Panasonic

PROGRAMMABLE CONTROLLER

FP7 CPU Unit

User's Manual

Ethernet Expansion Function

WUME-FP7CPUETEX-02

2021.3 | panasonic.net/id/pidsx/global

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safety.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

-Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
-Do not use this product in areas with inflammable gas. It could lead to an explosion.
-Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.
-Battery may explode if mistreated. Do not recharge, disassemble or dispose of fire.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

-To prevent excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
-Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke generation.
-Do not touch the terminal while turning on electricity. It could lead to an electric shock.
-Use the external devices to function the emergency stop and interlock circuit.
-Connect the wires or connectors securely.
The loose connection could cause excessive exothermic heat or smoke generation.
-Ground the protective earth (PE) terminal (Class D grounding). Failure to do so could lead to an electric shock.
-Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It could cause excessive exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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Introduction

Thank you for buying a Panasonic product. Before you use the product, please carefully read the installation instructions and the user's manual, and understand their contents in detail to use the product properly.

Types of Manual

- There are different types of user's manual for the FP7 series, as listed below. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website https://industrial.panasonic.com/ac/e/dl_center/manual/.

Unit name or purpose of use	Manual name	Manual code
FP7 Power Supply Unit	FP7 CPU Unit User's Manual (Hardware)	WUME-FP7CPUH
FP7 CPU Unit		
	FP7 CPU Unit Command Reference Manual	WUME-FP7CPUPGR
	FP7 CPU Unit User's Manual (Logging Trace Function)	WUME-FP7CPULOG
	FP7 CPU Unit User's Manual (Security Function)	WUME-FP7CPUSEC
Instructions for Built-in LAN Port	FP7 CPU Unit User's Manual (LAN Port Communication)	WUME-FP7LAN
	FP7 CPU Unit User's Manual (Ethernet Expansion Function)	WUME-FP7CPUETEX
	FP7 CPU Unit User's Manual (EtherNet/IP communication)	WUME-FP7CPUEIP
	FP7 Web Server Function Manual	WUME-FP7WEB
Instructions for Built-in COM Port	FP7 series User's Manual (SCU Communication)	WUME-FP7COM
FP7 Extension (Communication) Cassette (RS-232C, RS485 Type)		
FP7 Extension (Communication) Cassette (Ethernet Type)	FP7 Series User's Manual (Communication Cassette Ethernet Type)	WUME-FP7CCET
FP7 Extension (Function) Cassette Analog Cassette	FP7 Analog Cassette User's Manual	WUME-FP7FCA
FP7 Digital Input/Output Unit	FP7 Digital Input/Output Unit User's Manual	WUME-FP7DIO
FP7 Analog Input Unit	FP7 Analog Input Unit User's Manual	WUME-FP7AIH
FP7 Analog Output Unit	FP7 Analog Output Unit User's Manual	WUME-FP7AOH
FP7 Thermocouple Multi-analog Input Unit	FP7 Thermocouple Multi-analog Input Unit FP7 RTD Input Unit User's Manual	WUME-FP7TCRTD
FP7 RTD Input Unit		
FP7 Multi Input/Output Unit	FP7 Multi Input/Output Unit User's Manual	WUME-FP7MXY
FP7 High-speed counter unit	FP7 High-speed Counter Unit User's Manual	WUME-FP7HSC
FP7 Pulse Output Unit	FP7 Pulse Output Unit User's Manual	WUME-FP7PG
FP7 Positioning Unit	FP7 Positioning Unit User's Manual	WUME-FP7POSP
FP7 Serial Communication Unit	FP7 series User's Manual (SCU Communication)	WUME-FP7COM
FP7 Multi-wire Link Unit	FP7 Multi-wire Link Unit User's Manual	WUME-FP7MW

Unit name or purpose of use	Manual name	Manual code
FP7 Motion Control Unit	FP7 Motion Control Unit User's Manual	WUME-FP7MCEC
PHLS System	PHLS System User's Manual	WUME-PHLS
Programming Software FPWIN GR7	FPWIN GR7 Introduction Guidance	WUME-FPWINGR7

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1

Add-ons Specifications

1.1 Ethernet Add-ons

1.1.1 Overview of Add-ons

■ Expansion of the number of connections

- The number of user connections has been expanded to the maximum of 216 so that the unit can communicate with more devices.

(Note): As for the general-purpose communication, the maximum number of connections is 16.

■ Routing setting function

- When a partner device exist in a different network and that network is located in a place through a router other than the default gateway, the routing setting should be required.

■ FTP client function

- Enables the transfer of files and data.
- Supports SSL transfer.
- Four FTP servers can be set.
- Sixteen transfer settings can be registered.
- Four transfer modes can be set.
  PUT file / GET file / PUT data / GET data
- The logging trace done file can be transfered

■ HTTP client function

- Enables the communication with WEB servers.
- Supports SSL communication.
- Four WEB servers can be set.
- Sixteen transfer settings can be registered.
- Three transfer modes can be set.
  Send (Upload) / Get (Download) / Send and get (Upload and download)

■ Mail send function

- Enables mail transmission.
- Supports SSL communication.
- One SMTP server can be set.
- Eight destination groups can be set.
- Sixteen transfer settings can be registered.
- The following five communication triggers can be set.
  Bit device / Cycle / Time / Instruction / PLC status change
- Files can be transferred at the the time of completion of logging trace.

■ Additional instructions

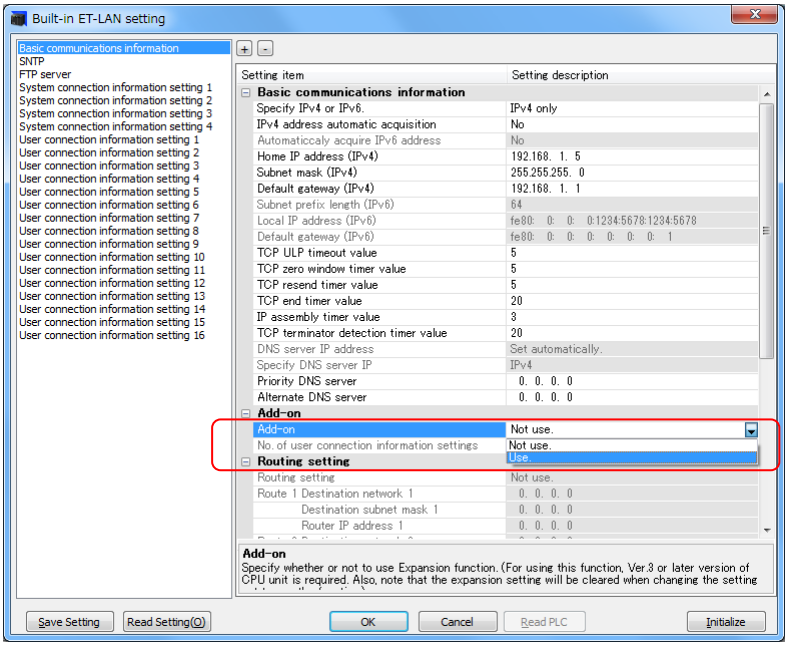
Classification	Name	Function
IP address and connection setting instructions	IPv4SET	IP address setting
	CONSET	User connection setting
	OPEN	Connection open
	CLOSE	Connection close
FTP client instructions	FTPcSV	FTP client connected server setting
	FTPcSET	FTP client transfer setting
	FTPcLOG	FTP client logging/trace transfer setting
	FTPcREQ	FTP client transfer request
	FTPcCTL	FTP client transfer control
HTTP client instructions	HTTPcSV	HTTP client connected server setting
	HTTPcSET	HTTP client transfer setting
	HTTPcREQ	HTTP client transfer request
	HTTPcCTL	HTTP client transfer control
Mail send (SMTP client) instructions	SMTPcSV	Mail send server and sender settings
	SMTPcADD	Destination group setting instruction
	SMTPcSET	Mail send setting instruction
	SMTPcREQ	Mail send request instruction
	SMTPcLOG	Logging/trace mail send setting instruction
	SMTPcCTL	SMTPc transfer control
Communication instructions	ETSTAT	Ethernet unit status read
	PGPSEND	General-purpose communication send instruction leading edge execution
	PINGREQ	PING request instruction (Note)
Special instruction	GETSTNO	Starting word number acquisition of target slot
Data comparison instruction	BCMP	Matched blocks detection

(Note): The PINGREQ instruction is supported from the CPU unit version 3.2.

1.1.2 Using Add-ons

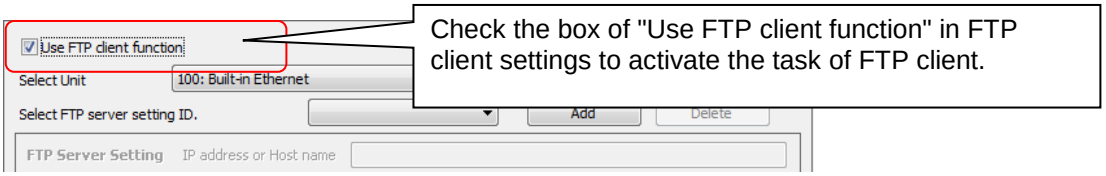
■ Activating Add-ons

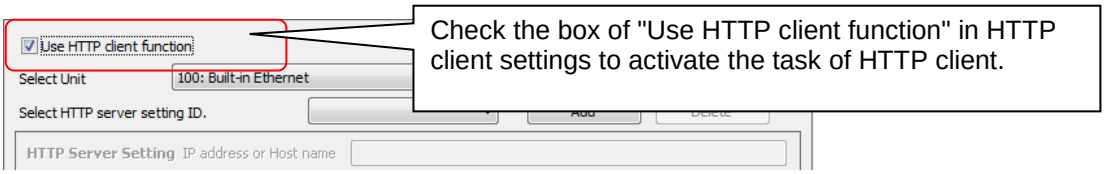
- For using each function for extending the number of user connections, the routing setting, FTP client, HTTP client and mail transmission (SMTP client), change "Add-on" to "Use" in Built-in ET-LAN setting dialog box.
- When "Add-on" is set to "Not use", each communication task does not start.

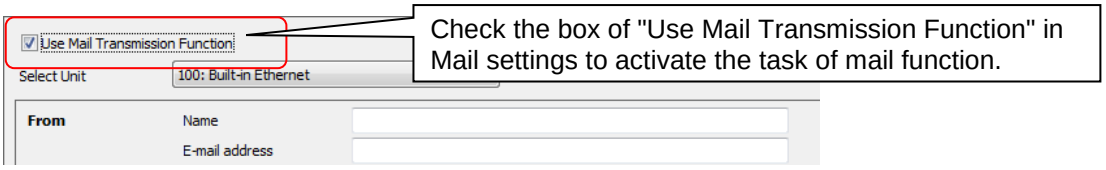


■ FTP client settings, HTP client settings and Mail settings

- When "Add-on" is set to "Use" in FP7 configuration, each communication task can be activated.
- When setting in the setting windows of FPTc, HTTPc and mail settings, the functions are automatically activated.
- When executing the server settings with the server setting instructions (FTPcSV, HTTPcSV, SMTPcSV), the functions are activated at that point.







1.1.3 IP Address Setting Specifications

■ List of usable IP addresses

Address range	Remarks
000.000.000.001 to 000.255.255.255	*1
001.000.000.000 to 126.255.255.255	
128.000.000.000 to 223.255.255.255	

*1: Although this range can be set, try not to use it as much as possible.

■ List of conditional IP addresses

○: Available, ×: Not available, △: Self IP address is not available. Default gateway is available.

Address range	Setting with instruction			Setting with tool software		
	E1	E2	E3	T1	T2	T3
000.000.000.000	△	×	×	△	○	×
127.000.000.000 to 127.255.255.255	×	○	○	×	○	○
224.000.000.000 to 224.255.255.255	×	○	○	×	○	○
:	×	○	○	×	○	○
239.000.000.001 to 239.255.255.255	×	○	○	×	○	○
240.000.000.001 to 240.255.255.255	×	○	○	×	○	○
:	×	○	○	×	○	○
247.000.000.001 to 240.255.255.255	×	○	○	×	○	○
248.000.000.001 to 248.255.255.255	×	○	○	×	○	○
:	×	○	○	×	○	○
255.000.000.001 to 255.255.255.254	×	○	○	×	○	○
255.255.255.255	×	○	×	×	×	×

(Note 1): The marks E1 to E3 and T1 to T3 in the above list indicate the combinations in the following table.

Mark	Description
E1	Self IP address setting with IPv4SET instruction
E2	Destination address setting with CONSET instruction
E3	Server address setting with FTPcSV, HTTPcSV, SMTPcSV and IPv4SET instructions.
T1	Self IP address (IPv4) setting with tool software
T2	SNTP IP address (name), priority DNS server, alternative DNS server and router IP address settings with tool software
T3	System connection IP addresses 1 to 4 and user connection IP addresses 1 to 16 (max. 216) with tool software

(Note 2): When an IP address that cannot be set is specified with an instruction, an operation error will not occur and the error flags of CY (SR9) and SD29 will be set.

■ Netmask setting

Masked bits should be registered in ascending order. It is not possible to set bits as follows.

Input notation	Binary notation
255.255.253.0	11111111.11111111.11111101.00000000

■ Default gateway setting

- It may not be set according to the combination of IP address and default gateway.
- When it is not used, specify 000.000.000.000.
- It cannot be set in the following case.

(IP address AND netmask) ≠ (Default gateway address AND netmask)

■ Judgement using the combination of IP address and netmask

- The following combination is not possible.
- IP address AND (Inverse all bits of netmask: 1's complement) = 0
- IP address OR (netmask) = 255.255.255.255
- Only when the router IP address is other than 000.000.000.000, the above combination judgement is performed for the routing setting.

*The above combination may occur when setting to omit masks with IPv4SET instruction.

Example) When the netmask is 255.255.0.0, set the IP address to 0.0.255.255 with IPv4SET.

The set values for IP addresses, netmask and default gateway are initialized when performing the communication process with the above combination. The defaults are as follows.

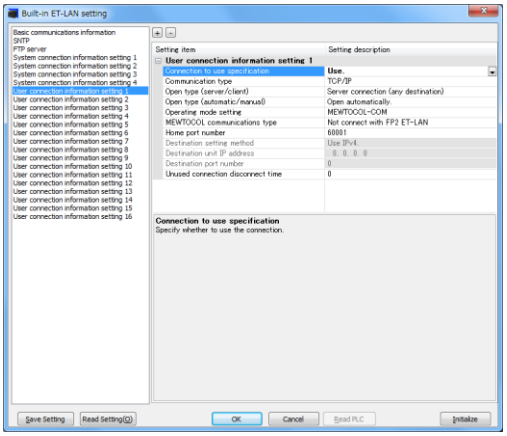
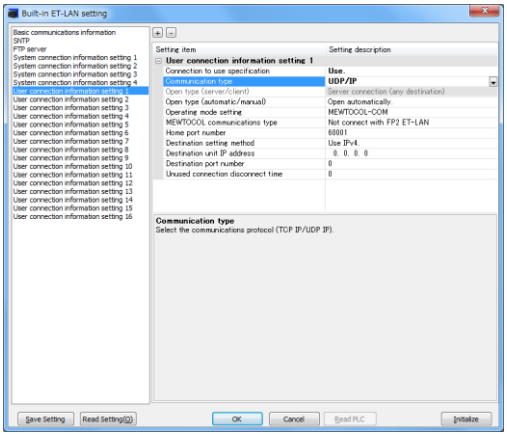
- IP address =192.168.1.5, Netmask = 255.255.255.0, Default gateway = 192.168.1.1

1.1.4 Recommended Connection Settings

■ Settings for slave communication

Communication method	TCP	UDP
Open method (Server/Client)	Server connection (destination unit arbitrary)	-
Open method (Automatic/Manual)	Open automatically	
Destination unit port No.	-	0
Destination unit IP address	-	0
Home unit port No.	Specify	Specify

For using TCP with slave communication, server connection (destination unit arbitrary) is recommended.
For using UDP with slave communication, it is recommended to set the destination unit port number to 0, and the destination unit IP address to 0.

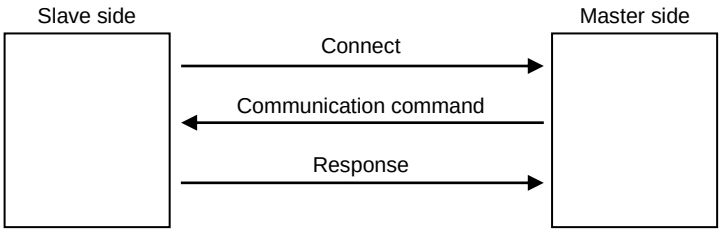
Recommended setting example (TCP/IP)	Recommended setting example (UDP/IP)
	

Even for slave communication, select client connection for establishing the connection from the slave side.

- Connection setting on the slave side

Open method (Server/Client)	Client connection
Destination unit port No.	Specify
Destination unit IP address	Specify
Home unit port No.	0

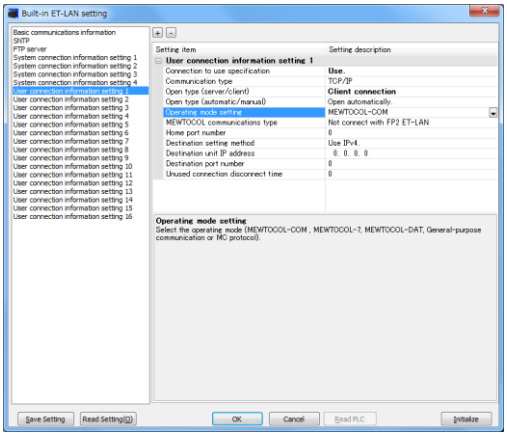
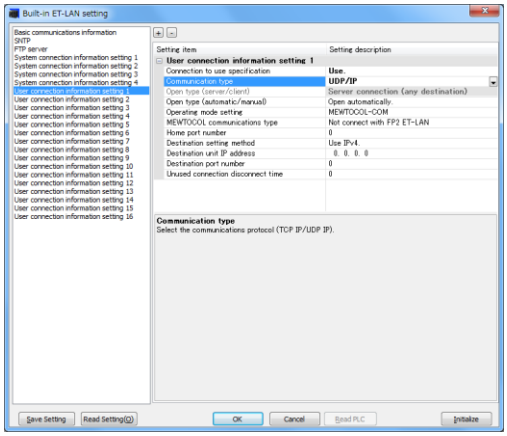
- Communication procedure



■ Settings for master communication

Communication method	TCP		UDP
Open method (Server/Client)	Client connection	Server connection (destination unit arbitrary)	-
Open method (Automatic/Manual)	Open automatically		
Destination unit port No.	Specify	-	Specify
Destination unit IP address	Specify	-	Specify
Home unit port No.	0	Specify	0

For using TCP (client) and UDP for master communication, it is recommended to set the home unit port number to 0.

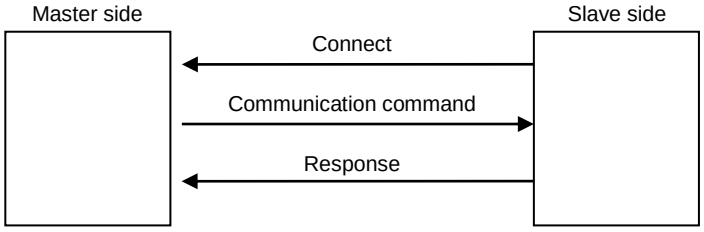
Recommended setting example (TCP/IP)	Recommended setting example (UDP/IP)
	

Even for master communication, select server connection for establishing the connection from the slave side.

- Connection setting on the master side

Open method (Server/Client)	Server connection (destination unit arbitrary)
Destination unit port No.	-
Destination unit IP address	-
Home unit port No.	Specify

- Communication procedure



1.2 I/O Allocation

1.2.1 I/O Relay Related to Built-in ET-LAN Function

For using each function of the built-in ET-LAN, the following I/O areas are occupied.

■ List of the number of occupied words and I/O points

Unit type		Application	No. of occupied words (No. of occupied points)	
			Input	Output
CPU unit	Built-in ET-LAN	Common occupied area	1 word (16 points) WX6	-
		User connections 1 to 16	3 words (48 points) WX7 to WX9	3 words (48 points) WY7 to WY9
		User connections 17 to 216	Max. 26 words (416 points) WX11 to WX36	Max. 26 words (416 points) WX7 to WX9

(Note 1): Input/output contacts of the CPU unit are allocated for using the functions of each cassette. Regardless of use of such functions, input occupies 10 words (160 points, WX0 to WX9) and output occupies 10 words (160 points, WY0 to WY9).

(Note 2): Occupied area in the area of user connections 17 to 216 varies according to the number of used connections.

(Note 3): The starting numbers of I/O contacts of each unit including the CPU unit can be changed by the setting of the tool software.

1.2.2 +Built-in ET-LAN common occupied area

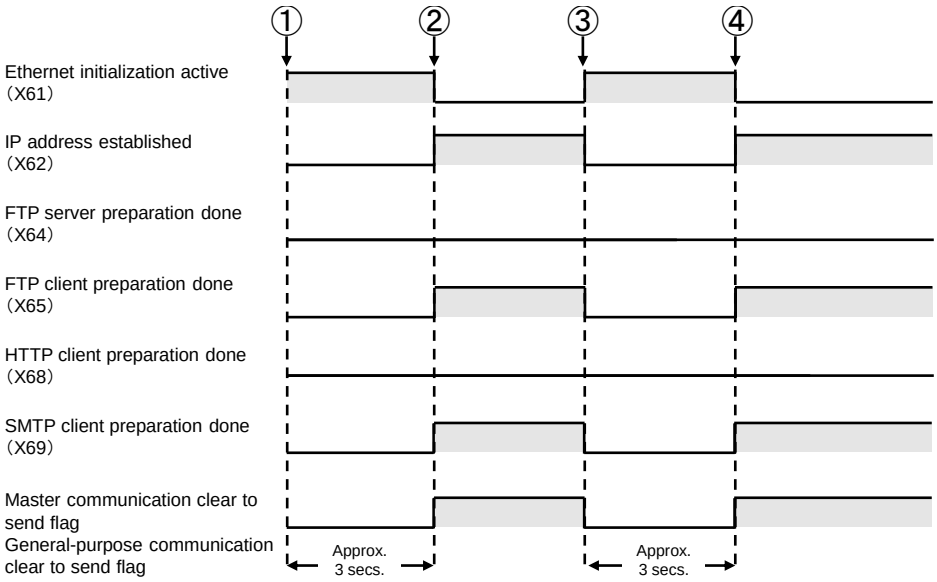
When using the Ethernet-related functions, flags for confirming the initialization, connection of network and the completion of preparation are allocated.

■ Allocation of common occupied areas

Address	Application		
X60	Disconnection detection relay	1 = Disconnect	0 = Connect
X61	Ethernet initialization active	1 = During initialization	0 = Completed
X62	IP address establishment	1 = Establish	0 = Not establish
X63	Reserved for system		
X64	FTP server preparation done	1 = Preparation done	0 = Unsable
X65	FTP client prepartion done	1 = Preparation done	0 = Unsable
X66	Reserved for system		
X67	Reserved for system		
X68	HTTP client preparation done	1 = Preparation done	0 = Unsable
X69	Mail send (SMTP client) preparation done	1 = Preparation done	0 = Unsable
X6A-X6F	Reserved for system		

■ Initialization and operation of each flag

The following figure shows the case for executing IPv4SET instruction using the FTP client function and mail send function (SMTP client).



①	PROG > RUN (Power ON)	③	IPv4 address setting (Executes IPv4SET instruction)
②	Ethernet initialization done FTP client/SMTP client preparation done Connection done	③	Ethernet initialization done FTP client/SMTP client preparation done Connection done

■ Initialization and flag operaiton

- The IPv4SET instruction is executed after confirming the IP address fixed flag (X62) is ON.
- Once the instruction is executed, the IPv4 setting parameter will be written in the system work area and initialization will be requested to the unit.
- Once the initialization is requested, the unit will close all connections and disconnect the communication.
- The unit turns OFF the IP address fixed flag (X62) and initializes the Ethernet unit with the value specified in the system work area.
- The unit starts auto negotiation at the time of initialization.
- The IP address fixed flag (X62) turns ON on the completion of initialization. It takes about three seconds to complete the initialization. When the IP address is not fixed, the IP address fixed flag (X62) remains OFF.
- Each communication task of FTPc, HTTPc and SMPTc starts according to the settings. It is possible to confirm those states with the ready flag for each operation.
- Each connection which automatic connection has been set is made, and the clear to send flag turns on when the connections are complete.

1.2.3 I/O Relays of Extended Connections

- When the number of connections is extended, the following areas are occupied as the flags to be used for the master communication.
- As this function cannot be used in the initial state, aalocate the number of used words to the CPU unit in the “I/O map setting" dialog box. For details, refer to 1.2.4 Confiming and Setting I/O Map.

■ Master communication clear to send flag (Extended area)

Address	Application	
WX11	Connections 17 to 32	1=Possible to send, 0=Impossible to send
WX12	Not used	
WX13	Connections 33 to 48	1=Possible to send, 0=Impossible to send
WX14	Not used	
WX15	Connections 49 to 64	1=Possible to send, 0=Impossible to send
WX16	Not used	
WX17	Connections 65 to 80	1=Possible to send, 0=Impossible to send
WX18	Not used	
WX19	Connections 81 to 96	1=Possible to send, 0=Impossible to send
WX20	Not used	
WX21	Connections 97 to 112	1=Possible to send, 0=Impossible to send
WX22	Not used	
WX23	Connections 113 to 128	1=Possible to send, 0=Impossible to send
WX24	Not used	
WX25	Connections 129 to 144	1=Possible to send, 0=Impossible to send
WX26	Not used	
WX27	Connections 145 to 160	1=Possible to send, 0=Impossible to send
WX28	Not used	
WX29	Connections 161 to 176	1=Possible to send, 0=Impossible to send
WX30	Not used	
WX31	Connections 177 to 192	1=Possible to send, 0=Impossible to send
WX32	Not used	
WX33	Connections 193 to 208	1=Possible to send, 0=Impossible to send
WX34	Not used	
WX35	Connections 209 to 216	1=Possible to send, 0=Impossible to send
WX36	Not used	

(Note 1): The areas in the above table are those when the starting word number of the CPU unit is "0".The starting word number can be chnged by the setting of the tool software.

■ Master communication send active flag / Send result flag (Extended area)

Address	Application		
WY11	Connections 17 to 32	Send active	1 = Sending, 0 = Complete
WY12		Send result	1 = Error, 0 = Normal
WY13	Connections 33 to 48	Send active	1 = Sending, 0 = Complete
WY14		Send result	1 = Error, 0 = Normal
WY15	Connections 49 to 64	Send active	1 = Sending, 0 = Complete
WY16		Send result	1 = Error, 0 = Normal
WY17	Connections 65 to 80	Send active	1 = Sending, 0 = Complete
WY18		Send result	1 = Error, 0 = Normal
WY19	Connections 81 to 96	Send active	1 = Sending, 0 = Complete
WY20		Send result	1 = Error, 0 = Normal
WY21	Connections 97 to 112	Send active	1 = Sending, 0 = Complete
WY22		Send result	1 = Error, 0 = Normal
WY23	Connections 113 to 128	Send active	1 = Sending, 0 = Complete
WY24		Send result	1 = Error, 0 = Normal
WY25	Connections 129 to 144	Send active	1 = Sending, 0 = Complete
WY26		Send result	1 = Error, 0 = Normal
WY27	Connections 145 to 160	Send active	1 = Sending, 0 = Complete
WY28		Send result	1 = Error, 0 = Normal
WY29	Connections 161 to 176	Send active	1 = Sending, 0 = Complete
WY30		Send result	1 = Error, 0 = Normal
WY31	Connections 177 to 192	Send active	1 = Sending, 0 = Complete
WY32		Send result	1 = Error, 0 = Normal
WY33	Connections 193 to 208	Send active	1 = Sending, 0 = Complete
WY34		Send result	1 = Error, 0 = Normal
WY35	Connections 209 to 216	Send active	1 = Sending, 0 = Complete
WY36		Send result	1 = Error, 0 = Normal

(Note 1): The areas in the above table are those when the starting word number of the CPU unit is "0". The starting word number can be changed by the setting of the tool software.

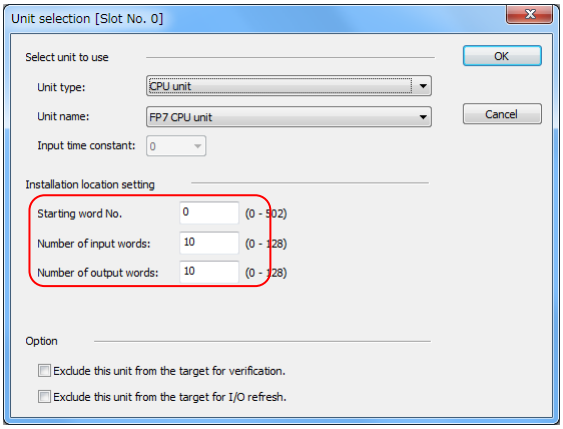
◆ NOTE

- **Each contact in the table above is used for reading the operation status. Do not write them using user programs.**

1.2.4 Confiming and Setting I/O Map

■ I/O map setting

- To use the I/O relays (WX11 to WX36 and WY11 and WY36) in the extension connection area, open the "Unit selection [Slot No. 0]" dialog box from the I/O map dialog box and change the number of input words and output words.
- The default is 10-word fixed area each for input and output for the CPU unit.



◆ **KEY POINTS**

- **When the number of user connections is changed using the add-on of the built-in ET-LAN, the occupied I/O areas of the CPU will change. Adjust the starting word numbers of other units or the CPU unit not to overlap the I/O areas.**

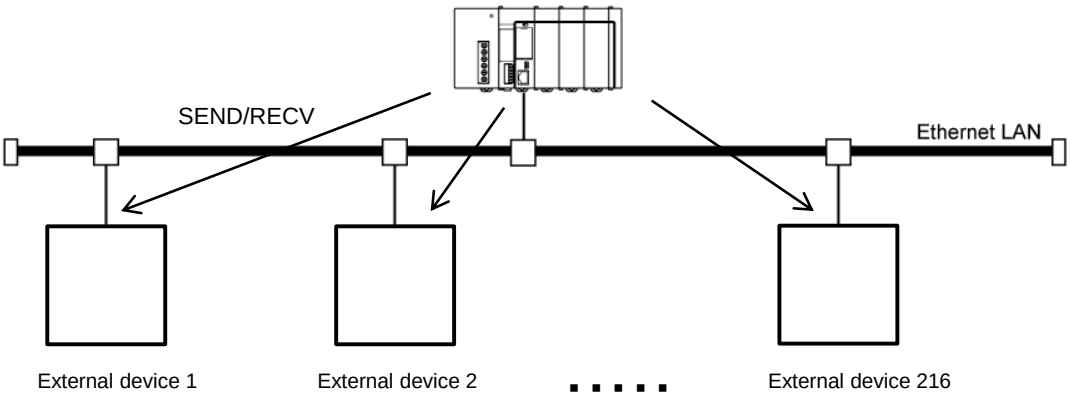
2

Extension of the Number of Connections

2.1 Overview of Extension of the Number of Connections

■ Overview of Extension of the Number of Connections

The number of user connections has been expanded to the maximum of 216 so that the unit can communicate with more devices. However, the connections for the general-purpose communication are limited the first 16 connections.



■ User connection numbers and available functions (A: Available, N/A: Not available)

Communication function		User connection No.		Remark
		1 to 16	17 to 216	
MEWTOCOL7-COM MEWTOCOL-COM	Master	A	A	(Note 1)
	Slave	A	A	
MEWTOCOL-DAT	Master	A	A	
	Slave	A	A	
MODBUS-TCP	Master	A	A	
	Slave	A	A	
General-purpose communication		A	N/A	

(Note 1): In MEWTOCOL7-COM, there is no master communication function.

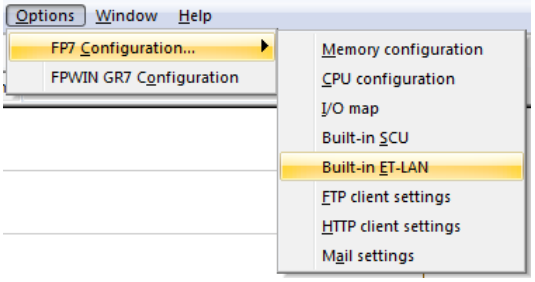
2.2 How to Use Add-on for the Number of Connections

2.2.1 Setting with Tool Software

The expansion setting for the number of connections are configured with Programming tool software "FPWIN GR7".

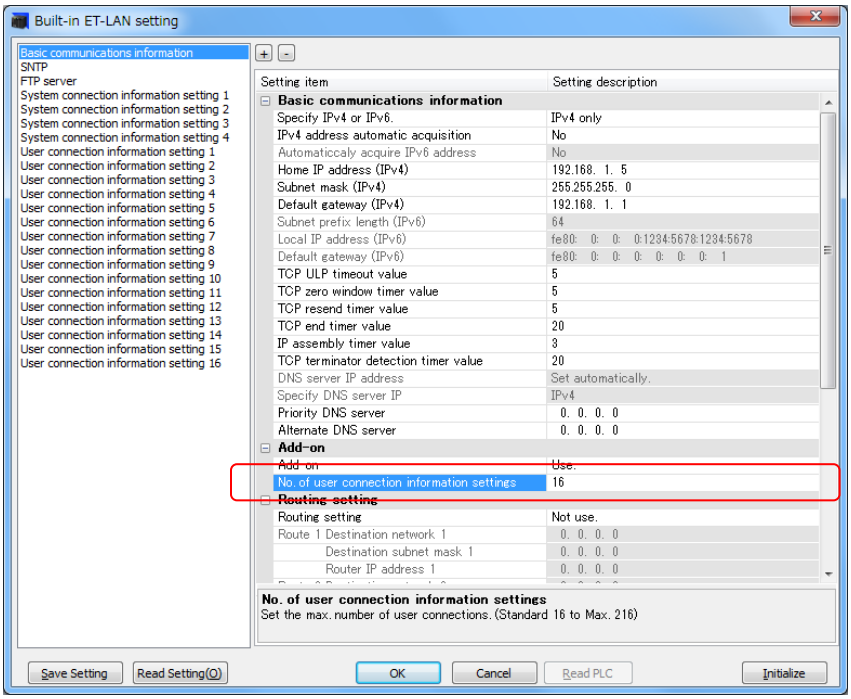
◆ **PROCEDURE**

1. **Select "Options" > "FP7 Configuration" > "Built-in ET-LAN" from the menu bar to open the built-in ET-LAN setting window.**



2. **Select "Basic communication information" in the left pane, and confirm "Add-on" is set to "Use".**

3. **Set "No. of user connection information settings" in the range of 16 to 216.**



2.2.2 Instructions Used in Master Communication

Instruction name	Description
SEND	Writes data to external devices.
RECV	Reads data from external devices.

(Note 1): From the CPU unit V3.00, the communication with DLU and DLL is available due to the additional specification of EE (hexadecimal) to destination unit numbers for the SEND and RECV instructions.

(Note 2): Precaution for setting user connection information
When the open method (server/client) is client connection, the home unit port number should be 0 except the case such that the port number needs to be fixed.

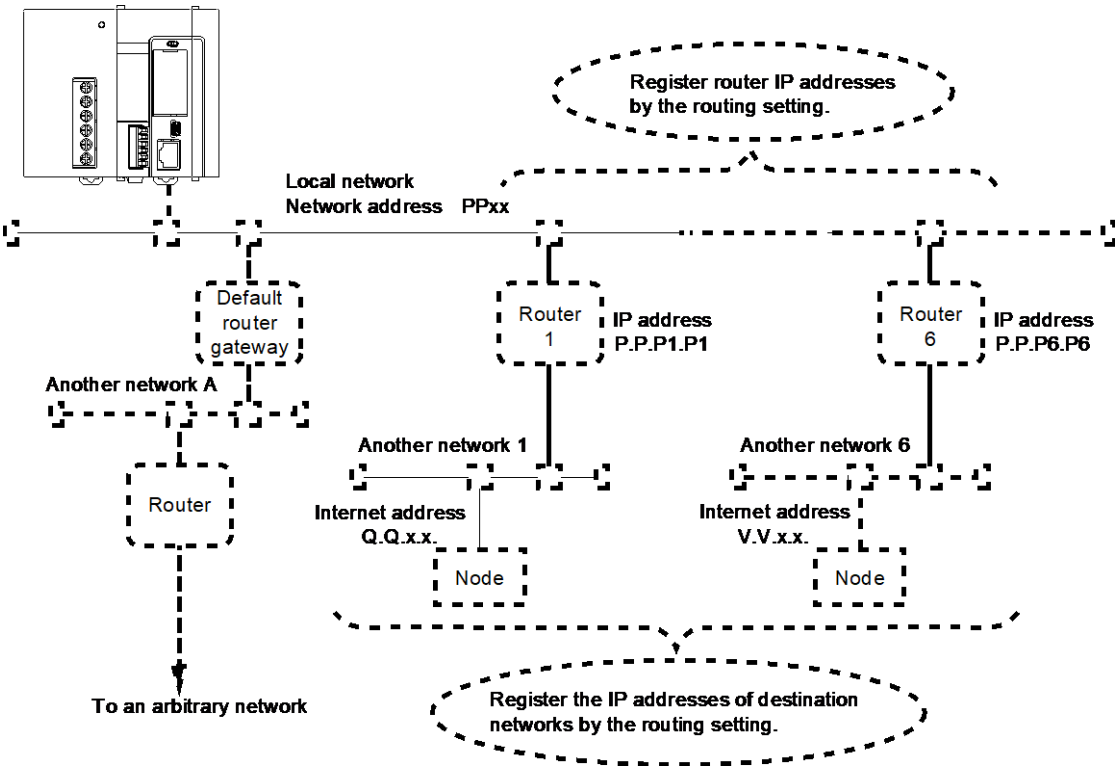
3

Routing Setting

3.1 Overview of Routing Setting

■ Overview of Routing Setting

When a partner device exists in a different network and that network is located in a place through a router other than the default gateway, the routing setting is used.



■ Items specified with tool software

Item	Default	Description
Routing setting	"Not use"	For performing routing, select "IPv4 only" or "IPv6 only".Selecting either one enables the route settings for 1 to 6.
Route 1-6 Destination network	"0.0.0.0" (Not set)	Specify the IP address (network address) of the destination network. Specify the IP address of the terminal (node) communicated. The setting range for each segment is 0 to 255.
Destiantion subnet mask 1-6	"0.0.0.0" (Not set)	Specify the destination subnet mask. Set the subnet mask of the network to which the terminal (node) communicated belongs. The setting range for each segment is 0 to 255.
Router IP address 1-6	"0.0.0.0" (Not set)	Specify the router IP address. Specify the IP address of the router used for communication. The setting range for each segment is 0 to 255.

(Note): The above table shows the case that IPv4 is selected. When IPv6 is selected, different items are displayed.

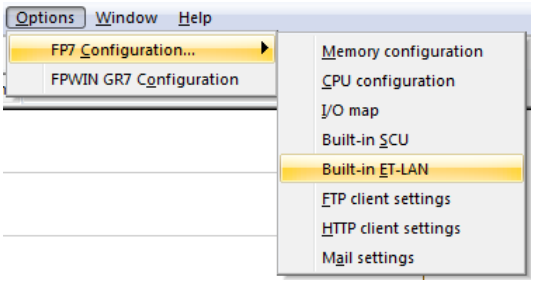
3.2 How to Use Routing Setting

3.2.1 Setting with Tool Software

The routing setting is configured with the programming tool software "FPWIN GR7".

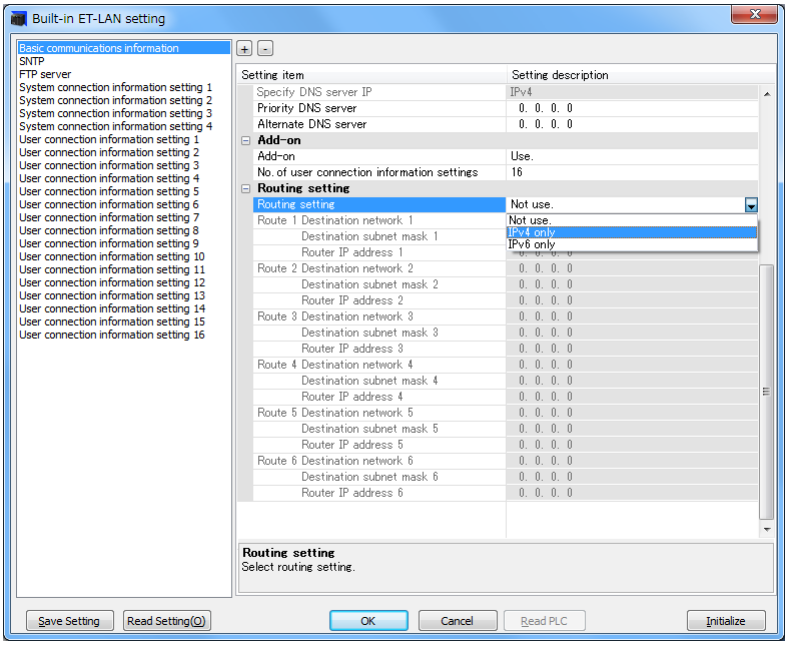
◆ **PROCEDURE**

1. **Select "Options" > "FP7 Configuration" > "Built-in ET-LAN" from the menu bar to open the built-in ET-LAN setting window.**



2. **Select "Basic communication information" in the left pane, and confirm "Add-on" is set to "Use".**

3. **Select "IPv4 only" or "IPv6 only" from the items of "Routing setting".**



4. **Set the destination IP address, subnet mask, and router IP address, and press the [OK] button. .**

4

FTP Client Function

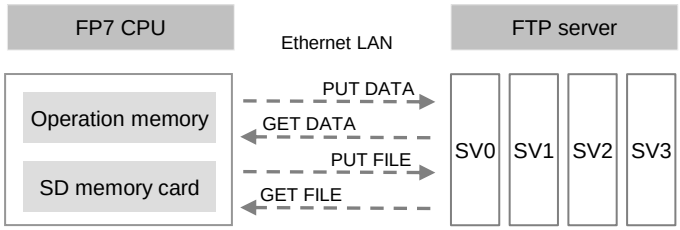
4.1 Overview of FTP Client Function

■ Overview of function

- The FTP client function is used to transmit data and files between PLC and FTP servers using the file transmission protocol.
- Two transfer methods are available, which are an arbitrary transfer by the transfer setting and an automatic transfer when a logging/trace file is determined.

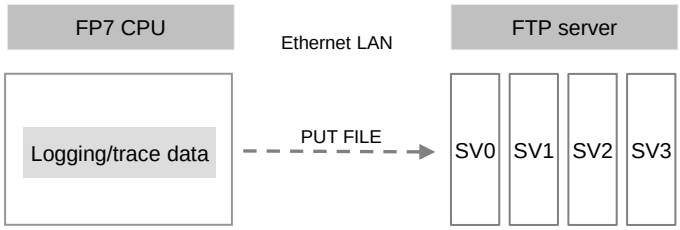
■ FTP file transfer

Specified files in an SD memory card or contents in the operation memory are filed with the transfer trigger specified with the setting tool or an instruction, and uploaded to FTP servers, or files downloaded from FTP servers are saved into an SD memory card or reflected in the operation memory.



■ Logging/Trace transfer

Logging/trace files will be uploaded to FTP servers once the logging/trace process is complete and files are determined.



4.2 FTP Client Function Specifications

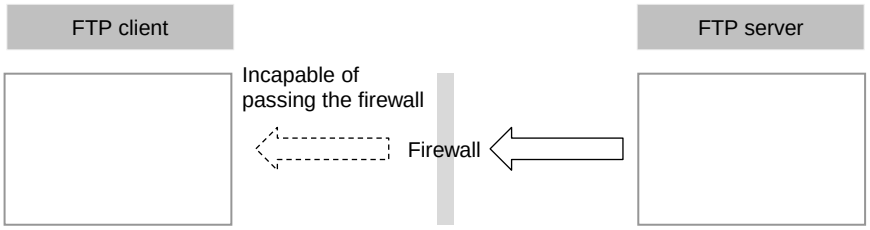
4.2.1 FTP Client Specifications

Item	Description
No. of simultaneous connections	1
No. of registered connections	4
Connection method	Select Active mode or Passive mode.
File size	When uploading: Max. 2 Gbytes (per file) When downloading: Max. 2 Gbytes (per file)
Others	Automatic retry Automatic file delete when upload/download succedded Specification of wild card of file names (*, ?) Overwrite transfer Rename transfer

4.2.2 Connection Method

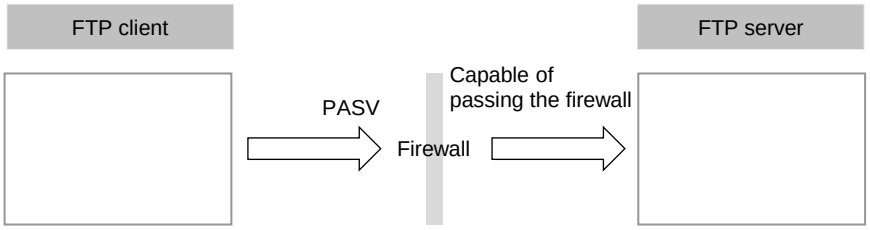
■ Active mode

For the FTP connection in Active mode, a request for connection is sent to the client from the server to establish the data transfer connection. Therefore, the connection from the outside (server) to the inside (client) may be rejected by the firewall on the client side.



■ Passive mode

For the FTP connection in Passive mode, a request for connection is sent to the server from the client to establish the data transfer connection. Therefore, the connection is possible even when the client is located inside of firewall.



4.3 Details of FTP Client Function

4.3.1 Basic Setup

■ FTP Server Settings

Up to four FTP servers can be set.

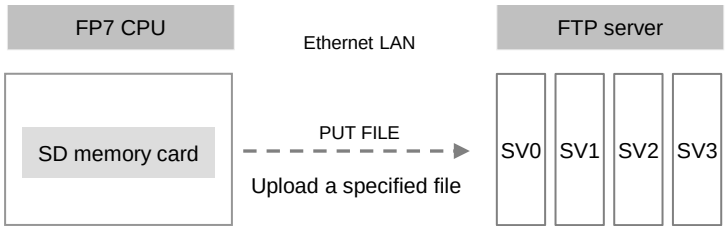
4.3.2 File Transfer Setting

- Data and files are transferred from PLC to FTP servers or from FTP servers to PLC.
- A maximum of 16 transfer settings can be registered.
- The settings are configured with the tool software or instructions, and the file transfer is executed with the instruction.

