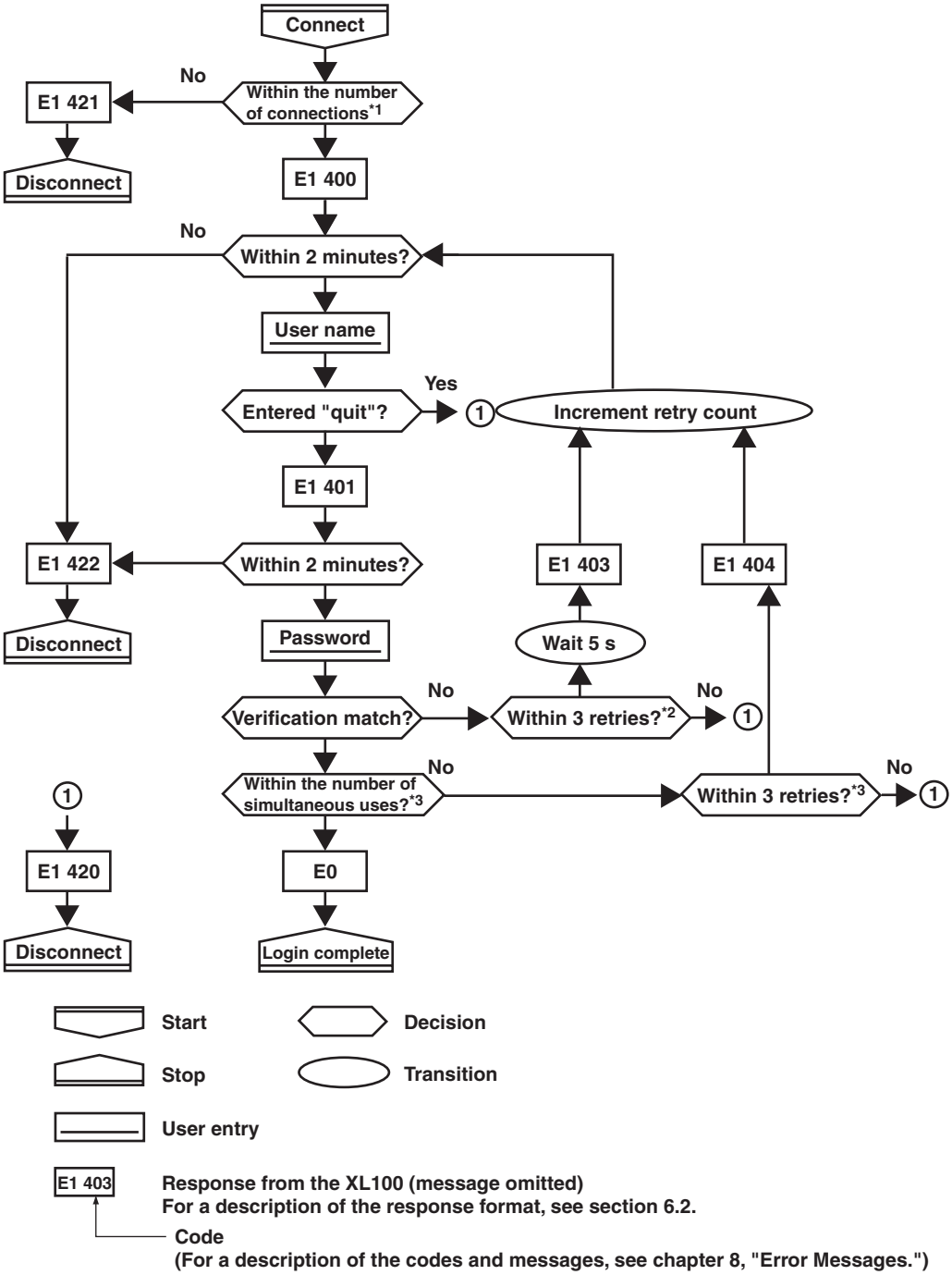
Upper 4 bits

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

Appendix 2 Login Process

You log into the XL100 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 5 become functional.

