HITACHI PROGRAMABLE CONTROLLER

HIDIC EH-150

Ethernet Module(EH-ETH)
APPLICATION MANUAL

NJI-361(X)

○ Warranty period and coverage

The product warranty period will be one year after the product has been delivered to the location designated in the order. If a malfunction occurs within the warranty period even though the product has been used within the range of correct conditions according to the product specifications given in this document, we will exchange or repair the defective part free of charge.

However, the following conditions are not be covered by this warranty:

(1) Damage due to negligent handling or misuse by the user.

(2) When the cause of the malfunction is due to components other than those supplied.

(3) When the cause of the error is due to a modification or repair performed by an entity other than the supplier.

(4) When the cause of the error is due to weather or accidents that are out of the supplier's control.

Further, the warranty here refers to that of the product itself, and does not include any damage caused by the malfunction of the product. The warranty is valid only in Japan.

○ General repair

Investigations and repairs outside the warranty period (1 year) will be charged. Also, we will repair damages caused by any reason not covered by the warranty and investigate the cause of malfunctions for a charge within the warranty period. Please contact the place of purchase or one of our service stations. (Research may not be possible, depending on the area of malfunction.)

○ Ordering parts or asking questions

When contacting us for repair, ordering parts or inquiring about other items, please have the following details ready before contacting the place of purchase or service station.

(1) Model

(2) Manufacturing number (MFG no.)

(3) Details of the malfunction

Warning

(1) This manual may not be reproduced in its entirety or any portion thereof without prior consent.

(2) The content of this document may be changed without notice.

(3) This document has been created with utmost care. However, if errors or questionable areas are found, please contact us.

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Safety Precautions

Read this manual and related documents thoroughly before installing, operating, performing preventive maintenance or performing inspection, and be sure to use the unit correctly. Use this product after acquiring adequate knowledge of the unit, all safety information, and all cautionary information. Also, make sure this manual enters the possession of the chief person in charge of safety maintenance.
Safety caution items are classified as “Danger” and “Caution” in this document.

DANGER : Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible death or severe injury.

CAUTION : Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible minor to medium injury to the body, or only mechanical damage.

However, depending on the circumstances, items marked with CAUTION may result in major accidents.

In any case, they both contain important information, so please follow them closely.

Icons for prohibited items and required items are shown below:

: Indicates prohibited items (items that may not be performed). For example, when open flames are prohibited, is shown.

: Indicates required items (items that must be performed). For example, when grounding must be performed, is shown.

1. About installation

CAUTION

- Use this product in an environment as described in the catalogue and this document.
  If this product is used in an environment subject to high temperature, high humidity, excessive dust, corrosive gases, vibration or shock, it may result in electric shock, fire or malfunction.
- Perform installation according to this manual.
  If installation is not performed adequately, it may result in dropping, malfunction or an operational error in the unit.
- Do not allow foreign objects such as wire chips to enter the unit.
  They may become the cause of fire, malfunction or failure.

2. About wiring

REQUIRED

- Always perform grounding (FE terminal).
  If grounding is not performed, there is a risk of electric shocks and malfunctions.

CAUTION

- Connect power supply that meets rating.
  If a power supply that does not meet rating is connected, fire may be caused.
- The wiring operation should be performed by a qualified personnel.
  If wiring is performed incorrectly, it may result in fire, damage, or electric shock.

3. Precautions when using the unit

DANGER

- Do not touch the terminals while the power is on.
  There is risk of electric shock.
- Structure the emergency stop circuit, interlock circuit, etc. outside the programmable controller (hereinafter referred to as PLC).
  Damage to the equipment or accidents may occur due to failure of the PLC.
  However, do not interlock the unit to external load via relay drive power supply of the relay output module.

CAUTION

- When performing program change, forced output, RUN, STOP, etc., while the unit is running, be sure to verify safety.
  Damage to the equipment or accidents may occur due to operation error.
- Supply power according to the power-up order.
  Damage to the equipment or accidents may occur due to malfunctions.

4. About preventive maintenance

DANGER

- Do not connect the ⊕, ⊖ of the battery in reverse. Also, do not charge, disassemble, heat, place in fire, or short circuit the battery.
  There is a risk of explosion or fire.

PROHIBITED

- Do not disassemble or modify the unit.
  These actions may result in fire, malfunction, or malfunction.

CAUTION

- Turn off the power supply before removing or attaching module/unit.
  Electric shock, malfunction or failure may result.

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Chapter 1 Introduction

We appreciate that you have selected the HITACHI Programmable Controller (This after called PLC) EH-150 Series.

This application manual describes how to properly operate the EH-150 Ethernet Module.

Please read this manual carefully to familiarize yourself with the procedures respectively of installation, operation, and maintenance and check.

We have several documentation to refer in below.

Table 1.1 The list of documentation

Items	Name of documentation	Number of Manual
Main system of EH-150	EH-150 Application manual	NJI-281*(X)
Programming Software	LADDER EDITOR (for MS-DOS) LADDER EDITOR for Windows® (Windows®95/98/NT)	NJI-325*(X) NJI-342*(X) NJI-343*(X)
Ethernet module	Ethernet module (EH-ETH) Application manual	NJI-361(X)

*The last character of the manual number may be modified when the product is revised.

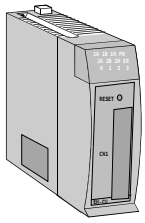
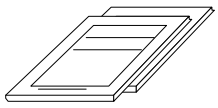
Notes. The contents of this manual may be modified without previous notice.

1.1 Before to use

This module is manufactured carefully. When you receive this Ethernet Module, kindly to check the following matters:

(1) If the model name is correct.
(2) If there is no shipping damage on product
(3) If following materials are in a carton box.

Table 1.1.1 List of Ethernet Module materials

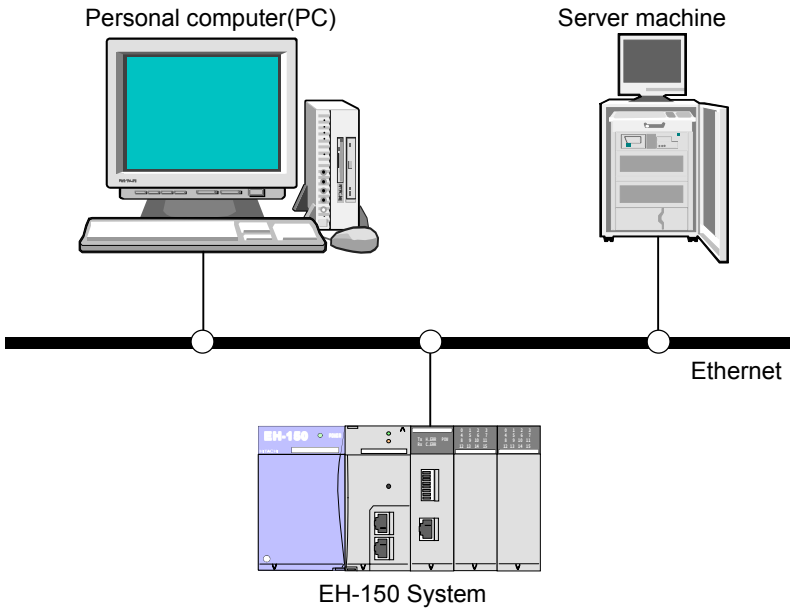
No.	Products Name	Outlook	Model number	pcs	Remarks
1	Ethernet module		EH-ETH	1	**(CAUTION)** **To use the specified CPU module, when you use this Ethernet module in your system. Please refer the description for this in Chapter 4 0.**
2	Data Sheet (Instruction Manual)		NJI-360*: Japanese	1	This documentation has the description of installation
			NJI-360*(X): English		
3	EMC regulation		NJI-380*(X)	1	

If you have find something inconvenience, please contact your distributor.

1.2 Outline

This product supports production control and system operation monitor, equipment monitor and maintenance by connecting PLC to information network.

1. EH-ETH (This after called this module) can be mounted onto the basic base of EH-150 system and is the communication module can be connected EH-150 system to Ethernet based on IEEE802.3.
2. This module connected to Ethernet will operate as one of the station of the network system. For this operation this module can exchange the data with personal computer or engineering workstation connected with network.



1.3 Feature

1. The data sending or receiving connection can be used 10 at once.

   - 6 connections for automatic send/receive and 4 connections for H-series protocol (Taskcode communication) can be used.
   - Sending data and receiving data can be done with one connection.
   - It is selectable TCP/IP or UDP/IP as the communication protocol for each connection.
   - The maximum sending or receiving data size between PLC and PLC or PLC and host computer is 1,454 bytes.

   ASR is omission of Automatic Sending/Receiving.
   When you use cyclic transmission function and automatic transmission function of ASR, you can transmit/receive a data without making a ladder(user) program.
   Task code communication is original communication protocol for H-series. You can make monitoring system or data logging system by connecting SCADA system which supports its protocol.

2. Saving the developing power with using **Web server function for set-up** and **Automatic sending/receiving function**.

   - The all configuration for communication can be done with using Web browser before to start communication. The configured data for communication can be saved with text format file.
   - It is possible to save the development power for communication program using Ladder diagram can be saved with using the automatic sending /receiving function.

3. Using programming software called LADDER EDITOR for Windows® via Ethernet communication line.

   - It is possible to monitor the I/O data or to handle the program of PLC with LADDER EDITOR for Windows® via Ethernet communication line. You can save the time and cost for maintenance of user program or total system.

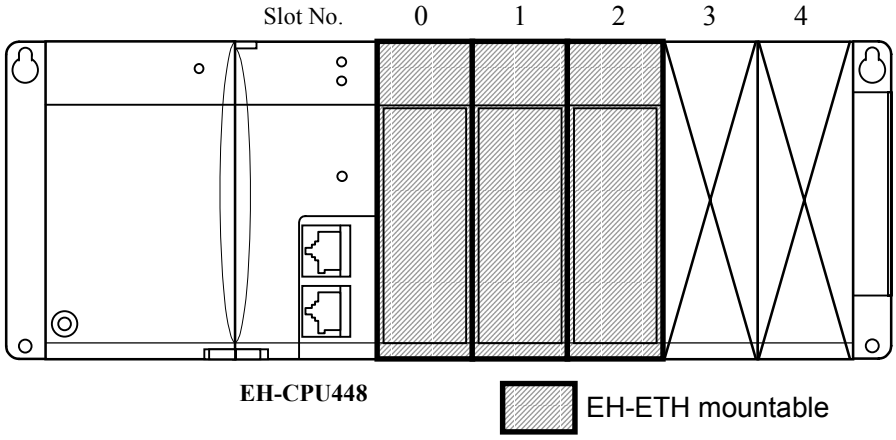
1.4 Notes to use

(1) The **EH-CPU448** is required as the master CPU to control this module.

Table 1.4.1 CPU

Type	HARDWARE REV.	ROM VER.
EH-CPU448	00 or more	N.C.

(2) It is possible to use **2 pcs of EH-ETH at once** with one basic base unit. Can not use it on the extension base units.



(3) The power down operation must be required when mounting or removing this module and connecting or removing the external wiring.

1.5 Term and abbreviation

Table 1.5.1 shows the term and abbreviation in this manual.

Table 1.5.1 Term and abbreviations

Term / abbreviation	Explanation
Ethernet information	This is general terms of parameter including IP address, routing information, task code logic port number etc.
ASR	This abbreviation of Automatic Sending/Receiving
ASR connection	This is connection which is called message communication for data communication in generally.
ASR information	This is general terms of parameter including communication protocol, logic port number, other node information etc to set each ASR connection.
Task code	This is original communication protocol for H-series PLC.
Task code connection	This is connection for task code communication.

Chapter2 System structure

Figure 2.1 shows an example of FA system consisting of combined EH-150 communication systems.

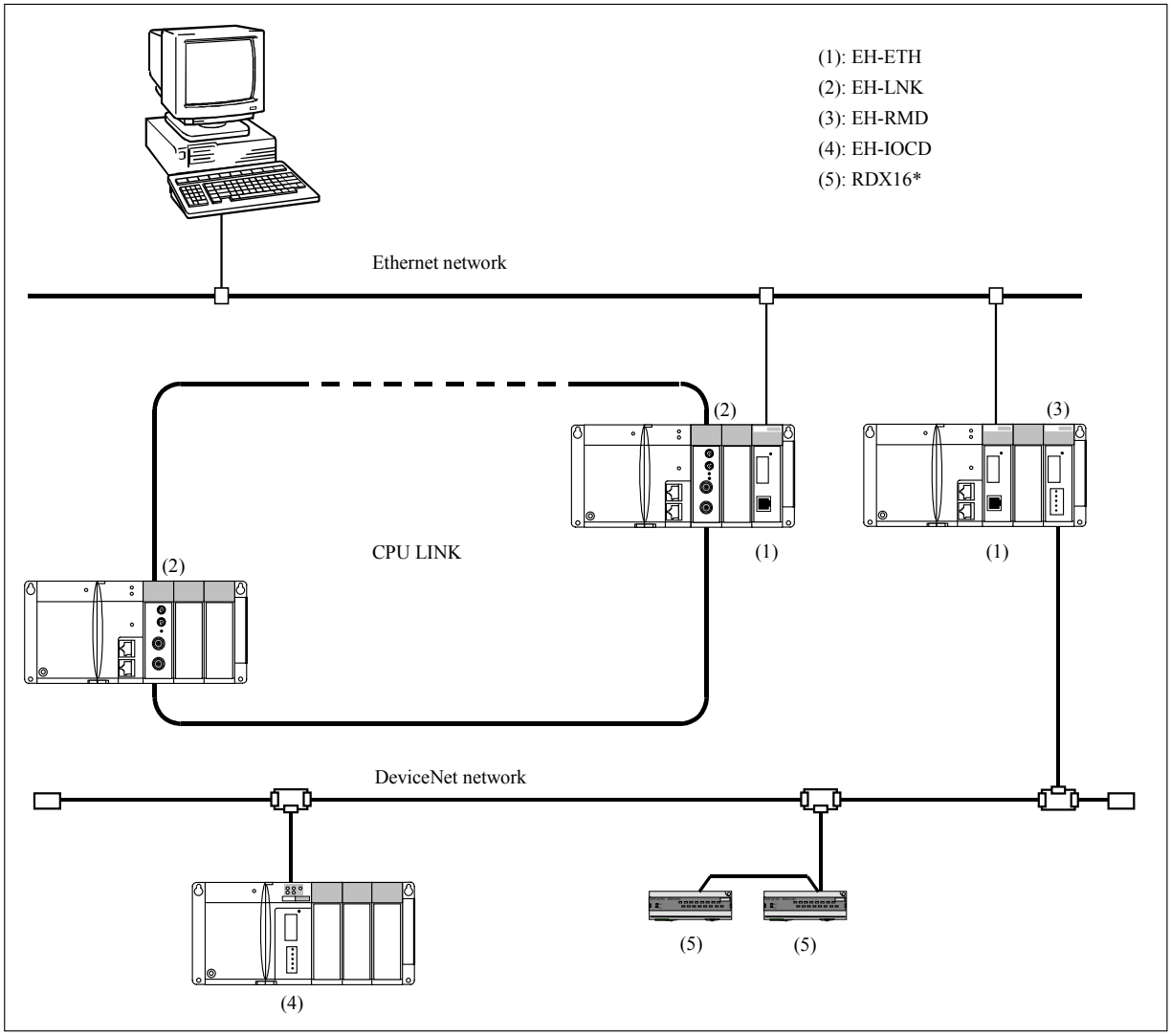


Figure 2.1 An example of FA system configuration with EH-150 series.