Item	Setting with tool software	Setting with instruction
FTP server setting	Basic setup	FTPcSV
File transfer setting	FTP file transfer settings	FTPcSET
Transfer execution	Transfer request by FTPcREQ instruction	Transfer request by FTPcREQ instruction

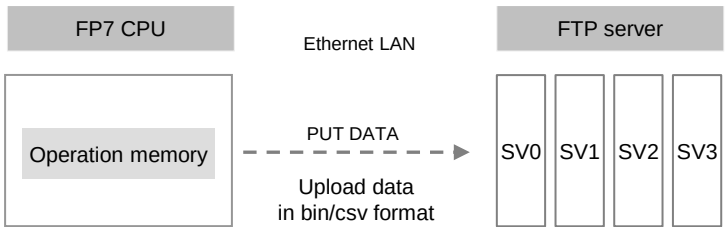
■ File transfer (PUTFILE)

Files in a specified SD memory card are transferred to FTP servers.



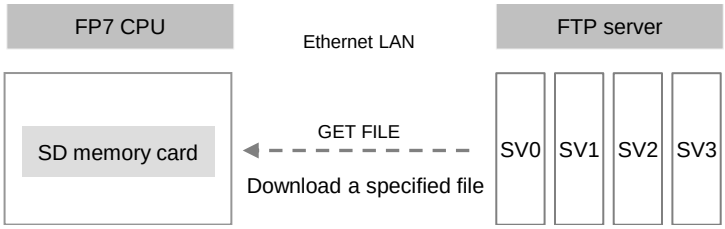
■ Data transfer (PUTDATA)

The operation memory in the PLC is filed and transferred to FTP servers. The file format is bin or csv only.



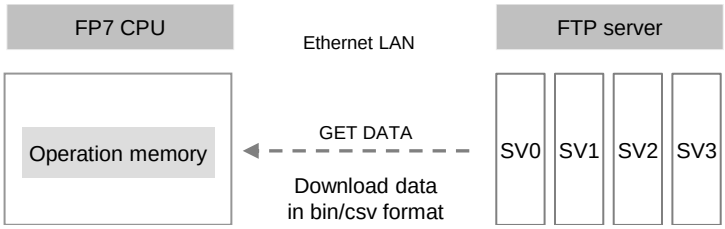
■ File transfer (GETFILE)

Files in FTP servers are transferred to an SD memory card in the PLC.



■ Data transfer (GETDATA)

Files in FTP servers are transferred to the operation memory in the PLC. The file format is bin or csv only.



4.3.3 Logging/Trace Transfer Settings

■ Logging/trace transfer settings

- Log files are transferred to FTP servers by the logging/trace transfer settings when the files are determined.
- A maximum of 16 transfer settings can be registered.
- The settings are configured with the tool software or instructions, and the transfer is automatically executed.

Item	Setting with tool software	Setting with instruction
FTP server setting	Basic setup	FTPcSV
Logging/trace transfer setting	Logging/trace transfer settings	FTPcLOG
Transfer execution	Automatically execute when files are determined.	Automatically execute when files are determined.

4.3.4 Overwrite Method and Rename Method

The overwrite method (default) or rename method can be selected for file transfer (PUTFILE or PUTDATA).

■ **Operation of overwrite method**

- Files are written with specified file names.
- When writing is interrupted for some reasons (such as troubles in network or servers), the partially written file remains.
- It is not possible to judge on the server side whether files have been transferred successfully or not without checking the file size or the contents.

■ **Operation of rename method**

- Specified data or files are transferred with tentative file names, and they are renamed to specified file names after the successful completion of transfer.
- The successful completion of file transfer can be confirmed by checking the specified file names on the server side.
- The processing time is longer than that of the overwrite method.

■ **Tentative file name**

- FP7_MAC address (Hexadecimal 12 characters).tmp (Extension tmp)
- If a file already exists when renaming files, that file is deleted before renaming.
- When retrying the transfer of multiple files, this situation may occur.

◆ **KEY POINTS**

- **For transferring files to FTP servers, the overwrite method or rename method is selectable. As tentative file names are renamed after the completion of the transfer in the rename method, it is possible to confirm that the files have reached to FTP servers successfully.**

- MEMO

4.4 How to Use File Transfer

4.4.1 Setting with Tool Software

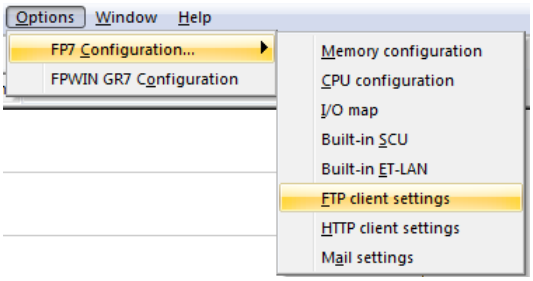
- Use the programming tool software "FPWIN GR7" to make the transfer settings.
- They can be also set with dedicated insturctions. Refer to 4.4.2 Setting with Instructions.

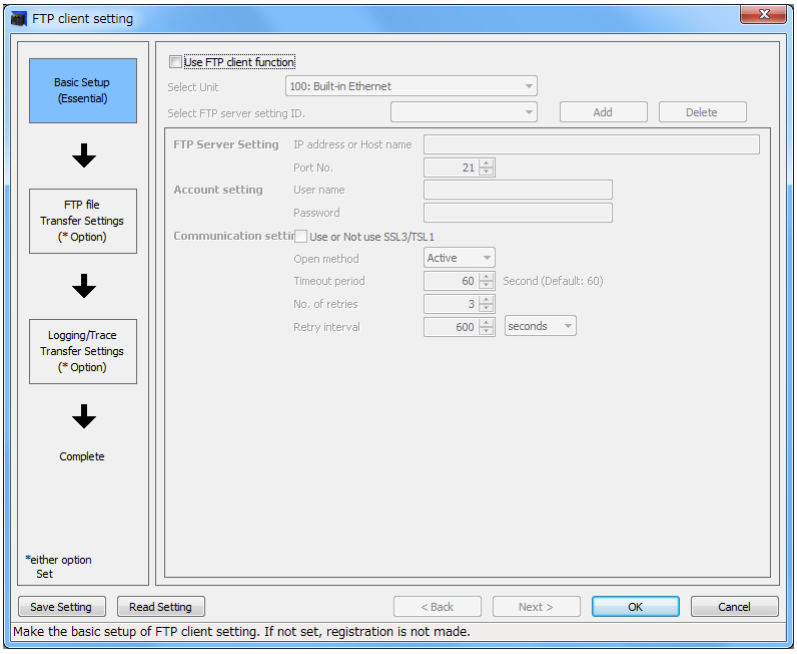
4.4.1.1 Basic Setup

Configure the settings for a FTP server to be connected.

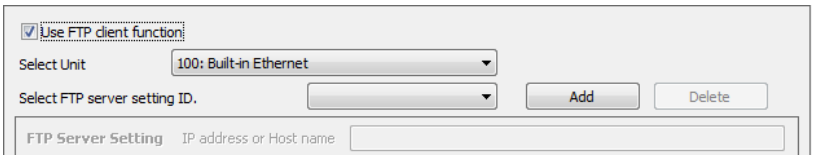
◆ **PROCEDURE**

1. Select "Options" > "FP7 Configuration" > "FTP client setting" from the menu bar to open the "FTP client setting" window.





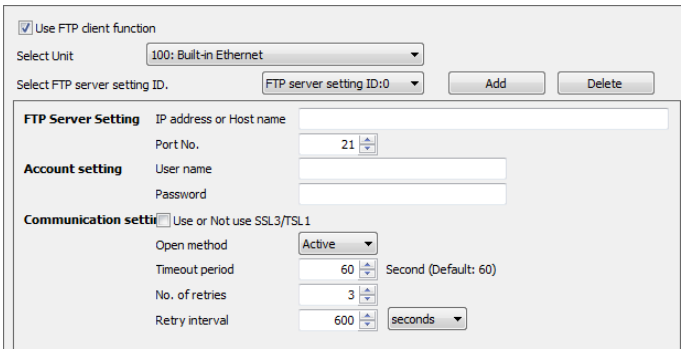
2. **Checking the box of "Use FTP client function" in Basic Setup (Essential) makes "Select Unit" and "Select FTP server setting ID" selectable.**



Select Unit is "100: Built-in Ethernet" only.

As the FTP server setting ID has not been set initially, click the [Add] button to add the FTP server setting.

3. **The following settings becomes available by adding the FTP server setting.**



4. **FTP server setting**

   Enter the destination IP address or host name, and specify the port number.

5. **Account setting**

   Enter the user name and password.

6. **Communication setting**

   Specify "Use or Not use SSL3/TSL1".

   Select "Open method". (Active / Passive)

   Specify "Timeout period". (30 to 300 seconds)

   Specify "No. of retries". (0 to 3 times)

   Specify "Retry interval". (10 to 86400 seconds / 1 to 1440 minutes / 1 to 24 hours)

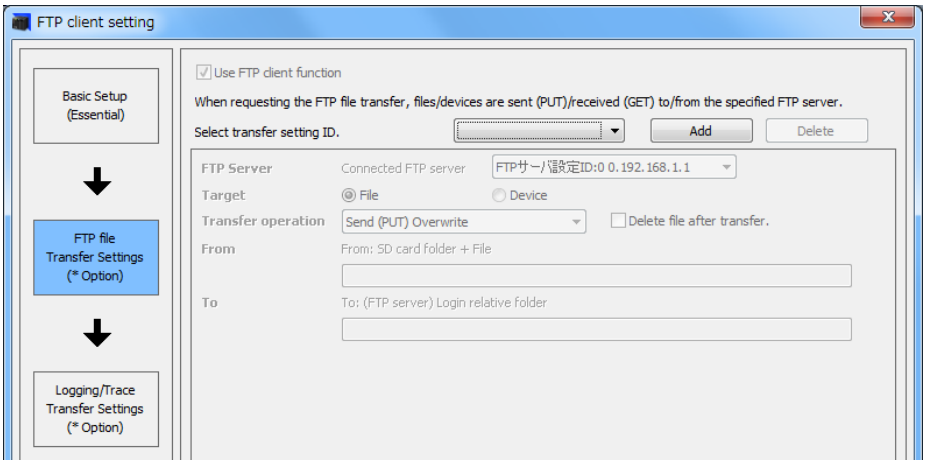
7. **Click the [Next] button to go to the FTP file transfer settings.**

4.4.1.2 FTP File Transfer Settings (Sending and Overwriting File)

- "Overwrite method" and "Rename method" are available for transferring files via FTP. The file transfer in the overwrite method is set here.
  For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

◆ **PROCEDURE**

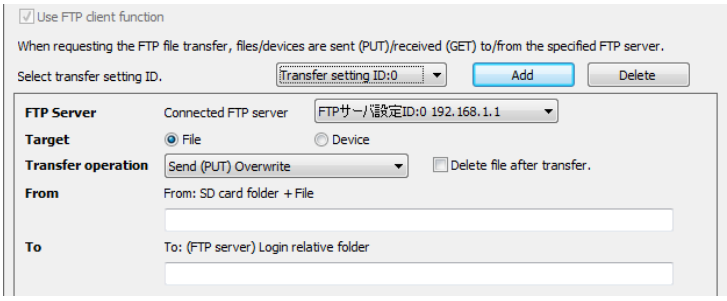
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

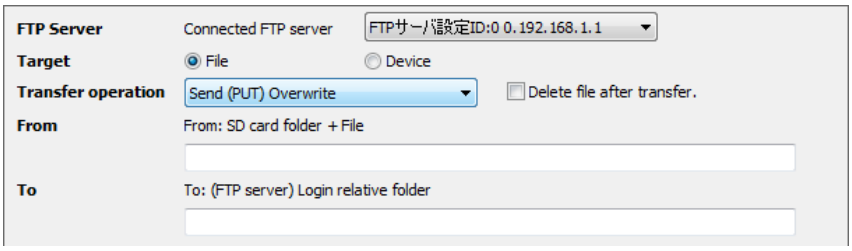


3. **FTP server**

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Target

Select “File".



5. Transfer operation

Select "Send (PUT) Overwrite".

To delete files after transfer, check "Delete file after transfer".

6. From

Specify a source SD card file (folder name and file name).

7. To

Specify a destination (FTP server) login relative folder.

For specifying the home directory, specify "/" or "\" only.

8. Save setting

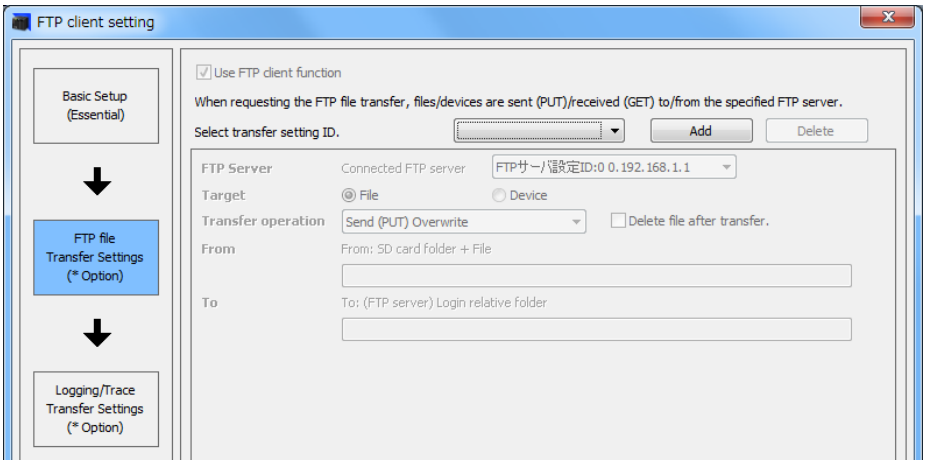
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.4.1.3 FTP File Transfer Settings (Sending and Renaming File)

- "Overwrite method" and "Rename method" are available for transferring files via FTP. The file transfer in the rename method is set here.
  For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

◆ **PROCEDURE**

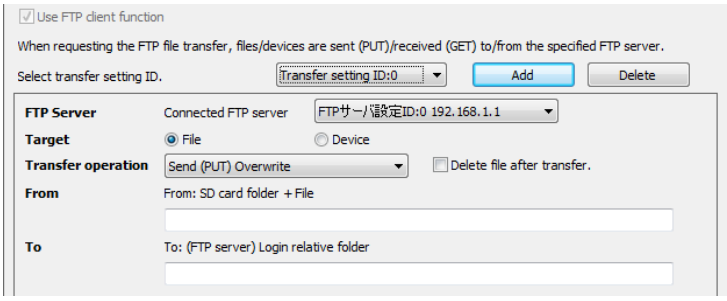
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

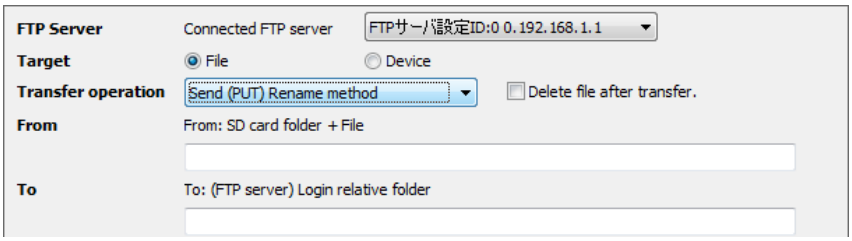


3. **FTP server**

   Select a destination FTP server from the list.
   The servers registered in Basic Setup are listed.

4. Target

Select “File".



5. Transfer operation

Select "Send (PUT) Rename method".

To delete files after transfer, check "Delete file after transfer".

6. From

Specify a source SD card folder + file.

7. To

Specify a destination (FTP server) login relative folder.

For specifying the home directory, specify "/" or "\" only.

8. Save setting

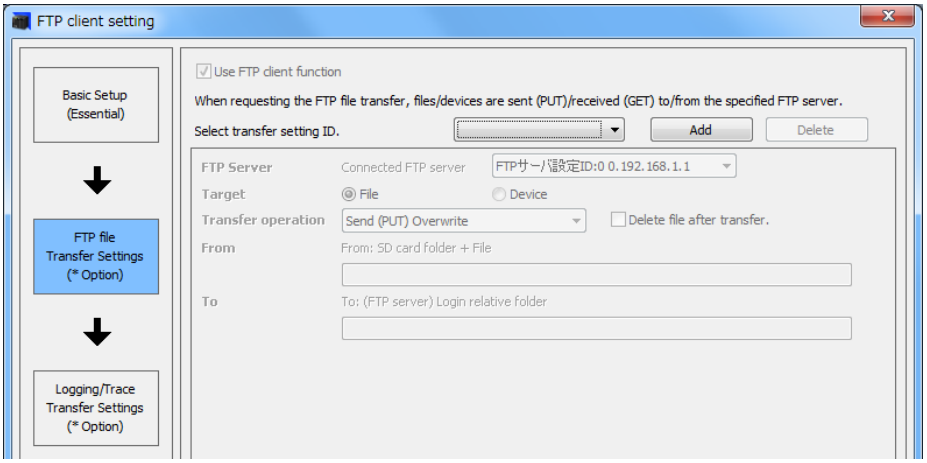
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.4.1.4 FTP File Transfer Settings (Getting File)

Configure the setting for getting files.

◆ **PROCEDURE**

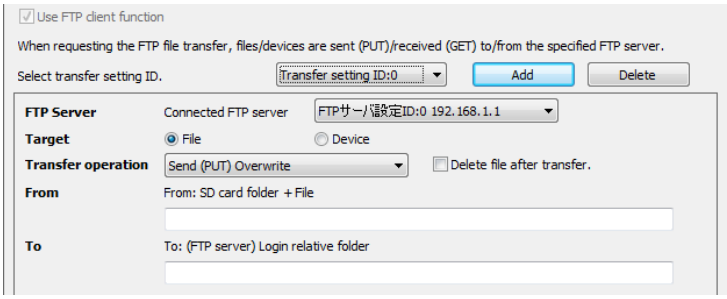
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

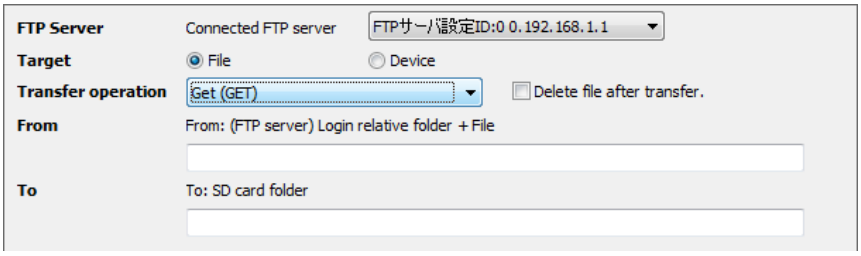


3. **FTP server**

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Target

Select “File".



5. Transfer operation

Select “Get (GET)".

To delete files after transfer, check "Delete file after transfer".

6. From

Specify a source (FTP server) login relative folder + file.

7. To

Specify a destination SD card folder.

8. Save setting

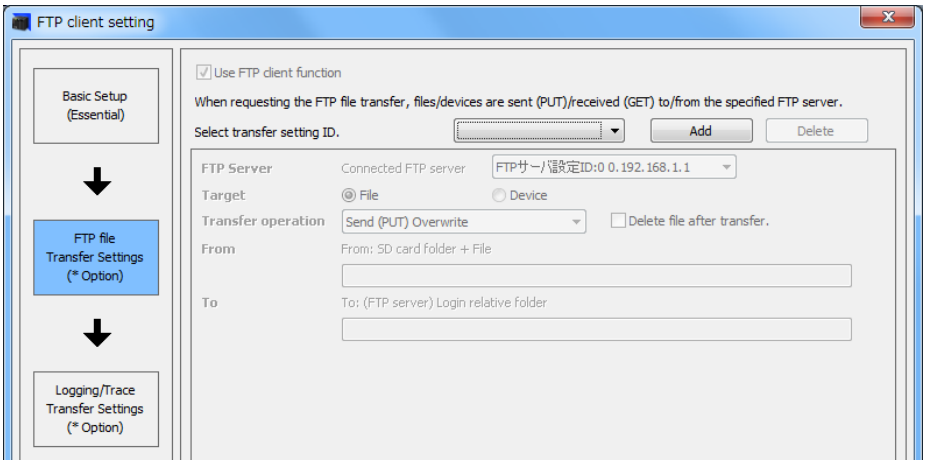
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.4.1.5 FTP File Transfer Settings (Sending and Overwriting Device)

- "Overwrite method" and "Rename method" are available for transferring devices via FTP.
  The device transfer in the overwrite method is set here.
  For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

◆ **PROCEDURE**

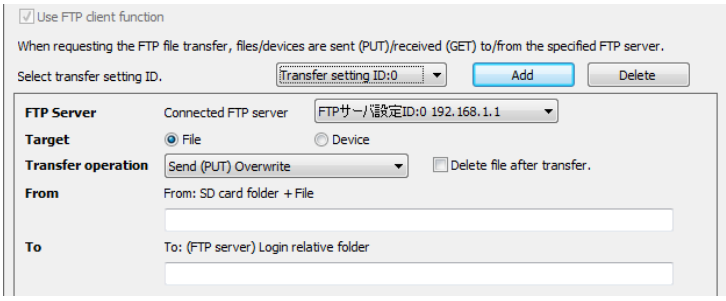
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

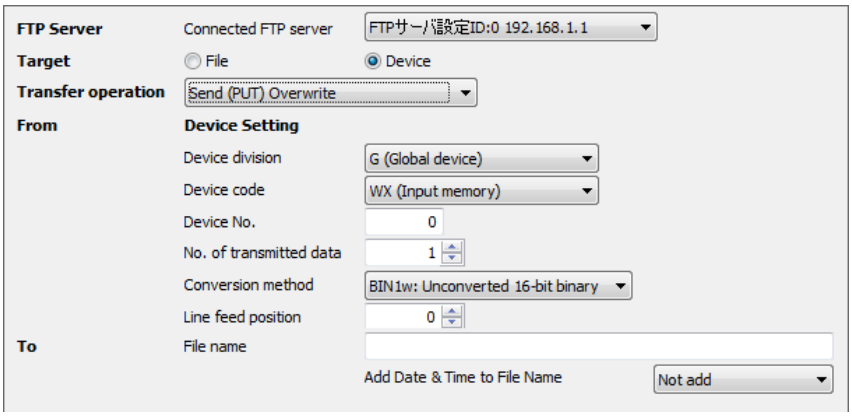


3. **FTP server**

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Target

Select "Device".



5. Transfer operation

Select "Send (PUT) Overwrite".

6. From: Device Setting

Select "Device division" [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify "No. of transmitted data".

Select "Conversion method".

Specify "Line feed position".

7. To

Specify a destination file name with (FTP server) login relative folder + file name.

Select whether or not to add date and time to file name.
[Not add / Add (Postposing) / Add (Preposing)]

8. Save setting

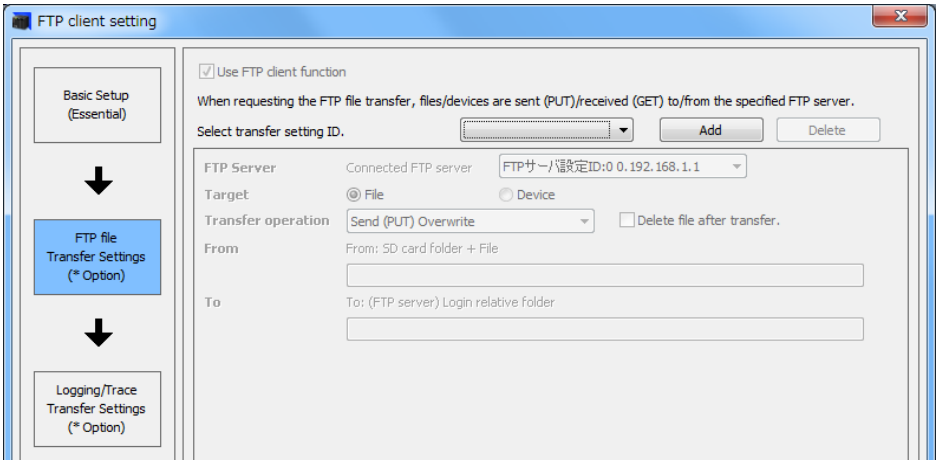
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.4.1.6 FTP File Transfer Settings (Sending and Renaming Device)

- "Overwrite method" and "Rename method" are available for transferring devices via FTP.
  The device transfer in the rename method is set here.
  For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

◆ **PROCEDURE**

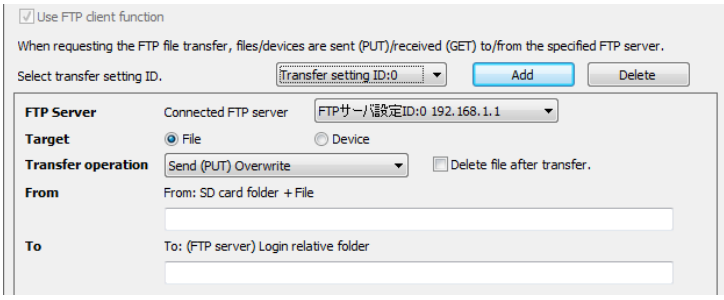
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

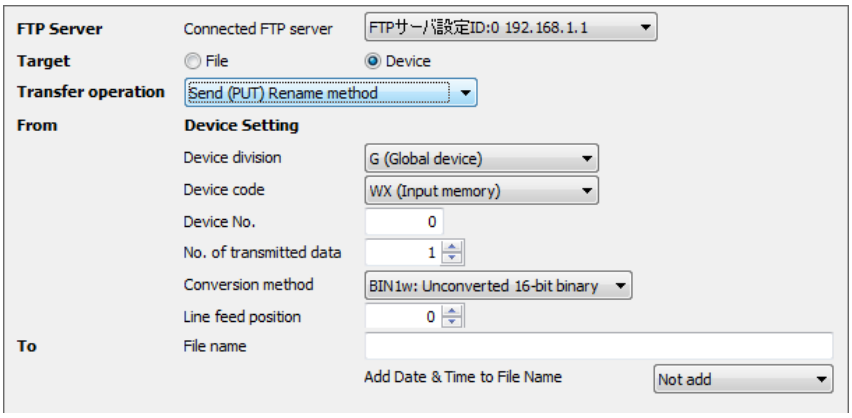


3. **FTP server**

   Select a destination FTP server from the list.
   The servers registered in Basic Setup are listed.

4. Target

Select "Device".



5. Transfer operation

Select "Send (PUT) Rename method".

6. From: Device Setting

Select "Device division" [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify "No. of transmitted data".

Select "Conversion method".

Specify "Line feed position".

7. To

Specify a destination file name with (FTP server) login relative folder + file name.

Select whether or not to add date and time to file name.
[Not add / Add (Postposing) / Add (Preposing)]

8. Save setting

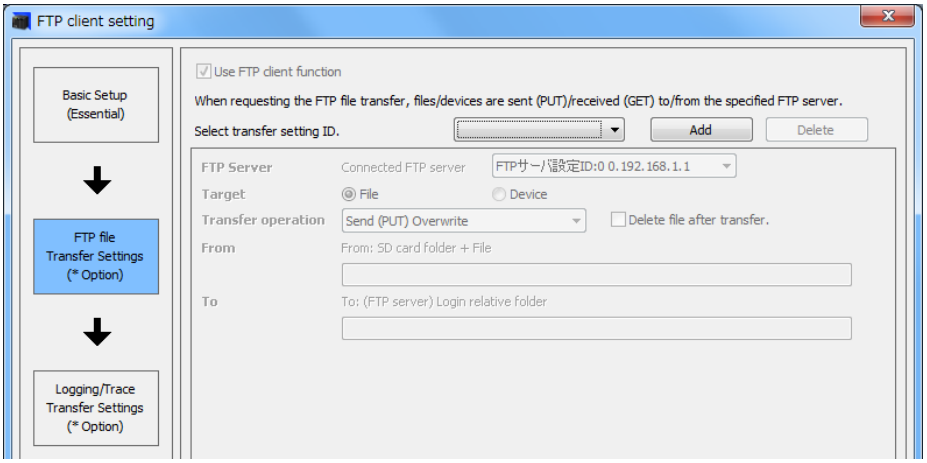
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.4.1.7 FTP File Transfer Settings (Getting Device)

Configure the setting for getting devices.

◆ **PROCEDURE**

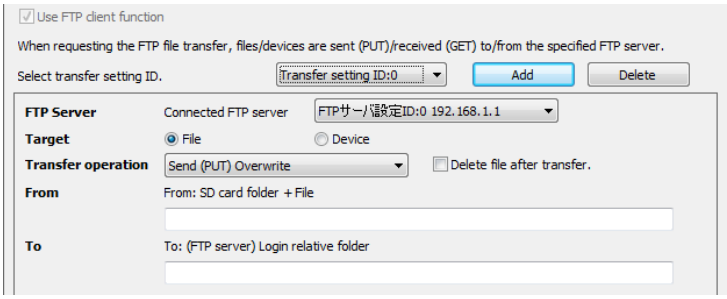
1. **After finishing the basic setup, click the [Next] button to go to the FTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

This setting is not required when performing the logging/trace transfer. Click the [Next] button to go to "Logging/Trace Transfer Settings".

2. **The following items becomes available by adding the log transfer setting ID.**

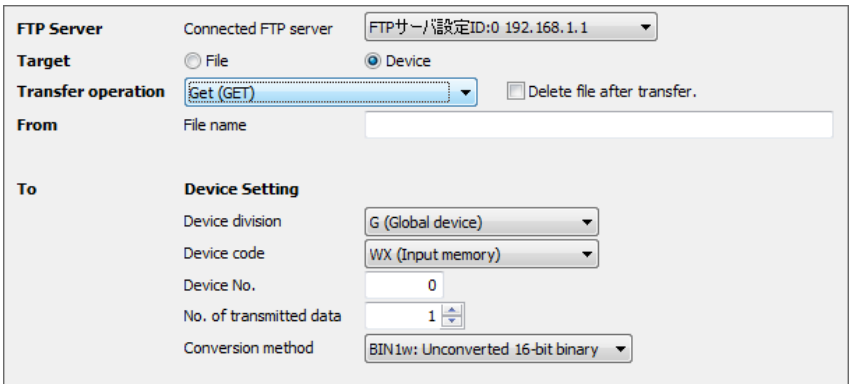


3. **FTP server**

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Target

Select "Device".



5. Transfer operation

Select “Get (GET)".

6. From

Specify a source file name with (FTP server) login relative folder + file name.

To delete files after transfer, check "Delete file after transfer".

7. From: Device Setting

Select "Device division" [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify "No. of transmitted data".

Select "Conversion method".

8. Save setting

The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

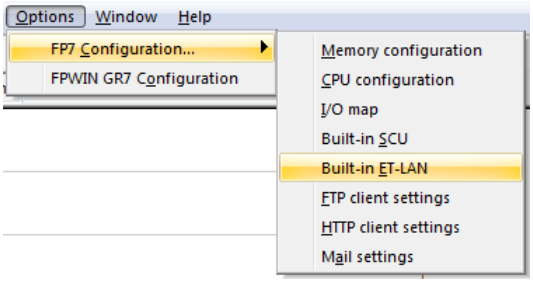
4.4.2 Setting with Instructions

- The destination server setting and file transfer setting are specified with instructions.
- Although they can be specified with only instructions, the setting to use the add-on in the built-in ET-LAN setting is required.

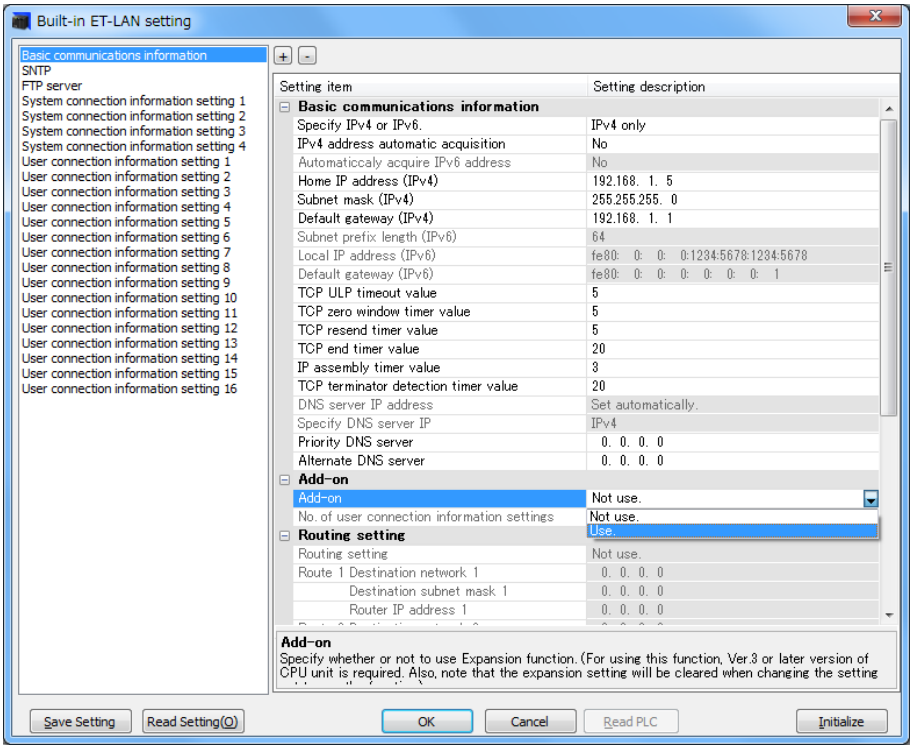
■ Setting to use the add-on

◆ **PROCEDURE**

1. Select "Options" > "FP7 Configuration" > "Built-in ET-LAN" from the menu bar to open the built-in ET-LAN setting window.



2. Set "Add-on" to "Use" in Basic communication information, and click the [OK] button.



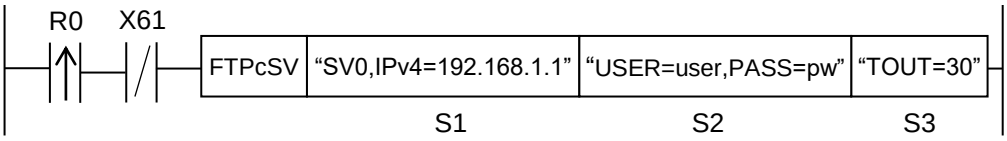
■ List of instructions

Instruction	Application
FTPcSV	Destination server setting
FTPcSET	Transfer etting

4.4.2.1 Destination Server Setting (FTPcSV)

- Sets the server to which the FTP client is connected.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (They are set when an incorrect IP address is specified or Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to have the add-on enabled in 1.1.2 Using Add-ons with the tool software before execution the instruction.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the server specification parameter or a character constant.
S2	Specify the starting address storing the login setting parameter or a character constant.
S3	Specify the starting address storing the detailed setting parameter or a character constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	

■ Processing

- The setting for the server connected to the FTP client is specified in the CPU unit according to specified parameters.
- It can be executed when all the transfer request relays of FTPc control relay and FPTc logging/trace control relay are set to 0: No request and when "Add-on" is set to "Use" in the built-in ET-LAN setting. (In the case other than the abve, an operation error is occurred.)
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when a specified IP address is out of range.)
- The initial value is setting with the instruction when the server setting is not specified.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- When an incorrect IP address is specified, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the server specification parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- Specify the FTP server setting from SV0 in order. When the right order is skipped, an error occurs. It is possible to specify when the setting has been already registered.
- Only one server can be specified at the same time.
- Specify an FTP server number, IP address or host name of FTP server, port number, open method, and SSL3/TLS1 authentication within 256 characters in total.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings	
S1	FTP server No. (Essential)	Specify FTP servers. Specify the following keywords. SV0: Server 0, SV1: Server 1, SV2: Server 2, SV3: Server 3
	IP address or host name of FTP server (Essential)	Specify IP address or host name. For IP address, specify the keyword "IPv4=" or "IPv6=" at the beginning. For host name, specify "HOST=". ・For IPv4: IPv4=111.122.133.144 ・For IPv6: IPv6=1111:122:2:1555:0:0:1888 * For IPv4 address, there are unsettable range. For details, refer to 1.1.3 IP Address Setting Specifications. ・For host name HOST=FTP.pidsx.com
	Port No. (can be omitted)	Specify port number. Port number range: 1 to 65535 PORT=: Port number (Default = 21)
	Open method (can be omitted)	Specify open method. Active＝act / Passive＝pasv OPEN=: Open method (Default = act)
	SSL3/TSL1 authentication (can be omitted)	Specify whether or not to use SSL3/TSL1 authentication. SSL: Use SSL3/TLS1. NON: Not use

(Note 1): Input an FTP server number, IP address or host name of FTP server, port number, open method, and SSL3/TLS1 authentication separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): Specify the parameters for specifying servers in the oroder of the above table.

Setting example

Example 1	S1	"SV0,IPv4=192.255.2.10,PORT=21,OPEN=act,SSL"
Settings		FTP server No.: 0, IP address: 192.255.2.10, Port No.: 21, Open method: Active, SSL3/TLS1 authentication: Use
Example 2	S1	"SV1,IPv6=1111:1222:1555:0:0:1888,SSL"
Settings		FTP server No.: 1, IP address: 1111:1222:1555:0:0:1888, Port No.: Omitted (Default: 21), Open method: Omitted (Default: Active), SSL3/TLS1 authentication: Use
Example 3	S1	"SV2,HOST=FTP.pidsx.com,PORT=28,OPEN=pasv,NON"
Settings		FTP server No.: 2, Host name: FTP.pidsx.com, Port No.: 28, Open method: Passive, SSL3/TLS1 authentication: Use

■ Operand [S2] setting

- Specify the starting address storing the login setting parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "INITIAL" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings		Setting range
S2	User name (can be omitted)	Specify a user name. Specify the keyword "USER=" at the beginning. USER=XXX (Default: root)	Max. 32 characters
	Password (can be omitted)	Specify a password. Specify the keyword "PASS=" at the beginning. PASS=XXX (Default: root)	Max. 32 characters

(Note 1): Input a user name and password separated by a comma ",".
(Note 2): Upper and lower case characters can be used for sepcifying keywords.
(Note 3): Specify the login setting parameters in the oroder of the above table.

Setting example

Example 1	S2	"USER=root,PASS=pidsx"
Settings		User name: root, Password: pidsx
Example 2	S2	"USER=PANASONIC,PASS=SUNX"
Settings		User name: PANASONIC, Password: SUNX

■ Operand [S2] Settings for user name and password

Pattern	Specification method
Specify user name: Delete password	"USER=xxx,PASS="
Delete user name: Specify password	"USER=,PASS=xxx"
Delete user name: Delete password	"USER=,PASS="
Specify user name: Not change password	"USER=xxx"
Not change user name: Specify password	",PASS=xxx"

Setting example

Example 1	S2	"USER=root,PASS="
Settings		User name: root, Password: Delete
Example 2	S2	"USER=,PASS=SUNX"
Settings		User name: Delete, Password: SUNX
Example 3	S2	"USER=,PASS="
Settings		User name: Delete, Password: Delete
Example 4	S2	"USER=root"
Settings		User name: root, Password: Not change
Example 5	S2	",PASS=SUNX"
Settings		User name: Not change, Password: SUNX

■ Special keyword of operand [S2] setting

Special keyword	Description
INITIAL	Set the default.
KEEP	Not change the current settings.

Setting example

Example 1	S2	"INITIAL"
Settings		User name: root, Password: root
Example 2	S2	"KEEP"
Settings		User name: Not change, Password: Not change

■ Operand [S3] setting

- Specify the starting address storing the detailed setting parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "INITIAL" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings		Setting range
S3	Timeout period (can be omitted)	Specify a timeout period. TOUT=: Time setting (Default: 60 seconds)	30 to 300 seconds
	No. of retries (can be omitted)	Specify the number of retries. RTRY=: No. of retries (Default: 3 times)	0 to 3
	Retry interval (can be omitted)	Specify the number of retries. RTTM=: Retry interval (Default: 600 seconds) *4	10 to 86400 seconds

(Note 1): Input a timeout period, number of retries and retry interval separated by a comma ",".
(Note 2): Upper and lower case characters can be used for sepcifying keywords.
(Note 3): Specify the detailed setting parameters in the order of the above table.
(Note 4): The retry interval can be specified by 10 seconds. It is rounded down to the 100. (Example: When specifying 38 seconds, it becomes 30 seconds.)

Setting example

Example 1	S3	"TOUT=30,RTRY=2,RTTM=500"
Settings		Timeout period: 30 seconds, No. of retries: 2, Retry interval: 500 seconds
Example 2	S3	"TOUT=270,RTRY=0,RTTM=4900"
Settings		Timeout period: 270 seconds, No. of retries: 0 (Not retry), Retry interval: 4900 seconds
Example 3	S3	"TOUT=30,RTRY=25"
Settings		Timeout period: 30 seconds, No. of retries: 25, Retry interval: Not change
Example 4	S3	",RTRY=25,RTTM=3000"
Settings		Timeout period: Not change, No. of retries: 25, Retry interval: 3000 seconds

■ Special keyword of operand [S3] setting

Special keyword	Description
INITIAL	Set the default.
KEEP	Not change the current settings.

Setting example

Example 1	S3	"INITIAL"
Settings		Timeout period: 60 seconds, No. of retries: 3, Retry interval: 600 seconds
Example 2	S3	"KEEP"
Settings		Timeout period: Not change, No. of retries: Not change, Retry interval: Not change

■ Flag operation

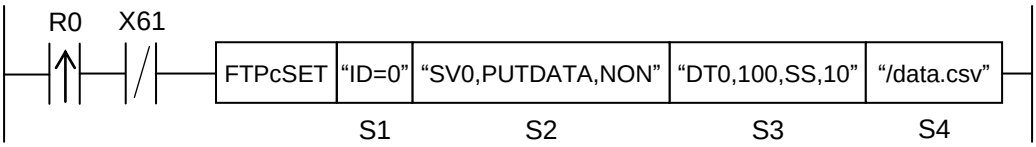
Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the same keyword is specified redundatnly. Set when even one request active relay of FTPc control relay or FTPc logging/trace control relay is 1: Requesting. Set when "Add-on" is set to "Not use" in Built-in ET-LAN setting. Set when server numbers are not specified in the righr order. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256.
CY flag (SR9)	Set when executed with an incorrect IP address. The detail code set in SD29 is "1: Specification of incorrect IP address". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to List of SD29 Detail Codes.

4.4.2.2 Transfer Settings (FTPcSET)

- Makes the FTP client transfer setting (0 to 15).
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to specify the settings for destination servers before executing instructions using 4.4.2.1 Destination Server Setting (FTPcSV) or 4.4.1.1 Basic Setup with the tool software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the transfer setting number (string) or a character constant.
S2	Specify the starting address storing the operation setting parameter or a character constant.
S3	Specify the starting address storing the source file name or a character constant.
S4	Specify the starting address storing the destination folder name or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	
S4	●	●	●	●			●	●												●	

■ Processing

- Stores the FTP client transfer settings of S2 to S4 in the transfer setting area specified by S1.
- Executable when the transfer request relay for the specified transfer setting is 0: No Request.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- Data is actually sent to files or obtained from files when the FTP transfer request (FTPcREQ) instruction is executed after the completion of the FTP client transfer settings.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the transfer setting number or a character constant.

Setting item	Settings		Setting range
S1	Transfer setting No.	Specify a transfer setting number. ID=: Transfer setting number	0 to 15

(Note): Transfer setting numbers should be specified from number 0 in ascending order. An error occurs when transfer setting numbers are not specified in ascending order. If transfer settings have been already registered, this rule is not applied.

Setting example

Example 1	S1	"ID=1"
Settings		Transfer setting number: 1
Example 2	S1	"ID=8"
Settings		Transfer setting number: 8

■ Operand [S2] setting

- Specify the starting address storing the operation setting parameter or a character constant.

Setting item	Settings			
S2	Specification of FTP server	Specify FTP servers. (3 digits fixed) SV0: Server 0, SV1: Server 1, SV2: Server 2, SV3: Server 3		
	Transfer target and operation	Set the target for the transfer and operation.		
		Parameter string	Target	Transfer operation
		PUTFILE	File	Send to servers (Overwrite method)
		PUTFILE-OVW	File	Send to servers (Overwrite method)
		PUTFILE-REN	File	Send to servers (Rename method)
		GETFILE	File	Obtain from servers
		PUTDATA	Device	Send to servers (Overwrite method)
		PUTDATA-OVW	Device	Send to servers (Overwrite method)
		PUTDATA-REN	Device	Send to servers (Rename method)
		GETDATA	Device	Obtain from servers
	File after transfer	Setting for deletig source files after transfer. (3 digits fixed) DEL: Delete, NON: Not delete		

(Note 1): Input operationg setting parameters and each setting parameter separated by a comma ",".

(Note 2): The operation setting parameters cnnot be omitted. Specify thme in the order of the above table.

(Note 3): For details of the transfer operations (overwrite method and rename method), refer to 4.3.4 Overwrite Method and Rename Method.

Setting example

Example 1	*S2*	"SV3,PUTFILE,NON"
Settings		FTP server: 3, Target: File, Operation: Send (PUT) Overwrite method, File after transfer: Not delete
Example 2	S2	"SV1,PUTFILE-OVW,DEL"
Settings		FTP server: 1, Target: File, Operation: Send (PUT) Overwrite method, File after transfer: Delete
Example 3	S2	"SV0,PUTFILE-REN,DEL"
Settings		FTP server: 0, Target: File, Operation: Send (PUT) Rename method, File after transfer: Delete
Example 4	S2	"SV2,GETFILE,DEL"
Settings		FTP server: 2, Target: File, Operation: Get (GET), File after transfer: Delete
Example 5	S2	"SV1,GETFILE,NON"
Settings		FTP server: 1, Target: File, Operation: Get (GET), File after transfer: Not delete

■ Operand [S3] setting (when transferring files)

Specify the starting address storing the source file name or a character constant.

Setting item	Settings	
S3	Source file name	For PUT Specify a file name in an SD card with an abolute path.
		For GET Specify a file name from the home directory of a user which logs in FTP servers with a relative path.

(Note 1): Wild cards "*" and "?" are usable for file names.

(Note 2): An error occurs when the number of files which match wild cards 101 or more.

(Note 3): In case of PUT, LOG folder names ("\LOG0" to "\LOG15") cannot be specified.

■ Operand [S3] setting (when putting device)

Specify the starting address storing the source device setting or a character constant.