When Using the Ethernet Login Function of the XL100



*1 Connections cannot exceed the maximum number of connections (see section 2.1).

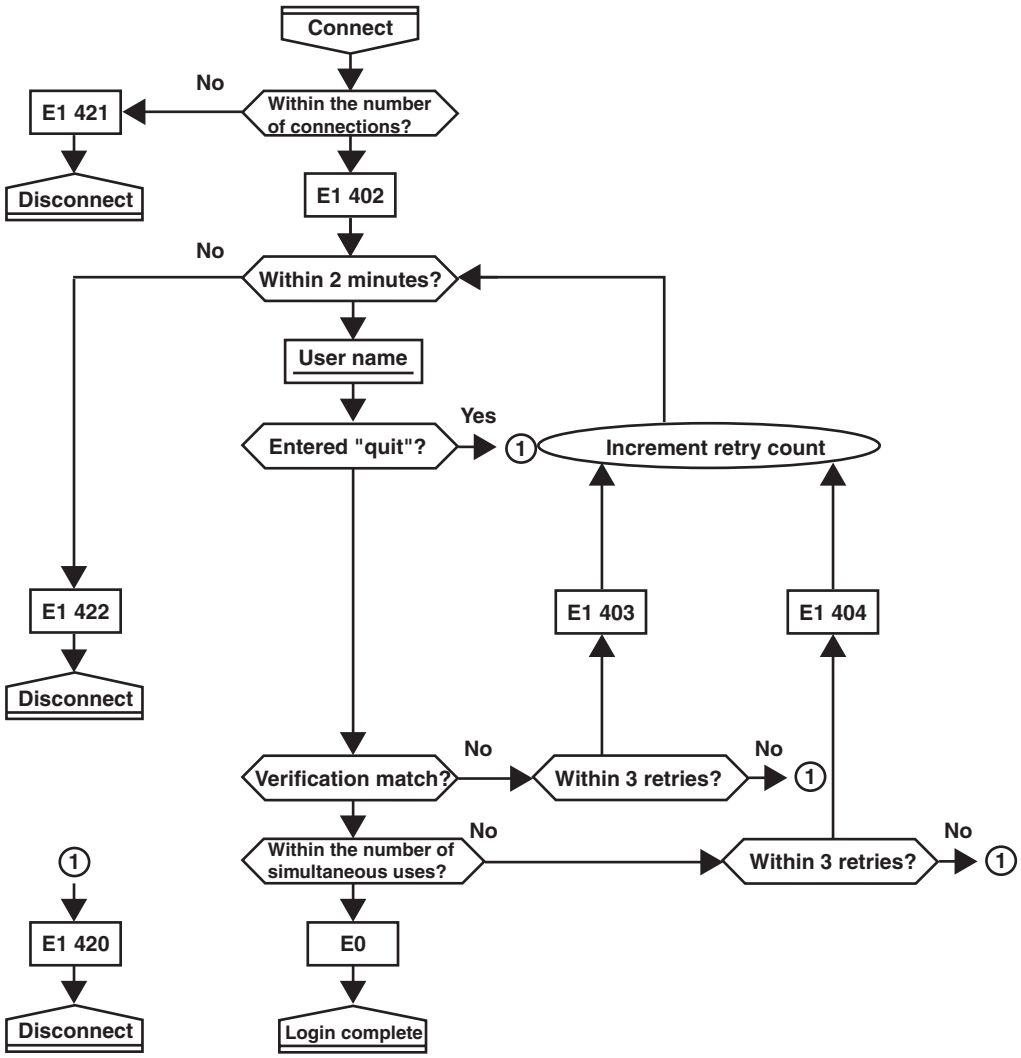
*2 If you attempt to log in using a wrong password four consecutive times, the communication is dropped (the number of retries for login is three).

*3 If you attempt to log in causing the number of simultaneous uses at the administrator or user level to be exceeded (see section 2.1) four consecutive times, the communication is dropped (even if the password is correct).