Chapter 3 Specifications

3.1 General Specifications

The general specification of this module is show in Table 3.1.

Table 3.1 General Specifications

Items	Specifications
Dielectric withstand voltage	250 V DC between the communication signal and case ground (FE)
Internal current consumption	5 V 200 mA
Operating ambient temperature and humidity	0 to 55 °C, 20 to 90 % RH (no condensation)
Storage ambient temperature and humidity	-10 to 75 °C, 10 to 90 % RH (no condensation)
Noise resistance	○ Noise voltage 1,500 Vpp, Noise pulse width 100 ns, 1 μs (Noise created by the noise simulator is applied across the power supply module's input terminals. This is determined by this company's measuring methods.) ○ Static noise: 3,000 V at metal exposed area
Vibration resistance	Conforms to JIS C 0911 (16.7 Hz double amplitude 3 mm X, Y and Z each direction)
Usage environment	No corrosive gases, no excessive dust
Structure	Open, wall-mounted type
Cooling	Natural air cooling
I/O assignment method	To use "COMM" for this module

3.2 Performance Specification

Performance Specification of this module is shown in Table 3.2.

Table 3.2 Performance Specification

Items		Specification
Communication method	Standard for Ethernet	Based on IEEE802.3
	Transmit modulation method	Base band
	Media Access method	CSMA/CD
	Transmit speed	10 Mbps
	Maximum segment length	100 (m)
Number of ASR connection		Maximum connection is 6 at once. Maximum data is 1454 bytes / each sending or receiving
H-protocol (Taskcode communication)		Maximum connection is 4 at once.

3.3 Functional Specifications

The functional specification of this module has shown in Table 3.3.

Table 3.3 Functional Specification

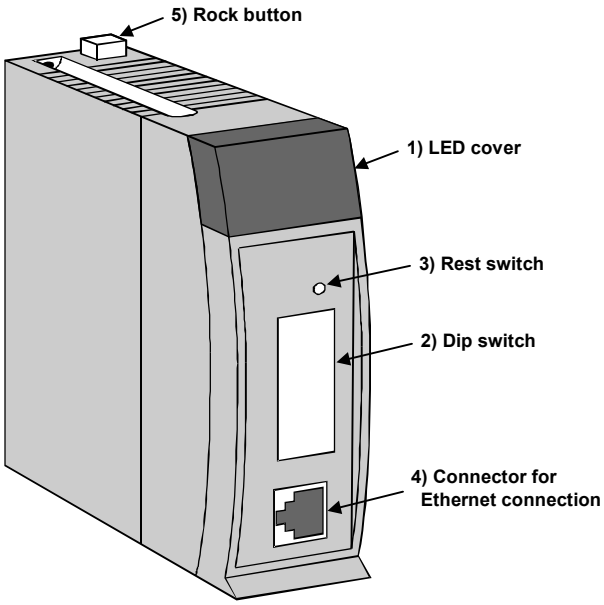
Items	Specification
Configuration	- The tool for configuration is general Web browser. - The configuration for IP address setting and Taskcode communication should be done at IP address setting mode (*1). - The ASR information and configuration for the area of sending/receiving should be changed at IP address setting mode or normal operation mode (*1). - IP address, routing information or configuration for taskcode communication can be also done by Ladder diagram.
Sending data	There are two sending functions. 1. Sending the data periodically called "Cyclic Sending". 2. Sending will be done at any time called "Event Sending". - It is possible to change the sending functionality for every ASR connection. - It is possible to use Web browser to change function of sending, to specify the attention of sending data and to specify the source of sending area.
Cyclic Sending	This should be specified when it is no need to keep synchronizing the data of source area. - It is possible to send the data with only specifying the attention of destination, area of source and time of cyclic. - There is no need to prepare the ladder diagram to take care the operation for sending. (*2)
Event Sending	The ladder diagram is required to control the everything related with sending operation.
Receiving data	There are two types Receiving mode. One is Normal mode. The other is Optional mode. [Normal mode] This should be specified when it is no need to keep synchronizing the data of destination area. - It is possible to receive the data into destination area with only specifying the attention of source and area of destination. - There is no need to prepare the ladder diagram to take care the operation for receiving. (*2) [Optional mode] This should be specified when it is need to keep synchronizing the data of destination area. - It is required to prepare the ladder diagram to take care the receiving data into the destination area.
H-protocol (Taskcode Communication)	- It is possible to specify TCP/IP or UDP/IP. - It is possible to communicate using H series taskcode (H-protocol).
Test mode	- Internal loop back checking and External loop back checking are available. - Peer to peer sending and receiving test is available.

*1: It is required to operate dip switch setting when changing the operation mode.

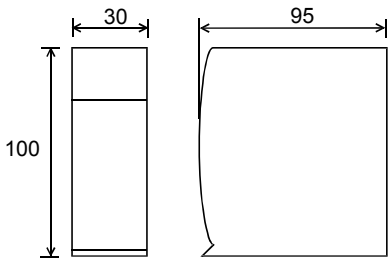
*2: You need to make ladder diagram for error procedure at communication abnormal according to your system.

Chapter 4 System equipment

Name and function of each part



Type	EH-ETH
Weight	0.15 kg
Dimensions (mm)	



No.	Name	Functions	Remarks
1)	LED cover	Refer to “4.2 LED Indication” for detailed information.	
2)	Dip switch	For setting operation mode and its IP address.	
3)	Rest switch	Initializing EH-ETH for module error etc.	
4)	Connector for Ethernet connection	RJ45 type connector	Please connect 10BASE-T cable.
5)	Lock button	When dismounting the module from a base unit, press this button and lift up the module, if necessary, the module can be fixed using a screw (M4, 10 mm) after installation on the base unit.	

4.1 Operating mode

Operation mode of EH-ETH is set by a dip switch on the front panel. The set operation mode is effective after completion of EH-ETH initialization. The dip switch setting is effective only when power on or the reset button pressed.

Out view of the dip switch is shown in Fig. 4.1.1.

Regarding detailed Ethernet information setting, refer to “5.2 Configuration of Ethernet information using Web browser”. And regarding detailed “self diagnostic refer to “10.1 Test functions”.

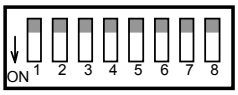


Fig. 4.1.1 Out view of the dip switch

Table 4.1.1 Dip switch setting and operation mode

bit								Operation mode	Contents
1	2	3	4	5	6	7	8		
ON	ON	Lowest byte of IP address (*1) b’000001 to b’111111(1 to 63)						IP address setting mode	Setting Ethernet information by user program
	OFF								Setting Ethernet information and ASR connection using general Web browser
OFF	*(*2)	*	*	*	*	ON	ON	Self diagnostic mode	Test mode of SEND and RECEIVE data
							OFF		External loop back check (*3)
						OFF	ON		Internal loop back check
							OFF	Normal operation mode	For normal operation

*1: In case of setting lowest byte of IP address, OFF position of the switch means “0” and ON position means “1”.

Example: When users set value "41 (Decimal)" as the lowest byte of IP address.

Bit						Bin	Hex	Dec
3	4	5	6	7	8			
ON	OFF	ON	OFF	OFF	ON	B'101001	H29	41

Upper 3 bytes are fixed to “192.168.0”. Therefore select one IP address temporally from “192. 168.0.1 to 192.168.0.63”

2: “” means don’t care.

*3: Need loop back connector.

Caution

- Because IP address “192.168.0.0” has a special meaning, all bit 3 to 8 should not be “0”. If the bit 3 to 8 are all “0”, then LED’s turn ON or flick as follows.

  In case of SOFTWARE VER.00 to VER.02: The Status LED flicker in red 6 times.

  In case of SOFTWARE after VER.03: The Status LED flicker in red 7 times and the I.ERR LED turns ON in red at the same time

- IP address set by the dip switch is used temporally to access a Web server inside EH-ETH. Therefore **the IP address set by the dip switch is not saved in a FLASH ROM in EH-ETH.**

- When you change operation mode during normal operation, the all communications will be stopped. Regarding the operation mode change and reset switch operation, please consult a system manager.

- When you restart EH-ETH, you may operate a relation equipment such as PC and work station.

4.2 LED indications

Fig. 4.2.1 shows out view of the LED cover.

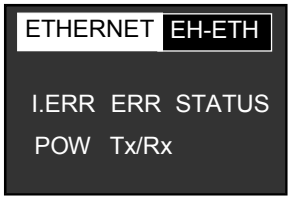


Fig. 4.2.1 Out view of the LED cover

There are 2 LED indications, one is that its meaning and indication are fixed, which is shown in table 4.2.1(1) and another is that the meaning and the indication depend on the operation mode, which is shown in table 4.2.1(2).

Table 4.2.1 LED indication (1)

LED	Color	Condition	Contents
POW	Green	ON	EH-ETH is on line. (*1)
	-	OFF	EH-ETH is off line.
Tx/Rx	Green	ON	Data being transmitted or received
	-	OFF	No communication activity

*1: When loop back connector is connected, the LED also turns ON.

Table 4.2.1 LED indication (2)

LED	Operation mode	Color	Condition	Contents
I.ERR	Normal operation	Red	ON	Ethernet information configuration error
		-	OFF	Normal operation
	IP address setting	Red	ON	Bit 3 to 8 are all OFF. (Temporal IP address is not correct.)
		-	OFF	Normal operation
	Self diagnostic	Green	ON	Executing self diagnostic
ERR	Normal operation	Red	ON	Open error in ASR connection.
		-	OFF	Normal operation or communication inactivated
	IP address setting	-	-	Always OFF
	Self diagnostic	Green	ON	Pass the self diagnostic.
		Red	ON	Self diagnostic error
STATUS	Normal operation	Green	ON	Normal operation
			Flicker	Initialization error because of wrong I/O assignment. (*2)
		Red	Flicker	Serious problem occurs which can not be recovered. LED flickering pattern shows error information. (*3)
	IP address setting	Green	ON	Initialization has been completed and Ethernet and ASR connecting parameters are ready to be changed.
			Flicker	Initialization error because of wrong I/O assignment. (*2)
		Red	7-times flicker	Dip switch bit 3 to 8 are all OFF. (Temporal IP address is not correct.)
	Self diagnostic	Green	Flicker	Executing self diagnostic.

*2: Even I/O assignment is not correct, accessing to Web server is possible and also it is possible to change Ethernet and ASR connecting parameters. But to set Ethernet parameters by Ladder program is not possible.

*3: Regarding details, refer to 4.2.1 “STATUS LED”

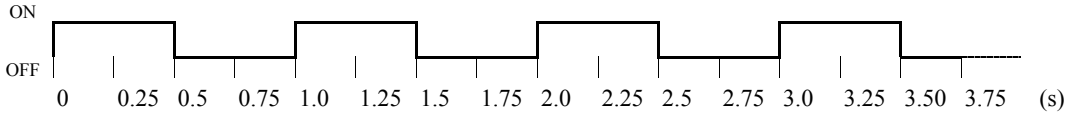
4.2.1 STATUS LED

STATUS LED shows many conditions of EH-ETH by combinations of LED color and eliminating patterns. Its meaning depends on the operation mode.

(A). In case of Green flickering

Operating mode	Meaning of LED
Normal operation and IP address setting	Initialization error because of wrong I/O assignment. Check installed slot of EH-ETH and set correct I/O assignment in CPU module.
Self operation mode	Executing self diagnostic

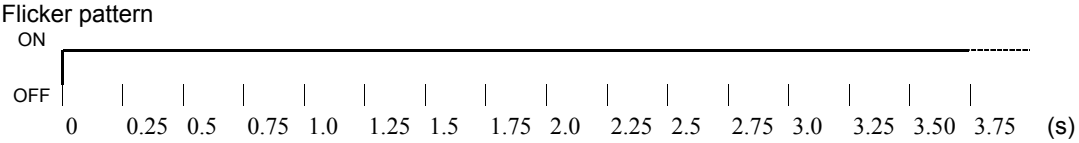
Flicker pattern



(B). In case of Green lighting

Operating mode	Meaning of LED
Normal operation	Normal operation
IP address setting	Initialization has been completed and Ethernet and ASR connecting parameters are ready to be changed.

Flicker pattern

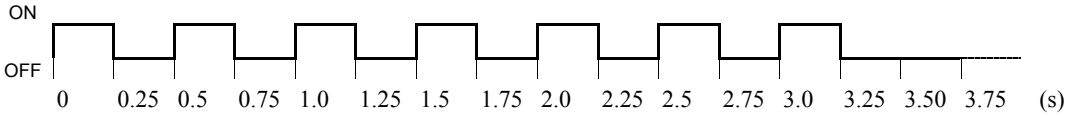


(C). In case of Red flickering

Operation mode	Meaning of LED
Normal operation	Serious problem occurs. LED flickering pattern shows error information.
IP address setting	Dip switch bit 3 to 8 are all OFF. (Temporal IP address is not correct.)

When mode is in IP address setting, if STATUS LED is flickering, check if bit 3 to 8 of the dip switch is all OFF. When EH-ETH is initialized after setting the dip switch correctly, then parameters can be changed.

7-times flicker: Temporal IP address is not correct.



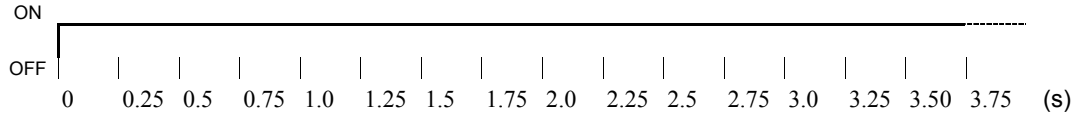
In case STATUS LED flicks in Red in the normal operation mode, unrecoverable error might exist. If EH-ETH is initialized in this condition, EH-ETH might be recovered but there is a possibility to fall into the problem again. If EH-ETH falls in the serious problem, please contact with the dealer.
Table 4.2.2 shows a list of the serious problems.