<table>
<tr><th>Setting item</th><th>Settings</th><th>Setting range</th></tr>
<tr><td rowspan="4">S3</td><td>Source device</td><td>・Global device
Specify device code + device number.
・Local device
"PB" + PB number + "_" (underbar) + Device code + Device number
<Devices that can be specified>
<table>
<tr><th>Global device</th><th>Local device</th></tr>
<tr><td>WX</td><td>WX</td></tr>
<tr><td>WY</td><td>WY</td></tr>
<tr><td>WR</td><td>WR</td></tr>
<tr><td>WL</td><td>WL</td></tr>
<tr><td>DT</td><td>DT</td></tr>
<tr><td>LD</td><td>LD</td></tr>
</table></td><td></td></tr>
<tr><td>No. of transferred data (No. of data)</td><td>Specify the number of transferred data (number of data).
* The number of data that can be trasferred simultaneously is 1MB for all 16 IDs. However, they are calculated with data after conversion.</td><td>1 to 524228
(512k points)</td></tr>
<tr><td>Conversion method</td><td>Specify a conversion method.
<table>
<tr><th colspan="2">Parameter</th><th>Extension (Saving format)</th></tr>
<tr><td>BIN1w</td><td>No conversion, 16-bit binary</td><td>.BIN (binary data)</td></tr>
<tr><td>US</td><td>16-bit unsigned decimal</td><td rowspan="10">.CSV (comma-separated text)</td></tr>
<tr><td>SS</td><td>16-bit signed decimal</td></tr>
<tr><td>UL</td><td>32-bit unsigned decimal</td></tr>
<tr><td>SL</td><td>32-bit signed decimal</td></tr>
<tr><td>SF</td><td>32-bit single-precision floating point</td></tr>
<tr><td>DF</td><td>64-bit double-precision floating point</td></tr>
<tr><td>HEX1w</td><td>16bitHEX</td></tr>
<tr><td>HEX2w</td><td>32bitHEX</td></tr>
<tr><td>HEX4w</td><td>64bitHEX</td></tr>
<tr><td>ASCII</td><td>ASCII character (Output enclosed with "")</td></tr>
</table></td><td></td></tr>
<tr><td>Line feed position</td><td>Specify line feed position.
0: Output the end of file only
n: Output by n data</td><td>0 to 255</td></tr>
</table>

(Note 1): Input source device setting parameters and each setting parameter separated by a comma ",".

(Note 2): Specify the operation setting parameters in the order of the above table.

(Note 3): When omitting "conversion method" and subsequent items, the conversion method is set to 16-bit binary and the line feed position is set to 0 (output the end of file only).

(Note 4): When omitting "Line feed position", it is set to 0: Output the end of file only.

Setting example

Example 1	S3	"WX16,32,BIN1w,0"
Settings		Device setting, Device division: Global, Device code: WX, Device No.: 16 No. of transferred data: 32 points (32 words), Conversion method: Unconverted 16-bit binary, Line feed position: Output the end of file only
Example 2	S3	"DT123456,250,SS,10"
Settings		Device setting, Device division: Global, Device code: DT, Device No.: 123456 No. of transferred data: 250 points (250 words), Conversion method: 16-bit signed decimal, Line feed position: Output by 10 data
Example 3	S3	"WR0,16,DF"
Settings		Device setting, Device division: Global, Device code: WR, Device No.: 0 No. of transferred data: 16 points (64 words), Conversion method: 64-bit double-precision floating point, Line feed position: Output the end of file only
Example 4	S3	"WL10,128"
Settings		Device setting, Device division: Global, Device code: WL, Device No.: 10 No. of transferred data: 128 points (128 words), Conversion method: Unconverted 16-bit binary, Line feed position: Output the end of file only
Example 5	S3	"PB100_WR1000,50,US,0"
Settings		Device setting, Device division: Local, PB No.: 100, Device code: WR, Device No.: 1000 No. of transferred data: 50 points (50 words), Conversion method: 16-bit unsigned decimal, Line feed position: Output the end of file only
Example 6	S3	"PB15_LD16,40,HEX4w,2"
Settings		Device setting, Device division: Local, PB No.: 15, Device code: LD, Device No.: 16 No. of transferred data: 40 points (160 words), Conversion method: 64-bit HEX, Line feed position: Output by 2 data
Example 7	S3	"PB10_WL10,32,UL"
Settings		Device setting, Device division: Local, PB No.: 10, Device code: WL, Device No.: 10 No. of transferred data: 32 points (64 words), Conversion method: 32-bit unsigned decimal, Line feed position: Output the end of file only
Example 8	S3	"PB1_WY128,5"
Settings		Device setting, Device division: Local, PB No.: 1, Device code: WY, Device No.: 128 No. of transferred data: 5 points (5 words), Conversion method: Unconverted 16-bit binary, Line feed position: Output the end of file only

■ Operand [S3] setting (when getting device)

Specify the starting address storing the destination device setting or a character constant.

<table>
<tr><th>Setting item</th><th>Settings</th><th>Setting range</th></tr>
<tr><td rowspan="3">S3</td><td>Destination device</td><td>・Global device
Specify device code + device number.
・Local device
"PB" + PB number + "_" (underbar) + Device code + Device number
<Devices that can be specified>
<table>
<tr><th>Global device</th><th>Local device</th></tr>
<tr><td>WX</td><td>WX</td></tr>
<tr><td>WY</td><td>WY</td></tr>
<tr><td>WR</td><td>WR</td></tr>
<tr><td>WL</td><td>WL</td></tr>
<tr><td>DT</td><td>DT</td></tr>
<tr><td>LD</td><td>LD</td></tr>
</table></td><td></td></tr>
<tr><td>No. of transferred data (No. of data)</td><td>Specify the number of transferred data (number of data).
* The number of data that can be trasferred simultaneously is 1MB for all 16 IDs. They are calculated with file size.</td><td>1 to 524228 (512k points)</td></tr>
<tr><td>Conversion method</td><td>Specify a conversion method.
<table>
<tr><th colspan="2">Parameter</th><th>Extension (Saving format)</th></tr>
<tr><td>BIN1w</td><td>Unconverted 16-bit binary</td><td>.BIN (binary data)</td></tr>
<tr><td>US</td><td>16-bit unsigned decimal</td><td rowspan="12">.CSV (comma-separated text)</td></tr>
<tr><td>SS</td><td>16-bit signed decimal</td></tr>
<tr><td>UL</td><td>32-bit unsigned decimal</td></tr>
<tr><td>SL</td><td>32-bit signed decimal</td></tr>
<tr><td>SF</td><td>32-bit single-precision floating point</td></tr>
<tr><td>DF</td><td>64-bit double-precision floating point</td></tr>
<tr><td>HEX1w</td><td>16bitHEX</td></tr>
<tr><td>HEX2w</td><td>32bitHEX</td></tr>
<tr><td>HEX4w</td><td>64bitHEX</td></tr>
<tr><td>ASCII</td><td>ASCII character (Output enclosed with "")</td></tr>
</table></td><td></td></tr>
</table>

(Note 1): Input source device setting parameters and each setting parameter separated by a comma ",".

(Note 2): Specify the operation setting parameters in the order of the above table.

(Note 3): When omitting "Conversion method", it is set to unconverted 16-bit binary.

(Note 4): The number of data that can be trasferred simultaneously is 1MB for all 16 IDs. They are calculated with file size.

Setting example

Example 1	S3	"WX16,32,BIN1w"
Settings		Device setting, Device division: Global, Device code: WX, Device No.: 16, No. of transferred data: 32 points (32 words), Conversion method: Unconverted 16-bit binary
Example 2	S3	"DT123456,250,SS"
Settings		Device setting, Device division: Global, Device code: DT, Device No.: 123456, No. of transferred data: 250 points (250 words), Conversion method: 16-bit signed decimal
Example 3	S3	"WR0,16,DF"
Settings		Device setting, Device division: Global, Device code: WR, Device No.: 0, No. of transferred data: 16 points (64 words), Conversion method: 64-bit double-precision floating point
Example 4	S3	"WL10,128"
Settings		Device setting, Device division: Global, Device code: WL, Device No.: 10, No. of transferred data: 128 points (128 words), Conversion method: Unconverted 16-bit binary

■ Operand [S4] setting (when transferring files)

Specify the starting address storing the destination folder name or a character constant.

Setting item	Settings	
S4	Destination file name	For PUT Specify a folder name from the home directory of a user which logs in FTP servers with a relative path. For specifying the home directory, specify "/" or “\" only. For GET Specify a storage folder name in an SD card with an absolute path.

(Note 1): When no destination folders exist, they are automatically created up to eight hierarchies.

(Note 2): In case of GET, LOG folder names ("\LOG0" to "\LOG15") cannot be specified.

■ Operand [S4] setting (when putting device)

Specify the starting address storing the destination file setting or a character constant.

Setting item	Settings	
S4	Destination file name	Specify a destination file name. Specify a folder name and file name from the home directory of a user which logs in FTP servers with a relative path. * The string after the last "." (period) is applied as an extension of file name.
	File name automatic addition position	Specify the position of the automatic additional data added to a file name. TOP: Automatic additional data is added before a file name. END: Automatic additional data is added after a file name. * Automatic additional data is year, month, day, hour, minute and second "(yymmdd_hhmmss)".

(Note 1): Specify a destination file name within 240 characters.

(Note 2): When no destination folders exist, they are automatically created up to eight hierarchies.

(Note 3): Specify the operation setting parameters in the order of the above table.

(Note 4): When omitting "File name automatic addition position", automatic additional data is not added to a file name.

Setting example

Example 1	S4	"\FTP\PutData1.bin,TOP"
Settings		Destination file name: \FTP\PutDdata1.bin, Time data addition setting: Add year-month-day data, Automatic addition position: Add automatic additional data before file name
Example 2	S4	"\FTP\PutData2.bin,END"
Settings		Destination file name: \FTP\PutDdata2.bin, Time data addition setting: Add time data, Automatic addition position: Add automatic additional data after file name
Example 3	S4	"\FTP\PutData3.bin"
Settings		Destination file name: \FTP\PutDdata3.bin, Time data addition setting: Add year-month-day data and time data, Automatic addition position: Not add automatic additional data to file name

■ Operand [S4] setting (when getting device)

Specify the starting address storing the source file name or a character constant.

Setting item	Settings	
S4	Source file name	Specify the starting address storing the source file name or a character constant.

(Note): Specify a folder name and file name from the home directory of a user which logs in FTP servers with a relative path.

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when transfer setting numbers are not specified in ascending order. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when an FTP server that has not been specified with the destination server setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

4.4.3 Executing File Transfer with Instructions

Executes file transfer according to the settings with the setting tool software or instructions.

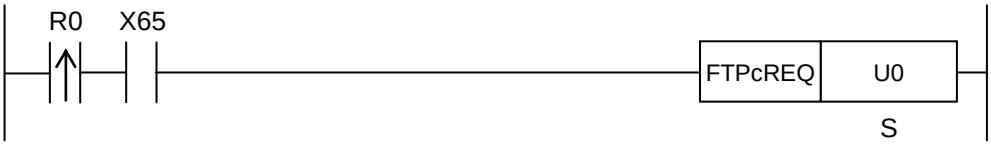
■ List of executed instructions

Instruction	Application
FTPcREQ	Requesting transfer
FTPcCTL	Controlling transfer

4.4.3.1 Requesting Transfer (FTPcREQ)

- Requests the transfer of FTP client.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when an Ethernet cable is disconnected or Ethernet is initialized.)
- Check if "X65: FTP client preparation done" is ON before executing the instruction.
- It is necessary to specify the transfer settings before executing the instruction using 4.4.2.2 Transfer Settings (FTPcSET) or 4.4.1.2 to 4.4.1.7 File Transfer Settings with the tool software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S	Specify the device address storing the transfer number (0 to 15) or a constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●

■ Processing

- Turns ON the transfer request relay of the transfer number specified by [S].
- It can be executed when the FTP client preparation done (X65) is ON. If it is OFF when executing the instruction, an operation error occurs.
- It is executable when the Ethernet cable disconnection (X60) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

- When it is executed under the following condition, an error code is set to the execution done code as a transfer error.

Status	Code	Status	Code
Destination server is not set.	1	Transfer prohibition setting	5
Transfer setting is not set.	2	Data decompression failed. Data decompression failed. (When accessing data with PUT)	8
Registering a process request failed.	4	Data decompression failed. (When accessing data with GET)	9

■ Precautions during programming

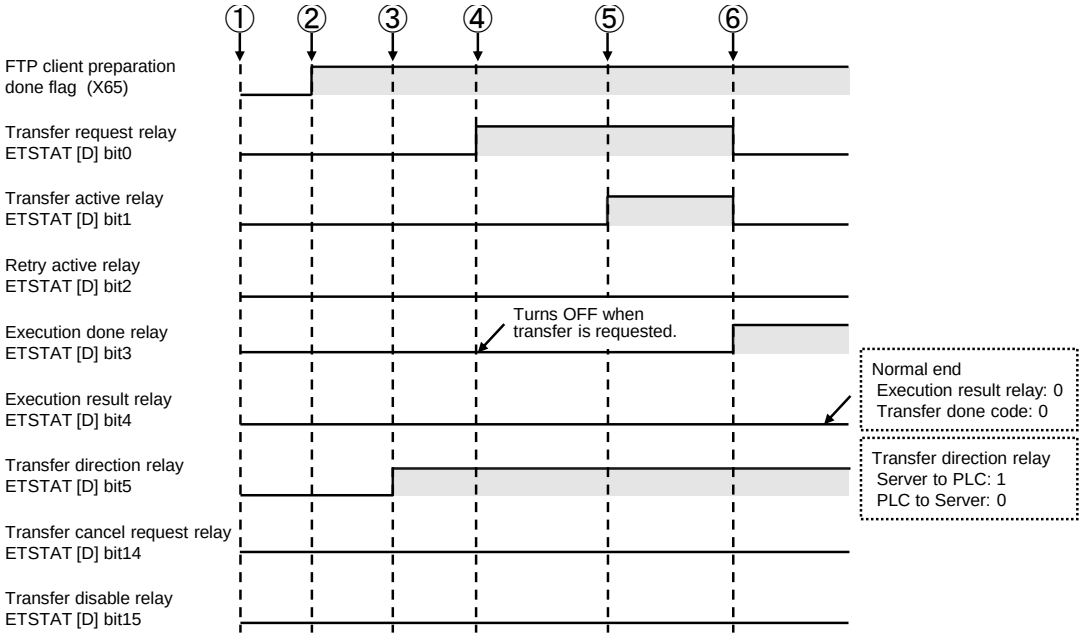
- This instruction is not available in interrupt programs.

■ Operand [S] setting

Setting item	Settings		Setting range
S	Transfer No.	Specify the device address storing a transfer number or a constant.	0 to 15

■ Time chart

- It shows the process that a transfer request was executed and data was obtained successfully from a server to FP7.
- The control relays (bit0 to bit15) can be monitored by reading arbitrary operation devices with ETSTAT instruction.



①	RUN (Power on)	④	Transfer setting (Executes FTPcSET instruction)
②	FTP client preparation done	⑤	FTP client login succeeded (Starts transfer)
③	Transfer setting (Executes FTPcSET instruction)	⑥	Transfer process done (Completes the execution of FTPcREQ instruction)

■ Control relay

Name	Bit No.	Description
Transfer request relay	0	0: No request, 1: Request
Transfer active relay	1	0: Stop, 1: During transfer
Retry active relay	2	0: No retry, 1: During retry
Execution done relay	3	0: During process, 1: Instruction execution complete
Execution result relay	4	0: Normal 1: Failed
Transfer direction relay	5	0: Send, 1: Receive
Reserved for system	6 to 13	-
Transfer cancel request relay	14	0: Not cancel, 1: Cancel
Transfer disable relay	15	0: Transfer enabled, 1: Transfer disabled

(Note): The state of control relays can be read with ETSTAT instruction.

■ Completion code

Name	No. of words	Description
Execution done code	1	Execution completion code
Transfer done code	1	Response code of FTP client

(Note): The state of completion codes can be read with ETSTAT instruction.

■ FTP client preparation done (WX6 bit 5)

Name	Bit No.	Description
FTP client preparation done (X65)	5	0: FTP client preparation incomplete, 1: FTP client preparation complete

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). To be set in case of out-of-range in indirect access (index modiication). Set when the FTP client prepartion done (X65) is OFF at the time of the execution of instruction. Set when an out-of-range value is specified for parameters. Set when the transfer request relay of a specified ID is "Request". Set when executed in an interrupt program. Set when a file transfer that has not been specified with the transfer setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed while the Ethernet cable is disconnected. The detail code set in SD29 is "10: Ethernet cable disconnected". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

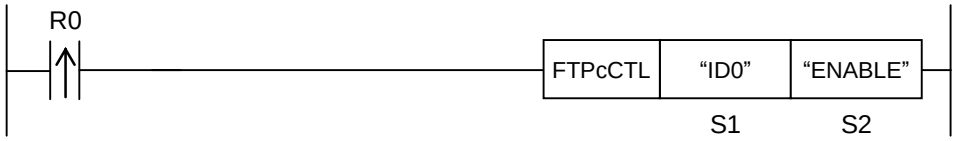
(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

4.4.3.2 Transfer Control (FTPcCTL)

Sets to enable, disable or cancel the transfer of FTP client.

- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when Ethernet is initialized.)
- It is necessary to specify the transfer settings before executing the instruction using 4.4.2.2 Transfer Settings (FTPcSET) or 4.4.1.2 to 4.4.1.7 File Transfer Settings with the tool software. (when control taget is specified with transfer number)
- It is necessary to specify the transfer settings before executing the instruction using 4.5.2.1 Logging/Trace Transfer Settings (FTPcLOG) or 4.5.1 Setting with Tool Software with the tool software. (when control taget is specified with LOG number)
- It takes some time to accept the processing of the transfer cancel request. Check the transfer status and check if the transfer stops after executing the instruction. For information on how to check the transfer status, refer to the case that S1 operand is "FTPc/HHTPc/SMTPc) in 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Explanation
S1	Specify the target to be controlled with the starting address or a character constant.
S2	Specify the controlled contents (transfer enabled/disabled/canceled) with the starting address or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	

■ Processing

- Controls to enable, disable or cancle the transfer for the target (S1) according to the specification of the control content (S2).
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Details of setting parameters

Setting item	Settings		
S1	Control target	1) When specifying transfer numbers individually	Specify 0 to 15 for x with "IDx".
		2) When specifying LOG numbers individually	Specify 0 to 15 for x with "LOGx".
		3) When specifying all transfer numbers and LOG numbers	Specify "ALL".
S2	Control content	1) When enabling transfer	Specify "ENABLE".
		2) When disabling transfer	Specify "DISABLE".
		3) When cancelling transfer	Specify "CANCEL".

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operation of FTPc control relay

Name	Transfer enabled	Transfer disabled	Transfer canceled
Transfer cancel relay	Not change	Not change	ON
Transfer disable relay	OFF	ON	Not change
Transfer request	Not change	Not change	Not change
Transfer active	Not change	Not change	Not change
Transfer retry active	Not change	Not change	Not change
Transfer done	Not change	Not change	Not change
Transfer failed	Not change	Not change	Not change
Transfer direction	Not change	Not change	Not change

(Note): The state of control relays can be read with ETSTAT instruction.

Setting example

	Settings	S1	S2
Example 1	When enabling the transfer of transfer No. 5	"ID5"	"ENABLE"
Example 2	When disabling all transfers	"ALL"	"DISABLE"
Example 3	When canceling the transfer of LOG7	"LOG7"	"CANCEL"

<table>
<tr>
<td>Example 4</td>
<td>When enabling the transfer of transfer No. 10 (Note)</td>
<td>DT0
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT0</td><td colspan="2">4 (No. of characters)</td></tr>
<tr><td>DT1</td><td>H44(D)</td><td>H49(I)</td></tr>
<tr><td>DT2</td><td>H30(0)</td><td>H31(1)</td></tr>
<tr><td>DT3</td><td></td><td></td></tr>
</table>
</td>
<td>DT10
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT10</td><td colspan="2">6 (No. of characters)</td></tr>
<tr><td>DT11</td><td>H4E(N)</td><td>H45(E)</td></tr>
<tr><td>DT12</td><td>H42(B)</td><td>H41(A)</td></tr>
<tr><td>DT13</td><td>H45(E)</td><td>H4C(L)</td></tr>
<tr><td>DT14</td><td></td><td></td></tr>
</table>
</td>
</tr>
</table>

(Note): For specifying a device for an operand which can specify character constants, store string data with SSET instruction excluding a double quotation mark.

■ Flag operation

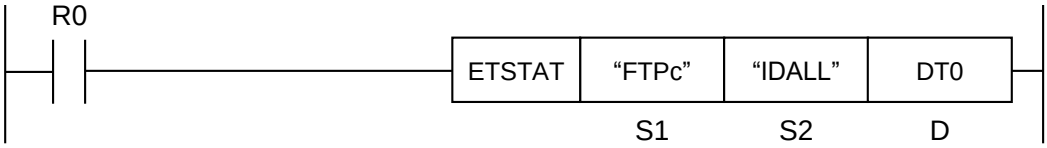
Name	Description
Latest error (SR7) Hold error (SR8)	Set when any items other than "IDx", "LOGx" or "ALL" are specified for the control target (S1). (x: 0 to 15) Set when an unset transfer setting is specified. Set when an unset logging/trace transfer setting is specified. Set when any items other than "ENABLE", "DISABLE" or "CANCEL" are specified for the control content (S2). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when a file transfer that has not been specified with the transfer setting instruction or the tool software is specified. Set when a logging/trace transfer setting that has not been specified with the logging/trace transfer setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT)

Reads information of Ethernet unit.

■ **Instruction format**



■ **Operation unit (i)**

- There is no operation unit.

■ **List of operands**

Operand	Description
S1	Specify the type to be read with the starting address or a character constant.
S2	Specify the target to be read with the starting address or a character constant.
D	Specify the starting address of destination.

■ **Available Devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
D	●	●	●	●			●	●													

■ **Processing**

- Reads the parameter information or status information specified by [S1] and [S2], and stores it in the area starting with [D].
- The number of words in the storage area varies according to the type of read data and the target.

■ **Precautions during programming**

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operands [S1] [S2] settings

Setting item	Settings		
S1	Read type	When specifying reading IPv4 address	Specify "IPv4".
		When specifying reading IPv6 address	Specify "IPv6".
		When specifying FTP client	Specify "FTPc".
		When specifying HTTP client	Specify "HTTPc".
		When specifying mail transmission	Specify "SMTPc".
S2	Read target	When specifying reading MAC address	Specify "MAC".
		When specifying reading destination IP address	Specify "CONNECT".
		When specifying transfer numbers individually	Specify 0 to 15 for x with "IDx".
		When specifying logging individually * Not available when S1 is HTTPc.	Specify 0 to 15 for x with "LOGx".
		When specifying all transfer numbers	Specify "IDALL".
		When specifying all loggings * Not available when S1 is HTTPc.	Specify "LOGALL".
D	Read destination	Specify the destination device address to which the state is read.	

■ Restrictions on combinations of operands [S1] and [S2]

"A" in the table below indicates the available combinations. An operation error occurs when other combinations are specified.

		S2	
		MAC	CONECT
S1	IPv4	A	A
	IPv6	A	A

		S2			
		IDx	LOGx	IDALL	LOGALL
S1	FTPc	A	A	A	A
	HTTPc	A	N/A	A	N/A
	SMTPc	A	A	A	A

■ When specifying IPv4 or IPv6 for S1

- Read content 1 (S1: IPv4, S2: For MAC: 15 words)

Name	No. of words	Description
Home IP address (IPv4)	4	Home IPv4 address
Subnet mask (IPv4)	4	Subnet mask
Default gateway (IPv4)	4	Default gateway
Home MAC address	3	Home MAC address

- Read content 2 (S1: IPv4, S2: For CONNECT: 17 words)

Name	No. of words	Description
Home IP address (IPv4)	4	Home IPv4 address
Subnet mask (IPv4)	4	Subnet mask
Default gateway (IPv4)	4	Default gateway
Destination IP address type	1	0:IPv4 1:IPv6
Destination IP address	4	Destination IP address (for IPv4)

- Read content 3 (S1: IPv6, S2: For MAC: 44 words)

Name	No. of words	Description
Home IP address 1 (IPv6)	8	Home IPv6 address (Manual setting)
Home IP address 2 (IPv6)	8	Home IPv6 address (Link local)
Home IP address 3 (IPv6)	8	Home IPv6 address (Router)
Home IP address 4 (IPv6)	8	Home IPv6 address (DHCP)
Subnet prefix length	1	Subnet prefix length
Default gateway (IPv6)	8	Default gateway
Home MAC address	3	Home MAC address

- Read content 4 (S1: IPv6, S2: For CONNECT: 50 words)

Name	No. of words	Description
Home IP address 1 (IPv6)	8	Home IPv6 address (Manual setting)
Home IP address 2 (IPv6)	8	Home IPv6 address (Link local)
Home IP address 3 (IPv6)	8	Home IPv6 address (Router)
Home IP address 4 (IPv6)	8	Home IPv6 address (DHCP)
Subnet prefix length	1	Subnet prefix length
Default gateway (IPv6)	8	Default gateway
Destination IP address type	1	0:IPv4 1:IPv6
Destination IP address	8	Destination IP address (for IPv6)

Setting example

Example 1) When specifying IPv4 address and the destination IP address of a specified connection

S1	S2	D
"IPv4"	"CONNECT"	DT20

	Value	Description
DT20	H00C0 (U192)	IPv4 address Example) In the case of 192.168.5.30:
DT21	H00A8 (U168)	
DT22	H0005 (U5)	
DT23	H001E (U30)	
DT24	H00FF (U255)	Subnet mask Example) In the case of 255.255.255.0:
DT25	H00FF (U255)	
DT26	H00FF (U255)	
DT27	H0000 (U0)	
DT28	H00C0 (U192)	Default gateway Example) In the case of 192.168.5.1:
DT29	H00A8 (U168)	
DT30	H0005 (U5)	
DT31	H0001 (U1)	
DT32	H0000	IP address type
DT33	H00C0 (U192)	Destination IPv4 address Example) In the case of 192.168.5.11:
DT34	H00A8 (U168)	
DT35	H0005 (U5)	
DT36	H000B (U11)	

Example 2) When specifying IPv4 address and MAC address

S1	S2	D
"IPv4"	"MAC"	DT20

	Value	Description
DT20	H00C0 (U192)	IPv4 address Example) In the case of 192.168.5.30:
DT21	H00A8 (U168)	
DT22	H0005 (U5)	
DT23	H001E (U30)	
DT24	H00FF (U255)	Subnet mask Example) In the case of 255.255.255.0:
DT25	H00FF (U255)	
DT26	H00FF (U255)	
DT27	H0000 (U0)	
DT28	H00C0 (U192)	Default gateway Example) In the case of 192.168.5.1:
DT29	H00A8 (U168)	
DT30	H0005 (U5)	
DT31	H0001 (U1)	
DT32	HEEFF	MAC address Example) In the case of AA-BB-CC-DD-EE-FF:
DT33	HCCDD	
DT34	HAABB	

Example 3) When specifying IPv6 address and the destination IP address of a specified connection

S1	S2	D
"IPv6"	"CONNECT"	DT0

	Value	Description
DT0	HFE80	Home IPv6 address (Manual setting) Example) In the case of FE80:11:2233:4455:6677:8899:99AA:AABB:
DT1	H0011	
DT2	H2233	
DT3	H4455	
DT4	H6677	
DT5	H8899	
DT6	H99AA	
DT7	HAABB	
DT8	HFE80	Home IPv6 address (Link local)
.	.	.
.	.	.
DT31	HAABB	Home IPv6 address (DHCP)
DT32	H0100	Subnet prefix length
DT33	HFE80	Default gateway Example) In the case of FE80::1:
DT34	H0000	
DT35	H0000	
DT36	H0000	
DT37	H0000	
DT38	H0000	
DT39	H0000	
DT40	H0001	
DT41	H0001	IP address type
DT42	HFE80	Destination IPv6 address Example) In the case of FE80:11:2233:4455:6677:8899:99AA:CCDD:
DT43	H0011	
DT44	H2233	
DT45	H4455	
DT46	H6677	
DT47	H8899	
DT48	H99AA	
DT49	HCCDD	

■ When S1 operand is (FTPc / HTTPc / SMTPc)

- Read content 1 (When S2 is IDALL or LOGALL: 20 words)

Name	No. of words	Description
Transferring ID No.	1	0 to 15 [Transfer number (ID) or LOG number]
Transferring data type	1	0: Transfer number (ID) or 1: LOG number
Transfer status	1	0: No request, 1: Waiting for transfer, 2: During login, 3: During sending, 4: During receiving, 5: During retry, 6: Transfer complete
Transfer result	1	0: Transfer succeeded, 1: Login error, 2: Transfer error, 3: Transfer canceled
Latest transfer success time	6	Year, month, day, hour, minute and second (6 words) when the last transfer succeeded
Latest transfer failure time	6	Year, month, day, hour, minute and second (6 words) when the last transfer failed
No. of transfer successes (Whole)	2	Number of times that transfer succeeded
No. of transfer failures (Whole)	2	Number of times that transfer failed

- Read content 2 (When S2 is IDx or IDALL: 7 words per data)

Name	No. of words	Description
Control relay (*1)	1	FTPc control relay, HTTPc control relay, Mail send control relay
Execution done code	1	0: Instruction execution succeeded, 1: Instruction execution failed
Transfer done code	1	FTP/HTTP/SMTP response code
No. of successful executions (individual)	2	Number of times that transfer succeeded
No. of failed executions (individual)	2	Number of times that transfer failed

- Read content 3 (For LOGx or LOGALL: 7 words per data)

Name	No. of words	Description
Control relay (*1)	1	FTPc logging control relay, HTTPc logging control relay, Mail send logging control relay
Execution done code	1	0: Instruction execution succeeded, 1: Instruction execution failed
Transfer done code	1	FTP/HTTP/SMTP response code
No. of successful transmissions (individual)	2	Number of times that transfer succeeded
No. of failed transmissions (individual)	2	Number of times that transfer failed

- *1 Control relay (16 bit)

Name	Bit No.	Description
Transfer request relay	0	0: No request, 1: Request
Transfer active relay	1	0: Stop, 1: During transfer
Retry active relay	2	0: No retry, 1: During retry
Execution done relay	3	0: During process, 1: Instruction execution complete
Execution result relay	4	0: Normal 1: Failed
Transfer direction relay	5	0: Send, 1: Receive * In case of Logging and HTTP client, always "0: Send"
Reserved for system	6 to 13	-
Transfer cancel request relay	14	0: Not cancel, 1: Cancel * In case of Logging and HTTP client, always "0: Not cancel"
Transfer disable relay	15	0: Transfer enabled, 1: Transfer disabled

Setting example

Example 1) When specifying a transfer number for the transfer in progress

S1	S2	D
"HTTPc"	"ID5"	DT20

・Status of ID5

	Value
DT20	Control relay
DT21	Execution done code
DT22	Transfer done code
DT23	Transfer succeeded
DT24	No. of times (Individual)
DT25	Transfer failed

Example 2) When specifying all LOG numbers

S1	S2	D
"FTPc"	"LOGALL"	DT0

Statuses of LOG0 to 15

DT0 to 19	Read content 1	
DT20	LOG transfer setting	* Only set bits turn ON.
DT21 to 27	Status of LOGx	Up to 16 data is read.
DT28 to 34	Status of LOGy	
DT35 to 41	Status of LOGz	

Setting example

Example 3) When specifying all ID numbers

S1	S2	D
"FTPc"	"IDALL"	DT0

・Statuses of all IDs

DT0 to DT19	Read content 1	
DT20	ID transfer setting	Only the bits of specified ID numbers turn ON.
DT21 to DT27	Status of ID0	Up to 16 data is read.
DT28 to DT34	Status of ID1	
DT35 to DT41	Status of ID2	
-	-	
DT(21+7x) to DT(27+7x)	Status of IDx	

■ List of FTP error codes

The following error codes can be confirmed with ETSTAT instruction.

Error code	Description
250	Normal end
421	It is not possible to provide services. Ends control connection. At the time of the shutdown of server.
425	It is not possible to open data connection.
426	Connection was closed and data transfer was canceled for some reason.
450	It is not possible to execute the request for any reason of access authority or file system.
451	Processing was canceled due to a local error.
452	It is not possible to execute due to any problem in disk capacity.
500	Syntax error of commands
501	Syntax error of arguments or parameters
502	Command is not implemented.
503	The order of using commands is wrong.
504	Arguments or parameters are not implemented.
530	User could not log in.
532	Charging information must be confirmed with ACCT command for file transmission.
550	It is not possible to execute the request for any reason of access authority or file system.
551	It is not possible to execute because of a problem in the type of page structure.
552	It is not possible to execute due to any problem in disk capacity.
553	it is not possible to execute due to an incorrect file name.
1226	File delete error
9XX	Client service error

4.5 How to Use Logging/Trace Transfer

4.5.1 Setting with Tool Software

Use the programming tool software "FPWIN GR7" to make the transfer settings.

4.5.1.1 Basic Setup

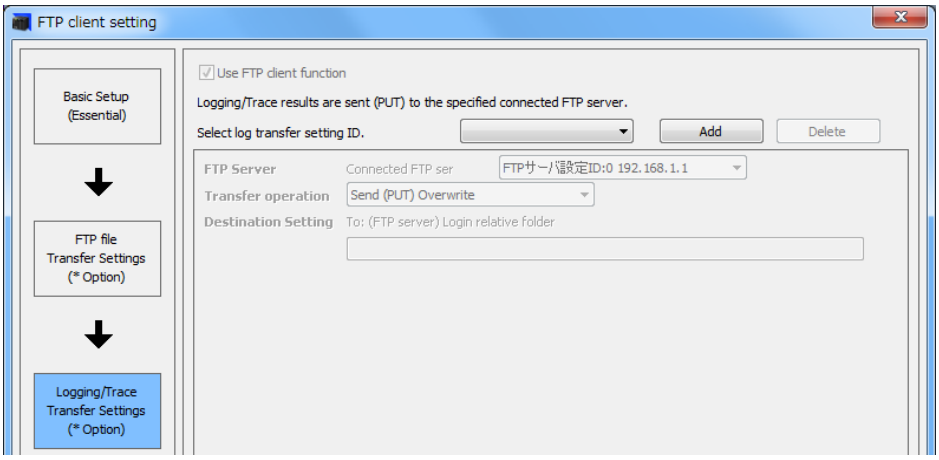
For details of Basic Setup, Refer to 4.4.1.1 Basic Setup.

4.5.1.2 Logging/Trace Transfer Settings (Send Overwrite)

- "Overwrite method" and "Rename method" are available for transferring logging/trace files via FTP. The settings for the logging/trace transfer in the overwrite method is specified here. For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

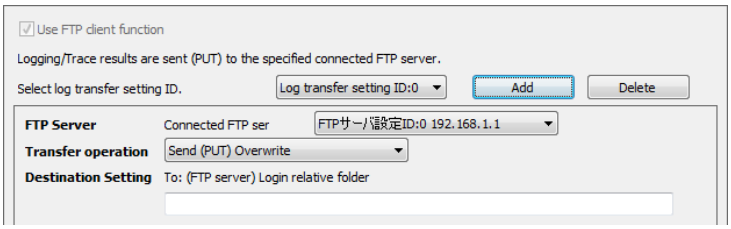
◆ **PROCEDURE**

1. **Press the [Next] button after specifying the basic setup. For using "Logging/Trace Transfer Setting", "FTP File Transfer Settings" are not required. Press the [Next] button to skip it.**



As the log transfer setting ID has not been set initially, click the [Add] button to add the log transfer setting.

2. The following items becomes available by adding the log transfer setting ID.

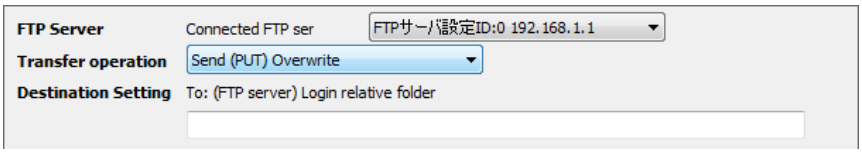


3. FTP server

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Transfer operation

Select "Send (PUT) Overwrite".



5. To

Specify a destination (FTP server) login relative folder.

6. Save setting

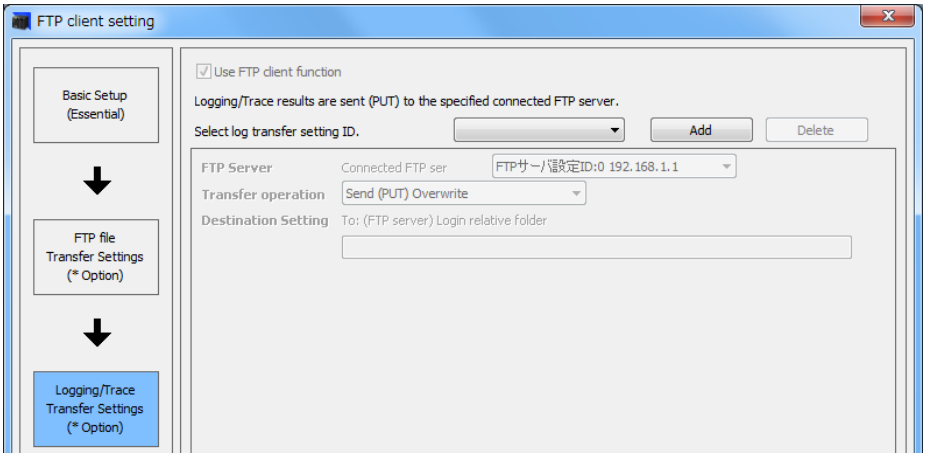
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.5.1.3 Logging/Trace Transfer Settings (Send Rename)

"Overwrite method" and "Rename method" are available for transferring logging/trace files via FTP. The settings for the logging/trace transfer in the rename method is specified here.
For the details of the overwrite method and rename method, refer to 4.3.4 Overwrite Method and Rename Method.

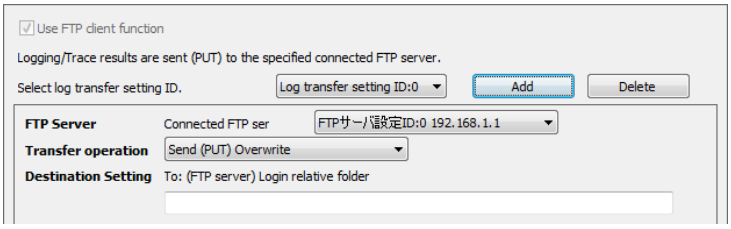
◆ **PROCEDURE**

1. **Press the [Next] button after specifying the basic setup. For using "Logging/Trace Transfer Setting", "FTP File Transfer Settings" are not required. Press the [Next] button to skip it.**



As the log transfer setting ID has not been set initially, click the [Add] button to add the log transfer setting.

2. **The following items becomes available by adding the log transfer setting ID.**



3. **FTP server**

Select a destination FTP server from the list.
The servers registered in Basic Setup are listed.

4. Transfer operation

Select "Send (PUT) Rename method".

5. To

Specify a destination (FTP server) login relative folder + file.

6. Save setting

The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

4.5.2 Settings with Instructions

The destination server setting and logging/trace transfer setting are specified with instructions.

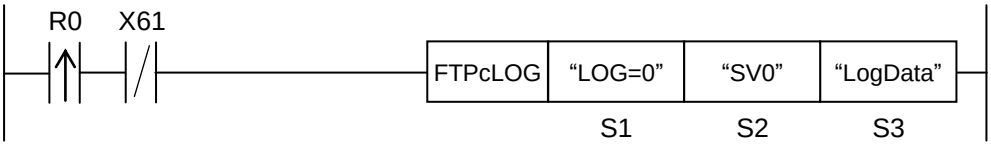
■ List of instructions

Instruction	Application
FTPcSV	Settings for destination servers, Refer to 4.4.2.1 Destination Server Setting (FTPcSV).
FTPcSET	Transfer settings, Refer to 4.4.2.2 Transfer Settings (FTPcSET).
FTPcLOG	Logging/Trace transfer settings

4.5.2.1 Logging/Trace Transfer Settings (FTPcLOG)

- Specifies the logging/trace transfer settings.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.。

■ List of operands

Operand	Description
S1	Specify the starting address storing the logging/trace number (string) or a character constant.
S2	Specify the starting address storing the operation setting parameter or a character constant.
S3	Specify the starting address storing the destination folder name or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	

■ Processing

- Stores the logging/trace transfer settings of S2 to S3 in the logging/trace transfer setting area specified by S1.
- It is executable when the transfer request relay of the FTPc logging/trace control relay for a specified logging/trace is 0: No request. (When requested, an operation error occurs.)
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the logging/trace number (string) or a character constant.

Setting item	Settings		Setting range
S1	LOG number	Specify LOG number. LOG=: LOG number	0 to 15

■ Operand [S2] setting

- Specify the starting address storing the operation setting parameter or a character constant.
- Only one server can be specified at the same time. Specify a FTP server number with one-byte three characters.

Setting item	Settings		Setting range
S2	Specification of FTP server (Essential)	Specify FTP servers. Specify the following keywords. SV0: Server 0 SV1: Server 1 SV2: Server 2 SV3: Server 3	0 to 3
	Specification of transfer operation (can be omitted)	Select the operation for transferring logging/trace files. Specify the operation after the keyword "MODE=". MODE=xxxx	

(Note 1): Input operationg setting parameters and each setting parameter separated by a comma ",".

(Note 2): Specify the operation setting parameters in the order of the above table. The order of keywords cannot be changed.

(Note 3): Upper and lower case characters can be used for sepcifying keywords.

■ Operand [S2] transfer operation setting

Settings	Setting value	Operation
Overwrite method (Default)	OVW	Performs transfer files with files names specified by the logging/trace setting. When the transfer is interrupted due to any trouble with network or servers, the files transferred partway reamin in servers. Confirm if the transfer has succeeded with an instruction such as ETSTAT instruction.
Rename method	REN	Performs transfer files with temporary file names, and renames them to specified file names after the success of the transfer. The successful completion of file transfer can be confirmed by checking the file names specified by the logging/trace setting. The processing time is longer than that of the overwrite method.

(Note): When either method is not specified, "Overwrite method" is applied.

Setting example

Example 1	S2	"SV0,MODE=OVW"
Settings		FTP server: 0, Transfer operation: Overwrite method
Example 2	S2	"SV3,MODE=REN"
Settings		FTP server: 2, Transfer operation: Rename method
Example 3	S2	"SV3"
Settings		FTP server: 3, Transfer operation: (Omitted)

■ Operand [S3] setting

- Specify the starting address storing the destination folder name or a character constant.
- A destination folder name should be specified within 256 characters.

Setting item	Settings		Setting range
S3	Destination folder name	Specify the starting address storing the destination folder name or a character constant.	Max. 256 characters

(Note 1): When no destination folders exist, they are automatically created up to eight hierarchies.

(Note 2): Specify a folder name from the home directory of a user which logs in FTP servers with a relative path.

■ Flag operation

Name	Description
Latest error(SR7) Hold error (SR8)	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the request active relay of the FTPc logging/trace control relay for a specified number is 1: Requesting. Set when the logging/trace condition of a specified LOGn number is not registered. Set when an out-of-range value is specified for parameters. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when an unset FTP server is specified.
CY flag(SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

4.5.2.2 Confirming the Execution of Transfer with Instruction

- The transfer is automatically performed when logging/trace files are determined.
- The status of transferring logging/trace files can be confirmed by reading a desired operation device with ETSTAT instruction.

Instruction	Application
ETSTAT	Refer to the section 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

4.6 Precautions When Using FTP Client

4.6.1 Precautions for FTP Client Operation

■ When specifying a non-existent folder

- When a specified folder does not exist when uploading files, folders are automatically created up to eight hierarchies.
- When no folder is created, an error occurs and the process is terminated.

■ When specifying a file with the same name

- When a file with the same name exists in a specified folder for downloading a file, the file is overwritten.
- The operation when a file with the same name exists in a folder of a specified FTP server for uploading a file varies according to the specifications of the FTP server.

■ When using a wild card (* or ?) in file names

- When an error occurs in the middle of uploading/downloading one file, the uploading/downloading continues up to the last file. If there is a file which could not be transferred after the completion, an error occurs.
- When an error occurs in the middle of uploading/downloading one file, retry is to re-execute the transfer with the same file card. Therefore, files created from the failure of transfer till the execution of retry are also transferred.
- When using the function which deletes files on successful completion of upload/download, files are deleted on successful completion of uplaod/download one by one.
- An error occurs when the number of files which match wild cards 100 or more.

4.6.2 Precautions When Setting FTP Client

■ Folder delimiter

- Use "(/ slash)" or "(\ back slash)" as delimiters for folders.

■ Characters that cannot be used for file and folder names

- The following characters cannot be used as one-byte characters; "\" " (space)" "," """ ":" ";" "<" ">" "=" "+" "|"

■ Restrictions on destination FTP servers

- Characters that cannot be used for folder and file names vary depending on destination FTP servers. Specify folder and files names according to the specifications of FTP servers used.

4.6.3 Number of Transferable Data and Processing Time

■ Number of specified transferred data and approximate processing time

This data is a guide only for the time required for the transfer instruction. (The scan time should be counted considering the processing times of other instructions in practice.)

<Transfer data when putting>

Conver-sion method	No. of characters by conversion method	Max. No. of settable data	Processing timer per 100 data (Note)	Max. No. of actual transferable data		Transfer data
				No. of data	File size	
Binary	2 bytes	524,288	0.024 ms	524,288	1 Mbytes	HFFFF
US	6 bytes	174,762	1.136 ms	11,000	71,401 bytes	HFFFF
SS	7 bytes	149,796	0.781 ms	16,000	115,501 bytes	HFFFF
UL	11 bytes	95,325	1.786 ms	7,000	77,001 bytes	HFFFFFFFF
SL	12 bytes	87,381	1.042 ms	12,000	146,401 bytes	HFFFFFFFF
SF	14 bytes	74,898	12.500 ms	1,000	15,401 bytes	0.001
DF	24 bytes	43,690	12.500 ms	1,000	33,601 bytes	0.001
HEX1	5 bytes	209,715	0.962 ms	13,000	69,001 bytes	HFFFF
HEX2	9 bytes	116,508	1.786 ms	7,000	66,601 bytes	HFFFFFFFF
HEX4	17 bytes	61,680	4.167 ms	3,000	64,601 bytes	HFFFFFFFFFFFFFFFF

(Note): The approximate processing time of 100 data. As for SF/DF, the processing time varies according to data values.

<Transfer data when getting>

Conver-sion method	No. of characters by conversion method	Max. No. of settable data	Processing timer per 100 data (Note)	Max. No. of actual transferable data		Transfer data
				No. of data	File size	
Binary	2 bytes	524,288	0.026 ms	490,000	980,000 bytes	HFFFF
US	6 bytes	174,762	0.694 ms	18,000	111,600 bytes	65,535
SS	7 bytes	149,796	0.625 ms	20,000	146,300 bytes	-00001
UL	11 bytes	95,325	1.136 ms	11,000	130,900 bytes	4,294,967,295
SL	12 bytes	87,381	0.833 ms	15,000	181,200 bytes	-0000000001
SF	14 bytes	74,898	17.857 ms	700	9,800 bytes	00000000.001
DF	24 bytes	43,690	20.833 ms	600	14,400 bytes	000000000000000000.001
HEX1	5 bytes	209,715	0.658 ms	19,000	98,000 bytes	HFFFF
HEX2	9 bytes	116,508	0.962 ms	13,000	118,800 bytes	HFFFFFFFF
HEX4	17 bytes	61,680	1.783 ms	7,000	122,400 bytes	HFFFFFFFFFFFFFFFF

(Note): The approximate processing time of 100 data. As for SF/DF, the processing time varies according to data values.