When Not Using the Ethernet Login Function of the XL100

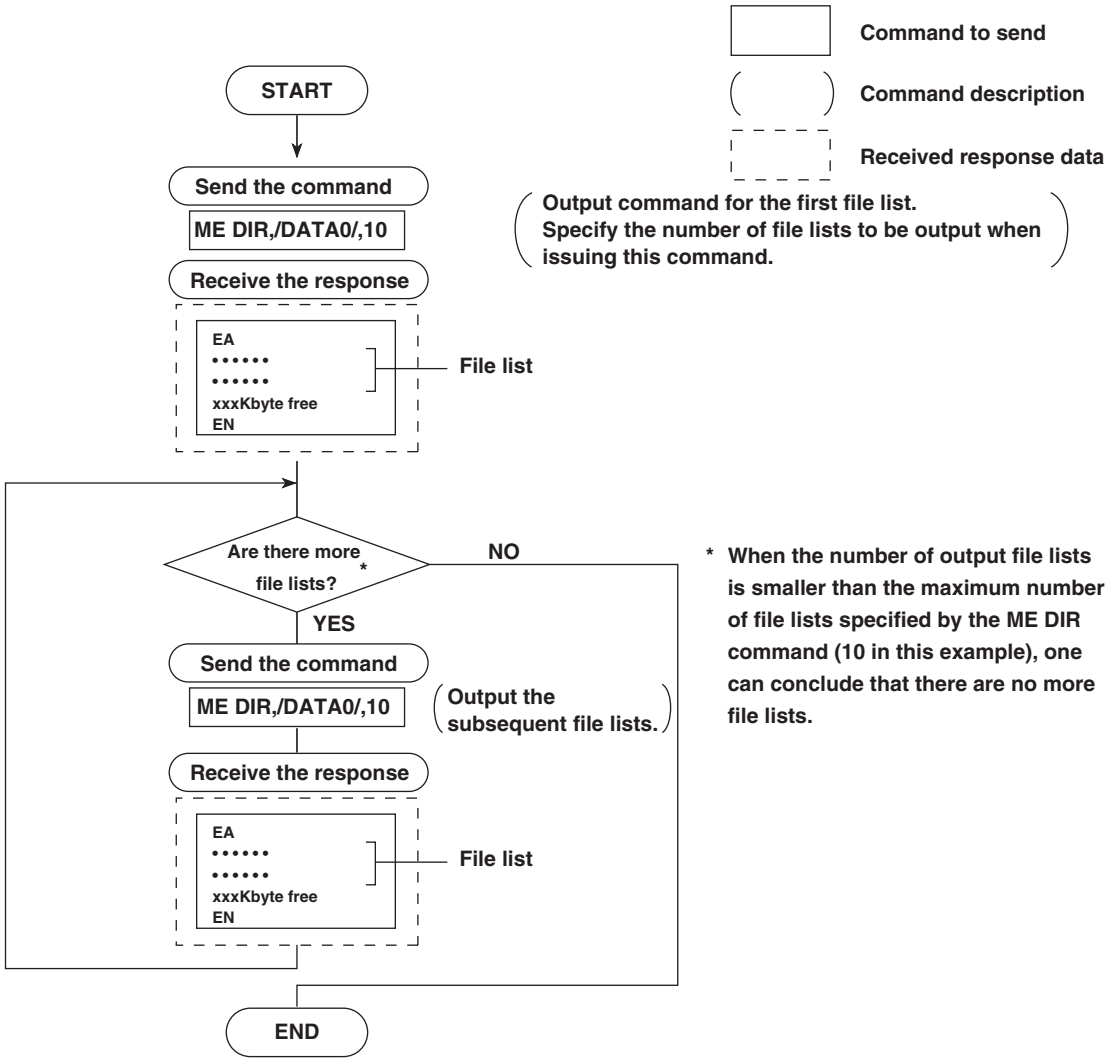
Login as “admin” or “user.”

- You can log into the XL100 as an administrator by accessing the XL100 using the user name “admin.”
- You can log into the XL100 as a user by accessing the XL100 using the user name “user.”