Table 4.2.2 Serious problems

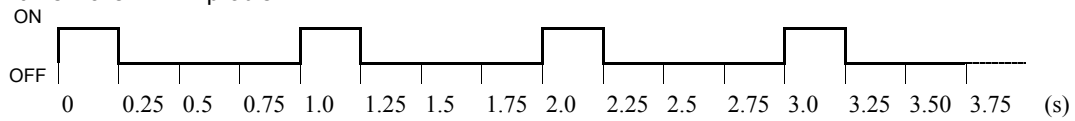
Number of flickering	Problem	Cause
0(ON)	Module problem	System software error
1	RAM problem	RAM error
2	FLASH memory problem	FLASH memory error
3	ASIC problem	ASIC has hardware problem
4	Communication hardware problem	Communication hardware has problem
5	Communication software problem	Communication software has problem
6	CPU module I/F problem	Software regarding I/F between CPU has problem

Color: Red

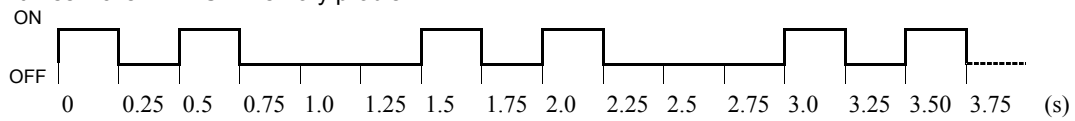
ON: module problem



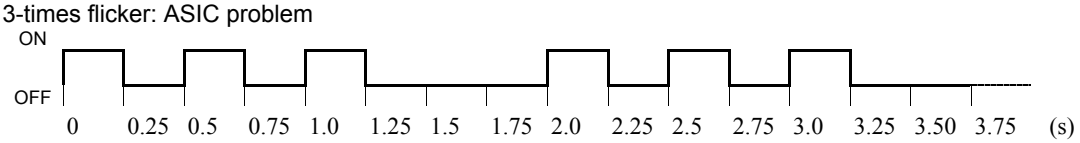
1-time flicker: RAM problem



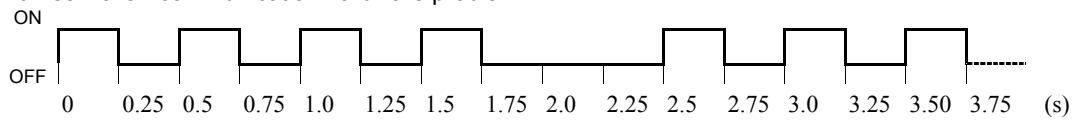
2-times flicker: FLASH memory problem



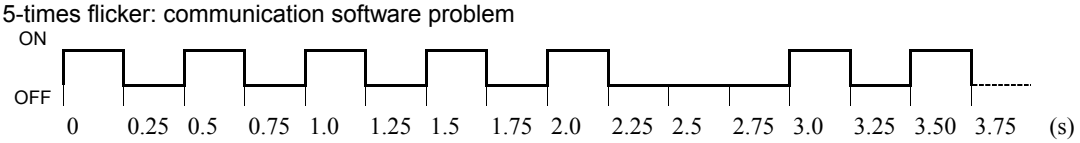
3-times flicker: ASIC problem



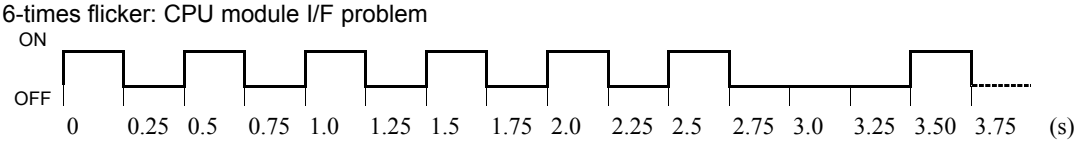
4-times flicker: communication hardware problem



5-times flicker: communication software problem



6-times flicker: CPU module I/F problem



Chapter 5 Configuration and procedure for starting communication

5.1 Ethernet information configuration

It is required to configure the Ethernet information to this module before to start communication. The Ethernet information is saved by the retained memory of this module as the part of setup.dat file.
The detail of the Ethernet information is shown in table 5.1.

Table 5.1 Ethernet information

Items			Default value
IP address of self station			192.168.0.1
Sub Net Mask of self station			255.255.255.0
Sending receiving test		Destination IP address	192.168.0.254
		Logical port number	4000
Default Gate Way address			0.0.0.0
Routing table 1	Network address		0.0.0.0
	Sub Net Mask		0.0.0.0
	Gate Way address		0.0.0.0
:			
:			
Routing table 6	Network address		0.0.0.0
	Sub Net Mask		0.0.0.0
	Gate Way address		0.0.0.0
For Task code communication usage	Task code port 1	Logical port number of self station	3004
		Type of service	0 (TCP/IP)
	Task code port 2	Logical port number of self station	3005
		Type of service	0 (TCP/IP)
	Task code port 3	Logical port number of self station	3006
		Type of service	0 (TCP/IP)
	Task code port 4	Logical port number of self station	3007
		Type of service	0 (TCP/IP)
	Timeout interval value		0 (No timeout)

There are two ways to configure the Ethernet information.

(1) To configure using Web browser. (Recommend)

(2) To configure by ladder diagram in CPU module.

In any case, it is required to change the position of dip switch into “Ethernet information setting mode”.

CAUTION

- It is possible to configure “Configuration of Ethernet information” by Web browser or ladder diagram. But the configuration of “Parameters for communication *1” can be done by only Web browser.
- The both information of not only “Configuration of Ethernet information” but also “Parameters for communication” are saved into setup.dat file.

*1 ASR information is general term of communication parameter.

5.2 Configuration of Ethernet information using Web browser

This module has the Web server and the set up page for several initial configuration values. User can change initial configuration value using Web browser(*1). The following items can be set by the set up page.
In this section, the procedure for changing the Ethernet information from the factory set value included in this module is described.

Table 5.2 The list of the items can be configured by Web browser

Items	Section number to refer
(1) Ethernet Information for this module IP address of self station, Configuration of destination for diagnostic, Configuration of task code port	This section
(2) Information of connection for automatically sending/receiving operation	Section 5.4.1 to 2 Section 5.3.3
(3) Information of I/O area for automatically sending/receiving operation	Section 5.4.4
(4) Downloading/Uploading of setup file	This section

CAUTION

The Web browser is required having frame function. (Ex. Netscape Navigator Ver4.0 later or Microsoft Internet Explorer Ver4.0 later)

5.2.1 Setting procedure

Figure 5.2.1 shows the outline of setting procedure.

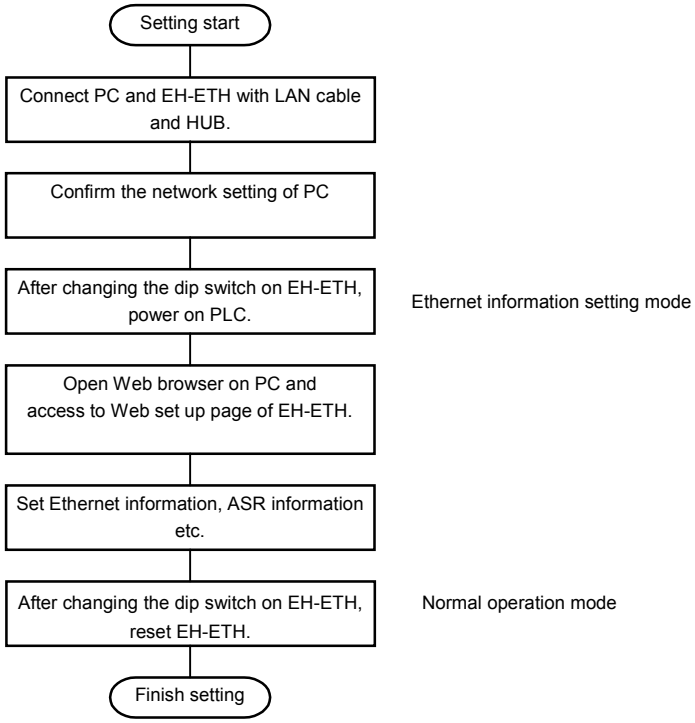


Figure 5.2.1 The outline of setting procedure

5.2.2 Configuration

Please connect PC and HUB, HUB and EH-ETH with LAN cable (10BASE-T).
The example in Figure5.2.2 shows the smallest network by the explanation of for convenience.

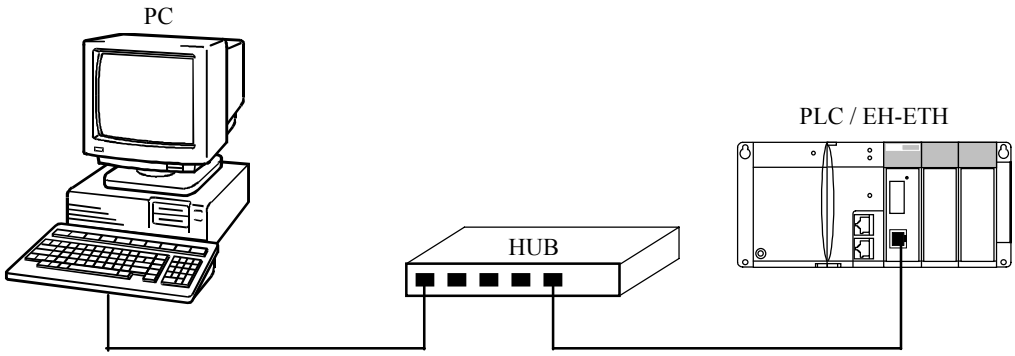


Figure 5.2.2 Example of network

5.2.3 Network Setting on PC side

You can not access to web setup page of EH-ETH immediately without following setting for the PC.
At the network configuration of figure 5.2.2, to access set up web page of EH-ETH, the setting of PC must be the below condition.

1). Subnet mask is 255.255.255.0.

2). IP address's upper 3 byte is 192.168.0 and lower byte is not duplicated the EH-ETH IP address lowest byte.

*1: EH-ETH IP address lowest byte is set by dipswitch 3 to 8.

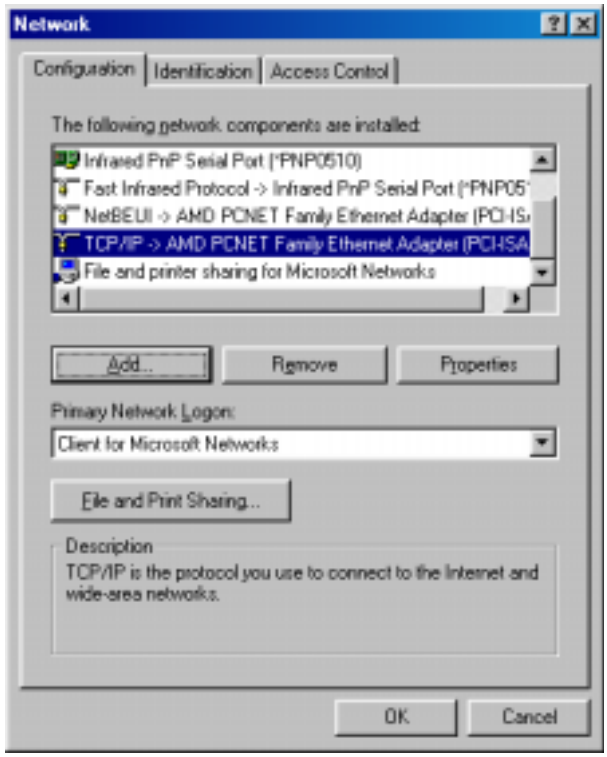
Tentatively, in case of subnet mask is **255.255.255.0** at PC side, and IP address is **192.168.0.128**, you do not need to set network setting at PC side. (Recommended value)
On the other hand, in case of subnet mask is **255.255.0.0**, and IP address is **172.16.0.128**, you need to change the network setting on PC.

The blow explains the changing procedure of network setting at PC side. Furthermore, PC's OS is Windows95 or later.

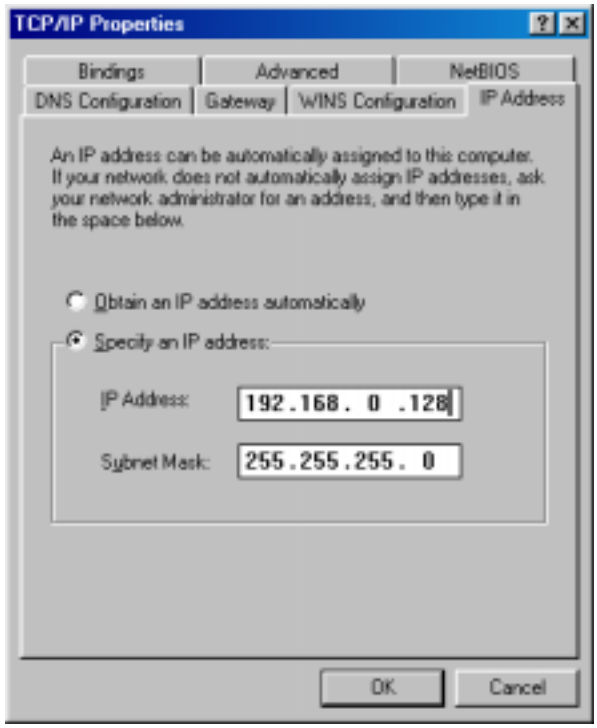
- IP address

(1). Open [Network] in control panel.

Click [TCP/IP] protocol and [Property] button.



(2). Select [IP address]tag, input [192.168.0.128] in IP address.



(3). Click [OK] button, you are requested to restart PC. Preparing restart PC, execute restarting PC.

With over, the network setting change of the PC is completion.

5.2.4 Setting of Dip switch

To set Ethernet information by Web browser, set **bit 1 ON**, **bit 2 OFF** of dip switch.

In this mode, **bit 3 to 8 means lower 6 bit of IP address**. Furthermore remained higher 26 bits of IP address is fixed. Figure 5.2.4.1 shows the temporary IP address.

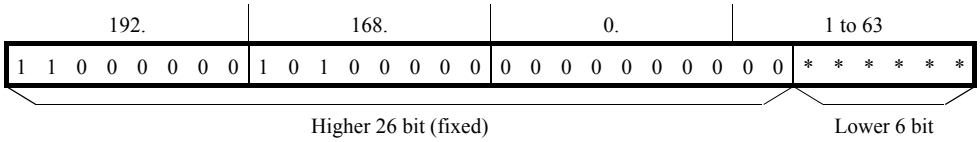


Figure 5.2.4.1 Temporary IP address at the time of the Ethernet information setting by a Web browser

As figure 5.2.4.1 shows, the temporary IP address is selected in the range from [192.168.0.1] to [192.168.0.63].

Table 5.2.4.1 shows the example of DIP switch setting. After setting the dip switch, power PLC on.

Table 5.2.4.1 Dip switch setting (Ethernet information setting mode by Web browser)

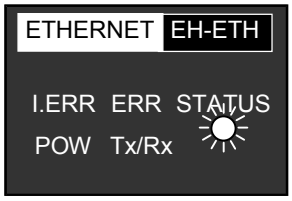
Bit No.								Description
1	2	3	4	5	6	7	8	
ON	OFF	IP address lowest byte b'000001 to b'111111(1 to 63)						Set Ethernet information by Web browser.

Caution

- IP address "192.168.0.0" is special address. Do not set bit 3 to 8 all OFF at bit 1 ON and 2 OFF of dip switch. In this condition, when EH-ETH is power on, LED turns as below.
  SOFTWARE VER.00 to 02: STATUS LED 6 times a cycle with red a flickering
  SOFTWARE VER.03 later: STATUS LED 7 times a cycle with red a flickering, and I.ERR LED turns red.
- IP address set by dip switch is used temporary to access web page of EH-ETH. This setting of dip switch is not stored to FLASH memory of EH-ETH.
- When you participate EH-ETH to Network of established, be careful to the duplicated IP address.