■ Number of transferable data for PUT data and GET data

- 1 Mbyte communication buffer is allocated for accessing data with PUT and GET.
- The communication buffer is equally divided by the number of registered transmissions and allocated. The number of transferable data for each transfer setting is in the range of the data allocated to each transfer setting.

No. of transfer settings	No. of transferable data for one transfer setting		
	No. of bytes	No. of words	Max. number of transmissions
1	1048576	524288	524288
2	524288	262144	262144
3	349525	174762	174762
4	262144	131072	131072
5	209715	104857	104857
6	174762	87381	87381
7	149796	74898	74898
8	131072	65536	65536
9	116508	58254	58254
10	104857	52428	52428
11	95325	47662	47662
12	87381	43690	43690
13	80659	40329	40329
14	74898	37449	37449
15	69905	34952	34952
16	65536	32768	32768

(Note): It is divided by the number of registrations for PUT and GET data, and the settings for PUT and GET files are not included.

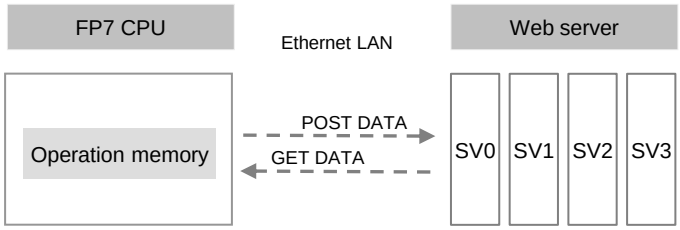
5

HTTP Client Function

5.1 Overview of HTTP Client Function

■ Overview of HTTP Client Function

The HTTP client function is used to transmit data between PLC and WEB servers using the HTTP communication.



5.2 Details of HTTP Client Function

■ Details of HTTP client function

- Enables the communication with WEB servers.
- Four WEB servers can be set.
- Sixteen transfer settings can be registered.
- Three transfer modes are available.

Mode		Description
1	Send (Upload)	Uploads data in the operation memory to WEB servers.
2	Get (Download)	Downloads data from WEB servers and reflects the values in the operation memory.
3	Send and Get (Upload and Download)	Downloads data from WEB servers after uploading the data in the operation memory, and reflect the values in the operation memory.

5.3 How to Use Transfer Settings

5.3.1 Setting with Tool Software

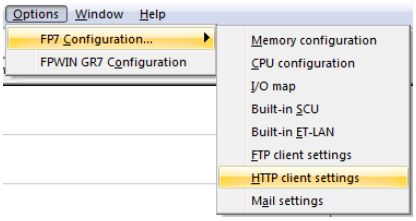
- Use the programming tool software "FPWIN GR7" to make the transfer settings.
- They can be also set with dedicated insturctions. Refer to 5.3.2 Setting with Instructions.

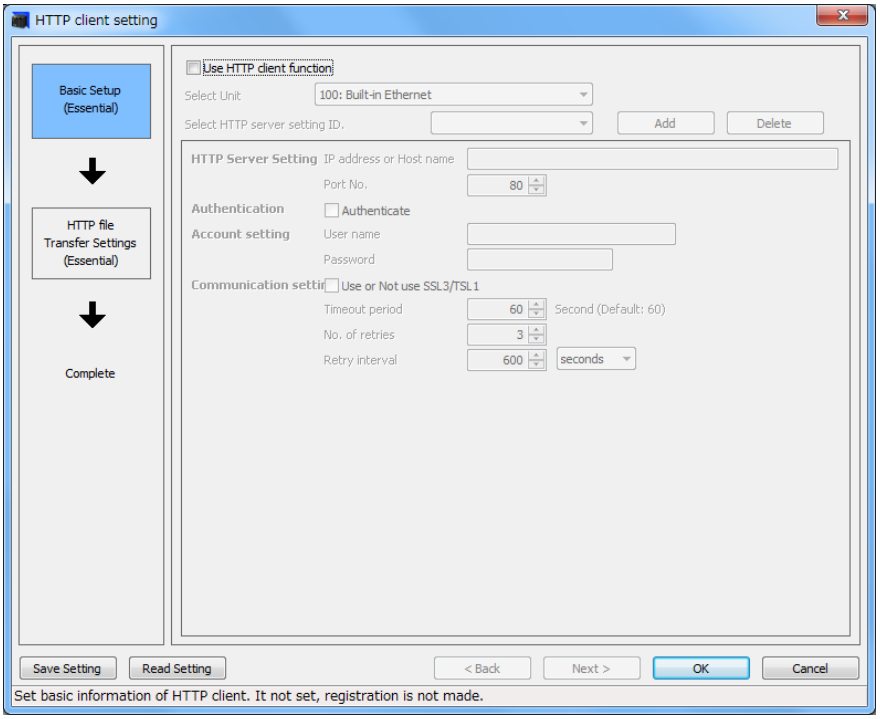
5.3.1.1 Basic Setup

Configure the settings for a HTTP server to be connected.

◆ **PROCEDURE**

1. **Select "Options" > "FP7 Configuration" > "HTTP client setting" from the menu bar to open the "HTTP client setting" window.**



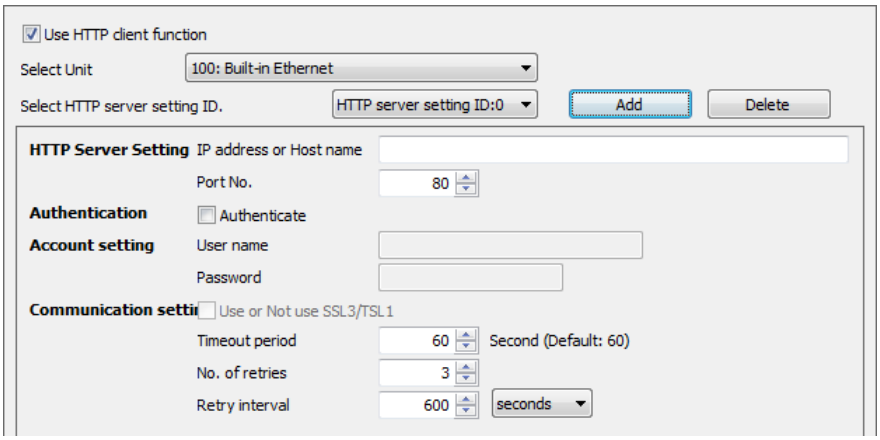


2. **Checking the box of "Use HTTP client function" in Basic Setup (Essential) makes "Select Unit" and "Select HTTP server setting ID" selectable.**

Select Unit is "100: Built-in Ethernet" only.

As the HTTP server setting ID has not been set initially, click the [Add] button to add the HTTP server setting.

3. **The following settings becomes available by adding the HTTP server setting.**



4. **HTTP Server Settings**

   Enter the destination IP address or host name, and specify the port number.

5. **Authentication**

   To perform authentication, check "Authenticate".

6. **Account setting**

   Checking the box of "Authenticate" in step 5 has the entry fields of user name and password enabled.

   Enter a user name and password.

7. **Communication setting**

   Specify "Use or Not use SSL3/TSL1".

   Specify "Timeout period". (30 to 300 seconds)

   Specify "No. of retries". (0 to 3 times)

   Specify "Retry interval". (10 to 86400 seconds / 1 to 1440 minutes / 1 to 24 hours)

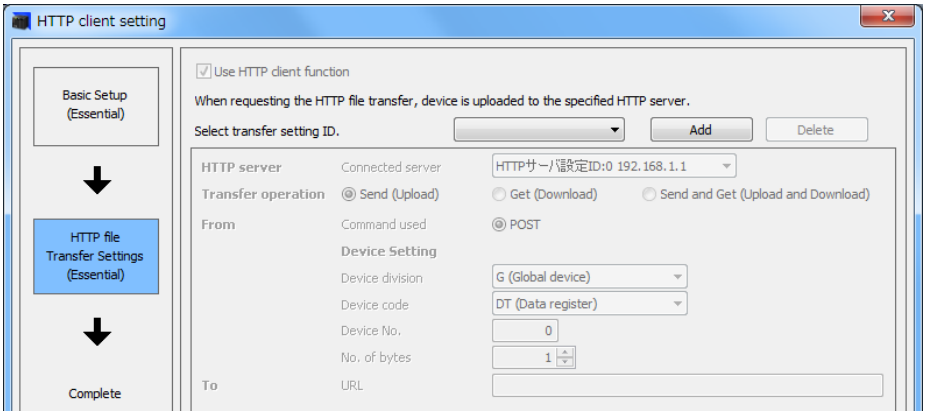
8. **Click the [Next] button to go to the HTTP file transfer settings.**

5.3.1.2 HTTP Transfer Settings - Send (Upload)

There are three modes for HTTP transfer; Send (Upload), Get (Download), and Send and Get (Upload and Download) Send (Upload) is set here.

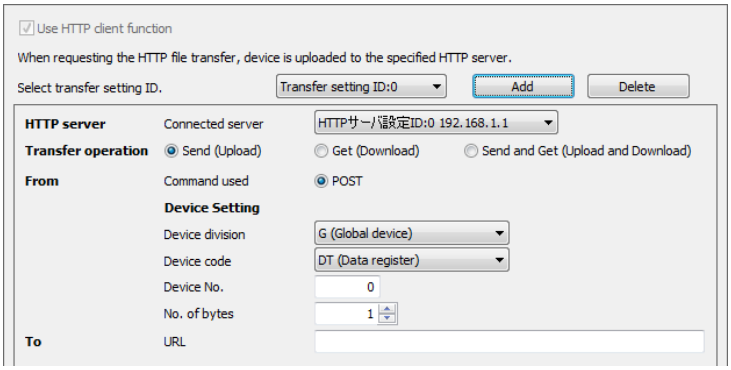
◆ **PROCEDURE**

1. **After finishing the basic setup, click the [Next] button to go to the HTTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

2. **The following items becomes available by adding the log transfer setting ID.**

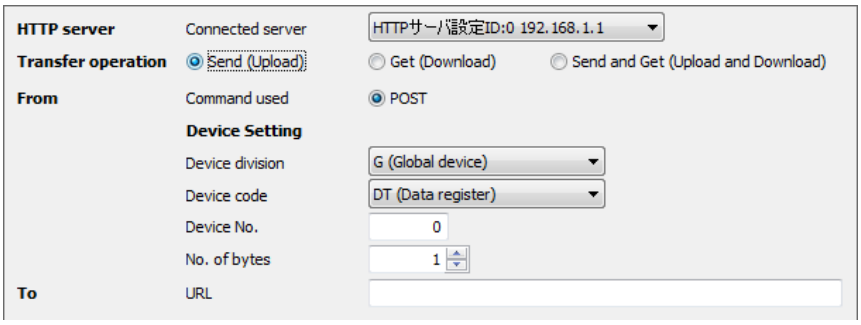


3. **HTTP server**

Select a destination HTTP server from the list.
The servers registered in Basic Setup are listed.

4. Transfer operation

Select "Send (Upload)".



5. From - Command used

Only Post is selectable.

6. From - Device Setting

Select "Device division". [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify the number of bytes.

7. To

Specify URL.

8. Save setting

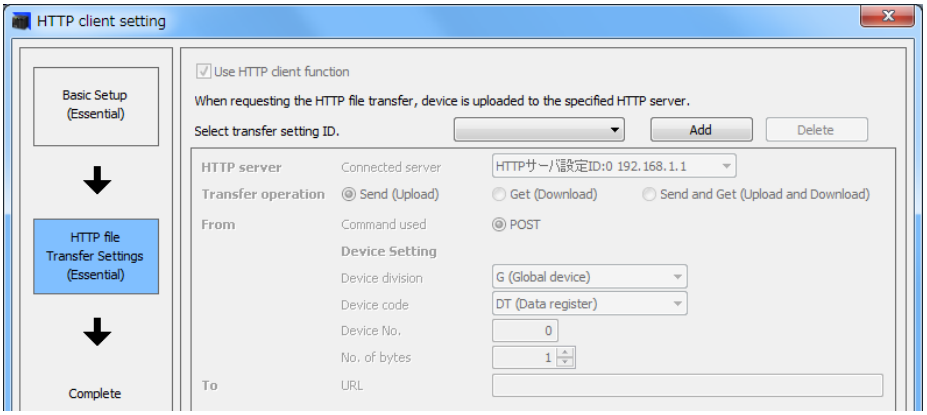
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

5.3.1.3 HTTP Transfer Settings - Get (Download)

There are three modes for HTTP transfer; Send (Upload), Get (Download), and Send and Get (Upload and Download) Get (Download) is set here.

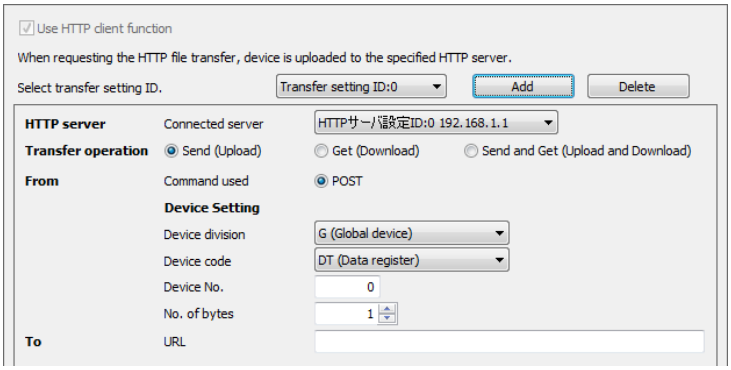
◆ **PROCEDURE**

1. **After finishing the basic setup, click the [Next] button to go to the HTTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

2. **The following items becomes available by adding the log transfer setting ID.**

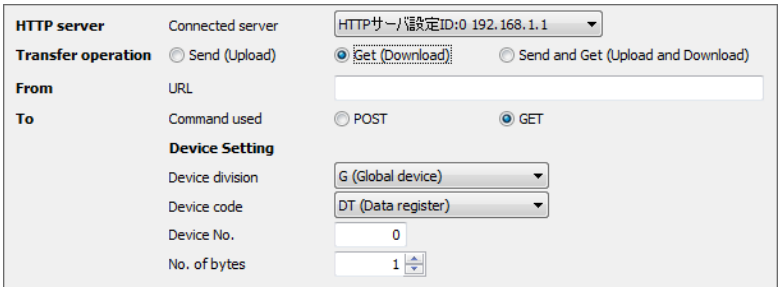


3. **HTTP server**

Select a destination HTTP server from the list.
The servers registered in Basic Setup are listed.

4. Transfer operation

Select "Get (Download)".



5. From

Specify URL.

6. To - Command used

Select POST or GET.

7. To - Device Setting

Select "Device division" [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify the number of bytes.

8. Save setting

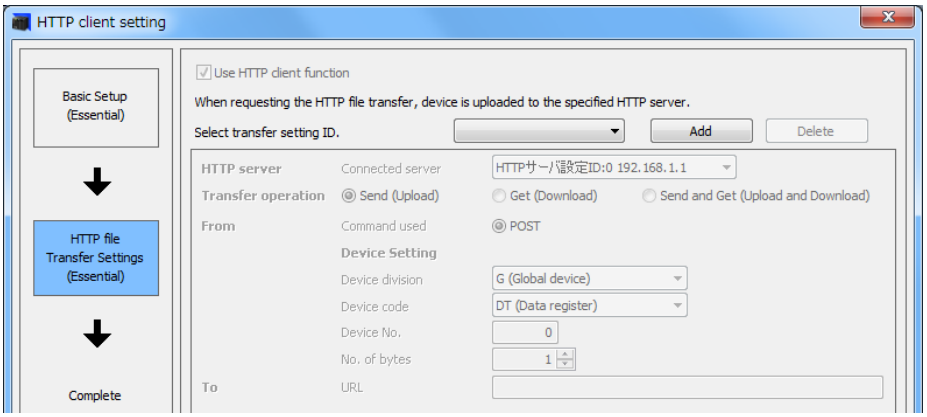
The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

5.3.1.4 HTTP Transfer Settings - Send and Get (Upload and Download)

There are three modes for HTTP transfer; Send (Upload), Get (Download), and Send and Get (Upload and Download)
Send and Get (Upload and Download) is set here.

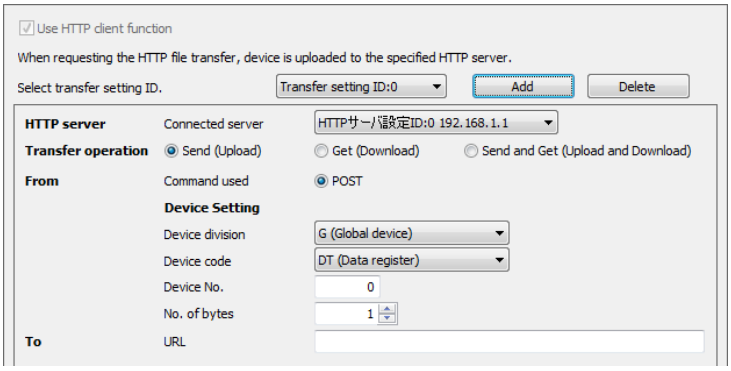
◆ **PROCEDURE**

1. **After finishing the basic setup, click the [Next] button to go to the HTTP file transfer settings.**



As the transfer setting ID has not been set initially, click the [Add] button to add the transfer setting.

2. **The following items becomes available by adding the log transfer setting ID.**

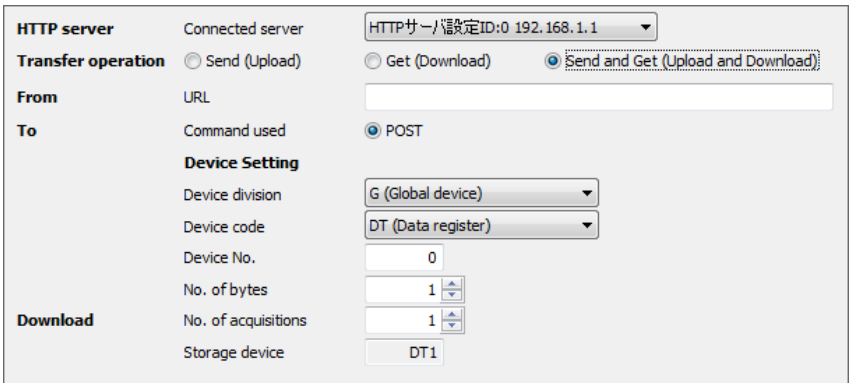


3. **HTTP server**

Select a destination HTTP server from the list.
The servers registered in Basic Setup are listed.

4. Transfer operation

Select "Send and Get (Upload and Download)".



5. From

Specify URL.

6. To - Command used

Only Post is selectable.

7. From - Device Setting

Select "Device division" [G (Global device) / L (Local device)]

When selecting L (Local device) for Device division, select a PB.

Select "Device code".

Specify "Device No.".

Specify the number of bytes.

8. Download

Specify "No. of acquisitions".

The storage address is automatically determined by the destination device setting.

9. Save setting

The settings can be saved in a file by clicking the [Save setting] button.
As the saved settings can be read by clicking the [Read setting] button, they can be reused in other projects.

5.3.2 Setting with Instructions

- The destination server setting and file transfer setting are specified with instructions.
- Although they can be specified with only instructions, the setting to use the add-on in the built-in ET-LAN setting is required. For details of the setting to use the add-on, refer to 4.4.2 Setting with Instructions of the FTP client function.

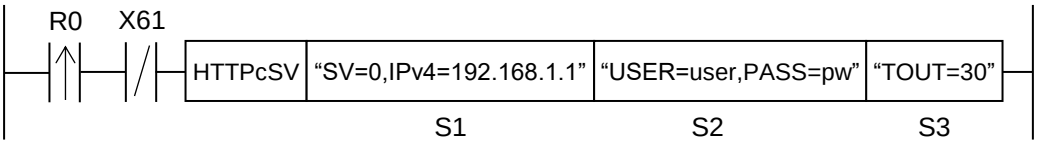
■ List of instructions

Instruction	Application
HTTPcSV	HTTP Server Settings
HTTPcSET	Transfer Settings

5.3.2.1 Destination Server Setting (HTTPcSV)

- Sets the server to which the HTTP client is connected.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (They are set when an incorrect IP address is specified or Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- For details of the setting to use the add-on, refer to 4.4.2 Setting with Instructions of the FTP client function.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the server specification parameter or a character constant.
S2	Specify the starting address storing the login setting parameter or a character constant.
S3	Specify the starting address storing the detailed setting parameter or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	

■ Processing

- The setting for the server connected to the HTTP client is specified in the CPU unit according to specified parameters.
- It can be executed when the transfer request relay of HTTPc control relay is set to 0: No request and when "Add-on" is set to "Use" in the built-in ET-LAN setting. (In the case other than the abve, an operation error is occurred.)
- The initial value is setting with the instruction when the server setting is not specified.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- When an incorrect IP address is specified, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the server specification parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- Specify the HTTP server setting from SV0 in order. When the right order is skipped, an error occurs. It is possible to specify by overwriting when the setting has been already registered.
- Only one server can be specified at the same time.
- Specify an HTTP server number, IP address or host name of HTTP server, port number, open method, and SSL3/TLS1 authentication within 256 characters in total.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

■ Operand [S1] setting

Setting item	Settings	
S1	HTTP server No. (Essential)	Specify HTTP servers. Specify the following keywords. SV0: Server 0, SV1: Server 1, SV2: Server 2, SV3: Server 3
	IP address or host name of HTTP server (Essential)	Specify IP address or host name. For IP address, specify the keyword "IPv4=" or "IPv6=" at the beginning. For host name, specify "HOST=". ・For Ipv4 IPv4=111.122.133.144 ・For Ipv6 IPv6=1111:122:2:1555:0:0:1888 * For IPv4 address, there are unsettable range. For details, refer to 1.1.3 IP Address Setting Specifications. ・For host name HOST=HTTP.pidsx.com
	Port No. (can be omitted)	Specify port number. Port number range: 1 to 65535 PORT=: Port number (Default = 80)
	SSL3/TSL1 authentication (can be omitted)	Specify whether or not to use SSL3/TSL1 authentication. SSL: Use SSL3/TLS1 NON: Not use (Default: Not use)

(Note 1): Input an HTTP server number, IP address or host name of HTTP server, port number, and SSL3/TLS1 authentication separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): Specify the parameters for specifying servers in the oroder of the above table.

Setting example

Example 1	S1	"SV0,IPv4=192.255.2.10,PORT=80,SSL"
Settings		HTTP server No.: 0, IP address: 192.255.2.10, Port No.: 80, SSL3/TLS1 authentication: Use
Example 2	S1	"SV1,IPv6=1111:1222::1555:0:0:1888,PORT=8080,SSL"
Settings		HTTP server No.: 1, IP address: 1111:1222::1555:0:0:1888, Port No.: 8080, SSL3/TLS1 authentication: Use
Example 3	S1	"SV2,HOST=HTTP.pidsx.com,PORT=80,NON"
Settings		HTTP server No.: 2, Hos name: HTTP.pidsx.com, Port No.: 80, SSL3/TLS1 authentication: Not use

■ Operand [S2] setting

Specify the starting address storing the login setting parameter or a character constant.

- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "INITIAL" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings		Setting range
S2	User name (Can be omitted)	Specify a user name. Specify the keyword "USER=" at the beginning. USER=XXX (Default: root)	Max. 32 characters
	Password (Can be omitted)	Specify a password. Specify the keyword "PASS=" at the beginning. PASS=XXX (Default: root)	Max. 32 characters

(Note 1): Input a user name and password separated by a comma ",".
(Note 2): Upper and lower case characters can be used for sepcifying keywords.
(Note 3): Specify the login setting parameters in the oroder of the above table.

Setting example

Example 1	S2	"USER=root,PASS=pidsx"
Settings		User name: root, Password: pidsx
Example 2	S2	"USER=PANASONIC,PASS=SUNX"
Settings		User name: PANASONIC, Password: SUNX

■ Operand [S2] Settings for user name and password

Pattern	Specification method
Specify user name: Delete password	"USER=xxx,PASS="
Delete user name: Specify password	"USER=,PASS=xxx"
Delete user name: Delete password	"USER=,PASS="
Specify user name: Not change password	"USER=xxx"
Not change user name: Specify password	",PASS=xxx"

Setting example

Example 1	S2	"USER=root,PASS="
Settings		User name: root, Password: Delete
Example 2	S2	"USER=,PASS=SUNX"
Settings		User name: Delete, Password: SUNX
Example 3	S2	"USER=,PASS="
Settings		User name: Delete, Password: Delete
Example 4	S2	"USER=root"
Settings		User name: root, Password: Not change
Example 5	S2	",PASS=SUNX"
Settings		User name: Not change, Password: SUNX

■ Special keyword of operand [S2] setting

Special keyword	Description
INITIAL	Set the default.
KEEP	Not change the current settings.

Setting example

Example 1	S2	"INITIAL"
Settings		User name: root, Password: root
Example 2	S2	"KEEP"
Settings		User name: Not change, Password: Not change

■ Operand [S3] setting

- Specify the starting address storing the detailed setting parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "INITIAL" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

■ Operand [S3] setting

Setting item	Settings		Setting range
S3	Timeout period (Can be omitted)	Specify a timeout period. TOUT=: Time setting (Default: 60 seconds)	30 to 300 seconds
	No. of retries (Can be omitted)	Specify the number of retries. RTRY=: No. of retries (Default: 3 times)	0 to 3
	Retry interval (Can be omitted)	Specify the number of retries. RTTM=: Retry interval (Default: 600 seconds) (Note 4)	10 to 86400 seconds

(Note 1): Input a timeout period, number of retries and retry interval separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): Specify the detailed setting parameters in the order of the above table.

(Note 4): The retry interval can be specified by 10 seconds. It is rounded down to the 100. (Example: When specifying 38 seconds, it becomes 30 seconds.)

Setting example

Example 1	S3	"TOUT=30,RTRY=2,RTTM=500"
Settings		Timeout period: 30 seconds, No. of retries: 2, Retry interval: 500 seconds
Example 2	S3	"TOUT=270,RTRY=0,RTTM=4900"
Settings		Timeout period: 270 seconds, No. of retries: 0 (Not retry), Retry interval: 4900 seconds
Example 3	S3	"TOUT=120,RTRY=3"
Settings		Timeout period: 120 seconds, No. of retries: 3, Retry interval: Not change

■ Special keyword of operand [S3] setting

Special keyword	Description
INITIAL	Set the default.
KEEP	Not change the current settings.

Setting example

Example 1	S3	"INITIAL"
Settings		Timeout period: 60 seconds, No. of retries: 3, Retry interval: 600 seconds
Example 2	S3	"KEEP"
Settings		Timeout period: Not change, No. of retries: Not change, Retry interval: Not change

■ Flag operation

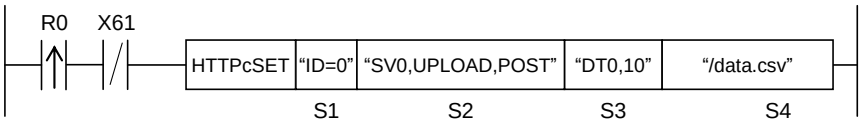
Name	Description
Latest error(SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the same keyword is specified redundatnly. Set when the transfer request relay of HTTPc transfer control relay is 1: Requesting. Set when "Add-on" is set to "Not use" in Built-in ET-LAN setting. Set when server numbers are not specified in the righr order. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256.
CY flag(SR9)	Set when executed with an incorrect IP address. The detail code set in SD29 is "1: Specification of incorrect IP address". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

5.3.2.2 Transfer Settings (HTTPcSET)

- Makes the HTTP client transfer setting (0-15).
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to specify the settings for destination servers before executing instructions using 5.3.2.1 Destination Server Setting (HTTPcSV) or 5.3.1.1 Basic Setup with the tool software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the transfer setting number (string) or a character constant.
S2	Specify the starting address storing the operation setting parameter or a character constant.
S3	Specify the starting address storing the source device setting or a character constant.
S4	Specify the starting address storing the destination URL or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	
S4	●	●	●	●			●	●												●	

■ Processing

- Stores the HTTP client transfer settings of S2 to S4 in the transfer setting area specified by S1.
- Executable when the transfer request relay for the specified transfer setting is 0: No Request.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- Data is actually sent or obtained when the HTTP transfer request (HTTPcREQ) instruction is executed after the completion of the HTTP client transfer settings.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the transfer setting number or a character constant.

Setting item	Settings		Setting range
S1	Transfer setting No.	Specify a transfer setting number. ID=: Transfer setting number	0 to 15

(Note): Transfer setting numbers should be specified from number 0 in ascending order. An error occurs when transfer setting numbers are not specified in ascending order. If transfer settings have been already registered, this rule is not applied.

Setting example

Example 1	S1	"ID=1"
Settings		Transfer setting number: 1
Example 2	S1	"ID=8"
Settings		Transfer setting number: 8

■ Operand [S2] setting

- Specify the starting address storing the operation setting parameter or a character constant.

Setting item	Settings		
S2	Specification of HTTP server	Specify HTTP servers. (3 digits fixed) SV0: Server 0 SV1: Server 1 SV2: Server 2 SV3: Server 3	
	Target and operation of transfer	Specify the target (device) and operation (Send or Get) of transfer.	
		UPLOAD	The target is Device, and the operation is Send.
		DOWNLOAD	The target is Device, and the operation is Get.
		UPDOWN	The target is Device, and the operation is Send and Get.
	Command used	Specify a command to be used for transfer. POST: Use POST command. GET: Use GET command. * Only POST can be specified for Upload or Upload and Download.	

(Note 1): Input operationg setting parameters and each setting parameter separated by a comma ",".
(Note 2): The operation setting parameters cnnot be omitted. Specify thme in the order of the above table.

Setting example

Example 1	S2	"SV3,UPLOAD,POST"
Settings		HTTP server: 3, Target: Device, Operation: Send (Upload), Command used: POST (Fixed)
Example 2	S2	"SV0,UPLOAD,POST"
Settings		HTTP server: 0, Target: Device, Operation: Send (Upload), Command used: POST (Fixed)

■ Operand [S3] setting (when Device is Upload)

Specify the starting address storing the source device setting or a character constant.

Setting item	Settings		Setting range
S3	Source device setting	Specify the source device setting. ・Global device Specify device code + device number. ・Local device "PB" + PB number + "_" (underbar) + Device code + Device number <Devices that can be specified>	
	No. of transferred data (No. of bytes)	Specify the number of transferred data (number of bytes). (1 to 7 digits) * The number of bytes that can be simultaneously transferred is 1 MB for all 16 IDs.	1 to 1048576 (1MB)

Global device	Local device
WX	WX
WY	WY
WR	WR
WL	WL
DT	DT
LD	LD

(Note 1): Input source device setting parameters and each setting parameter separated by a comma ",".
(Note 2): Specify the operation setting parameters in the order of the above table.

Setting example

Example 1	S3	"WX16,32"
Settings		Device setting, Device division: Global, Device code: WX, Device No.: 16, No. of bytes: 32 bytes
Example 2	S3	"DT123456,250"
Settings		Device setting, Device division: Global, Device code: DT, Device No.: 123456, No. of bytes: 250 bytes
Example 3	S3	"WR0,64"
Settings		Device setting, Device division: Global, Device code: WR, Device No.: 0, No. of bytes: 64 bytes
Example 4	S3	"WL10,128"
Settings		Device setting, Device division: Global, Device code: WL, Device No.: 10, No. of bytes: 128 bytes

■ Operand [S3] setting (when Device is Download)

Specify the starting address storing the destination device setting or a character constant.

<table>
<tr><th>Setting item</th><th colspan="2">Settings</th><th>Setting range</th></tr>
<tr><td rowspan="2">S3</td><td>Destination device setting</td><td>Specify the destination device setting.
・Global device
Specify device code + device number.
・Local device
"PB" + PB number + "_" (underbar) + Device code + Device number
<Devices that can be specified>
<table>
<tr><th>Global device</th><th>Local device</th></tr>
<tr><td>WX</td><td>WX</td></tr>
<tr><td>WY</td><td>WY</td></tr>
<tr><td>WR</td><td>WR</td></tr>
<tr><td>WL</td><td>WL</td></tr>
<tr><td>DT</td><td>DT</td></tr>
<tr><td>LD</td><td>LD</td></tr>
</table></td><td></td></tr>
<tr><td>No. of transferred data (No. of bytes)</td><td>Specify the number of transferred data (number of bytes). (1 to 7 digits)
* The number of bytes that can be simultaneously transferred is 1 MB for all 16 IDs.</td><td>1 to 1048576
(1MB)</td></tr>
</table>

(Note 1): Input each setting parameter for the destination device setting separated by a comma ",".

(Note 2): Specify the operation setting parameters in the order of the above table.

Setting example

Example 1	S3	"WX16,32"
Settings		Device setting, Device division: Global, Device code: WX, Device No.: 16, No. of bytes: 32 bytes
Example 2	S3	"DT123456,250"
Settings		Device setting, Device division: Global, Device code: DT, Device No.: 123456, No. of bytes: 250 bytes
Example 3	S3	"WR0,64"
Settings		Device setting, Device division: Global, Device code: WR, Device No.: 0, No. of bytes: 64 bytes
Example 4	S3	"WL10,128"
Settings		Device setting, Device division: Global, Device code: WL, Device No.: 10, No. of bytes: 128 bytes

■ Operand [S3] setting (when Device is Upload and Download)

- Specify the starting address storing the source device setting or a character constant.
- Downloaded data is stored following uploaded data.
  The number of acquisitions (the number of bytes) is stored in the first two words.

<table>
<tr><th>Setting item</th><th colspan="2">Settings</th><th>Setting range</th></tr>
<tr><td rowspan="3">S3</td><td>Source device setting</td><td>Specify the source device setting.
・Global device
Specify device code + device number.
・Local device
"PB" + PB number + "_" (underbar) + Device code + Device number
<Devices that can be specified>
<table>
<tr><th>Global device</th><th>Local device</th></tr>
<tr><td>WX</td><td>WX</td></tr>
<tr><td>WY</td><td>WY</td></tr>
<tr><td>WR</td><td>WR</td></tr>
<tr><td>WL</td><td>WL</td></tr>
<tr><td>DT</td><td>DT</td></tr>
<tr><td>LD</td><td>LD</td></tr>
</table></td><td></td></tr>
<tr><td>No. of transferred data (No. of bytes)</td><td>Specify the number of transferred data (number of bytes). (1 to 7 digits)
* The number of bytes that can be simultaneously transferred is 1 MB for all 16 IDs.</td><td>1 to 1048576 (1MB)</td></tr>
<tr><td>Maximum No. of acquisitions (No. of bytes)</td><td>Specify the maximum number of acquisitions (the number of bytes). (1 to 7 digits)
* Data can be obtained up to the maximum number of acquisitions.
* The number of bytes that can be simultaneously acquired is 1 MB for all 16 IDs.</td><td>1 to 1048576 (1MB)</td></tr>
</table>

(Note 1): Input source device setting parameters and each setting parameter separated by a comma ",".
(Note 2): Specify the operation setting parameters in the order of the above table.

Setting example

Example 1	S3	"WX16,32,32"
Settings		Device setting, Device division: Global, Device code: WX, Device No.: 16, No. of bytes: 32 bytes, No. of acquisitions: 32 bytes
Example 2	S3	"DT123456,250,250"
Settings		Device setting, Device division: Global, Device code: DT, Device No.: 123456, No. of bytes: 250 bytes, No. of acquisitions: 250 bytes
Example 3	S3	"WR0,64,64"
Settings		Device setting, Device division: Global, Device code: WR, Device No.: 0, No. of bytes: 64 bytes, No. of acquisitions: 64 bytes
Example 4	S3	"WL10,128,128"
Settings		Device setting, Device division: Global, Device code: WL, Device No.: 10, No. of bytes: 128 bytes, No. of acquisitions: 128 bytes

■ Operand [S4] setting (when Device is Upload)

- Specify the starting address storing the destination URL or a character constant.
- Specify a folder name and file name from the home directory of a user which logs in HTTP servers with a relative path.

■ Operand [S4] setting (when Device is Download)

- Specify the starting address storing the source URL or a character constant.
- Specify a folder name and file name from the home directory of a user which logs in HTTP servers with a relative path.

■ Operand [S4] setting (when Device is Upload and Download)

- Specify the starting address storing the destination URL or a character constant.
- Specify a folder name and file name from the home directory of a user which logs in HTTP servers with a relative path.

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when transfer setting numbers are not specified in ascending order. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when an HTTP server that has not been specified with the destination server setting instruction or the tool software is specified.
CY flag(SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

5.3.3 Executing Transfer with Instructions

Setting and requesting transfer with instructions

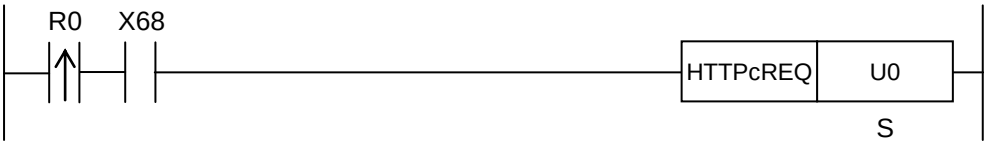
■ List of executed instructions

Instruction	Application
HTTPcREQ	Requests transfer.
HTTPcCTL	Controls transfer.

5.3.3.1 Transfer Request (HTTPcREQ)

- Requests the transfer of HTTP client.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when an Ethernet cable is disconnected or Ethernet is initialized.)
- Check if "X68: HTTP client preparation done" is ON before executing the instruction.
- It is necessary to specify the transfer settings before executing the instruction using 5.3.2.2 Transfer Settings (HTTPcSET) or 5.3.1.2 to 5.3.1.4 HTTP Transfer Settings with the tool software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S	Specify the device address storing the transfer number (0-15) or a constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●

■ Processing

- Turns ON the transfer request relay of the transfer number specified by [S].
- It can be executed when the HTTP client preparation done (X68) is ON. If it is OFF when executing the instruction, an operation error occurs.
- It is executable when the Ethernet cable disconnection (X60) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

- When it is executed under the following condition, a error code is set to the execution done code as a transfer error.

Status	Code	Status	Code
Destination server is not set.	1	Transfer prohibition setting	5
Transfer setting is not set.	2	Data decompression failed. (When accessing data with PUT)	8
Registering a process request failed.	4	Data decompression failed. (When accessing data with GET)	9

■ Precautions during programming

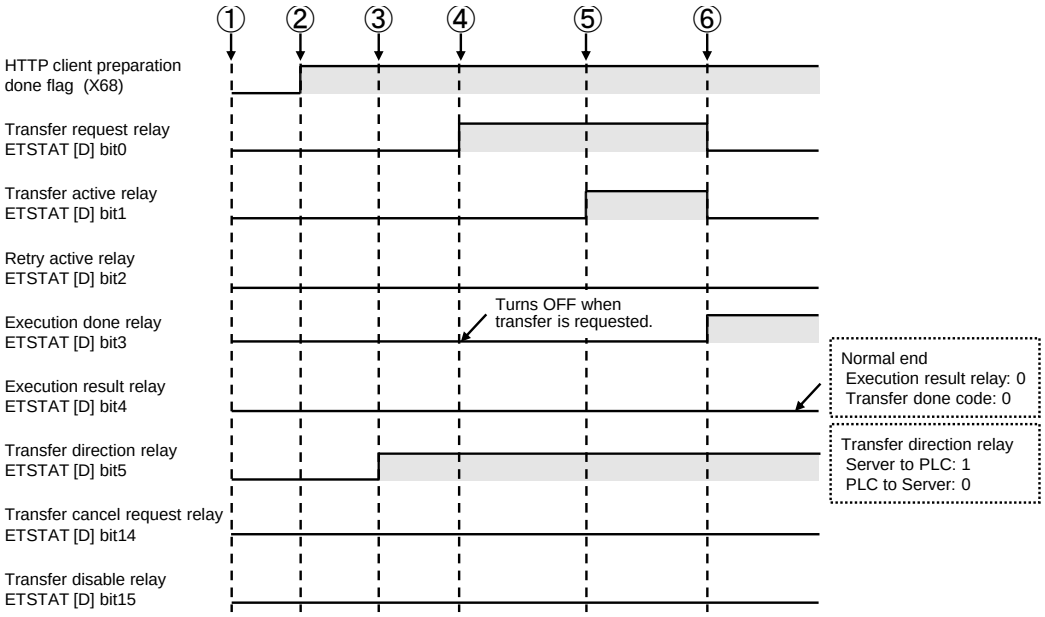
- This instruction is not available in interrupt programs.

■ Operand [S] setting

Setting item	Settings		Setting range
S	Transfer No.	Specify the device address storing a transfer number or a constant.	0 to 15

■ Time chart

- It shows the process that a transfer request was executed and data was obtained successfully from a server to FP7.
- The control relays (bit0 to bit15) can be monitored by reading arbitrary operation devices with ETSTAT instruction.



①	RUN (Power on)	④	Transfer request (Executes HTTPcREQ instruction)
②	HTTP client preparation done	⑤	HTTP client login succeeded (Starts transfer)
③	Transfer setting (Executes HTTPcSET instruction)	⑥	Transfer process done (Completes the execution of HTTPcREQ instruction)

■ Control relay

Name	Bit No.	Description
Transfer request relay	0	0: No request, 1: Request
Transfer active relay	1	0: Stop, 1: During transfer
Transfer retry active relay	2	0: No retry, 1: During retry
Execution done relay	3	0: During process, 1: Instruction execution complete
Execution result relay	4	0: Normal 1: Failed
Transfer direction relay (Note 1)	5	0: Send, 1: Receive
Reserved for system	6 to 13	-
Transfer cancel request relay (Note 2)	14	0: Not cancel, 1: Cancel
Transfer disable relay	15	0: Transfer enabled, 1: Transfer disabled

(Note 1): It is 0 (fixed) for logging and sending mails.
(Note 2): It is 0 (fixed) for logging and HTTPc.
(Note 3): The state of control relays can be read with ETSTAT instruction.

■ Completion code

Name	No. of words	Description
Execution done code	1	Execution completion code
Transfer done code	1	Response code of HTTP client

(Note): The state of completion codes can be read with ETSTAT instruction.

■ HTTP client preparation done (WX6 bit 8)

Name	Bit No.	Description
HTTP client preparation done (X68)	8	0: HTTP client preparation incomplete, 1: HTTP client preparation complete

■ Flag operation

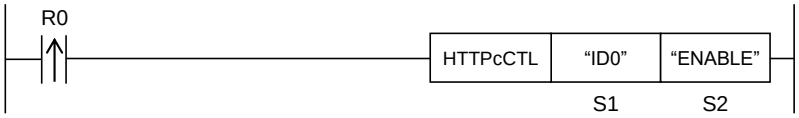
Name	Description
Latest error (SR7) Hold error (SR8)	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). To be set in case of out-of-range in indirect access (index modiication). Set when the HTTP client prepartion done (X68) is OFF at the time of the execution of instruction. To be set when an out-of-range value is specified for parameters. Set when the transfer request relay of a specified ID is "Request". Set when executed in an interrupt program. Set when a transfer setting that has not been specified with the transfer setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during when the Ethernet cable is disconnected. The detail code set in SD29 is "10: Ethernet cable disconnected". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

5.3.3.2 Transfer Control (HTTPcCTL)

- Sets to permit or prohibit the transfer of HTTP client.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when Ethernet is initialized.)
- It is necessary to specify the transfer settings before executing the instruction using 5.3.2.2 Transfer Settings (HTTPcSET) or 5.3.1.2 to 5.3.1.4 HTTP Transfer Settings with the tool software.
- It takes some time to accept the processing of the transfer cancel request. Check the transfer status and check if the transfer stops after executing the instruction. For information on how to check the transfer status, refer to the case that S1 operand is "FTPc/HHTPc/SMTPc) in 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

■ Instruction format



■ List of operands

Operand	Description
S1	Specify the target to be controlled with the starting address or a character constant.
S2	Specify the controlled contents (transfer enabled/disabled/canceled) with the starting address or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	

■ Processing

- Controls to enable, disable or cancle the transfer for the target (S1) according to the specification of the control content (S2).
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)

- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Details of setting parameters

Setting item	Settings		
S1	Control target	1) When specifying transfer numbers individually	Specify 0 to 15 for x with "IDx".
		2) When specifying all transfer numbers	Specify "ALL".
S2	Control content	1) When enabling transfer	Specify "ENABLE".
		2) When prohibiting transfer	Specify "DISABLE".
		3) When cancelling transfer	Specify "CANCEL".

Setting example

<table>
<tr><th></th><th>Settings</th><th>S1</th><th>S2</th></tr>
<tr><td>Example 1</td><td>When enabling the transfer of transfer No. 5</td><td>"ID5"</td><td>"ENABLE"</td></tr>
<tr><td>Example 2</td><td>When disabling all transfers</td><td>"ALL"</td><td>"DISABLE"</td></tr>
<tr><td>Example 3</td><td>When canceling the transfer of ID7</td><td>"ID7"</td><td>"CANCEL"</td></tr>
<tr><td>Example 4</td><td>When enabling the transfer of transfer No. 10 (Note)</td><td>DT0
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT0</td><td colspan="2">4 (No. of characters)</td></tr>
<tr><td>DT1</td><td>H44(D)</td><td>H49(I)</td></tr>
<tr><td>DT2</td><td>H30(0)</td><td>H31(1)</td></tr>
<tr><td>DT3</td><td></td><td></td></tr>
</table></td><td>DT10
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT10</td><td colspan="2">6 (No. of characters)</td></tr>
<tr><td>DT11</td><td>H4E(N)</td><td>H45(E)</td></tr>
<tr><td>DT12</td><td>H42(B)</td><td>H41(A)</td></tr>
<tr><td>DT13</td><td>H45(E)</td><td>H4C(L)</td></tr>
<tr><td>DT14</td><td></td><td></td></tr>
</table></td></tr>
</table>

(Note): For specifying a device for an operand which can specify character constants, store string data with SSET instruction excluding a double quotation mark.