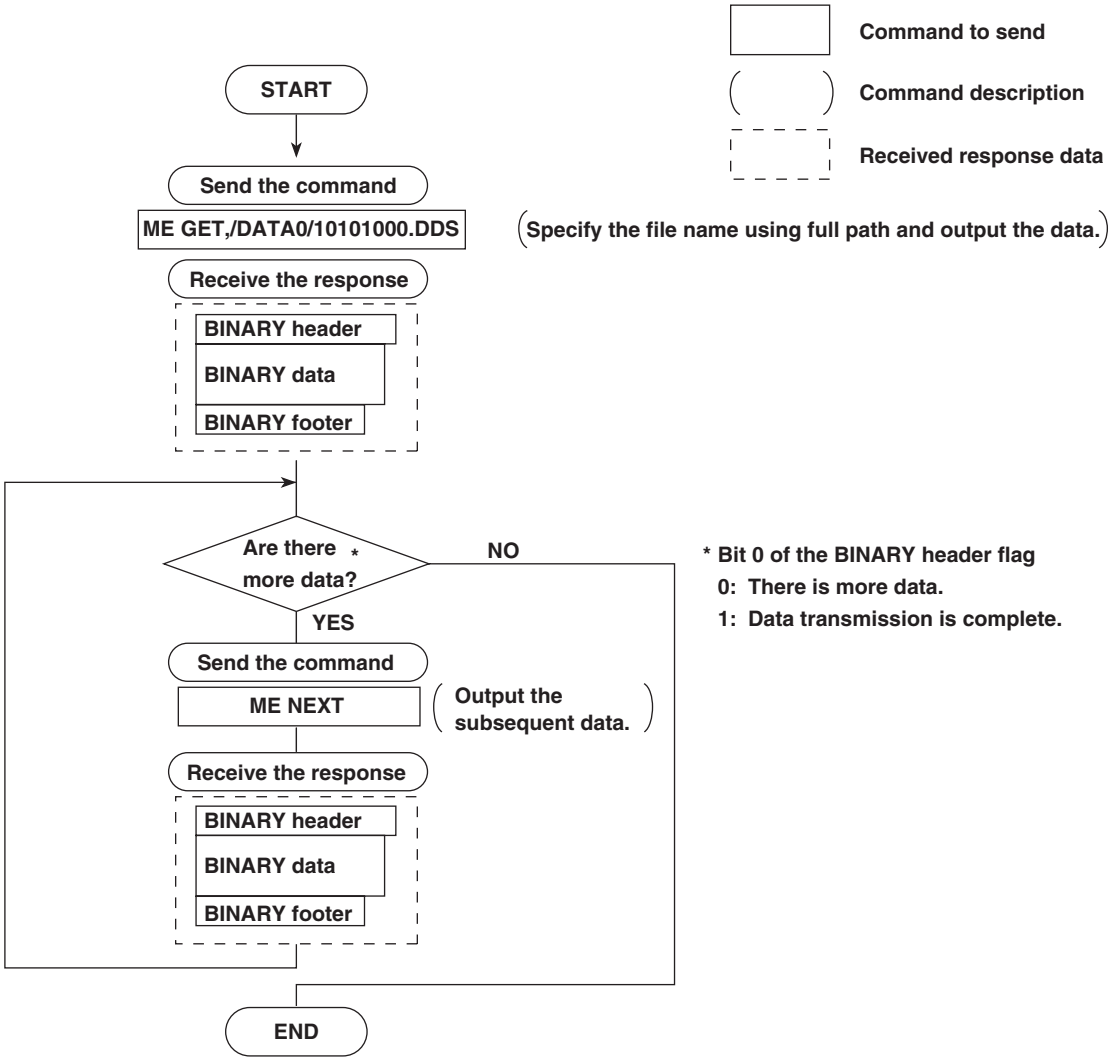
Appendix 3 Data Output Flow

Example in Which the List of Files in Directory DATA0 Is Output 10 Files at a Time



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

Example in Which the File 10101000.DDS in the DATA0 Directory Is Output



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