5.2.5 Access to set up page

When PLC is power on, STATUS LED turns on or flickers. You can access Web setup page at both conditions. We recommend setup the I/O assignment on CPU at first.



In the case that it is done with I/O correctly	Green illumination
In the case that it is not done with I/O assignment	Green flickering 0.5s

Figure 5.2.5.1 STATUS LED condition

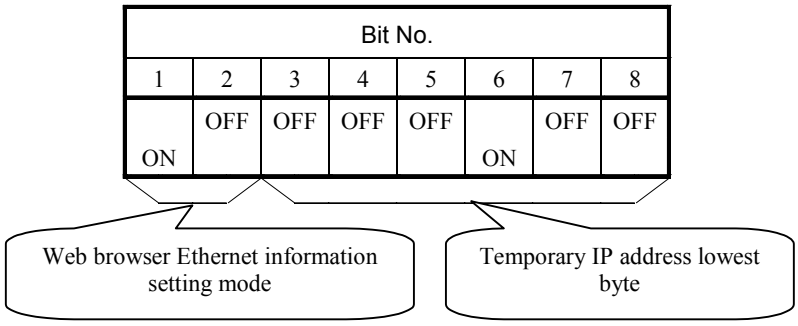
Caution

- You can access Web setup page without I/O assignment, but you can not use on-line connection of LADDER EDITOR for Windows via Ethernet, and ASR connection data transmission without I/O assignment.

Open Web browser to access setup page. Input IP address of EH-ETH.

For instance, in the case the dip switch is set as table 5.2.5.1, temporary IP address is "192.168.0.4", In this case, type http://192.168.0.4/ at address input box of Web browser. By this procedure, setup page will be displayed.

Table 5.2.5.1 Dip switch setting example



Trouble shoot

If the setup page does not appear with above mentioned procedure, "Proxy setting" on your browser is wrong. Please see "10.1 Trouble shooting flow (2) Various kinds setting.

The setup page has **three frames** as figure 5.2.5.2 shows. The setup page's language is English only.

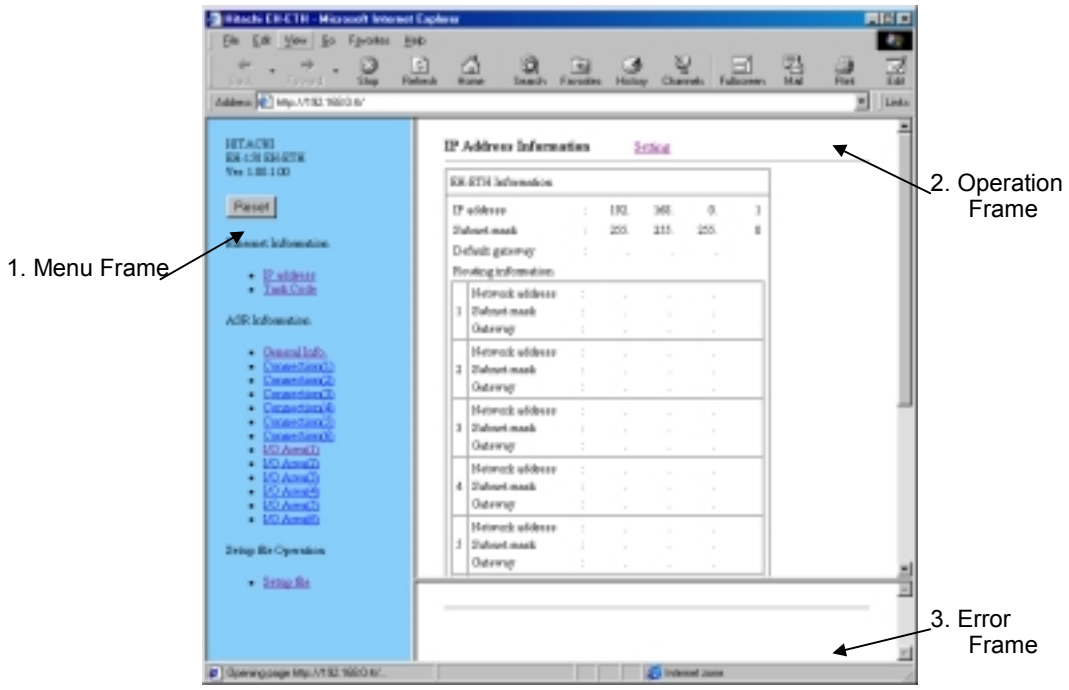


Figure 5.2.5.2 Set up page

1. **Menu frame**
   This frame is the menu to change the contents of the operation frame.

2. **Operation frame**
   This frame is shown to configure the several parameters. This frame is consisted 2 kinds of frame.

Table 5.2.5.2 Operation frame

Name	Description
Display Frame	This frame is used for displaying the current parameters related with the selected link in the menu frame. Display frame keeps the link(Setting) to the related configuration frame. To change the current parameters please click this Setting link.
Configuration Frame	This is the frame to change the several parameters.

3. **Error frame**
   If the illegal parameters on the operation frame are detected the error code will be displayed onto this error frame. Please refer the detailed description in chapter 5.2.8.

5.2.6 IP address setting

The IP address setting is described below.

(1) **"IP address display frame"**

Firstly, click the "IP address" in the menu frame. The "IP address display frame" will appear. The current IP address is shown here. The Factory setting of IP address is 192.168.0.1.

"IP address display frame" is shown in figure 5.2.6.1.

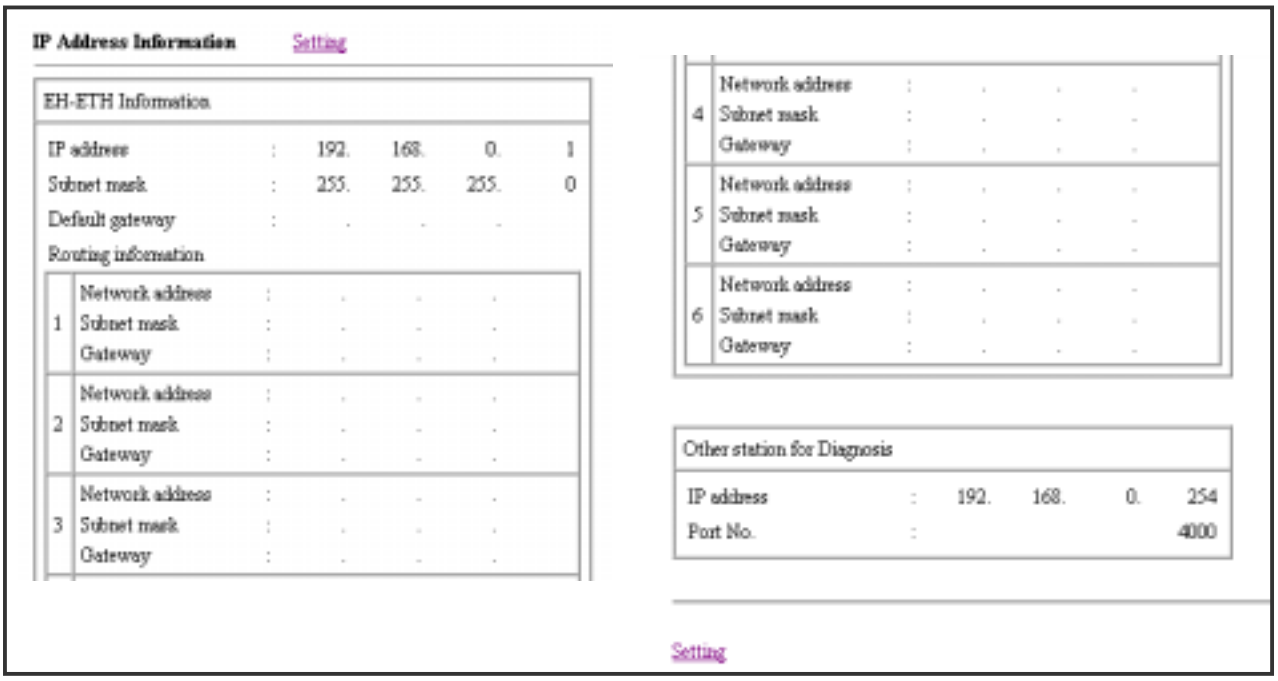


Figure 5.2.6.1 IP address display frame

(2) **"IP address setting frame**"

Secondly, click the "Setting" in the "IP address display frame". The "IP address setting frame" will appear. "IP address setting frame" is shown in figure 5.2.6.2.

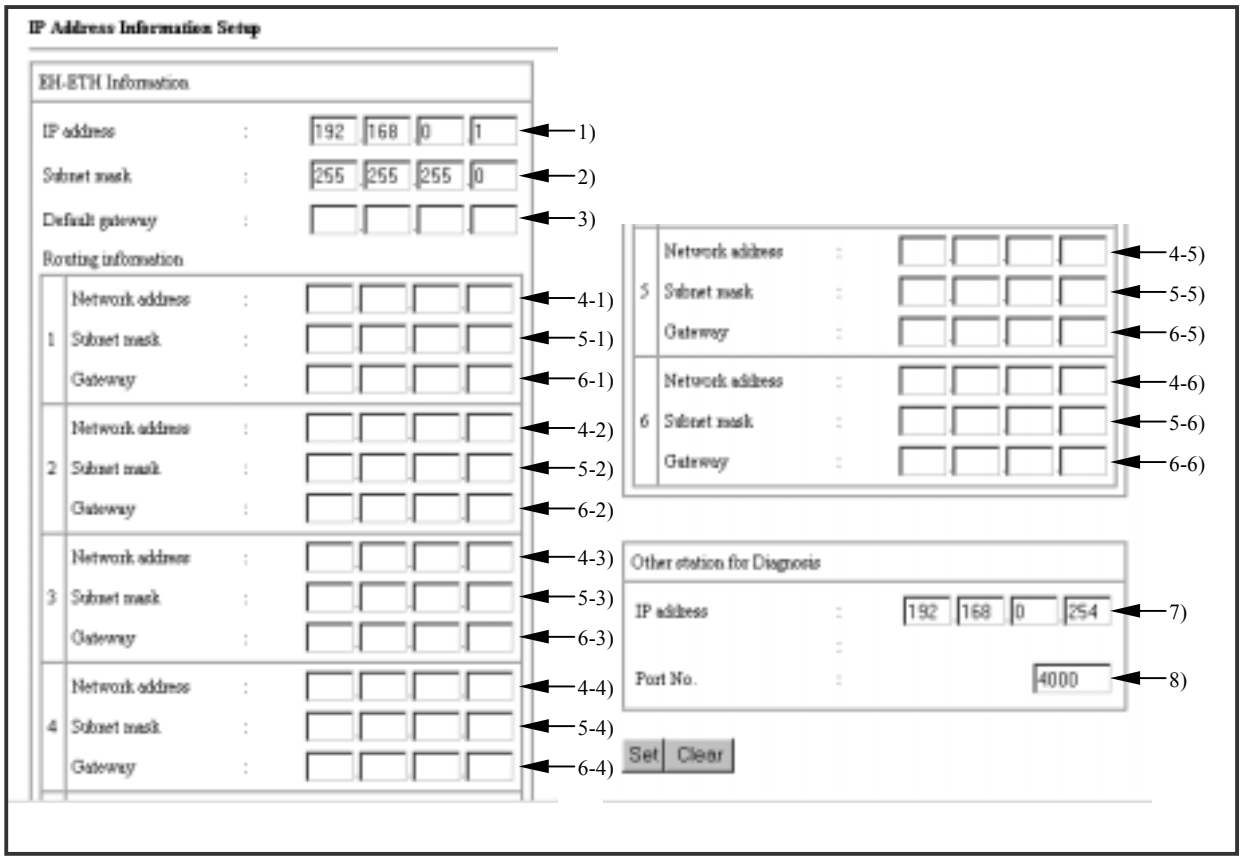


Figure 5.2.6.2 IP address setting frame

Table 5.2.6.1 The list of items of IP address operation frame

No	Name	Description	Range for setting
EH-ETH Information			
1)	IP address	To set the IP address of EH-ETH	Except 0.0.0.0 and 255.255.255.255
2)	Subnet mask	To set the Sub Net Mask of EH-ETH	Between 255.0.0.0 and 255.255.255.248
3)	Default Gateway	To set the Gate Way address of EH-ETH	Except 0.0.0.0 and 255.255.255.255
Routing Information [1:6]			
4-1)	Network address	To set the network address of the destination of routing.	Except 0.0.0.0 and 255.255.255.255
5-1)	Subnet mask	To set the Sub Net Mask of the destination of routing.	Between 255.0.0.0 and 255.255.255.255
6-1)	Gateway	To set the Gate Way address of the destination of routing	Except 0.0.0.0 and 255.255.255.255
Other station for Diagnosis			
7)	IP address	To set the destination IP address of EH-ETH's testing.	Between 0.0.0.0 and 255.255.255.255
8)	Port No.	To set the destination Port number of EH-ETH's testing.	Between 1 and 65535

When you click the "Set" button on the frame, EH-ETH will check the parameters. If all parameters are correct, they will be saved into set up file, and the "IP address display frame" will appear. If they are wrong, set up file is not updated. In this case, please check and correct the value, and set again.

To cancel the input value, please click the "Return" button of Web browser. The frame will return to the "IP address display frame".

Trouble shoot

After click "Set" button, there is a case which setting value is not displayed. In this case, you can solve by setting of Web browser. See "10.1 Trouble shooting flow (2) Various setting".

5.2.7 Configuration of connection for Task code communication

The setting procedure for Task code communication connection is described here.

(1) "**Task code display frame**"

Click the "Task Code" in menu frame. The "Task code display frame" will appear. The current configuration is displayed onto the "Task code display frame". "Task code display frame" is shown in figure 5.2.7.1.