■ HTTPc control relay flag operation

Name	Transfer enabled	Transfer disabled	Transfer canceled
Transfer cancel relay	Not change	Not change	ON
Transfer disable relay	OFF	ON	Not change
Transfer request	Not change	Not change	Not change
Transfer active	Not change	Not change	Not change
Transfer retry active	Not change	Not change	Not change
Transfer done	Not change	Not change	Not change
Transfer failed	Not change	Not change	Not change
Transfer direction	Not change	Not change	Not change

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when any items other than "IDx" or "ALL" are specified for the control target (S1). (x: 0 to 15) Set when a transfer setting that has not been specified with the transfer setting instruction or the tool software is specified. Set when any items other than "ENABLE", "DISABLE" or "CANCEL" are specified for the control content (S2). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256.
CY flag(SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

5.3.3.3 Status Acquisition of Ethernet Unit (ETSTAT)

- Reads information of Ethernet unit.
- For details, refer to the section 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

■ **List of HTTP error codes**

Error code	Description
300	Multiple pages can be used.
301	This address was moved to another address.
302	This address is temporarily placed in another address.
303	Refer to another page.
304	Although the access was permitted, the target document has not been updated.
305	Only the access via the proxy of Location field can be permitted.
307	This address temporarily belongs to another address.
400	An error occurs in the request such as a typing mistake.
401	Authentication failed. (This error occurs in cases such as the entry of a wrong password.)
403	You do not have access rights.
404	The page of the appropriate address does not exist, or the server is down.
405	A request of an unpermitted method type was received.
406	As a result drawn from the Accept header, unacceptable content was included.
407	Proxy authentication is required first.
408	No respose was made to the request within the wait time.
409	The request could not be completed because it conflicts with the resource of the current state.
410	The request cannot be used in the server and the destination address is unknown.
411	The requset without the defined Content-Length was rejected.
412	The condition given in more than one request header field was judged incororect in the test on the server.
413	The request was rejected because its size is larger than the processible size.
414	The request was rejected because its URI is too long.
415	The requested service was rejected by the server because the requested resource is an unsupported format for the requested method.
416	The request contains the Range header field, but no If-Range request header field.
417	The expansion of the Expect request header field was not accepted.
500	An error occurs in CGI script, etc.
501	The function required for executing the request is not supported.
502	An incorrect response was received when the server acting as a gateway or proxy attempted to execute a request.
503	It is not possible to access the address for some reason.
504	A response necessary for completing the request could not be received from a server such as DNS.
505	An unsupported HTTP protocol version was received.
9XX	Client service error

5.4 Precautions When Using HTTP Client

This section describes the precautions for uploading/downloading data between PLCs and HTTP servers using the HTTP client function.

■ Number of transferable data

- 1 MB send buffer is provided for data transmission.
- The send buffer is equally divided by the number of registered transfer settings. The number of transferable data for each transfer setting is in the range of the number of data allocated to each transfer setting.

No. of transfer settings	No. of transferable data for one transfer setting		
	No. of bytes	No. of words	Max. number of transmissions
1	1048576	524288	524288
2	524288	262144	262144
3	349525	174762	174762
4	262144	131072	131072
5	209715	104857	104857
6	174762	87381	87381
7	149796	74898	74898
8	131072	65536	65536
9	116508	58254	58254
10	104857	52428	52428
11	95325	47662	47662
12	87381	43690	43690
13	80659	40329	40329
14	74898	37449	37449
15	69905	34952	34952
16	65536	32768	32768

(Note): The above buffer is used for the upload, download, and upload and download functions. There is the same restriction on the buffer for them.

■ Number of specified transferred data and approximate processing time

- Refer to the section of "Number of specified transferred data and approximate processing time" in "4.6 Precautions When Using FTP Client".

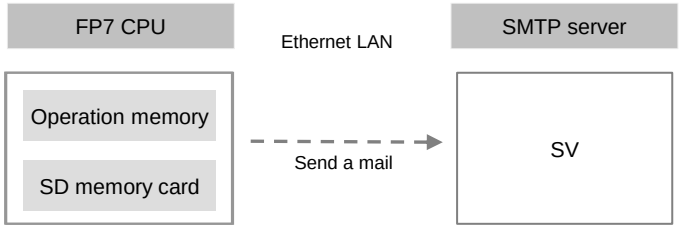
6

Mail Transmission Function

6.1 Overview of Mail Transmission Function

■ Overview of mail transmission function

- The mail transmission function is used to send mails from PLC using the mail transmission protocol.
- Two transfer methods are available, which are an arbitrary transfer by the transfer setting and an automatic transfer when a logging/trace file is determined.



6.2 Details of Mail Transmission Function

6.2.1 Basic Setup

■ SMTP server settings

One SMTP server can be set.

■ Destination group setting

Up to eight destination groups can be set.

6.2.2 Event Mail Setting

- By the event mail setting, a mail is sent when a PLC event occurs
- A maximum of sixteen send triggers can be set.
- The following five types of send triggers are available.

Classification		Description
1	Bit	A mail is sent at the rising of a specified bit device.
2	Cycle	A mail is sent with a period of the unit of hour, minute or second.
3	Instruction	A mail is sent when SMTPcREQ instruction is executed.
4	Time	A mail is sent in units of minute, hour, day, week, month or year
5	PLC status change	A mail is sent when one of the following events occurs; the power is turned on (Note 1) / An error is cleared / The mode is switched from PROG. to RUN / The operation stop self-diagnostic error is detected / The operation continue self-diagnostic error is detected.

(Note 1): The trigger (when the power turns on) cannot be specified with an instruction.

- Each setting and transmission is executed with the tool software or instructions.

Item	Setting with tool software	Setting with instruction
SMTP server setting	Basic Setup	SMTPcSV
Destination group setting	Basic Setup	SMTPcADD
Mail setting	Event Mail setting	SMTPcSET
Execution of transmission	Trigger specified in the mail setting	Trigger specified with SMTPcSET instruction

6.2.3 Logging/Trace Mail Setting

- A mail is sent when a file is determined by the logging/trace mail setting.
- The settings are configured with the tool software or instructions, and the transmission is automatically executed.

Item	Setting with tool software	Setting with instruction
SMTP server setting	Basic Setup	SMTPcSV
Destination group setting	Basic Setup	SMTPcADD
Logging/Trace mail setting	Logging/Trace mail setting	SMTPcLOG
Execution of transmission	Automatically executed when files are determined.	Automatically executed when files are determined.

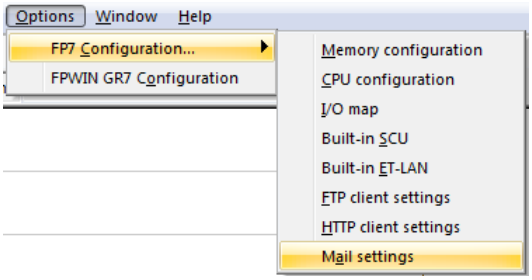
6.3 How to Use Event Mail Transmission

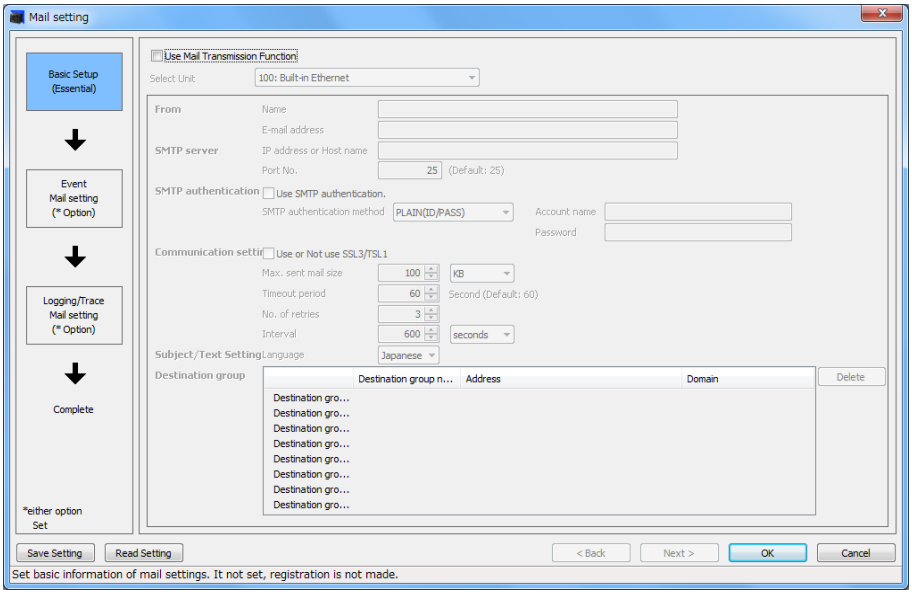
6.3.1 Setting with Tool Software

Use the programming tool software "FPWIN GR7" to make the transfer settings.

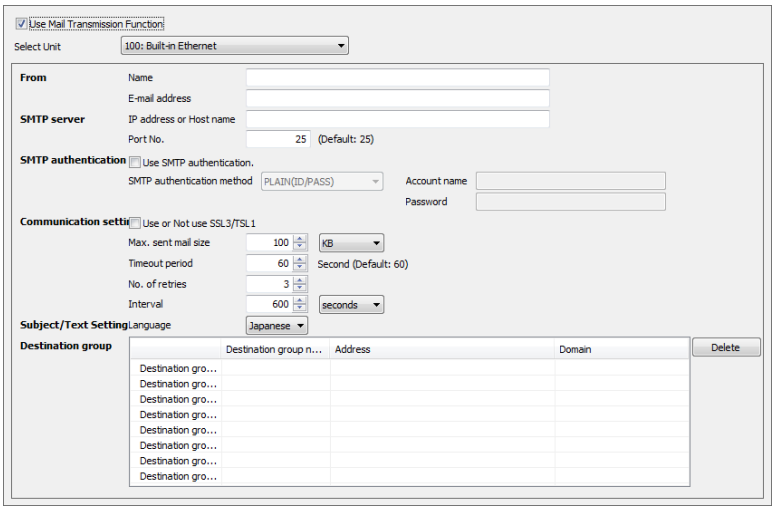
◆ **PROCEDURE**

1. **Select "Options" > "FP7 Configuration" > "Mail settings" from the menu bar to open the "Mail setting" window.**





2. Checking the box of "Use Mail Transmission Function" in Basic Setup (Essential) has the setting for "Select Unit" and the following items enabled.



Select Unit is "100: Built-in Ethernet" only.

3. From

Enter the name and mail address of a sender.

4. SMTP server

Enter the IP address or host name of SMTP server.

Specify "Port No.".

5. SMTP authentication

Check the box of "Use SMTP authentication" to use the SMTP server authentication.

Checking this box makes the SMTP authentication methods selectable. Select a method from the list.
[CRAM-MD5 / PLAIN (ID/PASS) / PLAIN (ID/ID/PASS) / LOGIN]

Enter an account name and password.

6. Communication setting

Check the box of "Use or Not use SSL3/TSL1" to use the SSL3/TLS1 of SMTP server.

Specify "Max. sent mail size", "Timeout period", "No. of retires" and "Interval" as necessary.

7. Subject/Text Setting

Select language for subject and texts.

8. Destination group

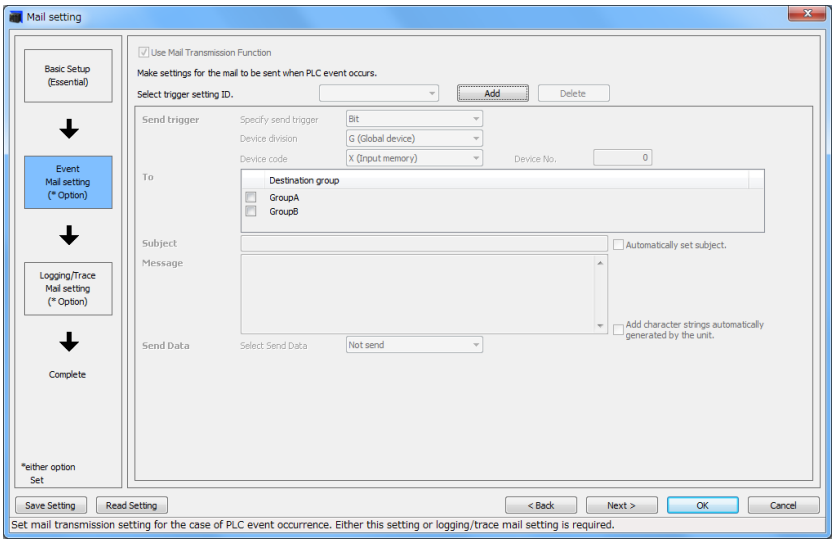
Up to eight destination groups can be registered.

Destination group name:
Enter a destination group name within 64 characters.

Address:
Enter the address of a member belonging to a destination group within 256 characters. An address can be specified with a host name only or host name + domain name.
Multiple addresses can be specified by separating each address with ",".

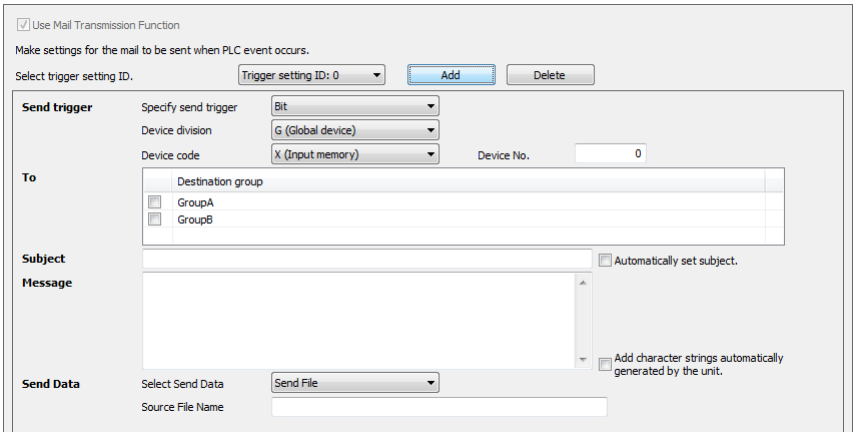
Domain:
When an entered address contains only the host name, the destination address is created with the domain name to be specified here.
Enter a domain name within 32 characters.
Only one domain name can be specified.

9. Click the [Next] button to go to the event mail setting.



As the trigger setting has not been set initially, click the [Add] button to add the trigger setting.

10. The following items becomes available by adding the trigger setting ID.



11. Send trigger

Specify send trigger:
Select a send trigger from the list.
(Bit / Cycle / Instruction / Time / PLC status change)

<When "Send trigger" is "Bit">

Select "Device division". [G (Global device) / L (Local device)]

<When "Device division" is "Local device">
Select the PB of local device.

Select "Device code".

Specify "Device No.".

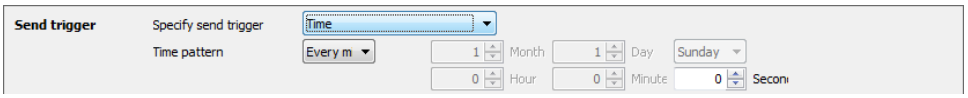
<When "Send trigger" is "Cycle">

Select a cycle. (second / minute / hour)

<When "Send trigger" is "Instruction">

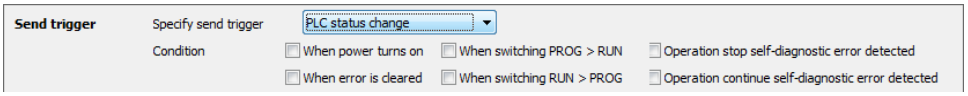
SMTPcREQ is displayed.

<When "Send trigger" is "Time">



Select a time pattern. (Every minute / Every hour / Every day / Every week / Every month / Every year)
According to the selected time pattern, specify month, day, day of week, hour, minute or second.

<When "Send trigger" is "PLC status change">



Check trigger conditions to select. It is possible to select multiple conditions.

12. To

As the destination groups registered in Basic Setup are displayed, check desired destination groups.

13. Subject

Enter subject.
Checking "Automatically set subject" generates subjects in the table below according to the language selected in Basic Setup.

Subject automatically generated
bit on detect
Interval mail (cycle)
Specified Time (Every xxxx)
PLC status change (Power On)
PLC status change (Prog > Run)
PLC status change (Run > Prog)
PLC status change (Operation stop error)
PLC status change (Operation continuous error)
PLC status change (Error release)
SMTPcREQ command

14. Message

Enter message.
Checking "Add character strings automatically generated by the unit" adds character strings listed in the table below according to the language selected in Basic Setup.

Character strings added to mails	
Basic information	From:
	CPU Part Number:
	IPv4 address:
	IPv6 address:
	Detected Time:
Detailed information	bit on detect (R100)
	Interval mail (xxxx)
	Interval mail (24hour)
	Specified Time (Every xxxx)
	PLC status change (Power On)
	PLC status change (Prog > Run)
	PLC status change (Run > Prog)
	PLC status change (Operation stop error)
	PLC status change (Operation continuous error)
	PLC status change (Error release)
	SMTPcREQ command (PB##, xxxx)

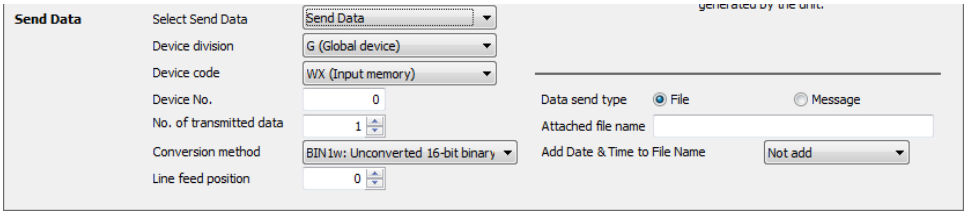
15. Send Data

Select from the list of "Select Send Data".
(Send File / Send Data / Not send)

<For sending files>

Specify a source file name (folder name and file name).

<For sending data>



Select "Device division". [G (Global device) / L (Local device)]

<When "Device division" is "Local device">

Select the PB of local device.

Select "Device code".

Specify "Device No.".

Specify "No. of transmitted data".

Select "Conversion method".

Specify "Line feed position".

Select "Data send type". (File / Message)

Specify "Attached file name".

Select “Add Date & Time to File Name”.
[Not add / Add (Postposing) / Add (Preposing)]

6.3.2 Settings with Instructions

The SMTP server setting, destination group setting, and mail transmission setting are configured with instructions.

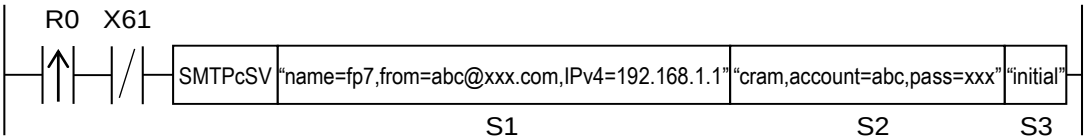
- The destination server setting, destination group setting, and mail transmission setting are configured with instructions.
- Although they can be configured with only instructions, the setting to use the add-on in the built-in ET-LAN setting is required.
- For details of the setting to use the add-on, refer to 4.4.2 Setting with Instructions of the FTP client function.

Instruction	Application
SMTPcSV	SMTP server setting
SMTPcADD	Destination group setting
SMTPcSET	Mail transmission setting

6.3.2.1 Destination Server Setting (SMTPcSV)

- Sets the information of the connected mail send server and the sender.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (They are set when IP address is not established or Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- For details of the setting to use the add-on, refer to 4.4.2 Setting with Instructions of the FTP client function.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the info of sender & mail send server or a character constant.
S2	Specify the starting address storing the authentication setting parameter or a character constant.
S3	Specify the starting address storing the detailed setting parameter or a character constant.

■ Available Devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	

■ Processing

- The mail server setting and sender setting are configured in the CPU unit according to specified parameters.
- It can be executed when all the send request relays of mail send control relay and mail send logging/trace control relay are set to 0: No request and when "Add-on" is set to "Use" in the built-in ET-LAN setting. (In the case other than the above, an operation error is occurred.)
- The initial value is setting with the instruction when the server setting is not specified.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- When an incorrect IP address is specified, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the info of sender & mail send server or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- Specify a source name, source e-mail address, IP address or host name of mail server, port number, and SSL3/TLS1 authentication within 256 characters in total.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

■ Operand [S1] setting

Setting item	Settings	
S1	Source name (Can be omitted)	Specify a source name. Specify the keyword "NAME=" at the beginning.
	Source e-mail address (Essential)	Specify a source e-mail address. Specify the keyword "FROM=" at the beginning.
	IP address or Host name of mail server (Essential)	Specify an IP address or host name. For IP address, specify the keyword "IPv4=" or "IPv6=" at the beginning. For host name, specify "HOST=". ・For IPv4: IPv4=111.122.133.144 ・For IPv6: IPv6=1111:122:2:1555:0:0:1888 * For IPv4 address, there are unsettable ranges. For details, refer to 1.1.3 IP Address Setting Specifications. ・For host name: HOST=smtp.pidsx.com
	Port No. (Can be omitted)	Specify a port number. (Default: 25) Setting range: 1 to 65535
	SSL3/TSL1 authentication (Can be omitted)	Specify whether or not to use SSL3/TSL1 authentication. SSL= Use SSL3/TLS1 NON=Not use

(Note 1): Input a source name, source e-mail address, IP address or host name of mail server, port number, and SSL3/TLS1 authentication separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): Specify the source information in the order of the above table.

Setting example

Example 1	S1	"NAME=FP7_001,FROM=pana@pana.com,IPv4=192.255.2.10,PORT=25,SSL"
Settings		Source name: FP7_001, Source e-mail address: pana@pana.com IP address: 192.255.2.10, Port No.: 25, SSL3/TLS1 authentication: Use
Example 2	S1	",FROM=sunx@sunx.com,IPv6=1111:1222::a8dd:0:0:6666,PORT=100,SSL"
Settings		Source name: Not change, Source e-mail address: sunx@sunx.com IP address: 1111:1222::a8dd:0:0:6666, Port No.: 100, SSL3/TLS1 authentication: Use
Example 3	S1	"NAME=FP7_002,FROM=pewsunx@pewsunx.com,HOST=SMTPmailserver.com, PORT=1000,NON"
Settings		Source name: FP7_002, Source e-mail address: pewsunx@pewsunx.com Host name: SMTPmailserver.com, Port No.: 1000, SSL3/TLS1 authentication: Not use
Example 4	S1	"NAME=FP7_002,FROM=pewsunx@pewsunx.com,HOST=SMTPmailserver.com"
Settings		Source name: FP7_002, Source e-mail address: pewsunx@pewsunx.com Host name: SMTPmailserver.com, Port No.: Not change, SSL3/TLS1 authentication: Not use

■ Operand [S2] setting

- Specify the starting address storing the authentication setting parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "NOUSE" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings		Setting range
S2	SMTP authentication method (Essential)	Specify SMTP authentication method. CRAM: CRAM-MD5 is used. PLAIN1: PLAIN1 (ID/PASS) is used. PLAIN2: PLAIN2 (ID/PASS) is used. LOGIN: LOGIN is used.	
	Account (Can be omitted)	Specify an account. ACCOUNT=xxx (Default: root)	Max. 32 characters
	Password (Can be omitted)	Specify a password. Specify the keyword "PASS=" at the beginning. PASS=xxx (Default: root)	Max. 32 characters

(Note 1): Input an SMTP authentication method, account, and password separated by a comma ",".
(Note 2): Upper and lower case characters can be used for sepcifying keywords.
(Note 3): Specify the authentication setting parameters in the order of the above table.

Setting example

Example 1	S2	"CRAM,ACCOUNT=sunx,PASS=control"
Settings		SMTP authentication method: CRAM-MD5, Account: sunx, Password: control
Example 2	S2	"PLAIN2,ACCOUNT=FP0R,PASS=small"
Settings		SMTP authentication method: PLAIN2, Account: FP0R, Password: small
Example 3	S2	"LOGIN,ACCOUNT=FP2SH,PASS=middle"
Settings		SMTP authentication method: LOGIN, Account: FP2SH, Password: middle

■ Operand [S2] Settings for account name and password

Pattern	Specification method
Account is specified. : Password is deleted.	"CRAM,ACCOUNT=xxx,PASS="
Account is deleted. : Password is specified.	"PLAIN1,ACCOUNT=,PASS=xxx"
Account is deleted. : Password is deleted.	"PLAIN2,ACCOUNT=,PASS="
Account is specified. : Password is not changed.	"LOGIN,ACCOUNT=xxx"
Account is not changed. : Password is specified.	"CRAM,,PASS=xxx"

Setting example

Example 1	S2	"CRAM,ACCOUNT=root,PASS="
Settings		SMTP authentication method: CRAM-MD5, Account: root, Password: Delete
Example 2	S2	"PLAIN1,ACCOUNT=,PASS=SUNX"
Settings		SMTP authentication method: PLAIN1, Account: Delete, Password: SUNX
Example 3	S2	"PLAIN2,ACCOUNT=,PASS="
Settings		SMTP authentication method: PLAIN2, Account: Delete, Password: Delete
Example 4	S2	"LOGIN,ACCOUNT=root"
Settings		SMTP authentication method: LOGIN, Account: root, Password: Not change
Example 5	S2	"CRAM,,PASS=SUNX"
Settings		SMTP authentication method: CRAM, Account: Not change, Password: SUNX

■ Special keyword of operand [S2] setting

Special keyword	Description
NOUSE	The SMTP authentication setting is not used.
KEEP	The current setting is not changed.

Setting example

Example 1	S2	"NOUSE"
Settings		SMTP authentication method: Not use, Account: Not use, Password: Not change
Example 2	S2	"KEEP"
Settings		SMTP authentication method: Not change, Account: Not change, Password: Not change

■ Operand [S3] setting

- Specify the starting address storing the detailed setting parameter or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- When spedifying "INITIAL" or "KEEP" without specifyng parameters, the unit oprates according to the table of special keywords.
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings		Setting range
S3	Max. sent mail size (Can be omitted)	Specify the maximum size of a sent mail. MAIL SIZE=: Sent mail size (Default: 100)	1 to 10240KB
	Timeout period (Can be omitted)	Specify a timeout period. TOUT=: Time setting (Default: 60 seconds)	30 to 300 seconds
	No. of retries (Can be omitted)	Specify the number of retries. RTRY=: No. of retries (Default: 3 times)	0 to 3
	Retry interval (Can be omitted)	Specify the number of retries. RTTM=: Retry interval (Default: 600 seconds) *1	10 to 86400 seconds
	Language (Can be omitted)	Specify a language to be used for Subject and Text. JPN= Japanese (Default) ENG= English	

(Note 1): Input the maximum sent mail size, timeout period, number of retries, retry interval and language separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): The retry interval can be specified by 10 seconds. It is rounded down to the 10. (Example: When specifying 38 seconds, 30 seconds are set.)

(Note 4): Specify the authentication setting parameters in the order of the above table.

Setting example

Example 1	S3	"MAILSIZE=1000,TOUT=30,RTRY=2,RTTM=500,JPN"
Settings		Max. size: 1000, Timeout period: 30 seconds, No. of retries: 2, Retry interval: 500 seconds, Language: Japanese
Example 2	S3	"MAILSIZE=10000,TOUT=270,RTRY=0,RTTM=4900,ENG"
Settings		Max. size: 10000, Timeout period: 270 seconds, No. of retries: 0 (Not retry), Retry interval: 4900 seconds, Language: English
Example 3	S3	"MAILSIZE=500,TOUT=30,RTRY=3,RTTM=200"
Settings		Max. size: 500, Timeout period: 30 seconds, No. of retries: 3, Retry interval: 200 seconds, Language: Not change
Example 4	S3	"MAILSIZE=5000,,RTRY=5,RTTM=3000,ENG"
Settings		Max. size: 5000, Timeout period: Not change, No. of retries: 55, Retry interval: 3000 seconds, Language: English

■ Special keyword of operand [S3] setting

Special keyword	Description
INITIAL	Set the default.
KEEP	The current setting is not changed.

Setting example

Example 1	S3	"INITIAL"
Settings		Max. size: 100, Timeout period: 60 seconds, No. of retries: 3, Retry interval: 600 seconds, Language: Japanese
Example 2	S3	"KEEP"
Settings		Max. size: Not change, Timeout period: Not change, No. of retries: Not change, Retry interval: Not change, Language: Not change

■ Flag operation

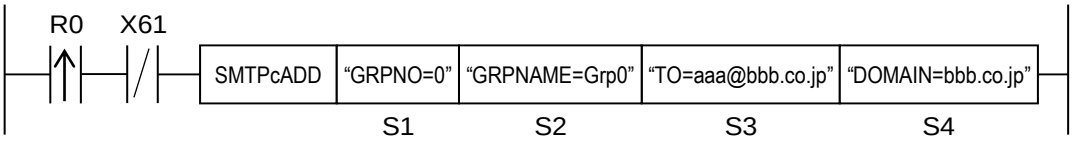
Name	Description
Latest error (SR7) Hold error (SR8)	To be set when an out-of-range value is specified for parameters. Set when the same keyword is specified redundatnly. Set when even one request active relay of mail transmission control relay or mail transmission logging/trace control relay is 1: Requesting. Set when "Add-on" is set to "Not use" in Built-in ET-LAN setting. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256.
CY flag (SR9)	Set when executed with an incorrect IP address. The detail code set in SD29 is "1: Specification of incorrect IP address". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.2.2 Destination Group Setting (SMTPcADD)

- Makes the destination group setting.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to specify the settings for destination servers before executing instructions using 6.3.2.1 Destination Server Setting (SMTPcSV) or 6.3.1 Setting with Tool Software with the tool software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the destination group number (string) or a character constant.
S2	Specify the starting address storing the destination group name or a character constant.
S3	Specify the starting address storing the destination address (host name) or a character constant.
S4	Specify the starting address storing the destination address (domain name) or a character constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	
S4	●	●	●	●			●	●												●	

■ Processing

- Specify the destination group name specified by S2 and the destination address specified by S3 and S4 for the destination group number specified by S1.
- It is executable when all the send request relays of the mail send control relay and mail send logging/trace control relay are 0: No request. (When requested, an operation error occurs.)
- A mail address consists of the following two parts.
  Host name@Domain name
  Host name: The part before "@".
  Domain name: The part after "@".

- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified. ("Abcd", "ABCD" and "abcd" are synonymous, however, destination groups and destination addresses are case sensitive.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the destination group number (string) or a character constant.

Setting item	Settings		Setting range
S1	Destination group number	Specify a destination group number. Specify the keyword "GRPNO=" at the beginning. GRPNO=Destination group number	0 to 7

(Note): Upper and lower case characters can be used for specifying keywords.

Setting example

Example 1	S1	"GRPNO=0"
Settings		Destination group number: 0
Example 2	S1	"GrpNo=7"
Settings		Destination group number: 7

■ Operand [S2] setting

- Specify the starting address storing the destination group name or a character constant.

Setting item	Settings		Setting range
S2	Destination group name	Specify a destination group name. Specify the keyword "GRPNAME=" at the beginning. GRPNAME=Destination group name	Max. 64 characters

(Note): Upper and lower case characters can be used for specifying keywords.

Setting example

Example 1	S2	"GRPNAME=Grp0"
Settings		Group name: Grp0
Example 2	S2	"GrpName=Grp1"
Settings		Group name: Grp1

■ Operand [S3] setting

- Specify the starting address storing the destination address or a character constant.

Setting item	Settings	
S3	Destination address (Host name)	Specify a destination address (host name). Specify the keyword "TO=" at the beginning. TO=Destination address

(Note 1): The destination address of S3 can be specified with a hone name only or host name and domain name.

(Note 2): When a domain name is omitted, the destination address is created by the addition of the domain name of S4.

(Note 3): Multiple addresses can be specified by separating each address with ",".

(Note 4): Upper and lower case characters can be used for sepcifying keywords.

Setting example

Example 1	S3	"TO=suzuki@sunx.co.jp
Settings		Destination address: suzuki@sunx.co.jp, Domain name: Specify
Example 2	S3	"TO=sato"
Settings		Destination address: sato@sunx.co.jp, Domain name: Omit (Specify sunx.co.jp for S4.)
Example 3	S3	"TO=suzuki@sunx.co.jp,yamamoto@pana.co.jp"
Settings		Destination address: Specify multiple addresses, suzuki@sunx.co.jp, yamamoto@pana.co.jp, Domain name: Specify
Example 4	S3	"TO=yamamoto,ito"
Settings		Destination address: Specify multiple addresses, yamamoto@pana.co.jp, ito@pana.co.jp, Domain name: Omit (Specify "DOAMIN=" for S4.)
Example 5	S3	"TO=suzuki@sunx.co.jp,yamamoto,ito"
Settings		Destination address: Specify multiple addresses, Domain name: Mixture of Specify and Omit (Specify pana.co.jp for S4.)

■ Operand [S4] setting

- Specify the starting address storing the destination address (domain name) or a character constant.

Setting item	Settings		Setting range
S4	Destination address (Domain name)	Specify a destination address (domain name). Specify the keyword "DOMAIN=" at the beginning. DOMAIN=Domain name	Max. 32 characters

(Note 1): When a domain name is omitted for the specification of the destination address of S3, a specified domain name is added.

(Note 2): When all domain names are specified for the specification of the destination addresses of S3, the specification of the domain name of S4 can be omitted.

(Note 3): Only one domain name can be specified.

(Note 4): Upper and lower case characters can be used for sepcifying keywords.

Setting example

Example 1	S4	"DOMAIN=sunx.co.jp"
Settings		Domain name: sunx.co.jp
Example 2	S4	"Domain=sunx.co.jp"
Settings		Domain name: sunx.co.jp
Example 3	S4	"DOMAIN="
Settings		Domain name: Omitted

■ Flag operation

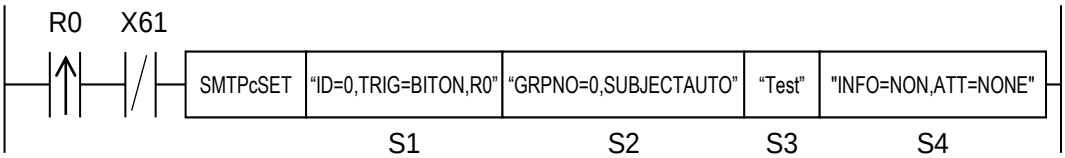
Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when even one request active relay of mail transmission control relay or mail transmission logging/trace control relay is 1: Requesting. Set when the domain name of S4 is omitted when specifying to omit a domain name for the destination address of S3. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when a mail transmission server that has not been specified with the destination server setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.2.3 Mail Transmission Settings (SMTPcSET)

- Configure the mail transmission settings.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to specify 6.3.2.2 Destination Group Setting (SMTPcADD) or the event mail setting by 6.3.1 Setting with Tool Software.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the setting number (string) and send trigger or a character constant.
S2	Specify the starting address storing the subject of sent mail and destination group no. (string) or a character constant.
S3	Specify the starting address storing the mail text to be sent or a character constant.
S4	Specify the starting address storing the attached data specification of sent mail or a character constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	
S4	●	●	●	●			●	●												●	

■ Processing

- Stores the mail transmission settings of S1 to S4 in the mail transmission setting area.
- It is executable when all the send request relays of the mail send control relays are 0: No request. (When requested, an operation error occurs.)
- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the setting number (string) and send trigger or a character constant.

Setting item	Settings		Setting range
S1	Setting No.	Specify a transfer setting number. Specify the keyword "ID=" at the beginning. ID=: Transfer setting number	0 to 15
	Send trigger	Specify a send trigger. Specify the keyword "TRIG=" at the beginning. TRIG=xxxxx * For information on send triggers, refer to the section of "Send Trigger Setting".	

(Note 1): Only one setting number and send trigger can be specified simultaneously.

(Note 2): It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

(Note 3): Input setting parameters separated by a comma ",".

(Note 4): Each parameter cnnot be omitted. Specify them in the order of the above table. The order of keywords cannot be changed.

(Note 5): Upper and lower case characters can be used for sepcifying keywords.

(Note 6): Setting numbers should be specified from number 0 in ascending order.An error occurs when transfer setting numbers are not specified in ascending order. If transfer settings have been already registered, this rule is not applied.

■ Operand [S1] send trigger setting

<table>
<tr><th>Setting</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">Bit device</td><td colspan="2">Specify the detection of bit device OFF to ON as a trigger. Specify "BITON" for the keyword "TRIG=", and set the bit device.
TRIG=BITON,xxxxx</td></tr>
<tr><td>For global device</td><td>Specify device code + device number.
Example) such as "X10", "R1024", and "DT12345.6"
Addressable devices: X, Y, R, L, T, C, S, P, E, DT.n, LD.n
For system relays, specify "S".</td></tr>
<tr><td>For local device</td><td>"PB" + PB number + "_" (underbar) + Device code + Device number
Example) such as "PB1_X50", "PB80_R512", and "PB200_DT102.4"
Addressable devices: X, Y, R, L, T, C, P, E, DT.n, LD.n</td></tr>
<tr><td rowspan="2">Time</td><td colspan="2">Specify sent time. Specify "TIME" for the keyword "TRIG=", and set the time.
TRIG=TIME,xxxx,yyyy</td></tr>
<tr><td colspan="2">・Setting format of cycle
<table>
<tr><th>Cycle</th><th>Set value of xxxx</th><th>Set format of yyyy</th></tr>
<tr><td>Every minute</td><td>/min</td><td>ss</td></tr>
<tr><td>Every hour</td><td>/hour</td><td>mm:ss</td></tr>
<tr><td>Every day</td><td>/day</td><td>hh:mm:ss</td></tr>
<tr><td>Every month</td><td>/mon</td><td>DD:hh:mm:ss</td></tr>
<tr><td>Every year</td><td>/year</td><td>MM:DD:hh:mm:ss</td></tr>
<tr><td>Every week</td><td>/week</td><td>hh:mm:ss-w</td></tr>
</table>
* Specify the format of yyyy as follows; ss = seconds (0 to 59), mm = minutes (0 to 59), hh = hours (0 to 23), DD (1 to 31) = days, MM = months (1 to 12), w = weeks (0 to 6)
* Specify w for every week as follows; 0 = Sunday, 1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday</td></tr>
<tr><td rowspan="2">Cycle</td><td colspan="2">Specify "CYCLIC" and the following strings in combination for the keyword "TRIG=".
TRIG=CYCLIC,xxxx</td></tr>
<tr><td colspan="2">・Set value of cycle time
<table>
<tr><th>Cycle time</th><th>Set value</th></tr>
<tr><td>Second</td><td>30SEC</td></tr>
<tr><td>Minute</td><td>1MIN, 2MIN, 3MIN, 4MIN, 5MIN, 6MIN, 10MIN, 15MIN, 30MIN</td></tr>
<tr><td>Hour</td><td>1HOUR, 2HOUR, 3HOUR, 4HOUR, 6HOUR, 12HOUR, 24HOUR</td></tr>
</table>
* The shortest cycle is 30 seconds.
* Only one cycle time can be set. Settings such as "1MIN30SEC" cannot be set.</td></tr>
<tr><td>Instruction</td><td colspan="2">Specify SMTPcREQ instruction as a trigger. Specify "PROGRAM" for the keyword "TRIG="
TRIG=PROGRAM</td></tr>
</table>

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td rowspan="2">PLC status change</td><td>Specify "STATUS" and the following strings in combination for the keyword "TRIG=".
TRIG=STATUS,xxxx</td></tr>
<tr><td>Multiple items can be specified. Separate each item with a comma (,).
<table>
<tr><th>Set value</th><th>Meaning</th></tr>
<tr><td>PROG>RUN</td><td>When switching the swtich PROG to RUN</td></tr>
<tr><td>RUN>PROG</td><td>When switching the swtich RUN to PROG</td></tr>
<tr><td>ERR>STOP</td><td>Operation stop self-diagnostic error detected.</td></tr>
<tr><td>ERR>RUN</td><td>Operation continue self-diagnostic error detected.</td></tr>
<tr><td>ERRCLR</td><td>When error is cleared</td></tr>
</table></td></tr>
</table>

Setting example

Example 1	S1	"ID=0,TRIG=BITON,DT100.1"
Settings		Setting No.: 0, Send trigger: Bit device (Global device: DT100 Bit 1)
Example 2	S1	"ID=1,TRIG=TIME,/day,13:30:00"
Settings		Setting No.: 1, Send trigger: Time (Every day at 13:30)
Example 3	S1	"ID=2,TRIG=TIME,/year,4:1:9:0:0"
Settings		Setting No.: 2 Send trigger: Time (Every year at 9:00 on April 1)
Example 4	S1	"ID=3,TRIG=TIME,/week,23:50:00-5"
Settings		Setting No.: 3, Send trigger: Time (Every week at 23:50 on Friday)
Example 5	S1	"ID=4,TRIG=CYCLIC,30SEC"
Settings		Setting No.: 4, Send trigger: Cycle (30-second cycle)
Example 6	S1	"ID=5,TRIG=CYCLIC,10MIN"
Settings		Setting No.: 5, Send trigger: Cycle (10-minute cycle)
Example 7	S1	"ID=6,TRIG=CYCLIC,12HOUR"
Settings		Setting No.: 6, Send trigger: Cycle (12-hour cycle)
Example 8	S1	"ID=7,TRIG=PROGRAM"
Settings		Setting No.: 7, Send trigger: Instructions
Example 9	S1	"ID=8,TRIG=STATUS,PROG>RUN"
Settings		Setting No.: 8, Sned trigger: PLC status change (When the switch changes PROG to RUN)
Example 10	S1	"ID=9,TRIG=STATUS,RUN>PROG"
Settings		Setting No.: 9, Sned trigger: PLC status change (When the switch changes RUN to PROG)
Example 11	S1	"ID=10,TRIG=STATUS,ERR>STOP"
Settings		Setting No.: 10, Send trigger: PLC status change (When operation stop self-diagnostic error is detected.)
Example 12	S1	"ID=11,TRIG=STATUS,ERR>RUN"
Settings		Setting No.: 11, Send trigger: PLC status change (When operation continue self-diagnostic error is detected.)
Example 13	S1	"ID=12,TRIG=STATUS,ERRCLR"
Settings		Setting No.: 12, Send trigger: PLC status change (When error is cleared.)
Example 14	S1	"ID=13,TRIG=STATUS,ERR>STOP,ERR>RUN,ERRCLR"
Settings		Setting No.: 13, Send trigger: PLC status change (When operation stop self-diagnostic error is detected.), PLC status change (When operation continue self-diagnostic error is detected.), PLC status change (When error is cleared.)

■ Operand [S2] setting

Specify the starting address storing the subject of sent mail and destination group no. (string) or a character constant.

Setting item	Settings		Setting range
S2	Destination group number	Specify a destination group. Specify a destination group number for the keyword "GRPNO=". GRPNO=n1+n2 … +n8 * Up to eight different group numbers connected with pluses (+) can be selected at the same time.	0 to 7
	Subject	Specify a mail subject. ・User-specified subject: SUBJECT=xxxxx ・Automatically-generated subject: SUBJECTAUTO * For details of subjects generated automatically, refer to the section of "Subjects automatically generated".	

(Note 1): Input setting parameters separated by a comma ",".

(Note 2): Each parameter cnnot be omitted. Specify them in the order of the above table. The order of keywords cannot be changed.

(Note 3): Upper and lower case characters can be used for sepcifying keywords.

(Note 4): Up to 100 destinations can be set.

Subjects automatically generated

Subject automatically generated
bit on detect (R100)
Interval mail (1minute)
Interval mail (24hour)
Specified Time (Every Minute 0s)
Specified Time (Every Hour 0m0s)
Specified Time (Every Day 17h30m0s)
Specified Time (Every Friday 17h30m00s)
PLC status change (Power On)
PLC status change (Prog > Run)
PLC status change (Run > Prog)
PLC status change (Operation stop error)
PLC status change (Operation continuous error)
PLC status change (Error release)
SMTPcREQ command

(Note 1): When multiple "PLC status change" settings has been specified as send triggers, the subject automatically generated is the PLC status change that is actually detected.

(Note 2): The language used for subjects automatically generated is specified in the mail server setting.

Setting example

Example 1	S2	"GRPNO=0,SUBJECT=Time Notify Mail"
Settings		Destination group number: 0, Subject, User-specified subject "Time Notify Mail"
Example 2	S2	"GRPNO=1+3+4+7,SUBJECT= "Cyclic Notify Mail"
Settings		Destination group numbers: 1, 3, 4, 7, Subject, User-specified subject "Cyclic Notify Mail"
Example 3	S2	"GRPNO=0+1+2+3+4+5+6+7,SUBJECTAUTO"
Settings		Destination group numbers: 0 to 7, Subject: Automatically generated

■ Operand [S3] setting

Specify the starting address storing the mail text setting to be sent or a character constant.
Enter a mail text within one-byte 256 characters.

Setting item	Settings		Setting range
S3	Mail text	Specify the starting address storing the mail text setting to be sent or a character constant.	Max. 256 characters

■ Operand [S4] setting

Specify the starting address storing the text auto addition setting and attached data specification of sent mail or a character constant.

Setting item	Settings	
S4	Event mail setting Auto addition setting	Specify whether to add event transfer information after a mail text specified by user or not. INFO=NON: Not add automatically. INFO=ADD: Add automatically. * For details of information automatically added, refer to the section "Information automatically added".
	Specification of attached data	Specify data to be attached to a mail. Specify the keyword "ATT=" at the beginning.
		・No attached data Specify "NONE" for the keyword "ATT=". ATT=NONE
		・Specify device (added to mail text) Specify "DATA" for the keyword "ATT" and specify the device to be added to the mail text. ATT=DATA,xxxxxxxxxxx * For information on how to specify devices, refer to the section "How to specify devices". * For details of information added to mail text, refer to the section "Device information added to mail text".
		・Specify device (with attached file) Specify "DATA" for the keyword "ATT" and specify the device to be added and attached files. ATT=DATA,xxxxxxxxxxx,FILE=yyyyyyyyyyy * For information on how to specify devices, refer to the section "How to specify devices". * For information on how to specify attached files, refer to the section "How to specify attached files".
		・Specify attached file Specify a file to be attached with full path after specifying "FILE" for the keyword "ATT". ATT=FILE,FileName * LOG folder names ("\LOG0" to "\LOG15") cannot be specified.

Information automatically added

Character strings added to mails	
Basic information	
	From:
	CPU Part Number:
	IPv4 address:
	IPv6 address:
Detailed information	
	bit on detect (R100)
	Interval mail (1minute) Interval mail (24hour)
	Specified Time (Every Minute 0s) Specified Time (Every Hour 0m0s) Specified Time (Every Day 17h30m0s) Specified Time (Every Friday 17h30m00s)
	PLC status change (Power On) PLC status change (Prog > Run) PLC status change (Run > Prog) PLC status change (Operation stop error) PLC status change (Operation continuous error) PLC status change (Error release)
	SMTPcREQ command (PB10, 100)

(Note 1): IPv4 address is output only when using IPv4 address, and IPv6 address is output only when using IPv6 address.

(Note 2): The language to be output to mails is specified in the mail server setting.

Device information added to mail text

Character strings added to mails	
Device get information	
	Device number: DT100
	Getting number: 4 devices
	Exchange method:
	1234, 5558, 764, 18270

(Note): The language to be output to mails is specified in the mail server setting.