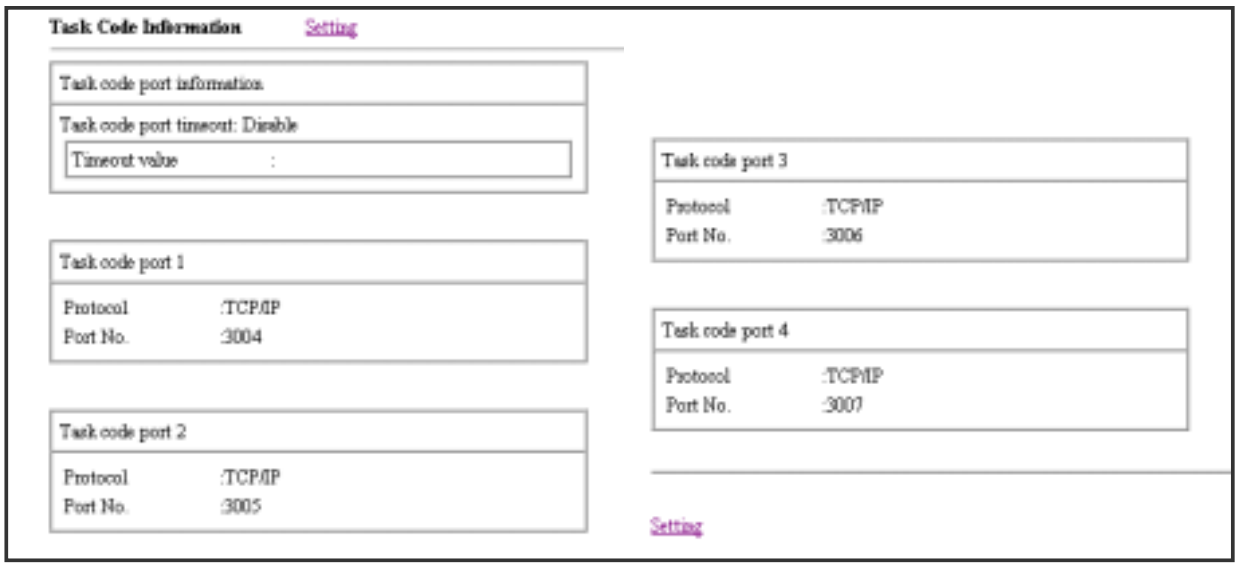


Figure 5.2.7.1 Task code display frame

(2) Displaying the "Task code setting frame"

Click the "Setting" in the Task code display frame. The "Task code setting frame" will appear. "Task code setting frame" is shown in figure 5.2.7.2. And the parameters which can be set by this setting frame are also shown in table 5.2.7.1.

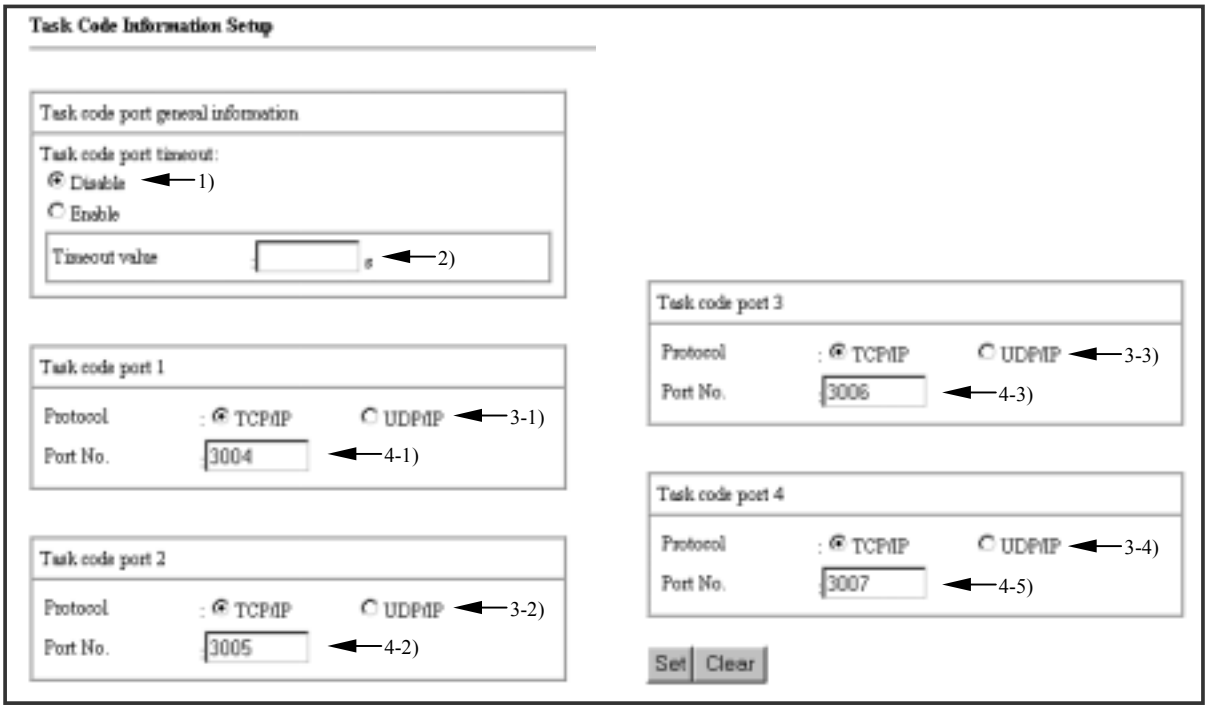


Figure 5.2.7.2 Task code setting frame

Table 5.2.7.1 The list of items of Task code operation frame

No	Name	Description	Range for setting
Task code port information			
1)	Task code port timeout	To set the timeout of Task code connection is enable or not. This value is valid for all Task code connections. If this is specified as disable, the value of item (2) is not valid.	Enable, Disable
2)	Timeout value	To set the value for timeout of Task code connection and this unit is second. This value is valid for all Task code connections.	Between 0 and 65535
Task code port [1:4]			
3-1)	Protocol	To select the protocol for Task code connection.	TCP/IP, UDP/IP
4-1)	Port No.	To set the logical port number for Task code connection.	Between 1 and 65535

When you click the “Set” button on the frame, EH-ETH will check the parameters. If all parameters are correct, they will be saved into set up file, and the “Task code setting window” will appear. If they are wrong, set up file is not updated. In this case, please check and correct the value, and set again.

To cancel the input value, please click the “Return” button of Web browser. The frame will return to the “Task code display frame”.

5.2.8 Ethernet information setting error code

The list of error code of Ethernet information setting is shown in table 5.2.8.1.

Table 5.2.8.1 The list of error code during the IP address setting

Error Code	Display comment	Causes
1001	Operation mode: Is not Ethernet information setup mode.	The position of dip switch is not for “Ethernet information setting mode”.
1101	Own station address: IP address is incorrect.	- Illegal value or character is set for IP address. - “0.0.0.0” or “255.255.255.255” is set for IP address.
1102	Own station address: Subnet mask is incorrect.	- Illegal value or character is set for Sub Net mask. - The out of value of “255.0.0.0” to “255.255.255.248” is set for Sub Net mask.
1103	Own station address: Default Gateway address is incorrect.	- Illegal value or character is set for Default Gate way address. - The out of value of “255.0.0.0” to “255.255.255.248” is set for Sub Net mask.
1104	Own station address: IP address or Subnet mask is incorrect.	“0.0.0.0” or “255.255.255.255” is set for IP address.
1105	Routing information (No. n[*1]): IP address or Subnet mask is incorrect.	- Illegal value or character is set for network address. - The out of value of “0.0.0.0” to “255.255.255.255” is set for Network address.
1106	Routing information (No. n[*1]): Subnet mask is incorrect.	- Illegal value or character is set for routing information. - The out of value of “255.0.0.0” to “255.255.255.248” is set for routing information.
1107	Routing information (No. n[*1]): Gateway address is incorrect.	- Illegal value or character is set for gate way address in routing information. - The out of value of “0.0.0.0” to “255.255.255.255” is set for gate way address in routing information.
1201	Test mode: IP address is incorrect.	“0.0.0.0” or “255.255.255.255” is set for IP address.
1202	Test mode: Port No. is incorrect.	“0.0.0.0” or “255.255.255.255” is set for IP address.
1203	TEST mode: Port No. is in conflict with ASR connection m.	Th port number of TEST mode and the port number of ASR connection m[*1] is in coincidence(conflict).
1301	Task code communication (No. p[*2]): Port No. is incorrect.	Illegal value or character is set for task code port number.
1303	Task code communication (No. 0): Timeout is incorrect.	Illegal value or character is set for task code time out number.
1305	Task code communication: Port No. conflict with ASR connection m.	The port number of task code and the port number of ASR connection m[*1] is in coincidence (conflict).

*1: n should be in 1 to 6.

*2: p should be in 1 to 4.

5.3 Configuration of Ethernet information by ladder diagram

(1) Setting the dip switch

To configure the Ethernet information by ladder diagram, setting dip switch bit1 is ON and bit 2 is ON is required.

Table 5.3.1 Setting the dip switch (Configuration Ethernet information by ladder diagram)

Bit No.								Description
1	2	3	4	5	6	7	8	
ON	ON	IP address lower byte b'000001 to b'111111(1 to 63)						To configure the Ethernet Information by ladder diagram.

CAUTION

- It is possible to access to this module by Web browser but it is not possible to change the "Ethernet information" by Web browser.
- Because of the IP address of "192.168.0.0" has special meaning, please not to set the dip switch bit 1 is ON and bit 2 is ON and don't turn bit3 to 8 into OFF. If with this power ON in this condition, STATUS LED will blink 6 times with red color.
- This dip switch setting is used as temporary setting to access Web server in this module. This dip switch setting is not saved into retaining memory of this module.

(2) Table of Ethernet information

The Ethernet information is saved into retained memory of this module with the format shown in table 5.4.2.

(3) Setting and referring the table value of Ethernet information

The dedicated command FUN200 should be used for setting or referring the value of Ethernet information of this module. This FUN200 command handles the data transfer between internal memory area of CPU and the retained memory of this module. The continuously 54 words of internal memory is required to set the Ethernet information by ladder diagram using FUN200 command.

Table 5.3.2 The table of Ethernet information

Offset of I/O No.	Items		
+00	IP address of own station		(Upper word)
+01			(Lower word)
+02	Sub Net mask		(Upper word)
+03			(Lower word)
+04	Destination IP address of sending / receiving test		(Upper word)
+05			(Lower word)
+06	Destination logical port number of sending / receiving test		
+07	Default Gate Way address		(Upper word)
+08			(Lower word)
+09	Routing information 1	Network address	(Upper word)
+0A			(Lower word)
+0B		Sub Net mask	(Upper word)
+0C			(Lower word)
+0D		Gate Way address	(Upper word)
+0E			(Lower word)
+0F	Routing information 2	Network address	(Upper word)
+10			(Lower word)
+11		Sub Net mask	(Upper word)
+12			(Lower word)
+13		Gate Way address	(Upper word)
+14			(Lower word)
+21	Routing information 5	Network address	(Upper word)
+22			(Lower word)
+23		Sub Net mask	(Upper word)
+24			(Lower word)
+25		Gate Way address	(Upper word)
+26			(Lower word)
+27	Routing information 6	Network address	(Upper word)
+28			(Lower word)
+29		Sub Net mask	(Upper word)
+2A			(Lower word)
+2B		Gate Way address	(Upper word)
+2C			(Lower word)
+2D	Task code communication port 1	Logical port number	
+2E		Protocol type	
+2F	Task code communication port 2	Logical port number	
+30		Protocol type	
+31	Task code communication port 3	Logical port number	
+32		Protocol type	
+33	Task code communication port 4	Logical port number	
+34		Protocol type	
+35	The value of timeout for Task code port		

(4) The configuration procedure of Ethernet information table

The configuration procedure of Ethernet information shown in table 5.3.3 is described here. And also the check procedure is described here.

Table 5.3.3 Example of the configuration

Items			The Value for set	The area to set
IP address of self station			192.168.16.8	*(1-H),(1-L)*
Sub Net mask			255.255.255.0	*(2-H),(2-L)*
Sending / receiving test		Destination IP address	192.168.16.254	*(3-H),(3-L)*
		Logical port number	4000	*(4)*
Default Gate Way address			192.168.16.1	*(5-H),(5-L)*
Routing information 1	Network address		192.168.32.0	*(6-H),(6-L)*
	Sub Net mask		255.255.255.0	*(7-H),(7-L)*
	Gate Way address		192.168.32.1	*(8-H),(8-L)*
Routing information 2 to 6	Network address		Not used	*(9-H),..,(21-L)*
	Sub Net mask		Not used	*(10-H),..,(22-L)*
	Gate Way address		Not used	*(11-H),..,(23-L)*
Task code communication	Task code port 1	Logical port number of own station	3004	*(24)*
		Service type	0 (TCP/IP)	*(25)*
	Task code port 2	Logical port number of own station	3005	*(26)*
		Service type	0 (TCP/IP)	*(27)*
	Task code port 3	Logical port number of own station	3006	*(28)*
		Service type	0 (TCP/IP)	*(29)*
	Task code port 4	Logical port number of own station	3007	*(30)*
		Service type	0 (TCP/IP)	*(31)*
	The value of timeout for Task code port		15 seconds	*(32)*

(a). Preparation of setting value

WM100 to WM135 (in total 54 words) shown in figure 5.3.1 are used as the source area of Ethernet information for this example.

I/O No.	Setting value (HEX) 15–8	7–0		I/O No.	Setting Value (HEX) 15–8	7–0	
WM100	192 (C0)	168 (A8)	*(1-H)*	WM10F*1	0 (00)	0 (00)	*(9-H)*
WM101	16 (10)	8 (08)	*(1-L)*	WM110*1	0 (00)	0 (00)	*(9-L)*
WM102	255 (FF)	255 (FF)	*(2-H)*		:		
WM103	255 (FF)	0 (00)	*(2-L)*		:		
WM104	192 (C0)	168 (A8)	*(3-H)*	WM12B*1	0 (00)	0 (00)	*(23-H)*
WM105	16 (10)	254 (FE)	*(3-L)*	WM12C*1	0 (00)	0 (00)	*(23-L)*
WM106	4000 (0FA0)		*(4)*	WM12D	3004 (0BBC)		*(24)*
WM107	192 (C0)	168 (A8)	*(5-H)*	WM12E	0 (0000)		*(25)*
WM108	16 (10)	1 (01)	*(5-L)*	WM12F	3005 (0BBD)		*(26)*
WM109	192 (C0)	168 (A8)	*(6-H)*	WM130	0 (0000)		*(27)*
WM10A	32 (20)	0 (00)	*(6-L)*	WM131	3006 (0BBE)		*(28)*
WM10B	255 (FF)	255 (FF)	*(7-H)*	WM132	0 (0000)		*(29)*
WM10C	255 (FF)	0 (00)	*(7-L)*	WM133	3007 (0BBF)		*(30)*
WM10D	192 (C0)	168 (A8)	*(8-H)*	WM134	0 (0000)		*(31)*
WM10E	32 (20)	1 (01)	*(8-L)*	WM135	15 (000F)		*(32)*

*1: The value of "0" is required for not used routing information area.

Figure 5.3.1 The source area map of Ethernet information

(b) FUN200 command

The notation of the FUN200 command specification and FUN200 usage for this module are described here.

FUN200 command	
Format	FUN 200 (s)
Parameter	Starting I/O No. of the S parameter area
Function	

- This command handles Ethernet information using extended XY area between CPU module and this module.
- The control type supported by this command is only “With hand shaking” for both receiving and sending. Don’t specify and execute “Without hand shaking” for this command.
- 54 words are the possible size when sending or receiving using this command at once.

The description of S parameter area

s + 0	(1) Error code
s + 1	(2) System area
s + 2	(Not be allowed to use by user)
s + 3	(3) Control type
s + 4	(4) The start of the area
s + 5	(5) Control bit I/O No. of starting sending or receiving
s + 6	(6) Starting I/O No. of Destination (or Source)
s + 7	(7) Size

The description of control bit table for sending or receiving

+ 0	(8) Starting execution flag
+ 1	(9) The completion flag without error
+ 2	(10) The completion flag with error

The description of the frame

The area should be set by user
The area inhibited to set by user

(8) Starting execution flag

When to start sending or receiving with FUN200 command, please set “1” by user program.

This bit will be reset by system execution when the sending or receiving is completed.

(9) The completion flag without error

This bit will be set to “1” when the sending or receiving by FUN200 command is completed without error. This will be reset by system when FUN200 start to execution.

(10) The completion flag with error

This bit will be set to “1” when the sending or receiving by FUN200 command is completed with error. This will be reset by system when FUN200 start to execution.

(1) Error code

The execution result of FUN200 command is set.

Completed without error -> = H0000

Completed with error -> != H0000

(2) System area

This area is used by system execution when FUN200 command is executed. Don’t use this area by user.

(3) Control type: (“With hand shaking” is supported.)

H0001:The request to get Ethernet information from this module

H0002: Don’t set this value.

H0003:The request to put Ethernet information to this module

H0004 to HFFFF: Don’t set these value.

(4) The start of the area :

b15	b11	b7	b0
Unit No.	Slot No.	The position of word	

Unit No. : Always “0” is required

Slot No. : One of 0 to 2 is required

The position of word : Always “0” is required

(5) Control bit I/O No. of starting sending or receiving

The actual address value of R, L or M which has the starting I/O No. of the sending or receiving control bit area should be set using ADRIO command.

(6) Starting I/O No. of Destination (or Source)

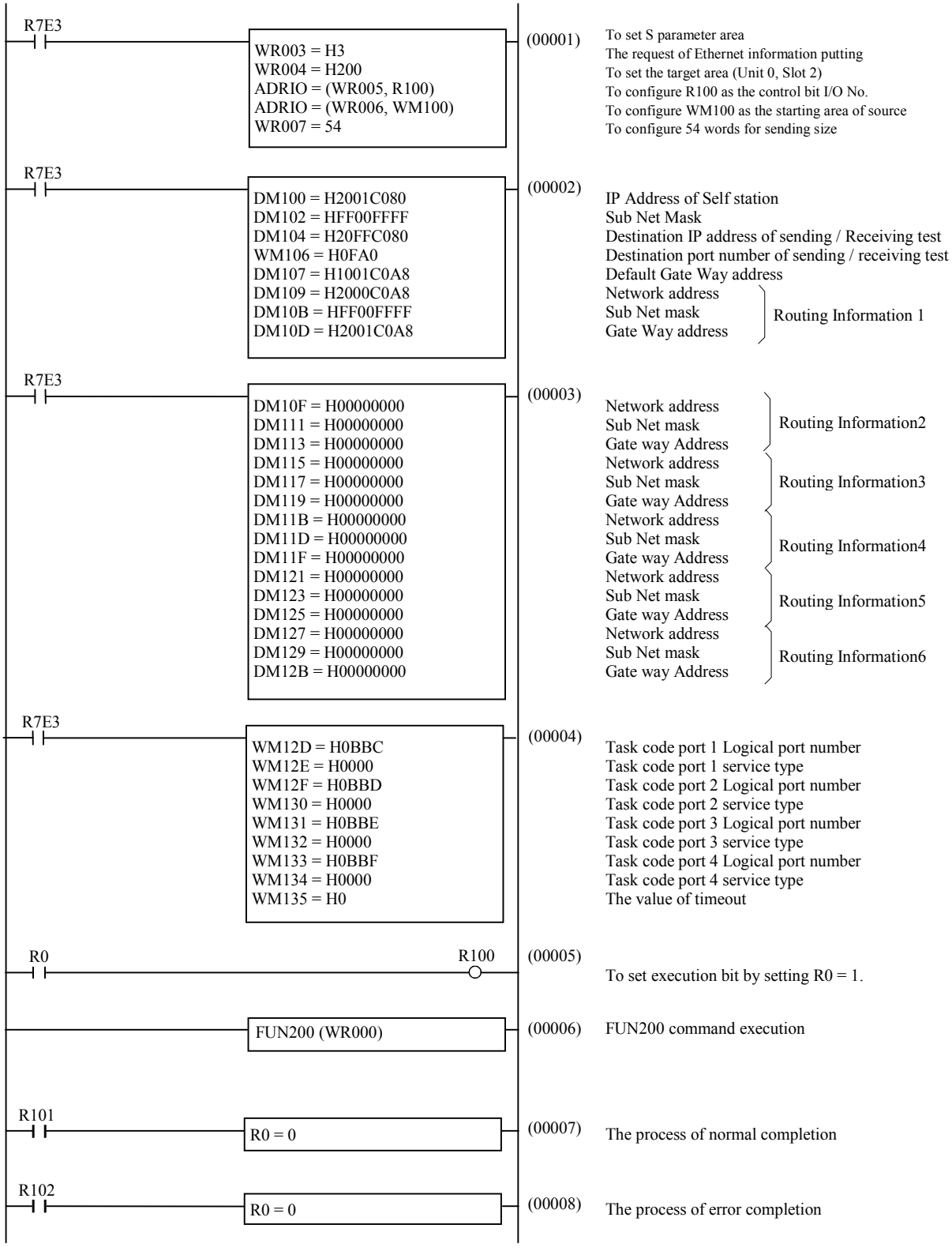
The actual address value of WR, WL or WM which has the starting I/O No. of the source or destination area should be set using ADRIO command.

(7) Size

The size of using area for sending or receiving should be set. For this module, maximum size is 54 words.

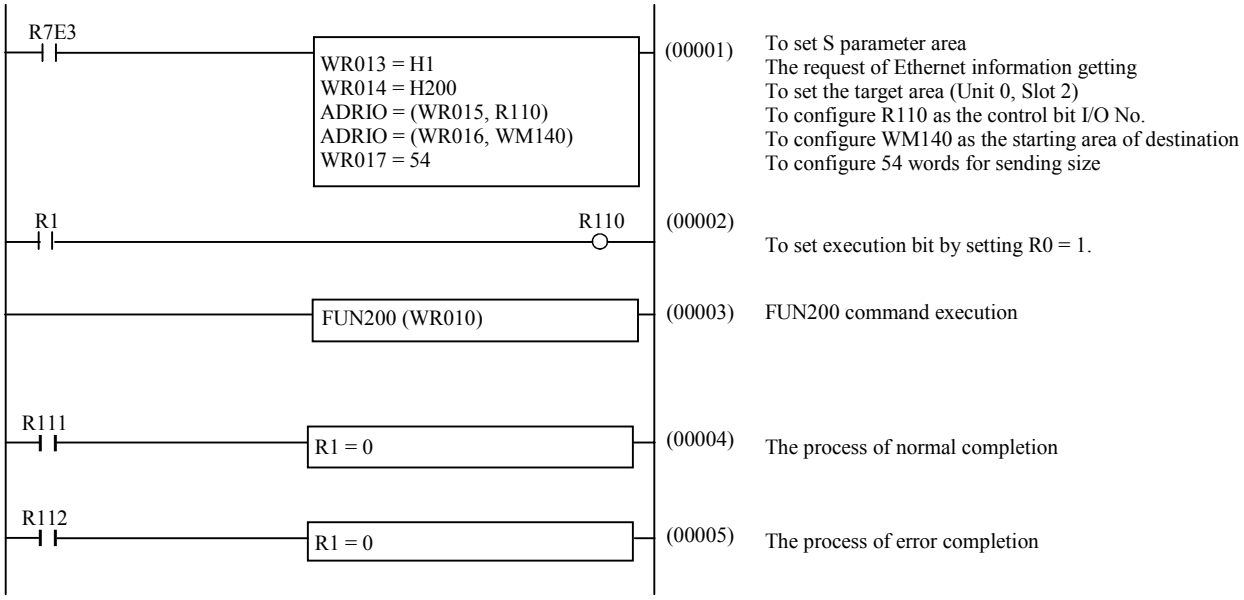
Sample program 1 The setting Ethernet information

Slot No.	0	1	2
EH-ETH	-	-	*



Sample program 2 To check the Ethernet information

Slot No.	0	1	2
EH-ETH	-	-	*



5.4 The configuration of ASR information

There are 3 kinds of configuration items for ASR information as shown in table 5.4.1.

Table 5.4.1 The classification of ASR information

Class	Outline	Description
1	ASR general setting	General setting for all connections.
2	Connection type	Setting for every connection
3	Setting the sending and receiving I/O area	I/O area setting to write/read for every connection

5.4.1 General configuration of ASR

You have to set the values which is used for all ASR connection in this page.

(1) Displaying of "ASR General Information display window"

Firstly, click the "General info." in the menu frame. The "ASR information display window" will appear. The current configuration is displayed onto the "ASR information display window". "ASR information display window" is shown in figure 5.4.1.1.

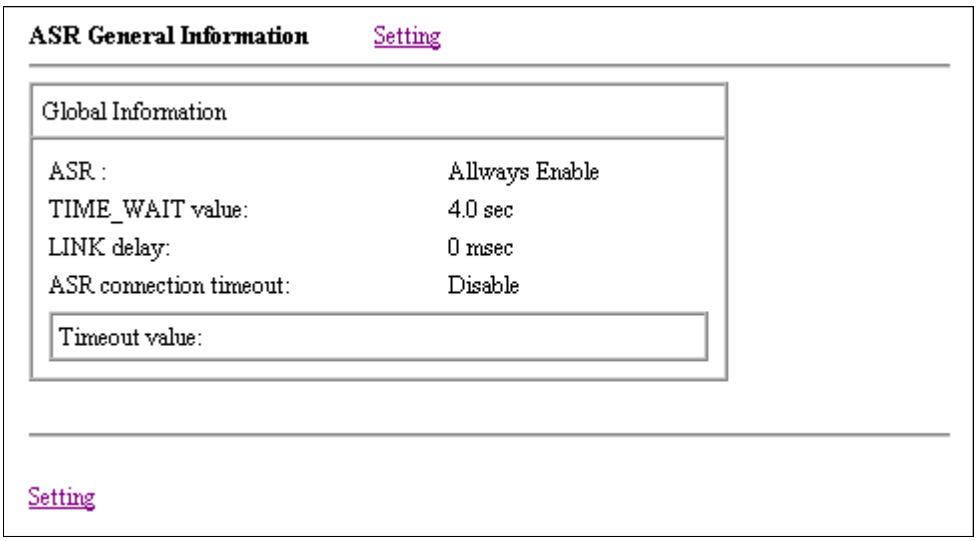


Figure 5.4.1.1 ASR information display window

(2) Displaying of "ASR General Information configuration window"

Secondly, click the "Setting" in the "ASR General Information display window". The "ASR General Information configuration window" will appear. "ASR General Information configuration window" is shown in figure 5.4.1.2.

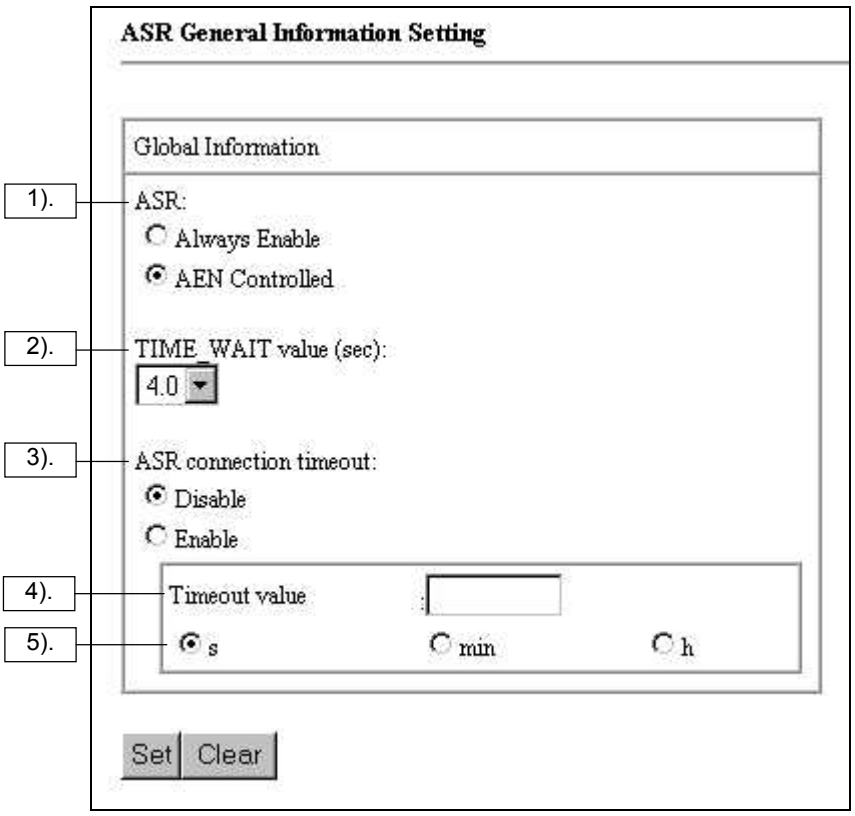


Figure 5.4.1.2 ASR Information configuration window

Table 5.4.1.1 The list of items of ASR information configuration

No	Name	Description	Range for setting
1)	ASR	To select the enable or disable base on the AEN bit configuration of control register MDCD whether the ASR is valid without any condition. When the [Always Enable] selected After the power on, if the connection is established, ASR will start soon. When the [AEN Controlled] selected When AEN=0(Initial status), ASR is not valid. When AEN=1, ASR is valid.	Always Enable, AEN Controlled
2)	TIME_WAIT value	To adjust the waiting time between the request of releasing connection and actually releasing the connection.	0 to 4.0(s) every 0.5(s)
3)	ASR connection timeout	To set the enable of timeout for the ASR connection. When the Disable is set, 5) and 6) are invalid.	Enable, Disable
4)	Timeout value	To set the timeout value for ASR connection. This value is valid for all ASR connection.	0 to 65535(s) 0 to 1092(min) 0 to 18(h)
5)	Unit	The unit for 5) is set here. (s is second, min is minute and h is hour)	s, min, h

Point

Setting "AEN Controlled" is very useful, when to invoke the ASR after finishing the source I/O area initialization. It is possible to start ASR by setting "MDCR.AEN" to 1 when the initialization is completed.

When you click the “Set” button on the frame, EH-ETH will check the parameters. If all parameters are correct, they will be saved into set up file, and the “ASR Information display window” will appear. If they are wrong, set up file is not updated. In this case, please check and correct the value, and set again.

5.4.2 The configuration of ASR connection

The procedure of setting for ASR connection

(1) Displaying of "ASR connection display window"

Firstly, click the “Connection (1)-(6)” in the menu window. The “ASR connection display window” will appear. The current configuration is displayed onto this window. This window is shown in figure 5.4.2.1.