■ Operand [S4] Device setting

<table>
<tr><th>Setting item</th><th>Settings</th></tr>
<tr><td rowspan="2">Source device setting</td><td>Specify the source device setting.
・Global device
Specify device code + device number.
Example) such as "WX10", "WR1024", and "DT123456"
・Local device
"PB" + PB number + "_" (underbar) + Device code + Device number
Example) such as "PB1_WX50", "PB80_WR512", and "PB200_DT1024"</td></tr>
<tr><td><Devices that can be specified>
<table>
<tr><th>Global device</th><th>Local device</th></tr>
<tr><td>WX</td><td>WX</td></tr>
<tr><td>WY</td><td>WY</td></tr>
<tr><td>WR</td><td>WR</td></tr>
<tr><td>WL</td><td>WL</td></tr>
<tr><td>DT</td><td>DT</td></tr>
<tr><td>LD</td><td>LD</td></tr>
<tr><td>SD</td><td></td></tr>
</table></td></tr>
<tr><td>No. of transferred data (No. of data)</td><td>Specify the number of transferred data (number of data).（1 to 1000）</td></tr>
<tr><td>Conversion method</td><td>Specify a conversion method.
<table>
<tr><th colspan="2">Parameter</th></tr>
<tr><td>BIN1w</td><td>: Unconverted 16-bit binary</td></tr>
<tr><td>US</td><td>: 16-bit unsigned decimal</td></tr>
<tr><td>SS</td><td>: 16-bit signed decimal</td></tr>
<tr><td>UL</td><td>: 32-bit unsigned decimal</td></tr>
<tr><td>SL</td><td>: 32-bit signed decimal</td></tr>
<tr><td>SF</td><td>: 32-bit single-precision floating point</td></tr>
<tr><td>DF</td><td>: 64-bit double-precision floating point</td></tr>
<tr><td>HEX1w</td><td>: 16bitHEX</td></tr>
<tr><td>HEX2w</td><td>: 32bitHEX</td></tr>
<tr><td>HEX4w</td><td>: 64bitHEX</td></tr>
<tr><td>ASCII</td><td>: ASCII character (Output enclosed with "")</td></tr>
</table>
* BIN1w cannot be specified for adding to mail texts.
For specifying BIN1w, select the method for adding attached files.</td></tr>
<tr><td>Line feed position</td><td>Specify line feed position.
・The setting range is 0 to 255.
0 : Output the end of file only
n : Output by n data</td></tr>
</table>

■ Operand [S4] Specification of attached files

Setting item	Settings
Attached file name	Output a device value, and specify the name of a file attached to a mail after the keyword "FILE=". FILE=xxxxxxxxx
File name automatic addition position	Specify the position of the automatic additional data added to a file name. TOP: Automatic additional data is added before a file name. END: Automatic additional data is added after a file name. * Automatic additonal data is year, month, day, hour, minute and second "(yymmdd_hhmmss)".

(Note 1): When omitting "File name automatic addition position", automatic additional data is not added to a file name.
(Note 2): Specify the operation setting parameters in the order of the above table.

Setting example

Example 1	S4	"INFO=NON,ATT=NONE"
Settings		Automatic additional information: Not add automatically, Specification of attached data: No attached file
Example 2	S4	"INFO=ADD,ATT=NONE"
Settings		Automatic additional information: Add automatically, Specification of attached data: No attached file
Example 3	S4	"INFO=NON,ATT=DATA,DT100,10,HEX1w"
Settings		Automatic additional information: Not add automatically, Specification of attached data: Specify device (attached to mail text), Device setting, Device division: Global, Device code: DT, Device number: 100, Number of transferred data: 10 points (10 words), Conversion method: 16bitHEX
Example 4	S4	"INFO=ADD,ATT=DATA,PB100_WR1000,50,US,FILE=PB100_WR1000_50.csv,TOP"
Settings		Automatic additional information: Add automatically, Specification of attached data: Specify device, Device setting, Device division: Local, PB number: 100, Device code: WR, Device number: 1000, Number of transferred data: 50 points (50 words), Conversion method: 16-bit unsigned decimal, Addition of attached file: FIL=PB100_WR1000_50.csv, Automatic addition position: Add automatic additional data before file name
Example 5	S4	"INFO=NON,ATT=FILE,\Folder\FileName.bin"
Settings		Automatic additional information: Not add automatically, Specification of attached data: specify file (\Folder\FileName.bin)

■ Flag operation

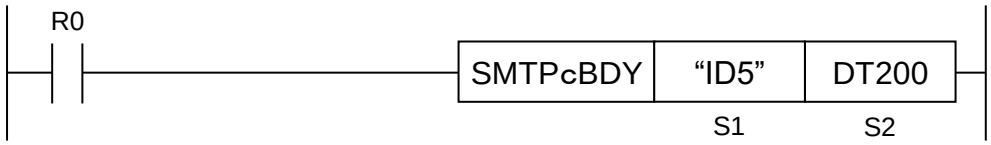
Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when setting numbers are not specified in ascending order. Set when the same destination group number is specified redundantly. Set when executed in an interrupt program. Set when the transfer request of the mail transmission control relay of a specified setting number is 1: Requesting. Set when the number of characters for operand specifying character constant exceeds 256. Set when a mail transmission server that has not been specified with the destination server setting instruction or the tool software is specified. Set when a destination group number that has not been specified with the destination group setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.2.4 Set Mail Text (SMTPcBDY)

Set specified texts to the mail text.

■ **Instruction format**



■ **Operation unit (i)**

There is no operation unit.

■ **List of operands**

Operand	Description
S1	Device address storing the specified number or character constant
S2	Device address storing text

■ **Available devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●													●

■ **Processing**

- CY (SR9) and SD29 are cleared to 0 when this instruction is completed successfully. It is set when the operation ends abnormally.
- Select the ET-LAN unit built in the CPU and the connection number with the UNITSEL instruction before executing the instruction.
- Make the event mail setting before executing the instruction.
- This instruction is not available in interrupt programs.
- The text specified by [S2] is set to the mail text of the number specified by [S1].
- Executable when the mail send control relay for the specified number is 0: No Request. (When requested, an operation error occurs.)
  * The unit configuration data of Ethernet never be rewritten.
  When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Operand [S1] setting

- Specify the starting address storing the setting number (string) and send trigger or a character constant.

Setting item	Settings		Setting range
S1	Setting No.	Specify a setting number. Even mail send setting number: Idx	0 to 15

■ Operand [S2] setting

- Specify the device address storing the text.
- * When IDx is specified for S1, the number of bytes can be specified up to 4096 bytes. An operation error occurs when it exceeds 4096 bytes.

■ Example of processing

Example)

- Image of mail text

Floor A: 25°C Floor B: 28°C

S1=“ID5” S2=DT200

DT200	H 001E		No. of bytes
DT201	H 6C (l)	H 46 (F)	Data part
DT202	H 6F (o)	H 6F (o)	
DT203	H 20 (SPACE)	H 72 (r)	
DT204	H 3A (:)	H 41 (A)	
DT205	H 32 (2)	H 20 (SPACE)	
DT206	H C2 (°)	H 35 (5)	
DT207	H 43 (C)	H B0 (°)	
DT208	H 0A (LF)	H 0D (CR)	
DT209	H 6C (l)	H 46 (F)	
DT210	H 6F (o)	H 6F (o)	
DT211	H 20 (SPACE)	H 72 (r)	
DT212	H 3A (:)	H 42 (B)	
DT213	H 32 (2)	H 20 (SPACE)	
DT214	H C2 (°)	H 38 (8)	
DT215	H 43 (C)	H B0 (°)	

■ Flag operation

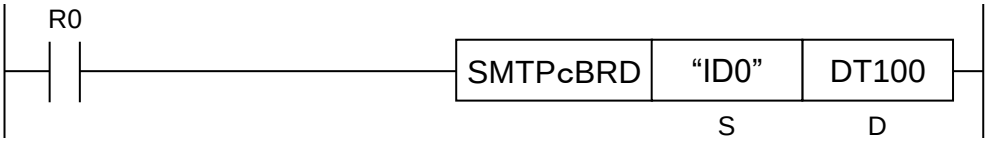
Name	Description
Latest error (SR7) Hold error (SR8)	To be set in case of out-of-range in indirect access (index modiication). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when an out-of-range value is specified for parameters. Set when executed in an interrupt program. Set when the transfer request of the mail send control relay of a target ID number is 1: Requesting. Set when the mail send setting of a target ID number is not set with the mail send setting instruction or the tool software.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.2.5 Read Mail Text (SMTPcBRD)

This reads the contents of mail texts.

■ **Instruction format**



■ **Operation unit (i)**

There is no operation unit.

■ **List of operands**

Operand	Description
S	Device address storing the specified number or character constant
D	Starting address storing the mail text

■ **Available devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●												●	
D	●	●	●	●			●	●													●

■ **Processing**

- It is used for reading the text creation form set to the mail text in the mail setting screen of the setting tool.
  When a mail text is not set, it cannot be read. Zero is stored in the number of bytes of the starting address.
- Once a mail is sent, the text creation form will be damaged.
- CY (SR9) and SD29 are cleared to 0 when this instruction is completed successfully. It is set when the operation ends abnormally. (Refer to the flag operation.)
- Select the ET-LAN unit built in the CPU and the connection number with the UNITSEL instruction before executing the instruction.
- Make the event mail setting before executing the instruction.
- This instruction is not available in interrupt programs.
- Reads the mail text of the number specified by [S] to the device address specified by [D].
- Executable when the send request relay of the mail send control relay for the specified number is 0: No Request.
  (When requested, an operation error occurs.)
- It is executable when the Ethernet initialization active (X61) is OFF.
  If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Operand [S] setting

Specify the starting address storing the setting number (string) and send trigger or a character constant.

Setting item	Settings		Setting range
S1	Setting No.	Specify a setting number. Even mail send setting number: Idx	0 to 15

■ Operand [D] setting

Specify the starting address storing mail texts.

■ Example of processing

Example)

- Image of mail text

```
%d/%d/2018
Temperature: %d°C
```

S1="ID0" S2=DT100

DT100	H 001E		No. of bytes
DT101	H64 (d)	H 25 (%)	
DT102	H 25 (%)	H 2F (/)	
DT103	H 2F (/)	H 64 (d)	
DT104	H 30 (0)	H 32 (2)	
DT105	H 38 (8)	H 31 (1)	
DT106	H 0A (LF)	H 0D (CR)	
DT107	H 65 (e)	H 54 (T)	
DT108	H 70 (p)	H 6D (m)	
DT109	H 72 (r)	H 65 (e)	
DT110	H 74 (t)	H 61 (a)	
DT111	H 72 (r)	H 75 (u)	
DT112	H 3A (:)	H 65 (e)	
DT113	H 25 (%)	H 20 (SPACE)	
DT114	H C2 (°)	H 64 (d)	
DT115	H 43 (C)	H B0 (°)	

■ Flag operation

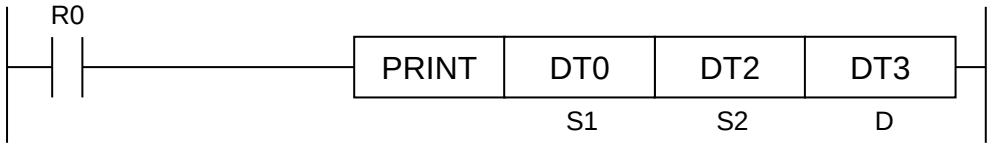
Name	Description
Latest error (SR7) Hold error (SR8)	To be set in case of out-of-range in indirect access (index modiication). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when an out-of-range value is specified for parameters. Set when executed in an interrupt program. Set when the transfer request of the mail send control relay of a target ID number is 1: Requesting. Set when the mail send setting of a target ID number is not set with the mail send setting instruction or the tool software.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.2.6 Create Text (PRINT)

This instruction is used for creating texts of mails, etc.

■ **Instruction format**



■ **Operation unit (i)**

There is no operation unit.

■ **List of operands**

Operand	Description
S1	Device address storing the text creation form or character constant
S2	Starting address storing the data to be output to texts
D	Starting address of the device storing texts.

■ **Available devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●													●
D	●	●	●	●			●	●													●

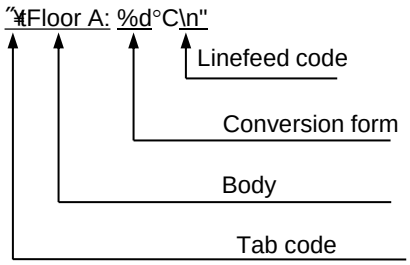
■ **Processing**

- ASCII code texts are created according to the specified text creation form.
- The text creation form can be specified using the operand S1, SSET instruction or the mail setting screen of GR7.
- Created texts can be connected using the SADD (Add String) instruction.
- The maximum size of a mail text is 4096 bytes for sending an event mail.

■ Operand [S1] setting

- Specify the device address storing the text creation form or character constant (max. 256 characters).
- The text creation form is composed of a main text, conversion form (such as %d, %e), linefeed code (\n) and tab code (\t).
- Up to 4096 characters can be specified for the text creation form. An operation error occurs when it exceeds 4096 characters.
- Up to 16 digits can be specified for one conversion form. An operation error occurs when it exceeds 16 digits.
- The maximum number of characters after conversion for a single datum execluding %s is 32. An operation error occurs when it exceeds 32 characters.
- The maximum number of characters after conversion of %s is 4096.
- All strings that are not recognized as conversion forms are treated as main texts.
  Example) Conversion form which does not allow capital letters (such as %D, %S)
  Characters which are not recognized as judgement characters of conversion forms are included (such as %A, %Z)

Explanation of text creation form



* When entering '%' in body
  %: %%

In the area where the conversion form is described, the output data specified by S2 is stored according to the conversion form
* For information on the conversion form, refer to the table of conversion form.
* Linefeed code (\n) is converted to CRLF (0A0Dh).
* Tab code (\t) is converted to HT (09h).

■ Operand [S2] setting

- Specify the starting address storing the data to be output to the text creation form.
- Arrange conversion data in the order specified in the conversion form.
- As for character data for %s, the data storing the number of (one-byte) characters is specified at the beginnng.
- It can be set with the SSET instruction.

Example:

SSET “Floor” DT112
S1 = “%d %u %x %b %f %e %Lg %s”
S2 = DT100
Result: -1 65535 ffff 1000 123.4567 123.4567 123.456789 Floor

DT100	H FFFF		Data for %d
DT101	H FFFF		Data for %u
DT102	H FFFF		Data for %x
DT103	H 1000		Data for %b
DT104 DT105	SF 123.4567		Data for %f
DT106 DT107	SF 123.4567		Data for %e
DT108 DT109 DT110 DT111	DF 123.456789		Data for %Lg
DT112	K 5		Data for %s No. of bytes
DT113	H 6c (l)	H 46 (F)	Data part
DT114	H 6f (o)	H 6f (o)	
DT115	**	H 72 (r)	

■ Operand [D] setting

- Specify the starting address storing texts.
- Up to 4096 bytes can be stored. An operation error occurs when it exceeds 4096 bytes.

■ Processing

Example 1)

- Image of mail text

Floor A: 25°C Floor B: 28°C

- Setting values

S1="Floor A: %d°C\nFloor B: %d°C"
S2=DT100
D=DT200

DT100	K 25
DT101	K 28
DT102	

DT200	U 1E		No. of bytes
DT201	H 6C (l)	H 46 (F)	Data part
DT202	H 6F (o)	H 6F (o)	
DT203	H 20 (SPACE)	H 72 (r)	
DT204	H 3A (:)	H 41 (A)	
DT205	H 32 (2)	H 20 (SPACE)	
DT206	H C2 (°)	H 35 (5)	
DT207	H 43 (C)	H B0 (°)	
DT208	H 0A (LF)	H 0D (CR)	
DT209	H 6C (l)	H 46 (F)	
DT210	H 6F (o)	H 6F (o)	
DT211	H 20 (SPACE)	H 72 (r)	
DT212	H 3A (:)	H 42 (B)	
DT213	H 32 (2)	H 20 (SPACE)	
DT214	H C2 (°)	H 38 (8)	
DT215	H 43 (C)	H B0 (°)	

Example 2)

- Image of mail text

Production volume: 5

- Setting values

S1="Production volume: %d"
S2=DT1
D=DT50

DT1	K 5
DT2	
DT3	

DT50	U 14		No. of bytes
DT51	H 72 (r)	H 50 (P)	Data part
DT52	H64 (d)	H 6f (o)	
DT53	H 63 (c)	H 75 (u)	
DT54	H 69 (i)	H 74 (t)	
DT55	H 6e (n)	H 6f (o)	
DT56	H 76 (v)	H 20 (SPACE)	
DT57	H 6c (l)	H 6f (o)	
DT58	H 6d (m)	H 75 (u)	
DT59	H 3a (:)	H 65 (e)	
DT60	H 35 (5)	H 20 (SPACE)	

Example 3)

- Image of mail text

(Tab)Normal operation

- Setting values

S1="\tNormal operation"
S2=DT1
D=DT50

DT1	
DT2	
DT3	

DT50	U 11		No. of bytes
DT51	H 4e (N)	H 09 (HT)	Data part
DT52	H 72 (r)	H 6f (o)	
DT53	H 61 (a)	H 6d (m)	
DT54	H 20 (SPACE)	H 6c (i)	
DT55	H 70 (p)	H 6f (o)	
DT56	H 72 (r)	H 65 (e)	
DT57	H 74 (t)	H 61 (a)	
DT58	H 6f (o)	H 69 (i)	
DT59	**	H 6e (n)	

Example 4)

- Image of mail text

Location: Nagoya, Aichi

- Setting values

S1="Location: %s, %s"
S2=DT1
D=DT50

DT1	U 6	
DT2	H 61 (a)	H 4E (N)
DT3	H 6F (o)	H 67 (g)
DT4	H 61 (a)	H 79 (y)
DT5	U 5	
DT6	H 69 (i)	H 41 (A)
DT7	H 68 (h)	H 63 (c)
DT8	**	H 69 (i)

DT50	U 17		No. of bytes
DT51	H 6F (o)	H 4C (L)	Data part
DT52	H 61 (a)	H 63 (c)	
DT53	H 69 (i)	H 74 (t)	
DT54	H 6E (n)	H 6F (o)	
DT55	H 20 (SPACE)	H 3A (:)	
DT56	H 61 (a)	H 4E (N)	
DT57	H 6F (o)	H 67 (g)	
DT58	H 61 (a)	H 79 (y)	
DT59	H 20 (SPACE)	H 2C (,)	
DT60	H 69 (i)	H 41 (A)	
DT61	H 68 (h)	H 63 (c)	
DT62	**	H 69 (i)	

■ Table of conversion forms

Conversion form	Meaning	Usage example
“%d” or “%i”	Converts 16-bit data to decimal ASCII data. (Signed integer)	"%d" , "%5d" , "%+5d" , "%-5d" , "%05d" , "%10.5d" , "% d"
“%Ld” or “%Li”	Converts 32-bit data to decimal ASCII data. (Signed integer)	"%Ld" , "%5Ld" , "%+5Ld" , "%-5Ld" , "%05Ld" , "%10.5Ld" , "% Ld"
“%u”	Converts 16-bit data to decimal ASCII data. (Unsigned integer)	"%u" , "%5u" , "%-5u" , "%05u" , "%10.5u"
“%Lu”	Converts 32-bit data to decimal ASCII data. (Unsigned integer)	"%Lu" , "%5Lu" , "%-5Lu" , "%05Lu" , "%10.5Lu"
“%x”	Converts 16-bit data to hexadecimal ASCII data.	"%x" , "%5x" , "%-5x" , "%05x" , "%10.5x" , "%#x" , "%X"
“%Lx”	Converts 32-bit data to hexadecimal ASCII data.	"%Lx" , "%5Lx" , "%-5Lx" , "%05Lx" , "%10.5Lx" , "%#Lx" , "%LX"
“%b”	Converts 16-bit BCD data to decimal ASCII data.	"%b" , "%5b" , "%-5b" , "%05b" , "%10.5b"
“%Lb”	Converts 32-bit BCD data to decimal ASCII data.	"%Lb" , "%5Lb" , "%-5Lb" , "%05Lb" , "%10.5Lb"
“%f”	Converts 32-bit single-precision real number data to floating-point ASCII data.	"%f" , "%5.2f" , "%+5.2f" , "%-5.2f" , "%05.2f" , "%#f" , "% f"
“%Lf”	Converts 64-bit double-precision real number data to floating-point ASCII data.	"%Lf" , "%5.2Lf" , "%+5.2Lf" , "%-5.2Lf" , "%05.2Lf" , "%#Lf" , "% Lf"
“%e”	Converts 32-bit single-precision real number data to exponent notation ASCII data.	"%e" , "%5.2e" , "%+5.2e" , "%-5.2e" , "%05.2e" , "%#5.2e" , "% e" , "%E"
“%Le”	Converts 64-bit single-precision real number data to exponent notation ASCII data.	"%Le" , "%5.2Le" , "%+5.2Le" , "%-5.2Le" , "%05.2Le" , "%#5.2Le" , "% Le" , "%LE"
“%g”	Convers 32-bit single-precision real number data to exponent notation ASCII data or floating-point ASCII data. (Expressible shorter format)	"%g" , "%5.2g" , "%+5.2g" , "%-5.2g" , "%05.2g" , "%#5.2g" , "%G"
“%Lg”	Convers 64-bit double-precision real number data to exponent notation ASCII data or floating-point ASCII data. (Expressible shorter format)	"%Lg" , "%5.2Lg" , "%+5.2Lg" , "%-5.2Lg" , "%05.2Lg" , "%#5.2Lg" , "%LG"
“%s”	Converts string data for the specified number of characters.	"%s" , "%5s" , %-5s" ,"%-05s"

* The number of converted digits for the conversion form is up to 16 digits.
* The 'L' of conversion modifier can be specified in a lower-case letter.

■ Format of conversion form

- Specification of alphabetical upper and lower case characters
  Specify alphabetical upper and lower case characters used in hexadecimal and exponent notation ASCII data.

Example)

Conversion form	Binary data	ASCII data
%x	HABCD	“abcd”
%X	HABCD	“ABCD”
%e	SF1234.567	“1.234567e+03”
%E	SF1234.567	“1.2345678+03”

* Upper case characters in %d, %u, %b, %f and %s are treated as main texts.

- Specification of display digit
  The display digit is specified with "Total number of characters" and "Number of characters of precision".
  If not specified, the default is used.
  It is specified with "n.m", "n", or ".m", etc.
  n: Total number of characters, m: Number of characters of precision

- Number of characters of precision
  [d , ld , i , Li , u , Lu , x , Lx , X , LX , b , Lb] represents the number of characters of numerical strings.
  [f , Lf , e , Le , E , LE] represents the number of characters after the decimal point.
  [g , Lg , G , LG] represents the number of significant figures.

Example)

Conversion form	Binary data	ASCII data
%d	K100	"100"
%5d	K100	"␣␣100"
%10.5d	K100	"␣␣␣␣␣00100"
%x	H12A	"12a"
%5x	H12A	"␣␣12a"
%10.5x	H12A	"␣␣␣␣␣ 0012a"
%b	H123	"123"
%5b	H123	"␣123"
%f	SF123.4567	"123.4567"
%8.3f	SF123.4567	"␣123.457"
%e	SF1234.567	"1.234567e+03"
%10.3e	SF1234.567	"␣1.235e+03"
%g	SF1234.567	"1234.567"
%8.6g	SF1234.567	"␣1234.57"
Conversion form	**Source character data**	**Converted character data**
%s	"abcdef"	"abcdef"
%10s	"abcdef"	"abcdef␣␣␣"
%10.5s	"abcdef"	"abcdef␣␣␣"

* (?) represents a space.

* When specifying the display digit using [f , Lf , e , Le , E , LE], always specify the number of characters after the decimal point, too.
* When the decimal part is specified with %s, the settings after (.) will be invalid.

Example) It will be 10-character data, from %10.5s to %10s.

* The digit number of %s is counted by one-byte characters. A double-byte character needs two digits.

When the digit number is not enough, an operation error occurs.

* %s is left-aligned by default.

- Specification of zero padding
  When the setting for the display digit is available, zero padding can be specified.
  Put zero (0) before the display digit.

Example)

Conversion form	Binary data	ASCII data
%05d	K100	"00100"
%05x	H12A	"0012a"
%05b	H123	"00123"
%08.3f	SF123.4567	"0123.457"
%10.3e	SF1234.567	"␣1.235e+03"
Conversion form	**Source character data**	**Converted character data**
%-010s	"abcdef"	"00000abcdef"
%010s	"abcdef"	"abcdef␣␣␣"

- Specification of right align and left align
  Default is right align. To set to left align, add minus (-) before the specification of digit number.

Example)

Conversion form	Binary data	ASCII data
%-5d	K100	"100␣␣"
%-5x	H12A	"12a␣␣"
%-5b	H123	"123␣␣"
%-8.3f	SF123.4567	"123.457␣"
%-10.3e	SF1234.567	"1.235e+03␣"
Conversion form	**Source character data**	**Converted character data**
%-10s	"abcdef"	"␣␣␣abcdef"

* (?) represents a space.
* %s is left-aligned by default.

- Specification of sign
  A plus sign (+) is not added by default.
  To add a plus sign (+), add (+).

Example)

Conversion form	Binary data	ASCII data
%+d	K100	"+100"
%+d	K-100	"-100"
%+5d	K100	"␣+100"
%+8.3f	SF123.4567	"+123.457"
%+10.3e	SF1234.567	"+1.235e+03"

* (?) represents a space.
* Even if (+) is added when specifying %u, %x or %s, it will not be reflected in the results.
  Example) %+u K100 -> The output data is "100", and the sign is not added.
* When it is used with (?) simultaneously and (?) is put before (+), neither "sign indication" nor "specification of digit position" will be valid.
  Example) %?+d K100 -> The output data is "100", and neither a space nor the sign is added.
* When it is used with (?) simultaneously and (+) is put before (?), "sign indication" will be valid.
  Example) %+?d K100 -> The output data is "+100", and the sign is added.

- Specification of digit position
  In the case of a positive number, a space is added to align the position in the case of a negative number.
  Add a space to align the position.

Example)

Conversion form	Binary data	ASCII data
%␣d	K100	"␣100"
%␣d	K-100	"-100"
%␣8.3f	SF123.4567	"␣123.457"
%␣8.3f	SF-123.4567	"-123.457"
%␣10.3e	SF1234.567	"␣1.235e+03"
%␣10.3e	SF-1234.567	"-1.235e+03"

* (?) represents a space.
* Even if (+) is added when specifying %u, %x or %s, it will not be reflected in the results.
  Example) %+u K100 -> The output data is "100", and the sign is not added.
* When it is used with (+) simultaneously and (?) is put before (+), neither "sign indication" nor "specification of digit position" will be valid.
  Example) %?+d K100 -> The output data is "100", and neither a space nor the sign is added.
* When it is used with (?) simultaneously and (+) is put before (?), "sign indication" will be valid.
  Example) %+?d K100 -> The output data is "+100", and the sign is added.

- Specification of another output type for numerical data type
  Another output type is automatically given by adding (#).

Example)

Conversion form	Binary data	ASCII data	Remarks
%#x	H12A	"0x12a"	"0x" is added.
%#X	H12A	"0X12A"	"0X" is added.
%#8.0f	SF123.45678	"␣␣␣123."	"." is always added.
%#10.0e	SF1234.5678	"␣␣␣␣1.e+03"	
%#10.0E	SF-1234.5678	"␣␣␣1.E+03"	
%#9.0g	SF1234	"␣␣␣1234.00"	"." is always added, and "0" after the decimal point is not omitted.
%#.9G	SF1234	"1234.00000000"	

* (?) represents a space.

* Even if (#) is added when specifying %d, %u, %b or %s, it will not be reflected in the results.
  Example) %#u K100 -> The output data is "100", and the output format does not change.

- Complex pattern
  Complex patterns are as follows.

Example)

Conversion form	Binary data	ASCII data	Remarks
%-10.3e	SF123.4567	"1.235e+02␣"	Exponent is output in at least two digits.
%+u	K1234	"1234"	When (+) is added to a conversion form to which "sign indication" is not applied, it will not be reflected in the result. For information on applicable forms, refer to "Specification of sign".
% u	K1234	"1234"	When (?) is added to a conversion form to which "specification of digit position" is not applied, it will not be reflected in the result. For information on applicable forms, refer to "Specification of digit position".
%#u	K1234	"1234"	When (#) is added to a conversion form to which "specification of another output type for numerical data type" is not applied, it will not be reflected in the result. For information on applicable forms, refer to "specification of another output type for numerical data type".
%␣+d	K1234	"1234"	When (+) is used with (␣) simultaneously and (␣) is put before (+), neither "sign indication" nor "specification of digit position" will be reflected. When (+) is put before (␣), "sign indication" will be valid. This rule is applied to all forms in which (+) and (?) are used.
%+␣d	K1234	"+1234"	
Conversion form	**Source character data**	**Converted character data**	**Remarks**
%-010s	"abcdef"	"0000abcdef"	%s is left-aligned by defualt, therefore, (-) is needed for zero padding.
%010s	"abcdef"	"abcdef␣␣␣"	
%10.5s	"abcdef"	"abcdef␣␣␣"	When the decimal part is specified with %s, the settings after (.) will be invalid.

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	To be set in case of out-of-range in indirect access (index modiication). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when an out-of-range value is specified for parameters. Set when executed in an interrupt program. Set when the transfer request of the mail send control relay of a target ID number is 1: Requesting. Set when the mail send setting of a target ID number is not set with the mail send setting instruction or the tool software.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.3 Sending Mails with Instructions

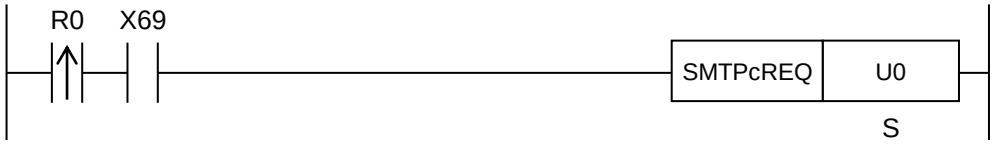
When "Instruction" is specified as a send trigger, even mail transmission is requested and the transmission status is checked.

Instruction	Application
SMTPcREQ	Requesting event mail transmission
SMTPcCTL	Controlling transmission

6.3.3.1 Mail Send Request (SMTPcREQ)

- Requests to send a mail.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed. (Set when an Ethernet cable is disconnected or Ethernet is initialized.)
- Check if "X69: Mail send preparation done" is ON before executing the instruction.
- It is necessary to specify 6.3.2.3 Mail Transmission Settings (SMTPcSET) or the event mail setting by 6.3.1 Setting with Tool Software.

■ **Instruction format**



■ **Operation unit (i)**

- There is no operation unit.

■ **List of operands**

Operand	Description
S	Specify the device address storing the transfer number (0-15) or a constant.

■ **Available devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●

■ **Processing**

- Turns ON the send request relay of the transmission number specified by [S].
- It is executable when the Ethernet cable disconnection (X60) is OFF. If it is OFF when executing the instruction, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.
- It can be executed when the SMTP client preparation done (X69) is ON. If it is OFF when executing the instruction, an operation error occurs.

- When it is executed under the following condition, a error code is set to the execution done code as a transfer error.

Status	Code	Status	Code
Destination server is not set.	1	Transfer prohibition setting	5
Transfer setting is not set.	2	Data decompression failed. (When accessing data with PUT)	8
Destination group is not set.	3	Data decompression failed. (When accessing data with GET)	9
Registering a process request failed.	4		

■ Precautions during programming

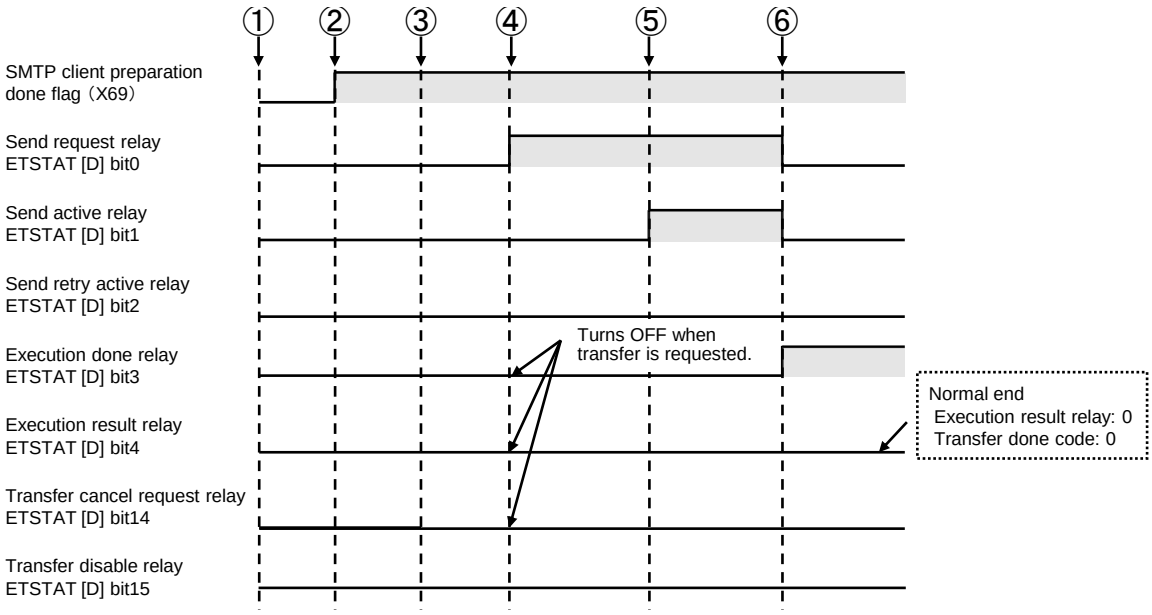
- This instruction is not available in interrupt programs.

■ Details of setting parameters

Setting item	Settings		Setting range
S	Transmission No.	Specify the device address storing a transmission number or a constant.	0 to 15

■ Time chart

- It shows the process that a transfer request was executed and data was obtained successfully from a server to FP7.
- The control relays (bit0 to bit15) can be monitored by reading arbitrary operation devices with ETSTAT instruction.



①	RUN (Power on)	④	Transfer request (Executes SMTPcREQ instruction)
②	SMTP client preparation done	⑤	SMTP client login succeeded (Starts transfer)
③	Transfer setting (Executes SSMTPcSET instruction)	⑤	Transfer process done (Completes the execution of SMTPcREQ instruction)

■ Control relay

Name	Bit No.	Description
Send request relay	0	0: No request, 1: Request
Send active relay	1	0: Stop, 1: During transfer
Send retry active relay	2	0: No retry, 1: During retry
Send done relay	3	0: During process, 1: Instruction execution complete
Send result relay	4	0: Normal 1: Failed
Transfer direction relay	5	0: Send, 1: Receive
Reserved for system	6 to 13	-
Send cancel request relay	14	0: Not cancel, 1: Cancel
Send disable relay	15	0: Transfer enabled, 1: Transfer disabled

(Note): The state of control relays can be read with ETSTAT instruction.

■ Completion code

Name	No. of words	Description
Execution done code	1	Execution completion code
Send done code	1	Response code of SMTP client

(Note): The state of completion codes can be read with ETSTAT instruction.

■ SMTP client preparation done (WX6 bit9)

Name	Bit No.	Description
SMTP client preparation done（X69）	9	0: SMTP client preparation incomplete, 1: SMTP client preparation complete

■ Flag operation

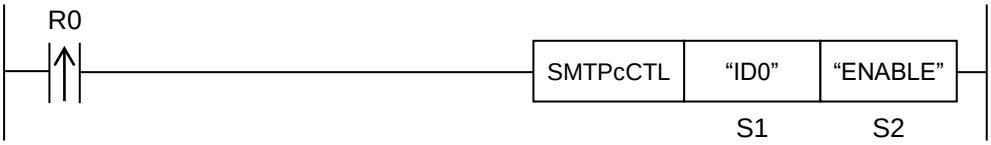
Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range in indirect access (index modiication). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the SMTP client prepartion done (X69) is OFF at the time of the execution of instruction. Set when an out-of-range value is specified for parameters. Set when the send disable relay is "Send disabled". Set when the send request relay of a specified ID is "Request". Set when executed in an interrupt program. Set when a mail transmission setting that has not been specified with the mail transmission setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during when the Ethernet cable is disconnected. The detail code set in SD29 is "10: Ethernet cable disconnected". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.3.2 Mail Send Control (SMTPcCTL)

- Sets to enable, disable or cancel sending mails.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when Ethernet is initialized.)
- It is necessary to specify 6.3.2.3 Mail Transmission Settings (SMTPcSET) or the event mail setting by 6.3.1 Setting with Tool Software. (when control taget is specified with transfer number)
- The logging/trace mail setting should be configured by Logging/Trace Mail Setting (SMTPcLOG) or 6.4.1 Setting with Tool Softwarebefore executing instructions. (when control taget is specified with LOG number)
- It takes some time to accept the processing of the transfer cancel request. Check the transfer status and check if the transfer stops after executing the instruction. For information on how to check the transfer status, refer to the case that S1 operand is "FTPc/HHTPc/SMTPc) in 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the target to be controlled with the starting address or a character constant.
S2	Specify the controlled contents (send enabled/disabled/canceled) with the starting address or a character constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	

■ Processing

- Controls to enable, disable or cancle the transmission for the target (S1) according to the specification of the control content (S2).
- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.

■ Operand [S1] setting

Setting item	Settings		
S1	Control target	1) When specifying send numbers individually	Specify 0 to 15 for x with "IDx".
		2) When specifying LOG numbers individually	Specify 0 to 15 for x with "LOGx".
		3) When specifying all send numbers and LOG numbers	Specify "ALL".

■ Operand [S2] setting

Setting item	Settings		
S2	Control content	1) When enabling sending	Specify "ENABLE".
		2) When disabling sending	Specify "DISABLE".
		3) When cancelling sending	Specify "CANCEL".

■ Mail send control relay flag operation

Name	Transfer enabled	Transfer disabled	Transfer canceled
Send cancel relay	Not change	Not change	ON
Send disable relay	OFF	ON	Not change
Send request	Not change	Not change	Not change
Send active	Not change	Not change	Not change
Send retry active	Not change	Not change	Not change
Send done	Not change	Not change	Not change
Send failed	Not change	Not change	Not change
Send direction	Not change	Not change	Not change

(Note): The send cancel relay turns OFF when the SMTPc transfer request instruction is executed.

Setting example

<table>
<tr><th></th><th>Settings</th><th>S1</th><th>S2</th></tr>
<tr><td>Example 1</td><td>When enabling the sending of send No. 5</td><td>"ID5"</td><td>"ENABLE"</td></tr>
<tr><td>Example 2</td><td>When disabling all sendings</td><td>"ALL"</td><td>"DISABLE"</td></tr>
<tr><td>Example 3</td><td>When canceling the sending of LOG7</td><td>"LOG7"</td><td>"CANCEL"</td></tr>
<tr><td>Example 4</td><td>When enabling the sending of send No. 10 (Note)</td><td>DT0
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT0</td><td colspan="2">4 (No. of characters)</td></tr>
<tr><td>DT1</td><td>H44(D)</td><td>H49(I)</td></tr>
<tr><td>DT2</td><td>H30(0)</td><td>H31(1)</td></tr>
<tr><td>DT3</td><td></td><td></td></tr>
</table></td><td>DT10
<table>
<tr><th></th><th colspan="2">Value</th></tr>
<tr><td>DT10</td><td colspan="2">6 (No. of characters)</td></tr>
<tr><td>DT11</td><td>H4E(N)</td><td>H45(E)</td></tr>
<tr><td>DT12</td><td>H42(B)</td><td>H41(A)</td></tr>
<tr><td>DT13</td><td>H45(E)</td><td>H4C(L)</td></tr>
<tr><td>DT14</td><td></td><td></td></tr>
</table></td></tr>
</table>

(Note): For specifying a device for an operand which can specify character constants, store string data with SSET instruction excluding a double quotation mark.

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when any items other than "IDx" or "LOGx" or "ALL" are specified for the control target (S1). (x: 0 to 15) Set when any items other than "ENABLE", "DISABLE" or "CANCEL" are specified for the control content (S2). Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the number of characters for operand specifying character constant exceeds 256. Set when a mail transmission setting that has not been specified with the mail transmission setting instruction or the tool software is specified. Set when a logging/trace mail setting that has not been specified with the logging/trace mail setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.3.3.3 Information Acquisition of Ethernet Unit (ETSTAT)

- Reads information of Ethernet unit.
- For details, refer to the section 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

■ List of SMTP error codes

The following error codes can be confirmed with ETSTAT instruction.

Error code	Description
421	Not available.
450	Failed because mailbox is not available (temporarily).
451	Server error
452	Memory shortage
500	Unknown command
501	Command argument error
502	Command is not implemented.
503	Command sequence is incorrect.
504	Command parameter is not implemented.
550	Failed because mailbox is not available (permanently).
551	User is not local user.
552	Command was cancelled because client memory area assignment is exceeded.
553	Mailbox name is invalid.
554	Transaction failed.
1XXX	Error in attached file
9XX	Client service error

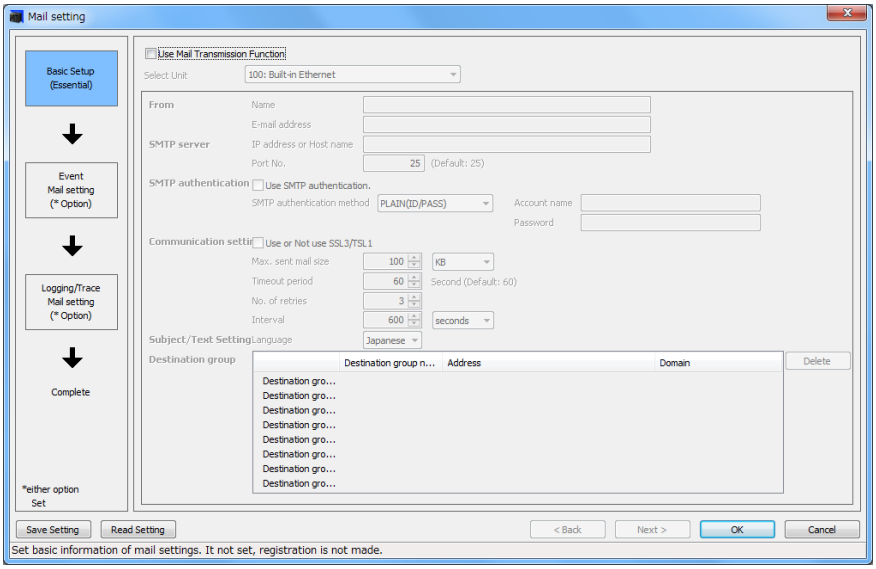
6.4 How to Use Logging/Trace Mail Transmission

6.4.1 Setting with Tool Software

Use the programming tool software "FPWIN GR7" to make the transfer settings.

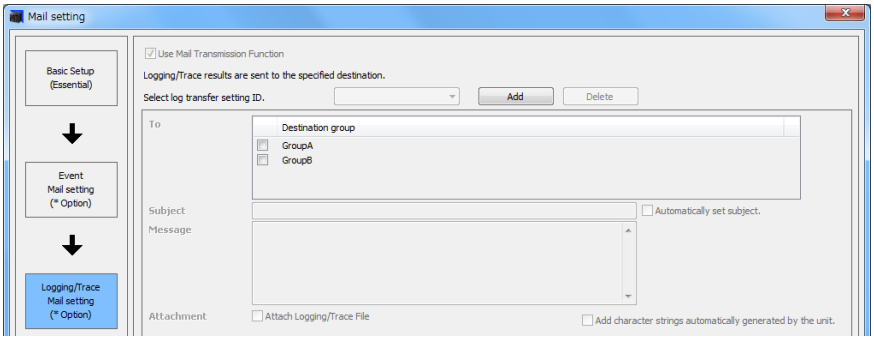
◆ **PROCEDURE**

1. **Select "Options" > "FP7 Configuration" > "Mail settings" from the menu bar to open the "Mail setting" window.**



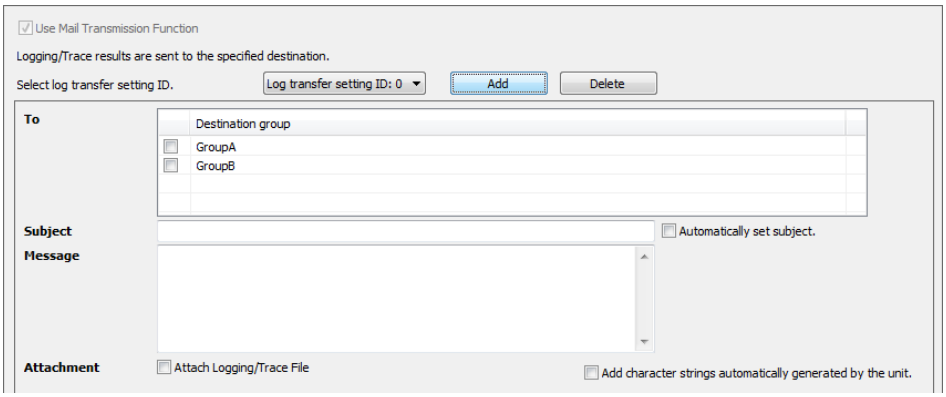
2. **For details of Basic Setup, refer to 6.3.1 Setting with Tool Software.**

3. **For using the logging/trace mail setting, skip the "Event mail setting".**



As the log transfer setting ID has not been set initially, click the [Add] button to add the log transfer setting.

4. The following items becomes available by adding the log transfer setting ID.



5. To

As the destination groups registered in Basic Setup are displayed, check desired destination groups.

6. Subject

Enter subject.
Checking "Automatically set subject" generates subjects in the table below according to the language selected in Basic Setup.

Subject automatically generated
Logging/Trace (LOG0)
Logging/Trace (LOG1)
...
Logging/Trace (LOG14)
Logging/Trace (LOG15)

7. Message

Enter message.
Checking "Add character strings automatically generated by the unit" adds character strings listed in the table below according to the language selected in Basic Setup.

Character strings added to mails	
Basic information	
	From:
	CPU Part Number:
	IPv4 address:
	IPv6 address:
	Logging Trace ID:
	File fixed Time:

8. Attachment

For attaching logging/trace files, check the box of "Attach Logging/Trace File".

6.4.2 Setting with Instructions

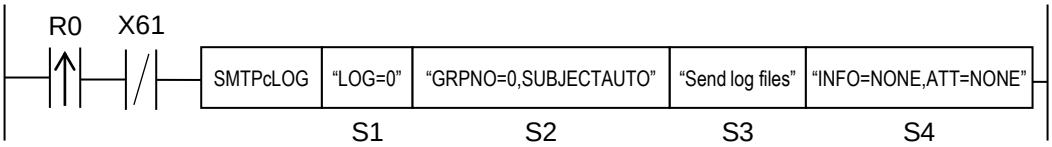
Function for setting and requesting transfer with instructions

Instruction	Application
SMTPcSV	SMTP server settings. Refer to 6.3.2.1 Destination Server Setting (SMTPcSV).
SMTPcADD	Destination group settings. Refer to 6.3.2.2 Destination Group Setting (SMTPcADD).
SMTPcLOG	Logging/Trace transfer settings.

6.4.2.1 Logging/Trace Mail Setting (SMTPcLOG)

- Makes the mail send setting at the time of file determination in logging/trace.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.
- It is necessary to specify 6.3.2.2 Destination Group Setting (SMTPcADD) or the event mail setting by 6.4.1 Setting with Tool Software.