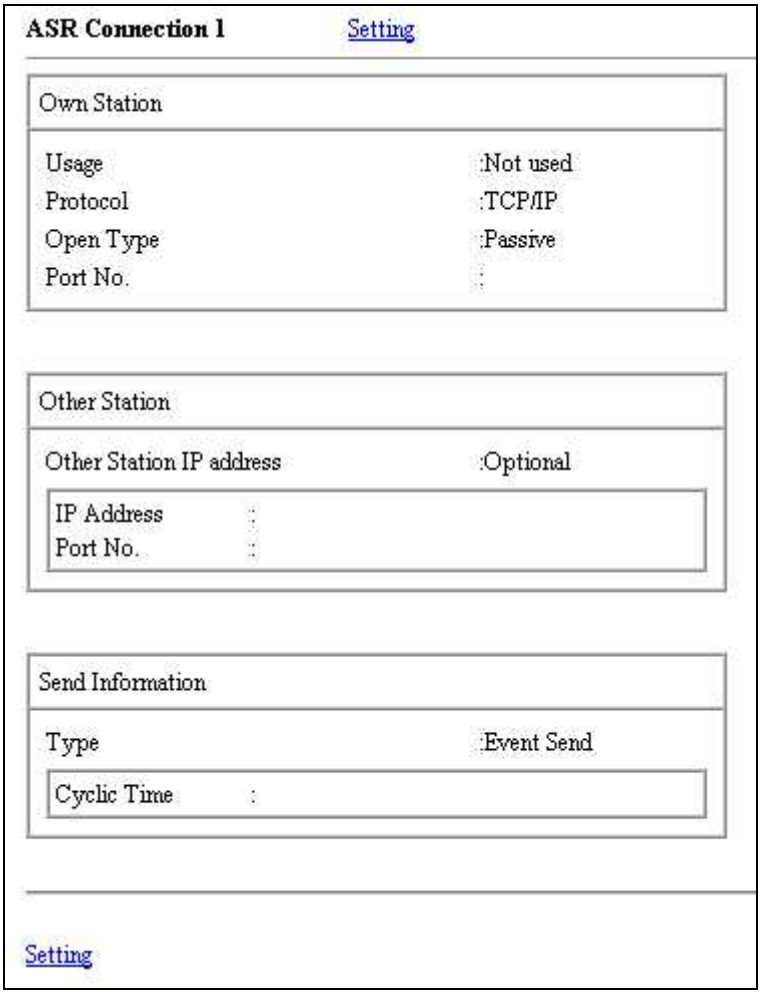


Figure 5.4.2.1 ASR connection display window

(2) Displaying of "ASR connection configuration window"

Secondly, click the “Setting” in the “ASR connection display window”. The “ASR connection configuration window” will appear. This window is shown in figure 5.4.2.2.

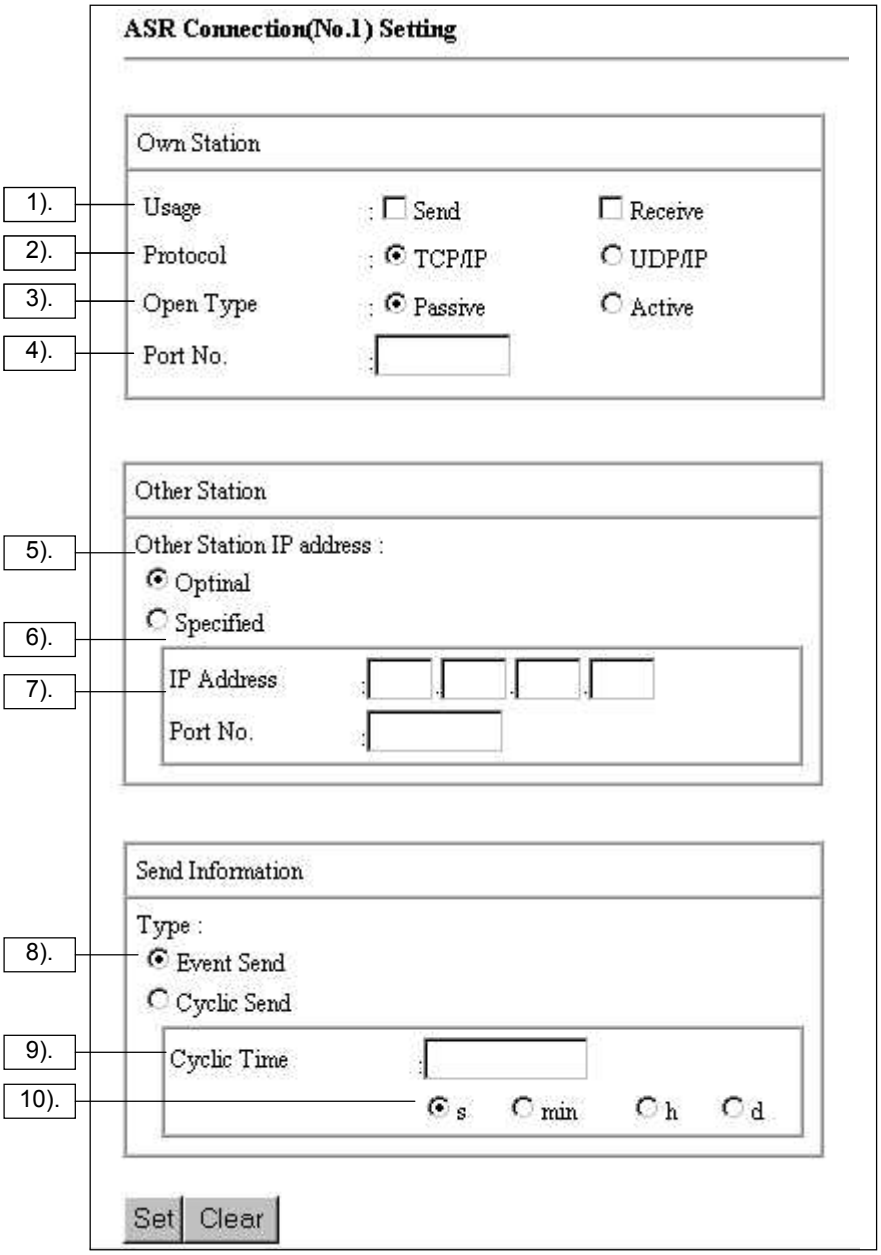


Figure 5.4.2.2 ASR connection configuration window

When you click the “Set” button on the frame, EH-ETH will check the parameters. If all parameters are correct, they will be saved into set up file, and the “ASR connection display window” will appear. If they are wrong, set up file is not updated. In this case, please check and correct the value, and set again.

Table 5.4.2.1 The list of items of ASR connection configuration

No.	Name	Description	Range for setting
Own Station			
1)	Usage	To specify the usage of connection. It is possible to set Send(for sending) or Receive(for receiving). It is possible to specify both. If the Send is not specified (8) to (10) are not valid.	Send, Receive
2)	Protocol	To specify the protocol of self station.	TCP/IP, UDP/IP
3)	Open Type	To specify the open type of self station. When Active is specified, open request is sent activity. When Passive is specified, open request from the target station is waited.	Active, Passive
4)	Port No.	To specify the logical port number of self station.	1 to 65535
Other Station			
5)	Other station IP address	To set the decision of specifying the target IP address or not. When Specified is specified, the communication is done only with specified target. When Optional is specified, the target station is not specified. If the Optional is specified (6) and (7) is not valid.	Optional, Specified
6)	IP address	To set IP address of target station.	0.0.0.0 to 255.255.255.255
7)	Port No.	To set logical port number of target station.	1 to 65535
8)	Type	To specify the sending type of connection. When Event Send is specified, (9) and (10) are not valid. (Please specify 0 or nothing for these. It will error when except 0 specified.)	Event Send, Cyclic Send
9)	Cyclic Time	To specify the time interval of Cyclic Send.	0 to 1073741 (sec) 0 to 17895 (min) 0 to 298 (hour) 0 to 12 (day)
10)	Unit	This is the unit for Cyclic Time.	s, min, h, d

There are some limitations in the combination between parameter 1) 2) 3) 5) in table 5.4.2.1. These are described in table 5.4.2.2.

Table 5.4.2.2 The possible combination to set

	Own Station			Other Station	
	2) Protocol	1) Usage	3) Open Type	5) Other station IP address	IP address setting Port No.setting
1	TCP/IP	Send, Receive, Send/Receive	Active	Specified	Need
2			Passive	Specified	Need
3				Optional	No need
4	UDP/IP	Send	-*1	Specified	Need
5		Receive	-*1	Specified	Need
6				Optional	No need

(*1): When "UDP/IP" is chosen as the protocol, ETH disregards the value which is set in "Open Type."

5.4.3 Configuration of ASR I/O area

When using the connection for sending, it is required to specify the internal output area (I/O) in the CPU module as the source area. And when using the connection for receiving, it is required to specify the internal output area in the CPU module as the destination area. The configuration procedure for these usage are described here.

(1) Displaying of "ASR I/O area display window"

Firstly, click the “I/O area (1)-(6) link selection” of menu window then the operation frame changes to the “ASR I/O area display window”. The current configuration is displayed onto this window.

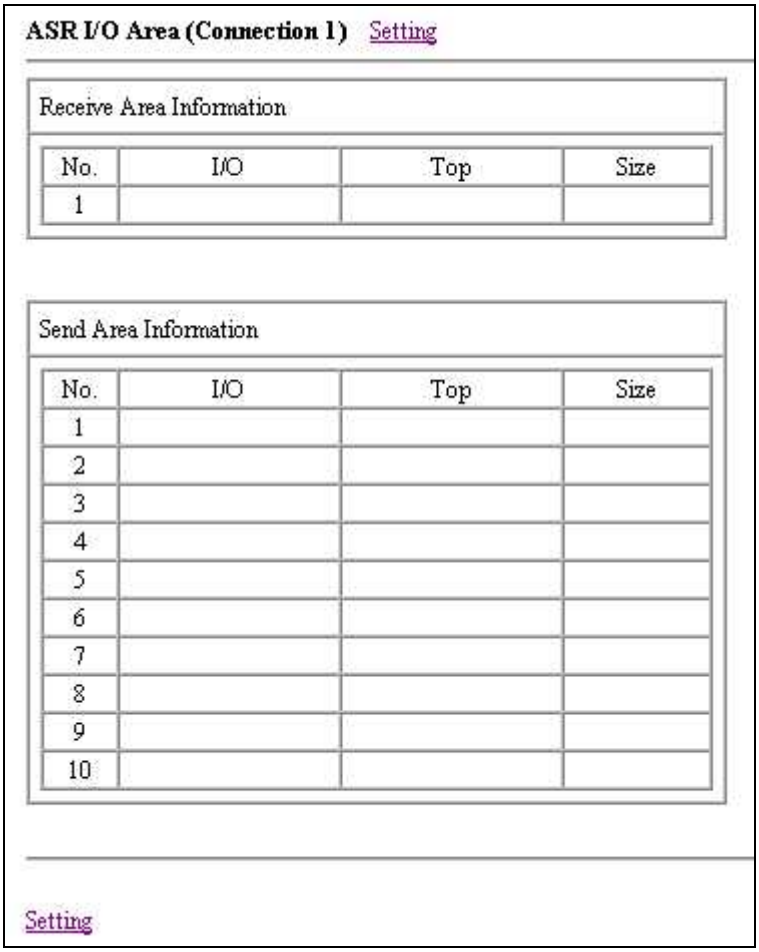


Figure 5.4.3.1 ASR I/O area display window

(2) Displaying of "ASR I/O area configuration window"

Secondly, click the “Setting link selection” of “ASR I/O area display window” then the operation frame changes to the “ASR I/O area configuration window”. This window is shown in figure 5.4.3.2. And the items which can be set by this configuration window are also shown in table 5.4.3.1.

When you click the “Set” button on the frame, EH-ETH will check the parameters. If all parameters are correct, they will be saved into set up file, and the “ASR I/O area display window” will appear. If they are wrong, set up file is not updated. In this case, please check and correct the value, and set again.

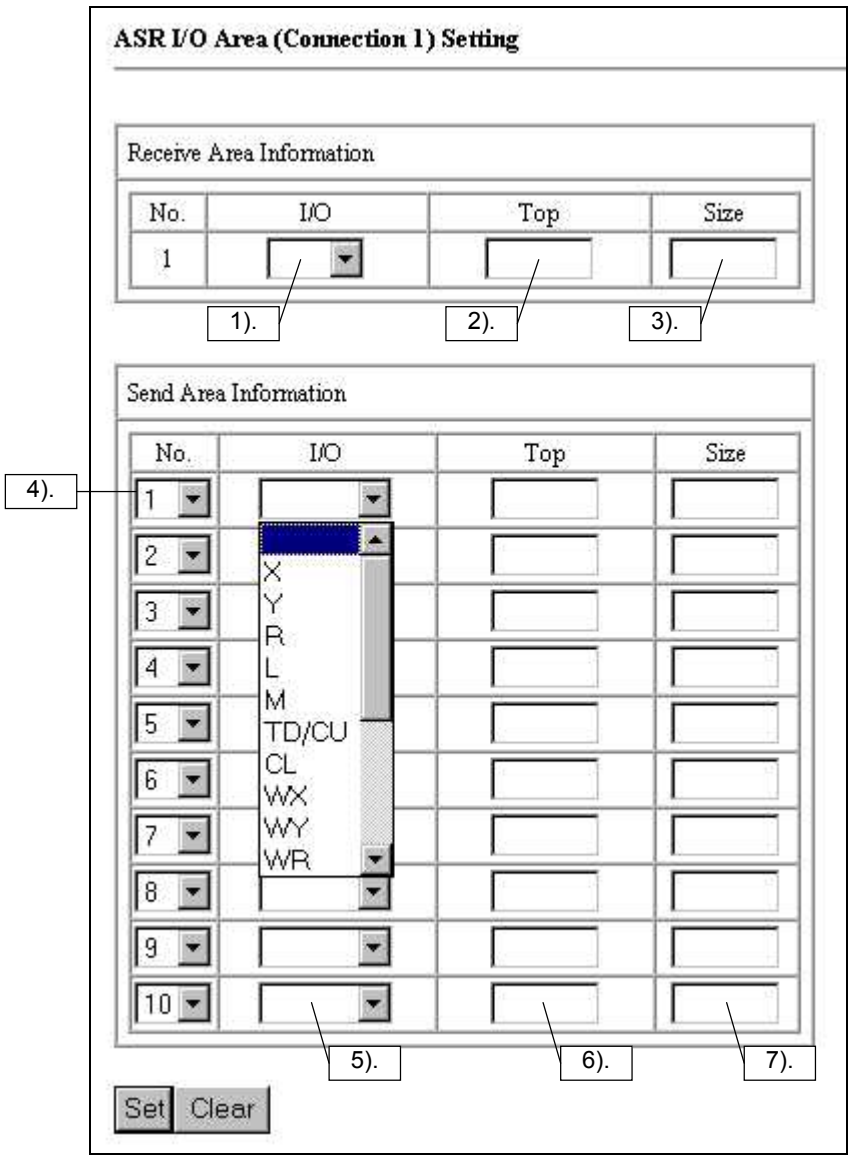


Figure 5.4.3.2 ASR I/O area configuration window

Table 5.4.3.1 The list of items of ASR I/O area configuration

No	Name	Description	Range for setting
Receive area			
1	I/O	To specify the I/O for the receiving area. If there is no specifying (2) and (3) are not valid.	WY,WR, WL, WM
2	Top	To specify the starting I/O number for the receiving area.	The range is same as each I/O's ranges.
3	Size	To specify the I/O size (count of words) for the receiving area.	1 to 727(word)
Send area			
4	No.	To specify the entry number. The entry number means the saving order of the sending I/O area data in the sending message. This is useful to change the I/O area order among the exist configuration. Please specify this No. not to be duplex. (If duplicated, result in error.)	1 to 10
5	I/O	To specify the I/O for the sending area. If there is no specifying (6) and (7) are not valid.	X,Y,R,L,M,TD/CU,CL, WX,WY,WR,WL,WM, TC,DIF,DFN,TM,TV
6	Top	To specify the starting I/O number for the sending area.	The range is same with each I/O's ranges.
7	Size	To specify the I/O size (count of words or bits) for the sending area.	1 to 11632 (bit type) 1 to 727(word type)

Caution

When you use the external I/O as the sending or receiving area, you have to set I/O assignment to the CPU module correctly. If you use the external I/O which is not set I/O assignment, it is not guaranty that data arrive to another node.