■ **Instruction format**



■ **Operation unit (i)**

- There is no operation unit.

■ **List of operands**

Operand	Description
S1	Specify the starting address storing a target LOG number (string) or a character constant.
S2	Specify the starting address storing a subject and destination group numbers (string) or a character constant.
S3	Specify the starting address storing mail texts or a character constant.
S4	Specify the starting address storing the settings of text auto generation and file attachement or a character constant.

■ **Available devices (●: Available)**

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
S3	●	●	●	●			●	●												●	
S4	●	●	●	●			●	●												●	

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Processing

- Stores the logging/trace mail settings of S2 to S4 in the logging/trace transfer setting area specified by S1.
- It is executable when the send request relay of the mail send logging/trace control relay for a specified logging/trace is 0: No request. (In the case of "1: Request", an operation error occurs.)
- It is executable when the Ethernet initialization done (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Operand [S1] setting

- Specify the starting address storing a logging/trace number (string) or a character constant.

Setting item	Settings		Setting range
S1	Target LOG number	Specify a target LOG number (0 to 15). Specify the keyword "LOG=" at the beginning. LOG=x	0 to 15

(Note): Upper and lower case characters can be used for specifying keywords.

■ Operand [S2] setting

- Specify the starting address storing a subject and destination group numbers (string) or a character constant.
- More than one destination group number can be specified simultaneously (Max. 8). Numbers are specified with bits.

Setting item	Settings		Setting range
S2	Destination group number	Specify a destination group. (0 to 7) Specify the keyword "GRPNO=" at the beginning. * Up to eight different group numbers connected with pluses (+) can be selected at the same time.	0 to 7
	Subject	Specify a mail subject. User-specified subject Specify a mail subject. Specify a subject for the keyword "SUBJECT=". SUBJECT=xxxx Automatically-generated subject A mail subject is automatically generated. Specify the keyword "SUBJECTAUTO". SUBJECTAUTO * For details of subjects generated automatically, refer to the section of "Subjects automatically generated".	For a user-specified subject, up to 64 characters.

(Note 1): Input each setting parameter for a subject and destination group numbers separated by a comma ",".
(Note 2): A subject and destination group numbers cannot be omitted. Specify them in the order of the above table. The order of keywords cannot be changed.
(Note 3): Upper and lower case characters can be used for sepcifying keywords.

Setting example

Example 1	S2	"GRPNO=0,SUBJECT=LogFileSend"
Settings		Subject: LogFileSend, Destination group number: 0
Example 2	S2	"GrpNo=0+1+2+3+4+5,Subject=TestSend"
Settings		Subject: TestSend, Destination group numbers: 0,1,2,3,4,5
Example 3	S2	"GrpNo=0+1+2+3+4+5,SubjectAUTO"
Settings		Subject: Automatic, Destination group numbers: 0,1,2,3,4,5

Subjects automatically generated

Subject automatically generated
Logging/Trace (LOG0)
Logging/Trace (LOG1)
・・・
Logging/Trace (LOG14)
Logging/Trace (LOG15)

■ Operand [S3] setting

- Specify the starting address storing mail texts or a character constant.
- Enter a mail text within one-byte 256 characters.

Setting item	Settings		Setting range
S3	Message	Specify the starting address storing mail texts or a character constant.	Max. 256 characters

■ Operand [S4] setting

Specify the starting address storing the settings of text auto generation and file attachment or a character constant.

Setting item	Settings	
S4	Add or not add character strings automatically generated by the unit	Specify whether to generate a message automatically or not. Specify the keyword "INFO=" at the beginning. Not generate a message automatically: INFO=NONE Generate a message automatically: INFO=AUTO
	Attach or not attach files	Specify whether to attach files or not. Specify the keyword "ATT=" at the beginning. Not attach files: ATT=NONE Attach files: ATT=FILE

(Note 1): Input each parameter for setting whether or not to generate a message automatically and to attach files separated by a comma ",".

(Note 2): The parameters for the automatic generation and file attachment cannot be omitted. Specify them in the order of the above table. The order of keywords cannot be changed.

(Note 3): Upper and lower case characters can be used for specifying keywords.

Setting example

Example 1	S4	"INFO=NONE,ATT=NONE"
Settings		Generate a message automatically: No, Attach files: No
Example 2	S4	"Info=AUTO,Att=FILE"
Settings		Generate a message automatically: Yes, Attach files: Yes

Information automatically added

Character strings added to mails
Basic information
From:
CPU Part Number:
IPv4 address:
IPv6 address:
Logging Trace ID:
File fixed Time:

■ **Flag operation**

Name	Description
Latest error (SR7) Hold error (SR8)	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the send request relay of the mail send logging/trace control relay for a target LOG number is "1: Request". Set when the LOGn send setting for a target LOG number is not registered. Set when an out-of-range number is specified for a destination group number. Set when an out-of-range value is specified for parameters. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when an unset destination group number is specified. Set when a mail transmission server is not specified. Set when a mail transmission server that has not been specified with the destination server setting instruction or the tool software is specified. Set when a destination group number that has not been specified with the destination group setting instruction or the tool software is specified.
CY flag (SR9)	Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

6.4.2.2 Confirming the Execution of Transmission with Instruction

- Transmission is automatically performed when logging/trace files are determined.
- The status of logging/trace mail transmission is checked.

Instruction	Application
ETSTAT	Refer to 4.4.3.3 Information Acquisition of Ethernet Unit (ETSTAT).

6.5 Precautions When Using Mail Transmission Function

This section describes the precautions for using the mail transmission function.

■ Restrictions on the transmission size of mails.

- Although the maximum size of sent mails can be set in the server settings, the maximum size of event mail texts is limited to 1MB regardless of this setting.
- As a 1MB buffer is equally divided by the number of transmission settings and used for event mail texts (that is the same way of thinking as FTP client), this limitation is applied when more than one event mail is registered.
- The file size of sent data is also included in event mail texts.
  The file size of a file in an SD card to be attached is not included in the size of mail texts.
- The maximum size of a text of logging/trace mail is 256 characters.

■ Number of specified transferred data and approximate processing time

- Refer to the section of "Number of specified transferred data and approximate processing time" in "4.6 Precautions When Using FTP Client".

7

Instruction References

7.1 List of Instructions Added to CPU Ver.3

The instructions supported from the CPU unit Ver.3 are as follows.

■ Instructions

Instruction	Function overview	On page
IP address and connection setting instructions		
IPv4SET	IPv4 address setting	7-3
CONSET	User connection setting	7-8
OPEN	Connection open	7-15
CLOSE	Connection close	7-17
FTP client instructions		
FTPcSV	FTP client connected server setting	4-23
FTPcSET	FTP client transfer setting	4-30
FTPcLOG	FTP client logging/trace transfer setting	4-58
FTPcREQ	FTP client transfer request	4-39
FTPcCTL	FTP client transfer control	4-42
HTTP client instructions		
HTTPcSV	HTTP client connected server setting	5-12
HTTPcSET	HTTP client transfer setting	5-18
HTTPcREQ	HTTP client transfer request	5-24
HTTPcCTL	HTTP client transfer control	5-27
Mail send (SMTP client) instructions		
SMTPcSV	Mail send server and sender settings	6-12
SMTPcADD	Destination group setting instruction	6-19
SMTPcSET	Mail send setting instruction	6-23
SMTPcREQ	Mail send request instruction	6-51
SMTPcLOG	Logging/Trace mail send setting instruction	6-61
SMTPcCTL	SMTPc transfer control	6-54
Communication instructions		
ETSTAT	Ethernet unit status read	4-45
PGPSEND	General-purpose communication send instruction leading edge execution	7-19
PINGREQ	PING request instruction (Note)	7-23
Special instructions		
GETSTNO	Obtaining the starting word number of target slot	7-26
Data comparison instructions		
BCMP	Detecting matched blocks	7-27

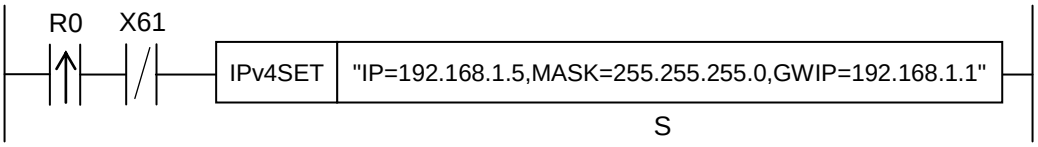
(Note): The PINGREQ instruction is supported from the CPU unit version 3.2.

7.2 IP Address and Connection Setting Instructions

7.2.1 IPv4SET

- Configures the IP adddress (IPv4) setting.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (They are set when an specified IP address is outside of the addressable range or Ethernet is initialized.)
- Confirm if "X61: Ethernet initialization active" is OFF before executing the instruction.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S	Specify the starting address storing the parameter of IPv4 address setting or a character constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●												●	

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

■ Processing

- Stores the IPv4 setting parameter of S in the operation work area, and initializes the Ethernet unit.
- Communication is not available during initialization.
- The unit configuration data of Ethernet never be rewritten. Executing this instructioni initializes the Ethernet unit with a value specified in the operation work area. For the items that has not been changed with the instruction, the values specified in the unit configuration are applied.
- The statuses such as the establishment of IPv4 address or cable disconnection can be confirmed in the input relay area WX6 (X61 to X69).

WX6	Bit0: Cable disconnected / Cable conducted	1/0
	Bit1: Ethernet being initialized / Ethernet initialization completed	1/0
	Bit2: IP address established / IP address not established	1/0
	Bit4: FTP server preparation completed / FTP server preparation not completed	1/0
	Bit5: FTP client preparation completed / FTP client preparation not completed	1/0
	Bit6: Reserved	1/0
	Bit7: Reserved	1/0
	Bit8: HTTP client preparation completed / HTTP client preparation not completed	1/0
	Bit9: Mail send preparation completed / Mail send preparation not completed	1/0

- When a specified IP address is outside of the addressable range, an error is set to CY flag and it becomes no operation.
- It is executable when the Ethernet initialization active (X61) is OFF. If it is ON when executing the instruction, an error is set to CY flag and it becomes no operation.

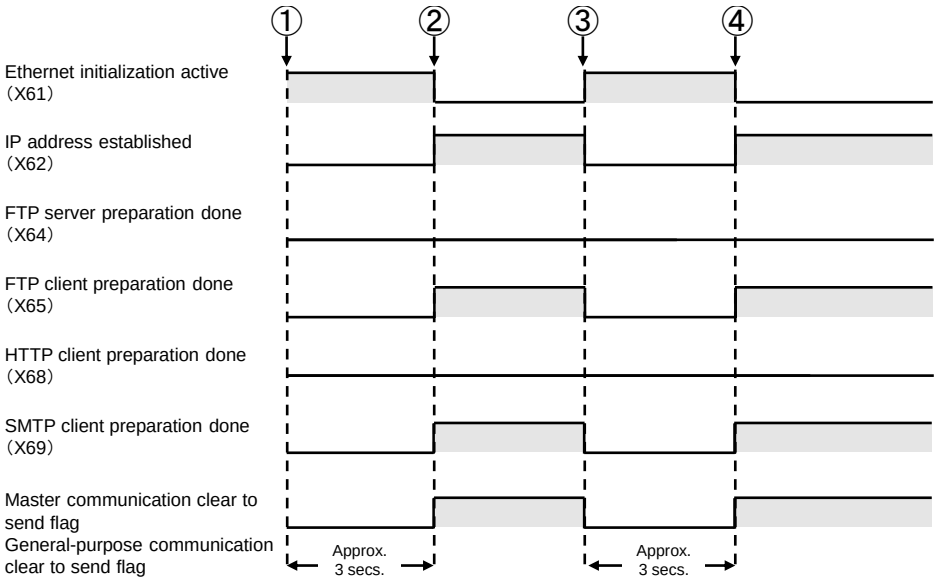
■ Setting result

- The result of the above settings can be confirmed in the system relay (SR9) and system data (SD29).

SR9 (CY flag)	SD29
0: Normal	0: Normal
1: Error	1: IPv4 address, 2: Subnet mask, 3: Default gateway, 4: Combination, 11: Ethernet initialization active

■ Time chart

The following figure shows the case for executing IPv4SET instruction using the FTP client function and mail send function (SMTP client).



①	PROG > RUN (Power ON)	③	IPv4 address setting (Executes IPv4SET instruction)
②	Ethernet initialization done FTP client/SMTP client preparation done Connection done	③	Ethernet initialization done FTP client/SMTP client preparation done Connection done

■ Execution and process of instruction

- Execute this instruction after confirming that the Ethernet initialization active flag is OFF.
- Once the instruction is executed, the IPv4 setting parameter will be written in the system work area and initialization will be requested to the unit.
- Once the initialization is requested, the unit will close all connections and disconnect the communication.
- The unit turns OFF the IP address fixed flag (X62) and initializes the Ethernet unit with the value specified in the system work area.
- The unit starts auto negotiation at the time of initialization.
- The IP address fixed flag (X62) turns ON on the completion of initialization. It takes about three seconds to complete the initialization.
- Each communication task of FTPc, HTTPc and SMPTc starts according to the settings. It is possible to confirm those states with the ready flag for each operation.
- Each connection which automatic connection has been set is made, and the clear to send flag turns on when the connections are complete.

■ Operand [S] setting

- Specify the starting address storing the parameter of IPv4 address setting or a character constant.
- A part of parameters can be omitted. The settings are not changed when parameters are omitted partially.
- When omitting the part before a specified keyword, omit only "keyword" without omitting ",".
- When omitting the part after a specified keyword, omit both "," and "keyword".
- It is prohibited to specify the same keyword redundantly. If specified, an error occurs.

Setting item	Settings	
S	IPv4 address	Specify IP address (IPv4). Specify the keyword "IP=" at the beginning. IP=111.122.133.144 (Default: 192.168.1.5)
	Subnet mask	Specify subnet mask. Specify the keyword "MASK=" at the beginning. MASK=255.255.255.0
	Default gateway	Specify IP address of default gateway. Specify the keyword "GWP=" at the beginning. GWIP=111.122.133.4 Specify 0 for the setting not to use the default gateway.

(Note 1): Input setting parameters and each setting parameter separated by a comma ",".
(Note 2): Upper and lower case characters can be used for sepcifying keywords.
(Note 3): Specify the keywords in the order of the above table.

Setting example

Example 1	S	"IP=192168.1.5,MASK=255.255.255.0,GWIP=192168.1.1"
Settings		IP address: 192.168.1.5, Subnet mask: 255.255.255.0, Default gateeway: 192.168.1.1
Example 2	S	"IP=192168.1.5,MASK=255.255.255.0,GWIP=0"
Settings		IP address: 192.168.1.5, Subnet mask: 255.255.255.0, Default gateeway: Not use

- When an address unusable for parameters is specified, CY flag (SR9) turns ON and 1(IP address error) to 4(Default gateway error) is set to SD29, and the process is terminated.
- For details of the settable range, refer to "1.1.3 IP Address Setting Specifications".

■ Setting status when parameters are omitted

IPv4 address is essential. It must be described. "Subnet mask" and "Default gateway" can be omitted. Omitted parameters are not changed.

Parameter			Specification method	Result reflected in parameters		
IP	MASK	GWIP		IP address	Subnet emask	Default gateway
Required	Omitted	Set	"IP=****,GWIP=*****"	Change	Not change	Change
Required	Set	Omitted	"IP=****,MASK=****"	Change	Change	Not change
Required	Omitted	Omitted	"IP=****"	Change	Not change	Not change

Setting example

Example 1	S	"IP=192168.1.5,,GWIP=192168.1.1"
Settings		IP address: 192.168.1.5, Subnet mask: Not change, Default gateeway: 192.168.1.1
Example 2	S	"IP=192168.1.5,MASK=255.255.255.0"
Settings		IP address: 192.168.1.5, Subnet mask: 255.255.255.0, Default gateeway: Not change
Example 3	S	"IP=192168.1.5"
Settings		IP address: 192.168.1.5, Subnet mask: Not change, Default gateeway: Not change

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set when an out-of-range value is specified for parameters. Set when the same keyword is specified redundatnly. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the setting is other than IPv4. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256.
CY flag (SR9)	Set when executed with an incorrect IP address. The detail code set in SD29 is "1: Specification of incorrect IP address". Set when executed with an incorrect subnet mask. The detail code set in SD29 is "2: Specification of incorrect subnet mask". Set when executed with an incorrect default gateway. The detail code set in SD29 is "3: Specification of incorrect default gateway". Set when executed in combination with incorrect IP addresses. The detail code set in SD29 is "4: Combination of incorrect IP addresses". Set when executed during the initialization of Ethernet. The detail code set in SD29 is "11: Ethernet initialization active".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

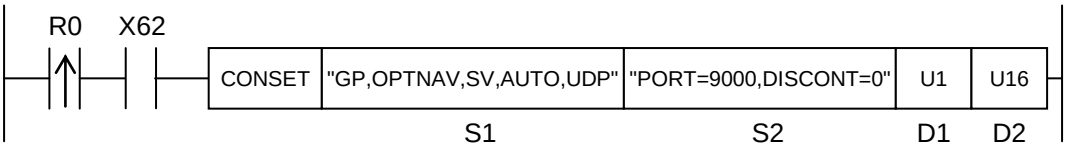
■ Precautions during programming

- If the IP address setting is changed during communication, the process performed during communication will fail.
- Execute the instruction only once when starting the PLC. (Do not execute it repeatedly.)
- It takes approximately three seconds to complete the initialization after the setting. Communication is disconnected until the completion of the initialization.
- All connections with the Ethernet function are disconnected during the execution.

7.2.2 CONSET

- Makes the connection setting parameters specified by [S1] and [S2] to the connection in the range specified by [D1] and [D2].
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (They are set when an incorrect IP address is specified or IP address is not established.)
- Check if "X62: IP address established" is ON before executing the instruction.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify the starting address storing the operation setting parameter or a character constant.
S2	Specify the starting address storing the port setting parameter or a character constant.
D1	Specify the device address storing a setting start connection number or a constant.
D2	Specify the device address storing a setting end connection number or a constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●												●	
S2	●	●	●	●			●	●												●	
D1	●	●	●	●			●	●								●	●				
D2	●	●	●	●			●	●								●	●				

■ Processing

- Makes the connection setting parameters specified by [S1] and [S2] to the connection in the range specified by [D1] and [D2].
- When an incorrect IP address is specified, an error is set to CY flag and it becomes no operation.
- It can be executed when X62: IP address established is ON. If it is OFF when executing the instruction, an error is set to CY flag and it becomes no operation.

■ Precautions during programming

- When specifying a device for an operand in which character constant can be specified, set string data beforehand with SSET instruction.
- When specifying string data, the number of characters should not execeed 256.
- Upper and lower case characters can be used for operands which character constant can be specified.
  ("Abcd", "ABCD" and "abcd" are synonymous, however, the file names are differentiated.)
- A target unit for the instruction is specified with UNITSEL beforehand.
- Set to make D1 be equal to or smaller than D2.
- The maximum number for D1 and D2 settable connection numbers is "Number of user connection information settings" in the Ethernet unit configuration data.
- When the open method is Client mode, the destination IP address is incremented by one for setting from the setting start connection to the setting end connection.
- When the open method is Server mode, the home port number is incremented by one for setting from the setting start connection to the setting end connection.
- Specify D1 and D2 so that the IP address of the destination unit or home unit port does not exceed the settable range.
- An operation error occurs when a connection is open or a connection with the automatic open setting exists at the time of the execution. However, when multiple connections are set, the settings for the connections before the connection in which an operation error occurs will change. The settings for the connections after the connection in which an operation error occurs will not change.
- The unit configuration data of Ethernet never be rewritten. When the unit configuration data has been already set, it is overwritten and the data becomes invalid.
- This instruction is not available in interrupt programs.

■ Operand [S1] setting

- Specify the starting address storing the operation setting parameters or a character constant.
- The parameters cannot be omitted.
- When spedifying "INITIAL" without specifyng parameters, the unit oprates according to the table of special keywords.

<table>
<tr><th>Setting item</th><th colspan="2">Settings</th></tr>
<tr><td rowspan="5">S1</td><td>Operating mode setting
(Essential)</td><td>Specify operation mode.
MEWCOM : Specify MEWTOCOL-COM.
MEW7COM : Specify MEWTOCOL-7.
MODBUS : Specify MODBUS-TCP.
MEWDAT : Specify MEWTOCOL-DAT.
GP : Specify General-purpose communication.
* An operation error occurs when GT is specified for the 17th or later user connections.</td></tr>
<tr><td>Option setting
(Essential)</td><td>Specify protocol options. Available options differ according to operation modes.
OPTAV: Option is available.
OPTNAV: Option is not available.
<table>
<tr><th>Operation mode select</th><th>OPTAV</th><th>OPTNAV</th></tr>
<tr><td>MEWTOCOL-COM</td><td>Connect with FP2 ET-LAN</td><td>Not connect</td></tr>
<tr><td>MEWTOCOL7-COM</td><td>Not available</td><td>-</td></tr>
<tr><td>MODBUS-TCP</td><td>Not available</td><td>-</td></tr>
<tr><td>MEWTOCOL-DAT</td><td>Connect with FP2 ET-LAN</td><td>Not connect</td></tr>
<tr><td>General-purpose communication</td><td>Not append a special header</td><td>Append a special header</td></tr>
</table></td></tr>
<tr><td>Open type setting
Server/Client
(Essential)</td><td>Specify open method (Server/Client).
CL: Client connection
SV: Server connection (any destination)</td></tr>
<tr><td>Open type setting
Automatic/Manual
(Essential)</td><td>Specify open method (Auto/Manual).
AUTO: Open automaticlly
MANU: Not open automatically (Open with open instruction)</td></tr>
<tr><td>Communication type setting
(Essential)</td><td>Specify communication type (TCP/UDP).
TCP: TCP/IP setting
UDP: UDP/IP setting</td></tr>
</table>

(Note 1): For operation settings, input each setting parameter separated by a comma ",".

(Note 2): Upper and lower case characters can be used for sepcifying keywords.

(Note 3): The operation setting parameters cnnot be omitted. Specify thme in the order of the above table.

(Note 4): There is the following difference between high-level instructions and configuration data when UDP is specified for the communication type.

Although the open type (server/client) setting is not available for configuration data, it must be specified either server or client for high-level instructions. Specify SV for using it as slave connection, and specify CL for using it as master connection.

Setting example

Example 1	S1	"MEWCOM,OPTAV,CL,AUTO,TCP"
Settings		Operating mode setting: MEWCOM, Option setting: Option available, Open type (Server/Client): Client, Open type (Automatic/Manual): Open automatically, Communication type: TCP/IP
Example 2	S1	"MODBUS,OPTNAV,SV,MANU,UDP"
Settings		Operating mode setting: MODBUS, Option setting: Option not available, Open type (Server/Client): Server (any destination), Open type (Automatic/Manual): Not open automatically, Communication type: UDP/IP
Example 3	S1	"GP,OPTNAV,SV,AUTO,UDP"
Settings		Operating mode setting: GP, Option setting: Option not available, Open type (Server/Client): Server (any destination), Open type (Automatic/Manual): Open automatically, Communication type: UDP/IP

■ Special keyword of operand [S1] setting

Special keyword	Description
INITIAL	Set the default.

Setting example

Example	S1	"INITIAL"
Settings		Operating mode setting: MEWCOL-COM, Option setting: Option not available, Open type (Server/Client): Client, Open type (Automatic/Manual): Open automatically, Communication type: TCP/IP

■ Operand [S2] setting

- Specify the starting address storing the port setting parameter or a character constant. Setting items differ between specifying Client and specifying Server. It is prohibited to specify the same setting parameter redundantly. If specified, an error occurs.

<When specifying Client (when connection from FP7)>

- Set it by incrementing the destination IP address by one from the setting start connection to the setting end connection. The increment range is the lower one block only.
- Destination unit port numbers and unused connection disconnect time are not incremented.
- An error occurs when the value of IPv4 address exceeds 255 and the value of IPv6 address exceeds FFFFh when being incremented.

Setting item	Settings	
S2	Destination unit IP address (Essential)	Specify the destination unit IP address of the setting start connection. Specify the keyword "IPv4=" or "IPv6=" at the beginning. ・For IPv4 address ・For IPv6 address IPv4=111.122.133.144 IPv6=1111:1222::1555:0:0:1888 * When specifying IPv4, 000.000.000.000(0.0.0.0) cannot be specified. * When specified, CY flag (SR9) turns ON and 1 (IP address error) is set to SD29, and the process is terminated. * An operation error does not occur. The setting is not made.
	Destination port number (Essential)	Specify the port number (1 to 65535) of destination unit. Specify the keyword "PORT=" at the beginning. PORT=xxxx
	Unused connection disconnect time (Essential)	Specify unused connection disconnect time (0 to 4294967295: 10 ms unit) However, when 0 is specified, connection is not automatically disconnected. Specify the keyword "DISCOUNT=" at the beginning. DISCONT=xxxx

(Note 1): Upper and lower case characters can be used for sepcifying keywords.

(Note 2): All the items cannot be omitted. Specify them in the order of the above table.

Setting example

Example 1	S2	"IPv4=192.255.2.10,PORT=9000,DISCONT=0"
Settings		Destination unit IP address: 192.155.2.10, Destination port number: 9000, Unused connection disconnect time: 0
Example 2	S2	"IPv6=1111:1222::1555:0:0:1999,PORT=10000,DISCONT=30000"
Settings		Destination unit IP address: 111:1222::1555:0:0:1999, Destination port number: 10000, Unused connection disconnect time: 30000
Example 3	S2	"IPv4=192.255.100.11,PORT=2500,DISCONT=50"
Settings		Destination unit IP address: 192.255.100.11, Destination port number: 2500, Unused connection disconnect time: 50

<When specifying Server (when connecting to FP7)>

- Set it by incrementing the home port number by one from the setting start connection to the setting end connection. The unused connection disconnect time is not incremented.
- An error occurs when the port number exceeds 65535 when incremeted.

Setting item	Settings	
S2	Home port number (Essential)	Specify the home port number (1 to 65535) of setting start connection. Specify the keyword "PORT=" at the beginning. PORT=xxxx
	Unused connection disconnect time (Essential)	Specify unused connection disconnect time (0 to 4294967295: 10 ms unit) However, when 0 is specified, connection is not automatically disconnected. Specify the keyword "DISCOUNT=" at the beginning. DISCONT=xxxx

Setting example

Example 1	S2	"PORT=9000,DISCONT=0"
Settings		Home port number: 9000, Unused connection disconnect time: 0
Example 2	S2	"PORT=10000,DISCONT=30000"
Settings		Home port number: 10000, Unused connection disconnect time: 30000
Example 3	S2	"PORT=10000,DISCONT=70"
Settings		Home port number: 10000, Unused connection disconnect time: 70

■ Operand [D1] setting

Specify the device address storing a setting start connection number or a constant.

Setting item	Settings		Setting range
D1	Setting start connection number	Specify setting start connection number.	1 to max. 216

■ Operand [D2] setting

Specify the device address storing a setting end connection number or a constant.

Setting item	Settings		Setting range
D2	Setting end connection number	Specify setting end connection number.	1 to max. 216

■ Flag operation

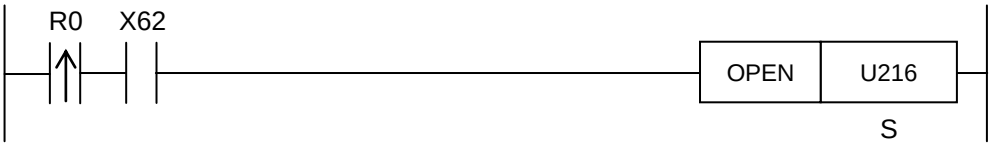
Name	Description
Latest error (SR7) Hold error (SR8)	Set when D1 is larger than D2. Set when D1 and D2 exceed the number of user connection information settings. To be set when an out-of-range value is specified for parameters. Set when the same keyword is specified redundatnly. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when the lower one block of IP address exceeds the settable range when incremented. Set when the home port number exceeds the settable range when incremented. Set when executed in an interrupt program. Set when the number of characters for operand specifying character constant exceeds 256. Set when there is a open connection. Set when there is a connection with the automatic open setting.
CY flag (SR9)	Set when executed with an incorrect IP address. The detail code set in SD29 is "1: Specification of incorrect IP address". Set when executed while IP address is not established. The detail code set in SD29 is "12: IP address not established".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

7.2.3 OPEN

- Opens a specified connection.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when IP address is not established, connection is being processed, or connection is occupied.)
- Check if "X62: IP address established" is ON before executing the instruction.

■ Instruction format



■ List of operands

Operand	Description
S	Specify the device address storing the connection number to be opened or a constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●

■ Processing

- The communication circuit of the connection specified by S is opened.
- When it is already open, it becomes no operation.
- The completion of the open operation can be confirmed by the status (ON) of the clear to send flag for the master communication or general-purpose communication.
- The open type setting (automatic/manual) is not changed.
- It can be executed when X62: IP address established is ON. If it is OFF when executing the instruction, an error is set to CY flag and it becomes no operation.
- During the processing of connection, an error is set to CY flag and it becomes no operation.
- When the connection is occupied, it becomes no operation.

■ Details of setting parameters

Specify the device address storing the connection number to be opened or a constant.

Setting item	Settings		Setting range
S	Connection No.	Specify a connection number.	1 to 216

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	To be set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program.
CY flag (SR9)	Set when executed while IP address is not established. The detail code set in SD29 is "12: IP address not established". Set when executed during the processing of connection. The detail code set in SD29 is "14: Connection being processed".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

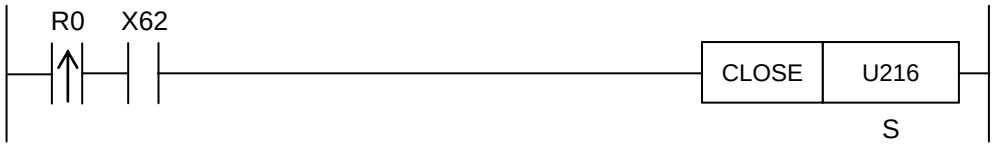
■ Precautions during programming

- When the open type is set to open automatically, it is not necessary to execute this instruction.
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

7.2.4 CLOSE

- Closes a specified connection.
- CY (SR9) and SD29 are cleared to 0 when this instruction is executed.
  (Set when IP address is not established, or connection is occupied.)
- Check if "X62: IP address established" is ON before executing the instruction.

■ Instruction format



■ List of operands

Operand	Description
S	Specify the device address storing the connection number to be opened or a constant.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●

■ Processing

- The communication circuit of the connection specified by S is closed.
- When it is already closed, it becomes no operation.
- The completion of the close operation can be confirmed by the status (OFF) of the clear to send flag for the master communication or general-purpose communication.
- It can be executed when X62: IP address established is ON. If it is OFF when executing the instruction, an error is set to CY flag and it becomes no operation.
- When the connection is occupied, an error is set to CY flag and it becomes no operation.

■ Details of setting parameters

Specify the device address storing the connection number to be closed or a constant.

Setting item	Settings		Setting range
S	Connection No.	Specify a connection number.	1 to max. 216

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	To be set when an out-of-range value is specified for parameters. Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN). Set when executed in an interrupt program.
CY flag (SR9)	Set when executed while IP address is not established. The detail code set in SD29 is "12: IP address not established". Set when executed while the connection is occupied. The detail code set in SD29 is "15: Connection being occupied".

(Note): For information of the error codes stored in the system data SD29, refer to 8.1.1 List of SD29 Detail Codes.

■ Precautions during programming

- When the open type is set to open automatically, the connection is closed once, but it will be automatically connected again.
- A target unit for the instruction is specified with UNITSEL beforehand.
- This instruction is not available in interrupt programs.

7.3 Communication Instruction

7.3.1 General-purpose Communication Send Instruction Leading Edge Execution (PGPSEND)

Data transmission is performed between the CPU unit and external devices using the built-in MCU, built-in ET-LAN, and the communication port of the expansion MUC unit or expansion ET-LAN unit (MCU: COM port, ET-LAN: connection).

■ Instruction format

■ Operation unit (i)

Operation unit	bit	UC	SC	US	SS	UL	SL	SF	DF	STR
i				●	●					

■ List of operands

Operand	Description
S	Specify the starting address of the source data area.
n	Specify the number of send data bytes. (It is always 16-bit data regardless of the specification of the operation unit i.)
D	Specify the device area of the local unit storing the processing result (1 word). [It is always 1-word (16-bit) data regardless of the specification of the operation unit i.]

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●													●
n	●	●	●	●			●	●							●	●	●				●
D	●	●	●	●			●	●													●

■ Outline of operation

- The data of the number of send data bytes specified by n is sent to the communication unit or communication port specified with UNITSEL instruction from the starting address (word address) in the send data area specified by S.

■ Precautions during programming (common)

- Do not use UNITSEL and PGPSEND instructions in combination.
- The settings of units and communication port to be communicated should be made by "UNITSEL" instruction in advance.
- The communication mode of the target MCU COM port and the communication mode for the connection setting of ET-LAN should be set to "General-purpose communication".
- Sending zero-byte data becomes an error.
- The general-purpose communication send done flag in the WX area is used for confirming the completion of the transmission using the general-purpose communication.
- When data is sent to a communication port that is during transmission, it results in no operation.
- PGPSEND should be executed after confirming that the general-purpose communication clear to send flag for the target COM port and connection is ON.
- Up to 16 send operations can be performed to different COM ports and connections simultaneously. (The total of simultaneous usage of SEND, RECV and PGPSEND instructions.)
- This instruction is not available in interrupt programs.

■ Precautions during programming (For MCU)

- For using MCU, communication settings for the MCU should be specified in advance.
- When the automatic addition function for start and end codes is enabled, it is up to 4096 bytes including the start and end codes.

■ Precautions during programming (For ET-LAN)

- Communication settings for ET-LAN should be specified in advance.
- It is for user connections 1 to 16 and not for system connections.
- User connections should be in the "Connected" state. It is recommended to specify to enable the auto open function in the connection setting of ET-LAN. Also, the connections can be connected with OPEN instruction.

■ Processing

- The slot numbers and communication port numbers specified with UNITSEL instruction are obtained from the system data (SD).
- Confirms that the general-purpose communication clear to send flag of a specified communication port is ON and the general-purpose communication send active flag is OFF.
- When sending is enabled, send data is transferred to the send buffer of a communication port and a send requet is executed.

■ Comparison between GPSEND and PGSEND instructions

Instruction	Characteristics	
GPSEND	The data send confirmation process is performed in GPSEND instruction.	
	Good point	Data can be sent to different COM ports and connections simultaneously without limit.
	Bad point	It is necessary to turn on the input conditions of GPSEND instruction until the completion of data send, and turn off the input conditions when scanning the completion of data send.
PGPSEND	The data send confirmation process is performed on the completion of scan.	
	Good point	Data is sent only once by turning on input conditions at the time of data send.
	Bad point	Simultaneous transmission to different COM ports and connections is limited to 16 data. (The total of simultaneous usage of SEND, RECV and PGPSEND instructions.)

(Note): The data send confirmation processes (Set WY7/Clear WY8/Store processing result) are different.

■ Operand [S] setting

Specify the starting address of the source data area.

■ Operand [n] setting

Specify the number of send data bytes. (It is always 16-bit data regardless of the specification of the operation unit i.)

Unit type	No. of sent data	Description
MCU (Note1) (Note 3)	1 to 4096	In case of positive values, a terminator is automatically added according to the "Terminator" setting of COM settings.
	-1 to -4096	In case of negative values, a terminator is not automatically added regardless of the "Terminator" setting of COM settings.
ET-LAN	1 to 16372	・When specifying "Append a special header" ・Send data and the end code are not distinguished.It is not automatically added.
	1 to 16384 (Note 2)	・When specifying "Not append a special header" ・Send data and the end code are not distinguished.It is not automatically added.

(Note 1): Up to a maximum of 4096 bytes including a header and a terminator. When "Header is automatically added" is valid in the COM setting of MCU, the settable maximum number of transmission data is decremented by one. When "Terminator" is set to "ETX" or "CR", the maximum number of sent data is decremented by one. When "Terminator" is set to "CR+LF", the maximum number of sent data is decremented by two. When "Terminator" is set to "Time", the maximum number of sent data is not decremented.

(Note 2): For sending data to FP2's ET-LAN, select "Not append a special header" in the user connection setting. The maximum number of transmission bytes is 8192 bytes.

(Note 3): For specifying a negative value for n (signed integer K), specify SS for the operation unit.

■ Operand [D] setting

Specify the device area of the local unit storing the processing result (1 word). [It is always 1-word (16-bit) data regardless of the specification of the operation unit i.]

Status	Set value
When transmission is completed	Number of transmitted bytes
When an error occurs	FFFFH

(Note): Error occurrence condition: The general-purpose communication clear to send flag is ON, the number of simultaneous usage of SEND, RECV and PGPSEND instructions is 16 or more, communication error

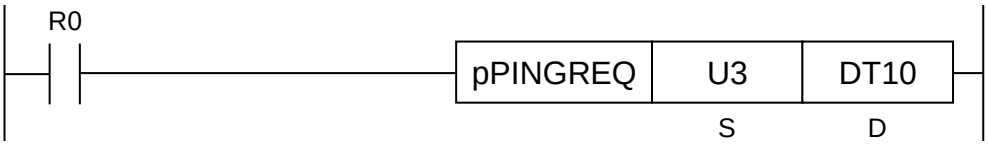
■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range values in indirect access (index modification). Set when the connection specified with UNITSEL is closed (other than "Connect"). Set when the communication port specified with UNITSEL is not "General-purpose communication". Set when the data device specified by S exceeds the area. Set when the number of sent data specified by n is 0. Set when the number of sent data including a header and a terminator exceeds the maximum value. Set when the number of sent data specified by n exceeds the data area. Set when 0 or a negative value is set for n in the transmission setting to ET-LAN. Set when executed in an interrupt program.

7.3.2 PING Request Instruction (PINGREQ)

Requests to send PING

■ Instruction format



■ Operation unit (i)

There is no operation unit.

■ List of operands

Operand	Description
S	Number of requests to send PING (Settable range: 1 to 10 times)
D	Starting address storing the result of PING request

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●
D	●	●	●	●			●	●													

■ Outline of operation

- This instruction is dedicated to ET-LAN.
- Requests to send PING to the destination IP address of a specified connection for the number of times specified by [S].
- Stores the request result of PING in the area starting with [D].
- The timeout period for one PING response is one second (fixed).
- The size of sent/received data is 56 bytes (fixed).
- This instruction is used for confirming the operation status of a communication relay device. When the operation status cannot be confirmed, the power supply can be reset from the PLC.
- Use the UNITSEL instruction to specify connections.
- When a destination IP address is not specified, an error occurs.
- When an Ethernet task is initialized while requesting PNG, 0 is put in all [D] which stores results.
- Use the ETSTA instuction to confirm the target IP address for the PING request.

■ Area storing execution result [D] to [D+5]

Operand	Execution result	Description
[D]	Execution result code	FFFF: In progress, 0: Normal end, H1x: Request error, H2x: Response error
[D+1]	No. of transmissions	
[D+2]	No. of responses	
[D+3]	Response time (Maximum)	K0 to K1000 (ms) Response time is in 10 ms unit. When it is less than 10 ms, 0 is stored.
[D+4]	Response time (Minimum)	
[D+5]	Response time (Average)	

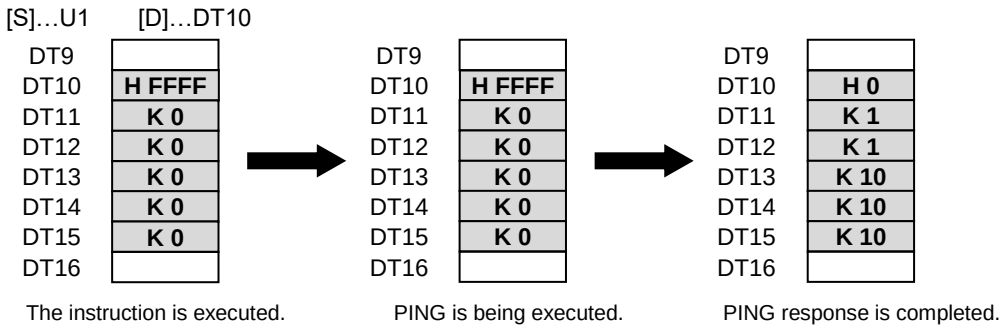
■ Execution result code [D]

- In the case of abnormal rquest (10 to 13), it is set when the instruction is executed and the time adjustment request is not performed.
- The response error (20) occurs when no response is returned from the Ethernet task.

Result code	Execution result	
0	Normal end	
10	Double startup error	PING request instruction is being executed.
11	Number of requests to send error	The number of requests to send is not in the settable range (1 to 10).
12	Ethernet unit unselected error	The unit selected with UNITSEL is not Ethernet unit.
13	Connection unused error	The specified connection is set to “Not use“.
14	Disconnection error	Ethernet is disconnected.
15	Ethernet initialization active error	Ethernet is being initialized.
20	Ethernet task response timeout	Occurs when no response is returned from the Ethernet task.

■ Example of processing

Example 1) Once, when PING request, send and response has been completed successfully (when the response time is 10 ms)



Example 2) Three times, when PING request, send and response has been completed successfully (when the response time is 10, 13, or 22 ms)

[S]…U3 [D]…DT10

DT9			DT9			DT9		
DT10	**H FFFF**	→	DT10	**H FFFF**	→	DT10	**H 0**	
DT11	**K 0**		DT11	**K 0**		DT11	**K 3**	
DT12	**K 0**		DT12	**K 0**		DT12	**K 3**	
DT13	**K 0**		DT13	**K 0**		DT13	**K 22**	
DT14	**K 0**		DT14	**K 0**		DT14	**K 10**	
DT15	**K 0**		DT15	**K 0**		DT15	**K 15**	
DT16			DT16			DT16		
The instruction is executed.			PING is being executed.			PING response is completed.		

Example 3) Three times, when PING request was made, and the operation timed out once (when the response time is 10 or 14 ms)

[S]…U3 [D]…DT10

DT9			DT9			DT9		
DT10	**H FFFF**	→	DT10	**H FFFF**	→	DT10	**K 0**	
DT11	**K 0**		DT11	**K 0**		DT11	**K 3**	
DT12	**K 0**		DT12	**K 0**		DT12	**K 2**	
DT13	**K 0**		DT13	**K 0**		DT13	**K 14**	
DT14	**K 0**		DT14	**K 0**		DT14	**K 10**	
DT15	**K 0**		DT15	**K 0**		DT15	**K 12**	
DT16			DT16			DT16		
The instruction is executed.			PING is being executed.			PING response timed out.		

Example 4) When PING request abended (Disconnection detection)

[S]…U1 [D]…DT10

DT9	
DT10	**K 13**
DT11	**K 0**
DT12	**K 0**
DT13	**K 0**
DT14	**K 0**
DT15	**K 0**
DT16	

The instruction is executed.

■ Flag operation

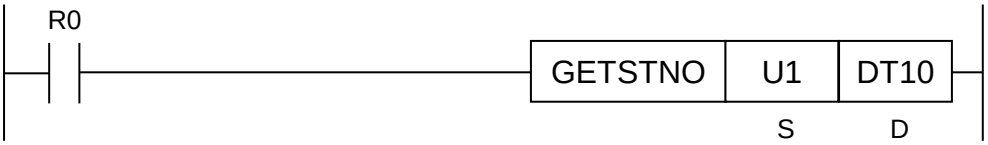
Name	Description
Latest error (SR7) Hold error (SR8)	Set when the device address specified by [D] to [D+5] exceeds the upper limit of the device. Set in case of out-of-range values in indirect access (index modification, pointer access). Set when executed in an interrupt program.

7.4 Special Instruction

7.4.1 Obtaining Starting Word Number of Specified Slot (GETSTNO)

The starting word number of a specified slot is obtained.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S	Specify the starting address storing the slot number or a constant.
D	Specify the starting address of destination.

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●								●	●				●
D	●	●	●	●			●	●													●

■ Processing

- Reads the starting word number of the slot specified by [S] to [D].

■ Precautions during programming

- An operation error occurs when a slot number without unit registration is specified when an I/O map has been registered.
- An operation error occurs when the number of a slot in which no unit is installed is specified when no I/O map has been registered.

■ Flag operation

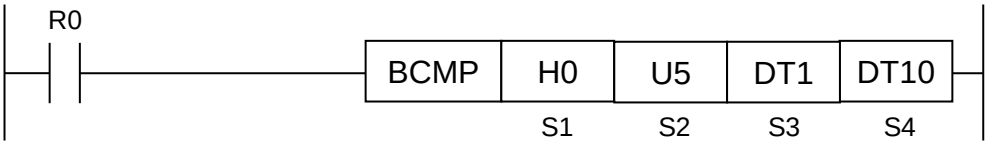
Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range values in indirect access (index modification). Set when an out-of-range value is specified for [S] (slot number). Set when a slot number (S) without unit registration is specified when an I/O map has been registered. Set when a slot number (S) without an installed unit is specified when no I/O map has been registered.

7.5 Comparison Instruction

7.5.1 Block Comparison (BCMP)

Compares two areas that blocks are specified in bytes.

■ Instruction format



■ Operation unit (i)

- There is no operation unit.

■ List of operands

Operand	Description
S1	Specify control data. (Settable range: 0 to 3)
S2	Specify the size of comparison blocks in bytes. (Settable range: 1 to 4096)
S3	Starting address (device address) of comparison block 1
S4	Starting address (device address) of comparison block 2

■ Available devices (●: Available)

Operand	16-bit device											32-bit device			Integer			Real number		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●								●	●				●
S2	●	●	●	●			●	●								●	●				●
S3	●	●	●	●			●	●													●
S4	●	●	●	●			●	●													●

■ Processing

- Compares the comparison block 1 specified by [S3] and the comparison block 2 specified by [S4] for the number of bytes specified by [S2] according the control data specified by [S1], and outputs the result to the system relay SB (=flag).

■ Operand [S1] control data setting

Specify the start position to compare the block 1 and block 2 either from the low or high byte.

S1	Starting address of block 1	Starting address of block 2
0	From low byte	From low byte
1	From high byte	From low byte
2	From low byte	From high byte
3	From high byte	From high byte

Example 1) When blocks match, the system relay SRB (= flag) turns ON.

Block 1: From low byte
Block 2: From low byte
Blocks: 5 bytes

S1: H0, S2: U5, S3: DT1, S4: DT10

Block 1

	High	Low
DT0	00H	00H
DT1	**31H**	**30H**
DT2	**33H**	**32H**
DT3	35H	**34H**

Block 2

	High	Low
DT10	**31H**	**30H**
DT11	**33H**	**32H**
DT12	35H	**34H**
DT13	37H	36H

Example 2) When blocks do not match, the system relay SRB (= flag) turns OFF.

Block 1: From low byte
Block 2: From low byte
Blocks: 5 bytes

S1: H0, S2: H5, S3: DT1, S4: DT10

Block 1

	High	Low
DT0	00H	00H
DT1	**31H**	**30H**
DT2	**33H**	**32H**
DT3	35H	**34H**

Block 2

	High	Low
DT10	**31H**	**30H**
DT11	**33H**	**33H**
DT12	35H	**34H**
DT13	37H	36H

Example 3) When blocks match, the system relay SRB (= flag) turns ON.

Block 1: From high byte
Block 2: From low byte
Blocks: 6 bytes

S1: H1, S2: U6, S3: DT0, S4: DT10

Block 1

	High	Low
DT0	**30H**	00H
DT1	**32H**	**31H**
DT2	**34H**	**33H**
DT3	00H	**35H**

Block 2

	High	Low
DT10	**31H**	**30H**
DT11	**33H**	**32H**
DT12	**35H**	**34H**
DT13	37H	36H

Example 4) When blocks match, the system relay SRB (= flag) turns ON.

Block 1: From high byte
Block 2: From high byte
Blocks: 7 bytes

S1: H3, S2: H7, S3: DT1, S4: DT10

Block 1

	High	Low
DT0	00H	00H
DT1	**31H**	30H
DT2	**33H**	**32H**
DT3	**35H**	**34H**
DT4	**37H**	**36H**
DT5	39H	38H

Block 2

	High	Low
DT10	**31H**	30H
DT11	**33H**	**32H**
DT12	**35H**	**34H**
DT4	**37H**	**36H**
DT5	39H	38H

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range values in indirect access (index modification). Set when the comparison range is outside the accessible range. Set when the control data is outside the range. Set when the block length is outside the settable range.
= flag (SB)	Set when the comparison blocks of S2 and S3 match. Reset when the comparison blocks of S2 and S3 do not match.

8

Common Items

8.1 List of Common Items

8.1.1 List of SD29 Detail Codes

The following are the detail codes when an error occurs because of the CY flag (SR9) turned ON.

SR9	SD29
0: Normal	0: Normal
1: Error	1: Incorrect IP address is specified. 2: Incorrect subnet mask is specified. 3: Incorrect default gateway is specified. 4: Incorrect IP addresses are combined. 10: Ethernet cable is disconnected. 11: Ethernet is being initialized. 12: IP address is not established. 13: Client is not started. 14: Connection is being processed. 15: Connection is occupied.

9

MC Protocol Communication Function

9.1 Overview of MC Protocol Communication Function

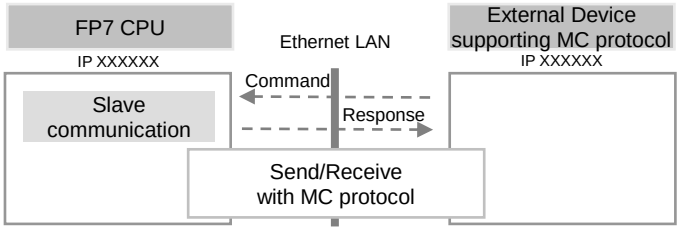
9.1.1 MC Protocol Communication

■ Overview of function

- Communication is performed with the communication protocol "MC protocol" that is released by Mitsubishi Electric Corporation for communication between PLCs and external devices.
- External devices including PLCs or FP7 have the transmission right, and perform communication by sending commands supporting "MC protocol" and receiving responses.
- Information according to the format as required by "MC protocol" including Ethernet header, IP header, TCP header or UDP header is added to commands and responses.
- The data size that can be sent or received at a time is a maximum of 960 words for the transmission in words and 7168 bits for the transmission in bits.

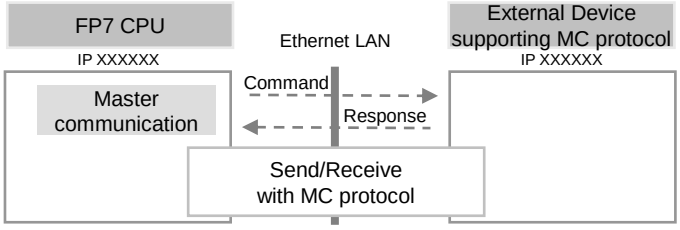
■ Slave communication

- When FP7 is used as a slave, programs for the communication on the FP7 side is not required as it returns responses automatically.



■ Master communication

- Data can be read and written between FP7 and external devices by specifying memory addresses and executing SEND/RECV instruction in user programs as FP7 generates messages according to the protocol automatically.



9.1.2 Communication Specifications of MC Protocol

- TCP/IP and UDP/IP communication methods are available.
- Communication using QnA compatible 3E frame and binary codes is supported.
- Both slave and master communications (SEND/RECV instructions) are supported.

■ Specifications

Item	Specifications	
Connection	1- 216	
Communication method	TCP/IP	UDP/IP
Home port number	5000 (Recommended)	
Supported frame	QnA compatible 3E frame	
Communication data code	Binary code	

(Note): When using multiple connections, change port numbers for each connection.

■ Operation mode setting of slave communication

Specify MC protocol, 3E frame and binary for the communication method of any connection of the built-in Ethernet.

■ How to use master communication

- Execute SEND/RECV instructions for connections to which the slave communication has been set.
- However, only SEND (bulk write) and RECV (bulk read) are available for the master communication.

■ Supported command

Only the following commands are supported for the master and slave communications.

Response of FP7	Function	Data unit	Command	Subcommand
Available	Bulk read	Bit	0401	0001
		Word	0401	0000
Available	Bulk write	Bit	1401	0001
		Word	1401	0000

9.1.3 I/O Relays Used for MC Protocol Communication

For information on the I/O relays used for the MC protocol communication, refer to 1.2 I/O Allocation.

9.2 How to Use MC Protocol Communication

9.2.1 Setting with Tool Software

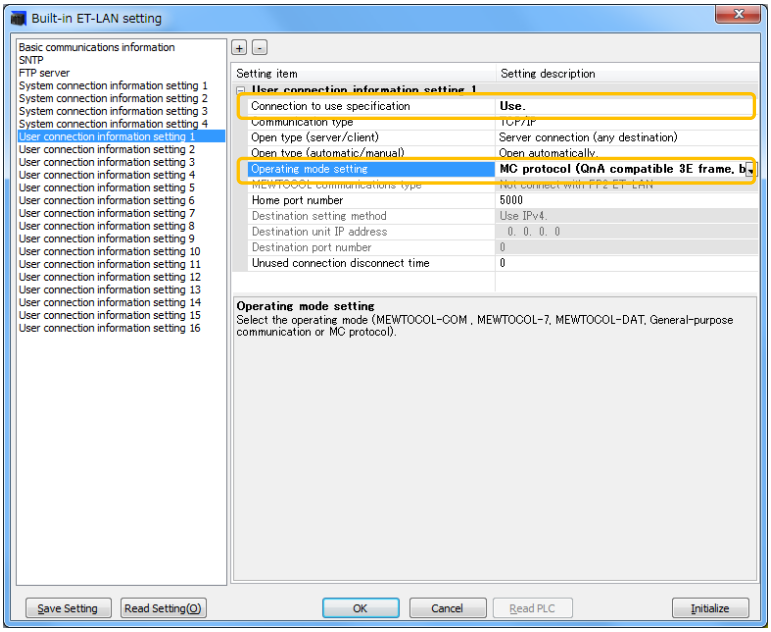
Use the programming tool software "FPWIN GR7" to make the settings.

◆ PROCEDURE

1. **Select "Options" > "FP7 Configuration" > "Built-in ET-LAN" in the menu bar.**

   The Built-in ET-LAN setting dialog box opens.

2. **Select any "User connection information setting" in the left pane.**
3. **Change the setting of "Connection to use specification" to "Use".**
4. **Select "MC protocol (QnA compatible 3E frame, binary) from the list of "Operating mode setting".**



5. **Set "Communication type", "Open type (server/client)", "Open type (automatic/manual)" and "Home port number".**
6. **Press the [OK] button.**

◆ KEY POINTS

- **For using multiple connections, set port numbers so that they are not overlapped.**
- **For the MC protocol communication, the setting for "MEWTOCOL communication type" is not required.**

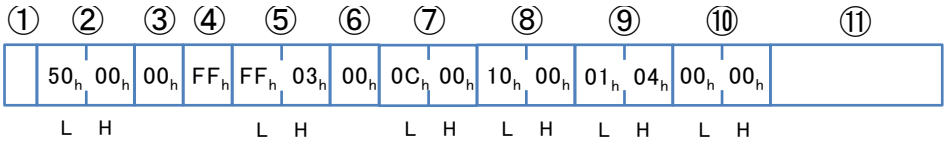
9.3 Communication Format

9.3.1 Format of Command Response

- For details, refer to "MELSEC Communication Protocol Reference Manual" published by Mitsubishi Electric Corporation.
- FP7 series supports only the QnA compatible 3E frame and binary communication. The following are restrictions.

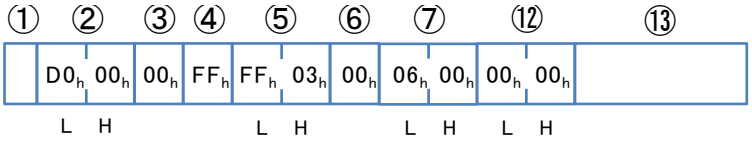
■ Command format

Transferable units differ depending on device types. They are identified by subcommands in the protocol.



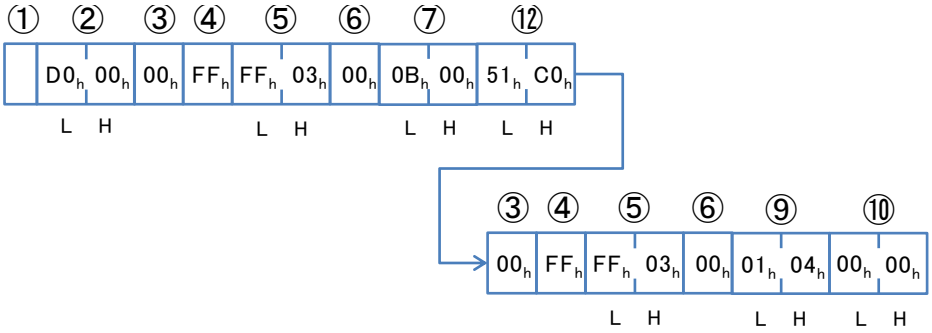
■ Response format (in normal state)

- "00" is returned to the completion code in the normal state.
- In the case of read command, response data is returned. In the case of write command, there is no response data part.



■ Response format (in abnormal state)

In case of abnormal state, an error code is stored as the completion code and the data in the error information part is added.



■ **Elements which compose command responses**

Number	Name	Description
①	Header	Ethernet header, IP header, TCP or UDP header
②	Subheader	For the binary communication supported by FP7 series, it is the following 4-byte data. Command: 00h 50h, Response: 00h D0h
③	Network number	The FP7CPU unit supports only "00h".
④	PC No.	The FP7CPU unit supports only "FFh".
⑤	Destination unit I/O number	The FP7CPU unit supports only "03FFh".
⑥	Destination unit number	The FP7CPU unit supports only "00h".
⑦	Request data length or response data length	The number of bytes of the following commands or responses.
⑧	CPU monitor timer	The FP7CPU unit does not support it.
⑨	Command	Bulk read: "0401h", bulk write: "1401h"
⑩	Subcommand	When sending in bits: "0001h", When sending in words: "0000h"
⑪	Request data part	The starting address, device type and the number of points are specified.
⑫	Completion code	In the normal state: "0000h", In the abnormal state: An error code is returned.
⑬	Response data part	For read commands, the starting address of read device, device type, the number of points and data are returned.

◆ **REFERENCE**

- **For the details of the request data and response data parts, refer to 9.3.3 Format of Request Data Part and Response Data Part.**

9.3.2 Command and Subcommand

- FP7 series supports the following commands only.
- Command and subcommand codes are created as 4-digit hex 2-byte codes which show the types and information of the commands. Subcommands indicate transfer units.
- When performing the master communication from the FP7 CPU unit, the transfer unit and subcommand vary depending on the type of the memory area specified for the operand of SEND/RECV instruction.

■ **Supported commands and codes**

Function	Transfer unit	Code in MC protocol	
		Command	Subcommand
Bulk read	Bit	0401	0001
	Word	0401	0000
Bulk write	Bit	1401	0001
	Word	1401	0000

9.3.3 Format of Request Data Part and Response Data Part

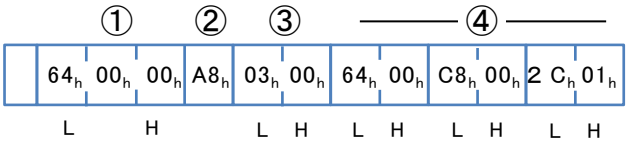
- The device information given to the rear part of each command and response is as follows.
- The data sequence and the number of data vary depending on the unit of read and write and the device type.
- These data are sent from the low bytes.

■ Components of request data and response data parts

No.	Name	Description
①	Starting device	The starting number of a target device for read and write is specified as 6-digit hex 3-byte data.
②	Device code	The device code to indicate a device type is specified.
③	No. of devices	The number of devices which perform read and write is specified. The number of words is specified for word devices and the number of bits is specified for bit devices. For reading and writing bit devices such as internal relays in word units, specify the number of words.
④	Data	The data sequence varies depeding on the device type and transfer unit for performing read and write.

■ Reading and writing word devices

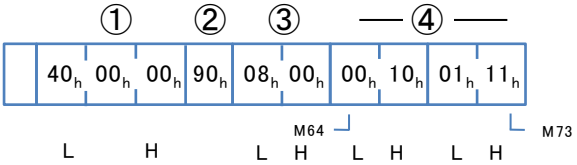
For reading or writing three words starting with the device no. 100 of the data register of MC protocol, i.e. D00100 to D00102 (FP7 device nos.: DT100 to DT102);



No.	Name	Description
①	Starting device	Specify H000064=100 for the starting device number as 3-byte data.
②	Device code	Specify the device code A8.
③	No. of devices	Specify the number of words, 3.
④	Send/Receive data on MC protocol	Read or write 3-word data.

■ Reading and writing bit devices (in units of bit)

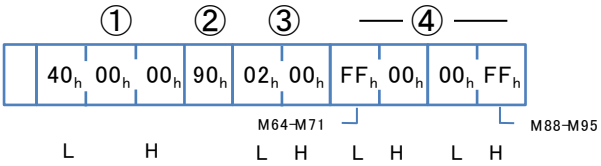
For reading or writing eight bits starting with the device no. 64 of the internal relay of MC protocol, i.e. M64 to M71 (FP7 device nos.: R40 to R47);



No.	Name	Description
①	Starting device	Specify H000040=64 for the starting device number as 3-byte data.
②	Device code	Specify the device code 90.
③	No. of devices	Specify the number of bits, 8.
④	Send/Receive data on MC protocol	The values of the internal relays M64 to M71 (FP7 device number: R40 to R47) on MC protocol are converted to 4-bit hex data per one internal relay, and sent/received from/to the low byte.

■ Reading and writing bit devices (in units of word)

For reading or writing two words starting with the device no. 64 of the internal relay of MC protocol, i.e. M64 to M95 (FP7 device nos.: R40 to R5F);



No.	Name	Description
①	Starting device	Specify H000040=64 for the starting device number as 3-byte data.
②	Device code	Specify the device code 90.
③	No. of devices	Specify the number of words, 2.
④	Send/Receive data on MC protocol	The values of the internal relays M64 to M95 (FP7 device number: R40 to R5F) on MC protocol are converted to 1-bit data per one internal relay, and sent/received from/to the low byte.

9.3.4 Device Codes and Device Numbers

The following is a correspondence table of MC protocols and FP7 device numbers.

■ Correspondence table of usable devices for the MC protocol slave communication function of FP7

MC protocol			FP7 device No.	Transfer unit	RD	WT
Device name	Device code BIN	Device No.				
Input (Note1)	9C	X0000 to X1FFF	X0000 to X511F	Bit Word	A	A
Output (Note 1)	9D	Y0000 to Y1FFF	Y0000 to Y511F	Bit Word	A	A
Link relay (Note 1)	A0	B0000 to B3FFF	L0000 to L1023F	Bit Word	A	A
Internal relay	90	M00000 to M15999	R0000 to R999F	Bit Word	A	A
Latch rela (Note 2)	92	L00000 to L16383	R10000 to R2023F	Bit Word	A	A
Data register (Note3)	A8	D000000 to D999423	DT0000 to DT999423	Word	A	A
File register (Note 3)	AF	R00000 to R32767	DT100000 to DT132767	Word	A	A
	B0	ZR00000 to ZRDB95F	DT100000 to DT999423	Word	A	A
Link register	B4	W0000 to W3FFF	LD0000 to LD16384	Word	A	A
Timer (Current value) (Note 4)	C2	TN0000 to TN4095	TE0000 to TE4095	Word	A	A
Timer (Contact)	C1	TS0000 to TS4095	T0000 to T4095	Bit Word	A	N/A
Counter (Current value) (Note 4)	C5	CN0000 to CN1023	CE0000 to CE1023	Word	A	A
Counter (Contact)	C4	CS0000 to CS1023	C0000 to C1023	Bit Word	A	N/A
Special relay	91	SM0000 to SM3583	SR0000 to SR223F	Bit Word	A	N/A
Special data register	A9	SD0000 to SD0255	SD0000 to SD0255	Word	A	N/A

(Note 1): The device number of the MC protocol of inputs, outputs, link relays and link registers are expressed in hexadecimal. The device numbers of other devices are expressed in decimal.

(Note 2): FP7 allocates latch relays to the interal relays. Set them in the hold area if necessary.

(Note 3): FP7 allocates the data registers and file registers of the MC protocol to data registers. As the allocated areas are overlapped, use either one of them. Data registers and file registers can be used within the device range of FP7. Note that the size of DT devices varies depending on models or memory allocation settings. Accessing the upper limit of each area of global and local devices is possible with the master communication function (SEND/RECV instruction).

(Note 4): FP7 treats the current values of the timer and counter as 32-bit values, however, it reads or writes only the lower 16 bits in the MC protocol communication function. When the current value exceeds the range that is expressed as 16-bit value, it is read as 65535.

(Note 5): Only global devices can be accessed in the MC protocol communication (slave communication) function of FP7. Local devices cannot be accessed.

■ Device code of MC protocol

- A device code is inserted in the request data part of a command as a hexadecimal 2-digit one-byte code which indicates the information of device type.
- For performing the master communication from the FP7 CPU unit, specify corresponding numbers from H0 to H8in the operance of the SEND and RECV instructions respectively. They are converted to device codes when the SEND and RECV instructions are executed, and sent.

■ Device type and transfer unit

- Transferable units differ depending on device types. They are identified by subcommands in the protocol.
- This is an example of using all data as global devices. When using local devices, the maximum values are less than the following memory settings.

■ The maximum values of usable data registers DT according to models and memory settings

FP7 model	Selectable memory settings				
CPS41ES/CPS41E	**Pattern 1**	**Pattern 2**	**Pattern 3**	**Pattern 4**	**Pattern 5**
Program capacity (No. of steps)	234000	221500	196000	144500	51500
Data register capacity (No. of words)	65536	131072	262144	524288	999424

FP7 model	Selectable memory settings			
CPS31ES/CPS31E	**Pattern 1**	**Pattern 2**	**Pattern 3**	**Pattern 4**
Program capacity (No. of steps)	121500	96000	64000	32000
Data register capacity (No. of words)	131072	262144	425984	589824

◆ REFERENCE

- **There is a limit to the range that can be used in the master communication function. For details, refe to 9.6.2 RECV Instruction (MC Protocol) and 9.7.2 SEND Instruction (MC Protocol).**

9.4 Bulk Read and Bulk Write

■ **Type and Device of Bulk Read and Bulk Write**

	Device	
	Bit	**Word**
Bit RD	Available	Not available
Word RD	Available	Available
Bit WT	Available	Not available
Word WT	Available	Available

9.4.1 Example of Bulk Read

■ **Form of bulk read command in bit unit (binary) and Example of reading 8 points of internal relays M100 to M107 (device numbers of FP7: R64 to R6B)**

Command

Form		Example	
Command	L	0x01	0x0401 Bulk read
	H	0x04	
Subcommand	L	0x01	0x0001 Bit unit
	H	0x00	
Starting device	L	0x64	
		0x00	
	H	0x00	
Device code		0x90	Device M
No. of devices	L	0x08	
	H	0x00	

Response

Form		Example				
Exit code	L	0x00				
	H	0x00				
Data of specified device		0x00	M100	off	M101	off
		0x10	M102	on	M103	off
		0x01	M104	off	M105	on
		0x11	M106	on	M107	on

The maximum number of bits that can be read at once is 7168.

■ Form of bulk read command in word unit (binary) and Example of reading 32 points of internal relays M100 to M131 (device numbers of FP7: R64 to R83)

Command

Form		Example	
Command	L	0x01	0x0401 Bulk read
	H	0x04	
Subcommand	L	0x00	0x0000 Word unit
	H	0x00	
Starting device	L	0x64	0x000064
		0x00	
	H	0x00	
Device code		0x90	Device M
No. of devices	L	0x02	
	H	0x00	

Response

Form		Example	
Exit code	L	0x00	
	H	0x00	
Data of specified device	L	0x00	M107 - M100
	H	0x00	M115 - M108
	L	0x34	M123 – M116
	H	0x12	M131 – M124

The maximum number of words that can be read at once is 960. When specifying the bit device, one word is 16 bits.

■ Form of bulk read command in word unit (binary) and Example of reading 3 points of data registers D0 to D2 (device numbers of FP7: DT0 to DT2)

Command

Form		Example	
Command	L	0x01	0x0401 Bulk read
	H	0x04	
Subcommand	L	0x00	0x0000 Word unit
	H	0x00	
Starting device	L	0x00	0x000000
		0x00	
	H	0x00	
Device code		0xA8	Device D
No. of devices	L	0x03	
	H	0x00	

Response

Form		Example		
Exit code	L	0x00		
	H	0x00		
Data of specified device	L	0x34	Value of D0 0x1234	4660 in decimal
	H	0x12		
	L	0x02	Value of D1 0x0002	2 in decimal
	H	0x00		
	L	0xEF	Value of D2 0xCDEF	-12817 in signed decimal
	H	0xCD		52719 in unsigned decimal

The maximum number of words that can be read at once is 960. When specifying the bit device, one word is 16 bits.

9.4.2 Example of Bulk Write

■ **Form of bulk write command in bit unit (binary) and Example of writing 8 points from internal relay M100 to M107 (device numbers of FP7: R64 to R6B)**

Command

Form		Example		
Command	L	0x01	0x0401 Bulk write	
	H	0x14		
Subcommand	L	0x01	0x0001 Bit unit	
	H	0x00		
Starting device	L	0x64		
		0x00		
	H	0x00		
Device code		0x90	Device M	
No. of devices	L	0x08		
	H	0x00		
Data of specified device		0x00	M100 off	M101 off
		0x10	M102 on	M103 off
		0x01	M104 off	M105 on
		0x11	M106 on	M107 on

The maximum number of bits that can be written at once is 7168.

■ Form of bulk write command in word unit (binary) and Example of writing 3 points from data register D100 to D102 (device numbers of FP7: DT100 to DT102)

Command

Form		Example		
Command	L	0x01	0x0401 Bulk write	
	H	0x04		
Subcommand	L	0x00	0x0000 Word unit	
	H	0x00		
Starting device	L	0x64	0x000064	
		0x00		
	H	0x00		
Device code		0xA8	Device D	
No. of devices	L	0x03		
	H	0x00		
Data of specified device	L	0x34	Value written to D100 0x1234	4660 in decimal
	H	0x12		
	L	0x02	Value written to D101 0x0002	2 in decimal
	H	0x00		
	L	0xEF	Value written to D102 0xCDEF	-12817 in signed decimal
	H	0xCD		52719 in unsigned decimal

Response

Form		Example	
Exit code	L	0x00	
	H	0x00	

The maximum number of words that can be written at once is 960.

9.5 Exit Codes When Communication Error Occurs

When a wrong command is sent or an error occurs in the CPU unit, a different exit code is returned. Exit codes returned in abnormal cases, the causes, and countermeasures are as follows.

Code	Occurrence timing
4031	Address is too long (Starting device + Number of written points)
C051	The number of devices is out of the settable range.
C056	The starting device is out of the settable range.
C059	Command search There is no command which matches the receive data command in the MC protocol command table.
C059	Subcommand is out of the settable range.
C05B	Device code is out of the settable range.
C05C	Subcommand is in bit unit (0001) and device code is word device.
C05F	Receive header check "Network number" check
C05F	Receive header check "PC number" check
C05F	Receive header check "Destination unit I/O number" check
C05F	Error in the number of written data
C060	Error in written contact data (except 0/1)
C061	Receive header check The number of received data is less than the minimum number of received bytes needed for the header check.
C061	The number of received data is less than the minimum number of received bytes.
**50 (Note)	Receive header check When a value other than 0x5000 is specified for the subheader The value consisting of the first one byte of the subheader plus 0x80 is inserted to the upper one byte ** of the error code.

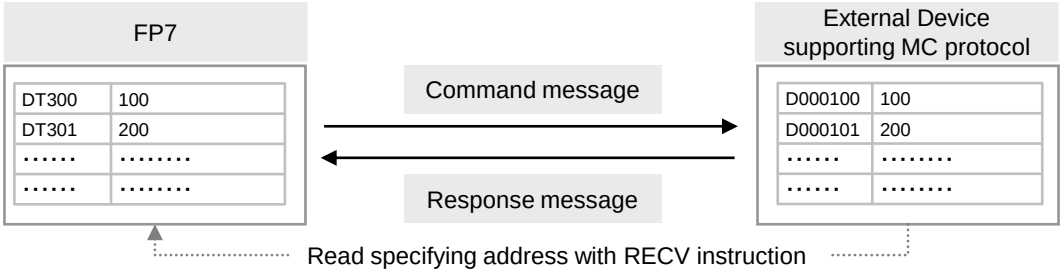
(Note): ** is the set MSB of the first one byte of subheader.
Example) when the subheader is 5FFF, DF(Hex) that is the first one byte 5F(Hex) to which 80(Hex) was added goes into **, and the error code becomes "DF50".

9.6 MC Protocol Master Communication (RECV)

9.6.1 Reading Data From External Devices

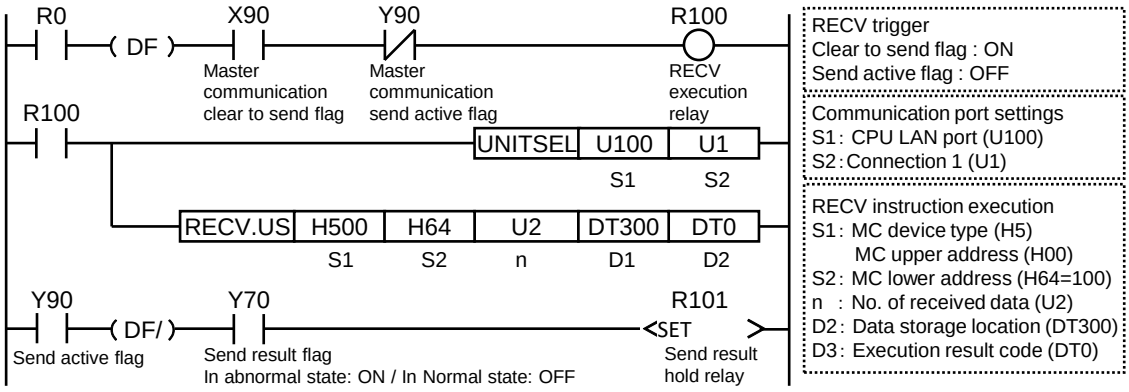
■ Procedure

The PLC has the transmission right in the master communication. The communication is performed by sending commands to devices which support MC protocol and receiving responses. By specifying a memory address and executing the SEND instruction in a user program, the PLC generates a message according to the protocol automatically.

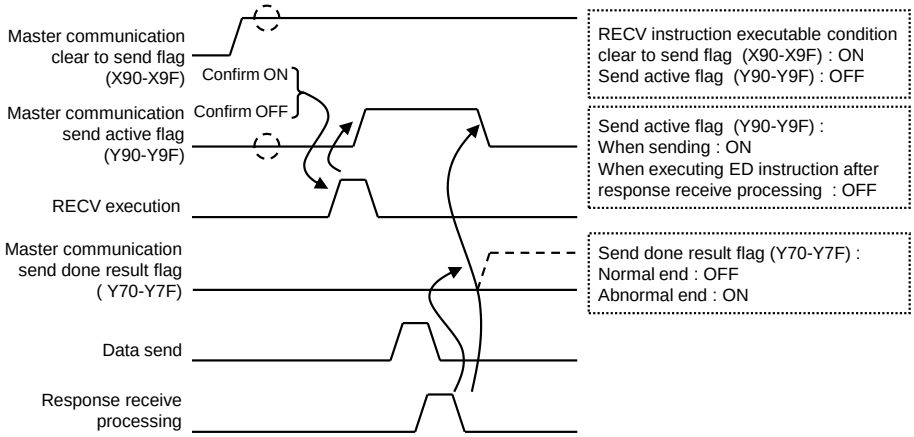


■ Sample program

- Sends the MC protocol command (bulk read) from the LAN port of the CPU unit, and reads it to the data registers of FP7 DT300 to DT301 from the addresses of an external device D000100 to D000101.
- Confirms that the connection 1 is established in the master mode (X90) and transmission is not being executed to the same port (Y90), and starts the RECV instruction.
- Specify a slot number (LAN port: U100) and a connection number (U1) with the UNITSEL instruction.
- The RECV instruction is executed with the code (H500) which indicates a destination device type and upper address, lower address (H64=100), the number of data (U2) and the storage address of FP7 (DT300).
- It is possible to confirm if a transmission error occurs by the send result done flag (Y70) when the send active flag (Y90) turns OFF.



■ Time chart



■ I/O allocation

I/O number	Name	Description
X90 to X9F	Master communication clear to send flag	Turns ON when a connection is established in the master communication.
Y90 to Y9F	Master communication send active flag	Turns ON during sending data based on SEND/RECV command. Turns OFF when the ED instruction is executed after the completion of the response receive processing.
Y70 to Y7F	Sending done result flag	Reports completion result of sending data in genera-purpose communication or master communication. (Normal completion: 0, Abnormal completion: 1)

(Note 1): Each contact in the table above is used for reading the operation status. Do not write them using user programs.

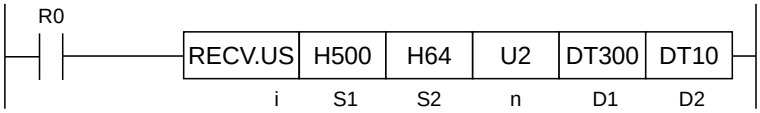
(Note 2): The above I/O numbers are those for the connections 1 to 16. For the details of the I/O numbers for the connections 32 to 216, refer to 1.2.3 I/O Relays of Extended Connections.

◆ KEY POINTS

- **Use the UNITSEL instruction following the SEND/RECV instruction to specify a target connection number for communication.**
- **Confirm the "master communication clear to send flag" of a corresponding connection is ON, and execute the SEND/RECV instruction. The master communication clear to send flag will not turn on until the detination connection is established. It is recommended to specify to enable the auto open function in the connection setting of ET-LAN. Also, the connections can be connected with OPEN instruction.**
- **Other SEND and RECV instructions cannot be executed for the connection during the master communication. Confirm that the "master communication send active flag" is OFF, and execute the instructions.**
- **SEND and RECV instructions cannot be executed for the connection during the slave communication (such as performing a data request from a host computer).**
- **Up to 16 instructions can be executed simultaneously for different COM ports and connections. (The total of simultaneous usage of SEND, RECV, pGPSEND and pPMSET instructions.)**

9.6.2 RECV Instruction (MC Protocol)

■ Instruction format



■ Operand

Item	Settings			Setting range
i	Specify an operation unit.			US / SS
S1	Specify the code and the upper address which indicates the type of the source device of a destination unit. (Note 1)			
		High byte	Code which indicates the type of the device (Hexadecimal 2-digit) (Note 2)	H0 to H8
		Low byte	Device upper address (Hexadecimal 2-digit) (Note 3)	H00 to HFF
S2	Specify the device type and the lower address of a destination unit. (Hexadecimal 4-digit) (Note 3)			H0 to HFFFF（0 to 65535）
n	Specify the number of received data. (Note 3)			1 to 960 words 1 to 7168 bits
D1	Specify the device starting address in the home unit storing received data. (Note 2)			-
D2	Specify the device area of the local unit storing the execution result code (1 word).			(Note 6)

(Note 1): The operand [S1] is specified by the combination of the source device code of a destination code and the address in hexadecimal data.
Example) When the device code is 3 (internal relay) and the upper hexadecimal 2 digit of the device address is H00, specify H300.

(Note 2): Specify the following value as the code "upper 2 bytes of [D2]" which indicates the destination device.

Unit	Device type			High byte of [S1]
Bit	Input	X	Hexadecimal	H0
	Output	Y	Hexadecimal	H1
	Link relay	B	Hexadecimal	H2
	Internal relay	M	Decimal	H3
	Latch relay	L	Decimal	H4
Word	Data register	D	Decimal	H5
	File register	R	Decimal	H6
		ZR	Hexadecimal	H7
	Link register	W	Hexadecimal	H8

(Note 3): The destination device address is specified by the combination of the low byte of [S1] and the value of [S2]. When the device address is in the range of H0 to HFFFF, specify "H00" for the low byte os [S1].

(Note 4): The number of received data is in word unit for the register transmission and it is in bit unit for the bit transmission.

(Note 5): The transfer method and the number of sent data specified by [n] vary according to the type of the device on FP7 specified by the operation [D1].

Device specified in [D1]	Transfer method	No. of sent data [n]	Remarks
16-bit device WX,WY,WR,WL,DT,LD	Register transmission	1 to 960	
1-bit device. X,Y,R,L,DT,n,LD,n	Bit transmission	1 to 7168	When the number of sent data is odd, 4-bit dummy code H0 is added.

(Note 6): The devices that can be specified in [D2] is WX, WY, XR, WL, DT, and LD. They are stored as one word in a specified area.
0: Normal end
1: The communication port is being used in the master communication.
2: The communication port is being used in the slave communication.
3: The number of master communication instructions simultaneously used is exceeded.
4: Transmission timeout
5: Response receive timeout
6: Receive data error

■ Available devices (●: Available)

Bit device

Operand	Bit device											32-bit device		Index modifier
	X	Y	R	L	T	C	P	E	SR	IN	OT	DT.b	LD.b	
D1	●	●	●	●								●	●	●

(Note): Bit devices cannot be specified for the operands S1, S2, n, and D2.

Word device

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS CS	TE CE	IX	K	U	H	SF	DF	" "	
S1	●	●	●	●			●	●								●	●				●
S2	●	●	●	●			●	●								● *1	● *1				●
n	●	●	●	●			●	●								●	●				●
D1	●	●	●	●			●	●													●
D2	●	●	●	●			●	●													●

*1): Only when "direct addressing" in the MODBUS mode or MC protocol mode is set, integers can be specified for a destination address.

■ Flag operation

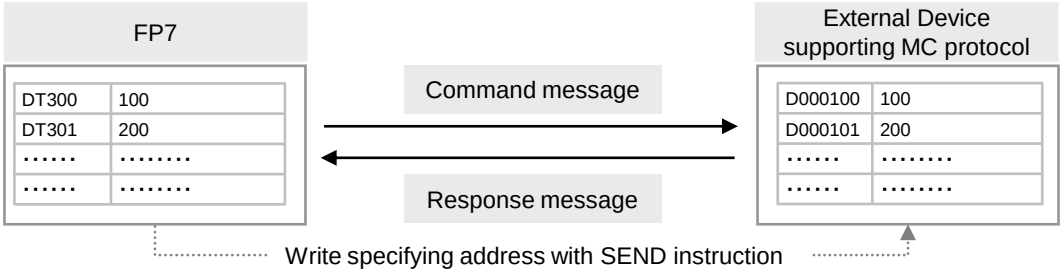
Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range values in indirect access (index modification).
	Set when the destination range is outside the accessible range.
	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN).
	When there is not a connection that is specified with the UNITSEL instruction, the connection is closed.
	The device code and the source upper address specified by S1 is out of the range.
	The source lower address specified by S2 is out of the range.
	The number of sent data specified by n is incorrect.
	The data device in the destination data area in the home unit specified by D1 is incorrect or exeeds the area.
	The device in which results are stored specified by D2 is incorrect.

9.7 MC Protocol Master Communication (SEND)

9.7.1 Writing Data to External Devices

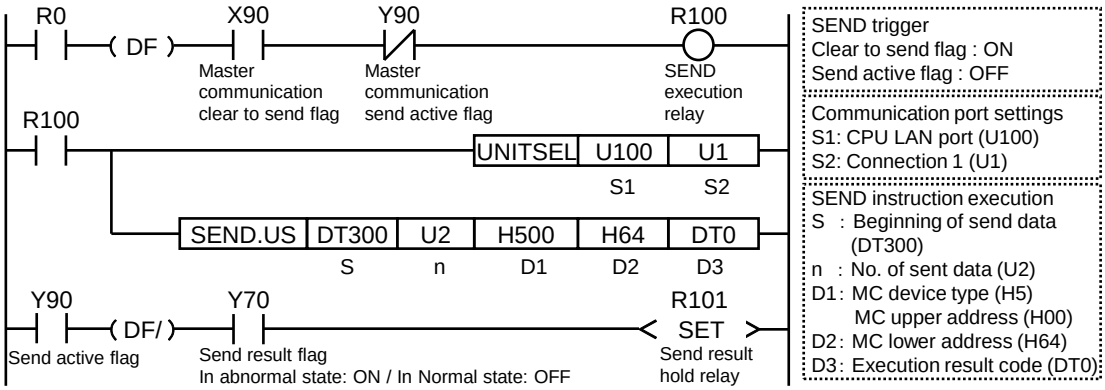
■ Procedure

The PLC has the transmission right in the master communication, and performs communication by sending commands to devices supporting "MC protocol" and receiving responses. By specifying a memory address and executing the SEND instruction in a user program, the PLC generates a message according to the protocol automatically.

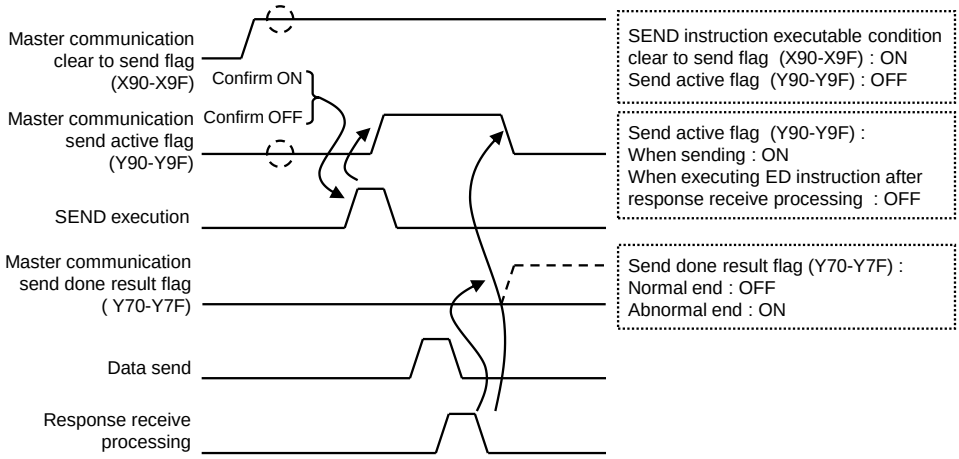


■ Sample program

- Sends the MC protocol command (bulk write) from the LAN port of the CPU unit, and writes the contents of the data registers of FP7 DT300 to DT301 to the addresses of an external device D000100 to D000101.
- Confirms that the connection 1 is established in the master mode (X90) and transmission is not being executed to the same port (Y90), and starts the SEND instruction.
- Specify a slot number (LAN port: U100) and a connection number (U1) with the UNITSEL instruction.
- The SEND instruction is executed with the address of FP7 (DT300) and the number of data (U2), the code (H5) which indicates the device type and the upper address of the destination device, and the lower address (H64=100).
- It is possible to confirm if a transmission error occurs by the send result done flag (Y70) when the send active flag (Y90) turns OFF.



■ Time chart



■ I/O allocation

I/O number	Name	Description
X90 to X9F	Master communication Clear to send flag	Turns ON when a connection is established in the master communication.
Y90 to Y9F	Master communication send active flag	Turns ON during sending data based on SEND/RECV command. Turns OFF when the ED instruction is executed after the completion of the response receive processing.
Y70 to Y7F	Sending done result flag	Reports completion result of sending data in genera-purpose communication or master communication. (Normal completion: 0, Abnormal completion: 1)

(Note 1): Each contact in the table above is used for reading the operation status. Do not write them using user programs.

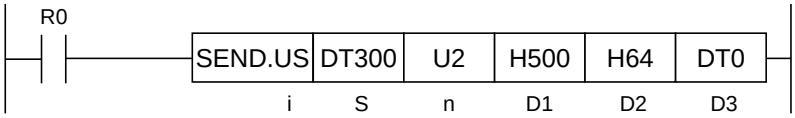
(Note 2): The above I/O numbers are those for the connections 1 to 16. For the details of the I/O numbers for the connections 32 to 216, refer to 1.2.3 I/O Relays of Extended Connections.

◆ KEY POINTS

- **Use the UNITSEL instruction following the SEND/RECV instruction to specify a target connection number for communication.**
- **Confirm the "master communication clear to send flag" of a corresponding connection is ON, and execute the SEND/RECV instruction. The master communication clear to send flag will not turn on until the detination connection is established. It is recommended to specify to enable the auto open function in the connection setting of ET-LAN. Also, the connections can be connected with OPEN instruction.**
- **Other SEND and RECV instructions cannot be executed for the connection during the master communication. Confirm that the "master communication send active flag" is OFF, and execute the instructions.**
- **SEND and RECV instructions cannot be executed for the connection during the slave communication. (such as performing a data request from a host computer).**
- **Up to 16 instructions can be executed simultaneously for different COM ports and connections. (The total of simultaneous usage of SEND, RECV, pGPSEND and pPMSET instructions.)**

9.7.2 SEND Instruction (MC Protocol)

■ Instruction format



■ Operand

Item	Settings			Setting range
i	Specify an operation unit.			US / SS
S	Specify the starting address of the source data area. (Note 1)			-
n	Specify the number of sent data. (Note 1) (Note 2)			1 to 960 words 1 to 7168 bits
D1	Specify the code and the upper address which indicates the type of the destination device of a destination unit. (Note 3)			
		High byte	Code which indicates the type of the device (Hexadecimal 2-digit) (Note 4)	H0 to H8
		Low byte	Device upper address (Hexadecimal 2-digit) (Note 5)	H00 to HFF
D2	Specify the device type and the lower address of a destination unit. (Hexadecimal 4-digit) (Note 6)			H0 to HFFFF（0 to 65535）
D3	Specify the device area of the local unit storing the execution result code (1 word).			(Note 6)

(Note 1): The transfer method and the number of sent data specified by [n] vary according to the type of the device on FP7 specified by the operation [S].

Type of FP7 devices specified in [S]	Transfer method	No. of sent data [n]	Remarks
16-bit devices WX,WY,WR,WL,DT,LD	Word transmission	1 to 960	
1-bit devices X,Y,R,L,DT,n,LD,n	Bit transmission	1 to 7168	When the number of sent data is odd, 4-bit dammy code H0 is added.

(Note 2): The number of sent data [n] is in word unit for the word transmission and it is in bit unit for the bit transmission.

(Note 3): The operand [D1] is specified by the combination of the destination device code of a destination code and the address in hexadecimal data.
Example) When the device code is 3 (internal relay) and the upper hexadecimal 2 digit of the device address is H00, specify H300.

(Note 4): Specify the following value as the code "upper 2 digits of [D1]" which indicates the destination device.

Unit	Device type			High byte of [D1]
Bit	Input	X	Hexadecimal	H0
	Output	Y	Hexadecimal	H1
	Link relay	B	Hexadecimal	H2
	Internal relay	M	Decimal	H3
	Latch relay	L	Decimal	H4
Word	Data register	D	Decimal	H5
	File register	R	Decimal	H6
		ZR	Hexadecimal	H7
	Link register	W	Hexadecimal	H8

(Note 5): The destination device address is specified by the combination of the low byte of [D1] and the value of [D2]. When the device address is in the range of H0 to HFFFF, specify "H00" for the low byte os [D1].

(Note 6): The devices that can be specified in [D3] is WX, WY, XR, WL, DT, and LD. They are stored as one word in a specified area.
0: Normal end
1: Communication port is being used in the master communication.
2: The communication port is being used in the slave communication.
3: The number of master communication instructions simultaneously used is exceeded.
4: Transmission timeout
5: Response receive timeout
6: Receive data error

■ Available devices (●: Available)

Bit device

Operand	Bit device											Specification of bit of word device		Index modifier
	X	Y	R	L	T	C	P	E	SR	IN	OT	DT.b	LD.b	
S	●	●	●	●								●	●	●

(Note) Bit devices cannot be specified for the operands n, D1, D2, and D3.

Word device

Operand	16-bit device											32-bit device			Integer			Real num-ber		String	Index modifier
	WX	WY	WR	WL	WS	SD	DT	LD	UM	WI	WO	TS	TE	IX	K	U	H	SF	DF	" "	
S	●	●	●	●			●	●													●
n	●	●	●	●			●	●								●	●				●
D1	●	●	●	●			●	●								●	●				●
D2	●	●	●	●			●	●								● *1	● *1				●
D3	●	●	●	●			●	●													●

*1): Only when "direct addressing" in the MODBUS mode or MC protocol mode is set, integers can be specified for a destination address.

■ Flag operation

Name	Description
Latest error (SR7) Hold error (SR8)	Set in case of out-of-range values in indirect access (index modification).
	Set when the source range is outside the accessible range.
	Set when the slot number specified with UNITSEL is not [S1]=100 (built-in ET-LAN).
	When there is not a connection that is specified with the UNITSEL instruction, the connection is closed.
	Set when the data device specified by S is incorrect or exceeds the area.
	The number of sent data specified by n is incorrect.
	The device code and the destination upper address specified by D1 is out of the range.
	The destination lower address specified by D2 is out of the range.
	The device in which results are stored specified by D3 is incorrect.

Record of changes

Manual No.	Date	Record of Changes
WUME-FP7CPUETEX-01	Jul. 2018	1st Edition
WUME-FP7CPUETEX-02	Mar. 2021	2nd Edition - Corrected mistakes

Order Placement Recommendations and Considerations

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ii)application which the performance degradation or quality problems, such as breakdown, of the Products may directly result in damage to the body or property

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vii) burning appliances
viii) military devices
ix) medical devices (except for general controls)
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(6) When the failure or defect was caused by a natural disaster or other force majeure.
(7) When the equipment is damaged due to corrosion caused by corrosive gases etc. in the surroundings.

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