5.4.4 Downloading and Uploading of Setup file

EH-ETH memories Web browser information as setup file (file name: setup.dat).

A user can download to host computer (PC or WS) via Web browser. A user can also upload a stored setup.data file to EH-ETH from host computer. You do not need to change a operation mode(dip switch setting) when you upload or download setupdat. Therefore you can save a time to set each item when you change IP address or EH-ETH itself.

You do not need to change dip switch to operate setup.dat file, you can change the setting of EH-ETH easily. This is User-friendliness good and all users who can access setup page can change the setting of EH-ETH. Therefore the control and operation of network equipment may have trouble by the change.

The download page of setup.dat file have **pass word function** for security. By this function, setting information can be protected from the access by except network administer

Caution

- This pass word function is added from **SOFTWARE VER.02**.
  This function is not available at SOFTWARE VER.00. But at **SOFTWARE VER.02** , user name is "User" and pass word is "Password". So substantially without notice access is unable to be avoided.

The below explanation is to access to setup page. Besides, part of operation procedure is depend on each SOFTWARE VERSION. The explanation of (2) or later is not applied for SOFTWARE VER.00.

LOGIN to setup page at normal operation mode.

(1). Click *Setup file* link in menu frame.

(2). "Network pass word input" is displayed.

(3). User name and pass word is different from each **SOFTWARE VER.**

[**SOFTWARE Ver.02**]

(3-1). Input "User" in usr name box, and "Password" in pass word box. First character of both "User" and "Password" is capital character.

[**SOFTWARE Ver.03 or later**]

(3-1). When you access setup page at first, input "User" in usr name box and brank in password box and click OK button. First character of "User" is capital character.

(3-2). When you already registered "user name" and "password", after input registered characters and click OK button.

The login to an setup page completes with over.

(1) "Setup file frame"

After login to setup page, operation frame is changed to "setup file page". This frame is shown in figure 5.4.4.1. The parameters which can be set at setting frame is shown in table 5.4.4.1.

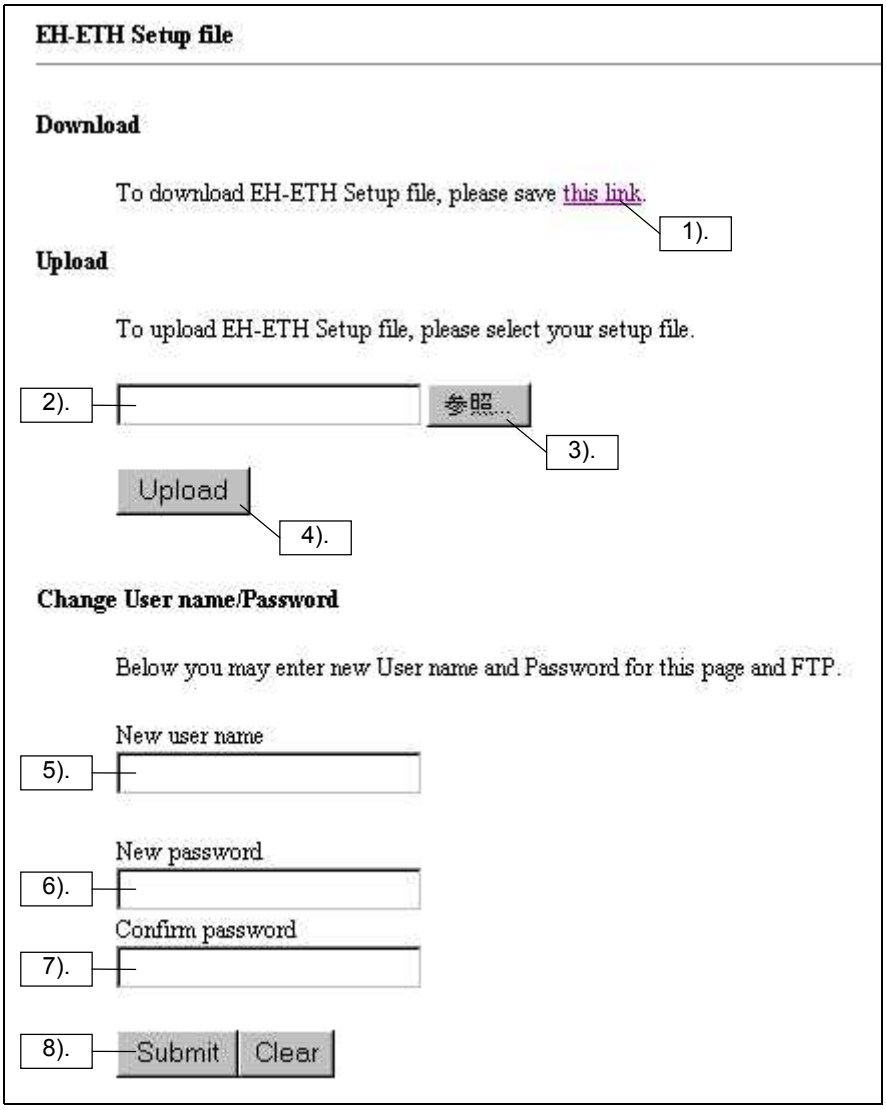


Figure 5.4.4.1 Setupt file frame

Table 5.4.4.1 Setup file frame parameter

No	Name	Description	Range
1).	Link	This is link to setup file (setup.dat). When you **download** setup.dat file, store this link.	
2).	File holder input text box	File name and path of setup.dat for **upload** is displayed. File is set by 3) button.	
3).	Browser button	When you click this button, upload dialog frame will be displayed. Specify the setup.data to store.	
4).	Upload button	Transmit setup.dat to **upload**. EH-ETH checks the setting contents. If there is error, error code will be appeared in error frame.	
5).	New user name input text box	This is to register user name. When user name is already registered, the name is displayed.	Alphabet and numbers 20 characters

(Continue to next page)

Table 5.4.4.1 Setup file frame parameter

No	Name	Description	Range
6).	New password input text box	This is to register password. When password is already registered, the asterisk (*) is displayed.	Alphabet and numbers 17 characters
7).	New password confirm test box	This is to confirm password in 6). When password is already registered, the asterisk (*) is displayed.	Alphabet and numbers 17 characters
8).	Submit button	Submit user name and password in 5) to 7).	

Caution

- When you upload setup file, the file name must be **setup.dat**. Give the file name as all the small letters.

Trouble shoot

- If you forget registered User Name and Password, do not change the operation mode to "Web browser Ethernet information setting mode". At Web browser Ethernet information setting mode, Password function will not be available.

5.4.5 ASR information set error code

The error codes of ASR information setting is shown in table 5.4.5.1

Table 5.4.5.1 ASR information setting error code

Error code	Comment	Cause
2101	General information (No.n): Port No. is incorrect.	Illegal value or character is set for ASR connection n[*1]port number
2102	General information (No.n): Other station IP address is incorrect.	At ASR connection n[*1] - Illegal value or character is set for ASR other station IP address. - The out of value of “0.0.0.0” to “255.255.255.255” is set for ASR other station IP address.
2103	General information (No.n): Other station Port No. is incorrect.	Illegal value or character is set for ASR other station port number at ASR connection n[*1] .
2104	General information (No.n): Cyclic time is incorrect.	Illegal value or character is set for cyclic transmission time at ASR connection n[*1] .
2105	General information: Timeout is incorrect.	Illegal value or character is set for ASR connection timeout.
2106	General information (No.n): Port No. is in conflict with ASR connection m.	The port number of ASR connection n[*1] and the port number of ASR connection m[*1] is in coincidence(conflict).
2107	General information (No.n): Port No. is in conflict with Task code connection p.	The port number of ASR connection n[*1] and the port number of ASR connection p[*1] is in coincidence(conflict).
2108	General information (No.n): Port No. is in conflict with the Diagnostic port.	The port number of ASR connection n[*1] and the port number of diagnostic is in coincidence(conflict).
2109	General information (No.n): Other station must be specified.	ASR connection n[*1] is active station, but other station is "Optional" is selected.
2202	Receive Information (No.n): Top is incorrect.	At ASR connection n[*1], illegal value or character is set for head I/O address of receive area.
2203	Receive Information (No.n): Size is incorrect.	At ASR connection n[*1], illegal value or character is set for head I/O address of receive area.
2204	Receive Information (No.n): Top + Size exceeds the limit.	At ASR connection n[*1] , data size of receive area is over the supported I/O area of CPU module.
2302	Send Information (No.n): Top is incorrect.	At ASR connection n[*1], illegal value or character is set for head I/O address of send area.
2303	Send Information (No.n): Size is incorrect.	At ASR connection n[*1], illegal value or character is set for head I/O address of send area.
2304	Send Information (No.n): Top + Size exceeds the limit.	At ASR connection n[*1] , data size of send area is over the supported I/O area of CPU module.
2305	Send Information (No.n): Total size is too big.	At ASR connection n[*1] , total send data size is over 727 words.
2306	Send Information: Item No. conflict.	Item number of Send areas are duplicated.
2401	Invalid filename.	Upload file name is not setup.dat.
2501	User name required.	User name is brank.
2502	Password confirmation failed.	Characters of password input text box and password confirm text box is not same.

*1: n should be in 1 to 6.

*2: p should be in 1 to 4.

Chapter 6 Task code communication

H series PLC has a communication protocol called task code, which enables easy communication between host computer and EH-ETH.

Features of task code communication
- No need ladder program for task code communication.
- A Host computer is able to up/download a ladder program to/from a CPU module using the task code. Also, it is possible to write and read any data in CPU module.
- EH-ETH transmits the request task code to EH-CPU448 to omit the header information of TCP (or UDP) packet issued by a host computer. This to, EH-ETH transmit response task code to a host computer to add TCP (or UDP) packet header information.

6.1 H series communication specification

The detailed function of each task code(command) is described in this chapter.

6.1.1 Outline

The following shows the outline of H series communication specification.

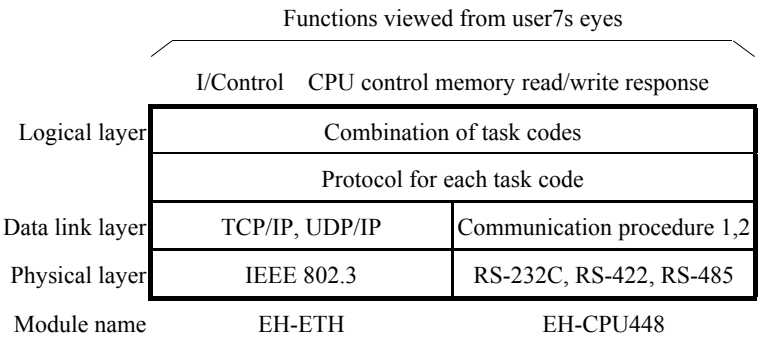


Figure 6.1.1 Out line of the communication protocols for H series

EH-ETH use **uni-directional** procedure at data link layer. At this **uni-directional procedure**, only a host computer can start the communication to H series module. The task code communication supported by EH-ETH is passive protocol because EH-ETH can respond only.

As explained above, for H-series, the protocol is defied so that the host computer can access all CPU in the network of H-series.

The following five functions of H-series are available to users.

(1) CPU control : RUN/STOP control of CPU, set/reset of occupancy, Read CPU status etc.
(2) I/O control : Various monitors
(3) Read memory : Read programs etc.
(4) Write memory : Clear all, transfer all etc,
(5) Response : Various response from CPU

To utilize these functions, various task codes are to be assembled in the host computer program.

See the **EH-150 application manual (NJI-280*(X)) Appendix 3 Task Code Specifications** for detailed task code (command code). And see the next chapter for data format.

6.1.2 Frame format

The task code format of EH-ETH is shown in Figure 6.1.2. If you make an application program for host computer, you should follow this format, which is different from the standard RS-232C protocol. The data must be binary.

Cautions
EH-ETH can accept only **binary data.** ASCII data is not available.

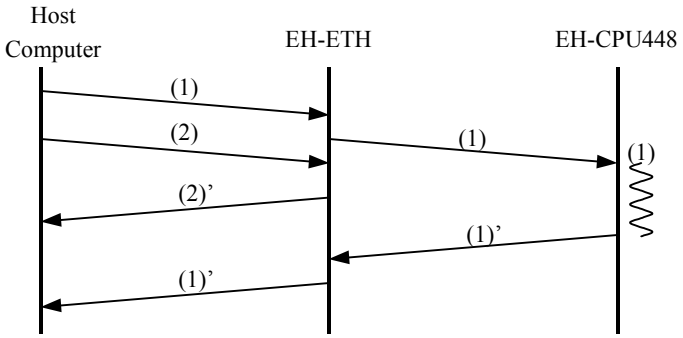
Item	Name	Size(byte)
(a)	Termination command	1
(b)	Through no.	1
(c)	LUMP address	4
(d)	Request/Response task code	Max. 244

(a)	(b)	(c)	(d)

Figure 6.1.2 Frame format

(a) Termination command	To use control CPU module.
H00: Normal operation. CPU will reply according to the requested task code. HFF: If CPU receives the task code with HFF, the CPU will stop processing for the last task code sent from a host computer. If there is no processing to be stopped, this command is ignored. H01 to HFE: EH-ETH ignores the task code with term.command H01 to HFE	
(b) Through no.	Through number to add request task code
Any number available. CPU will reply with adding same through number as in the command from host computer. You can use it for debugging or your own purpose so that host computer can handle several messages easily at the same time.	
(c) LUMP address	H series network address
See 6.2.1 for detailed information.	
(d) Request/Response task code	H series communication command code
See EH-150 application manual (NJI-280*(X) "Appendix 3 Task Code Specifications".	

Caution
- If EH-ETH receives the 2nd task code (2) before the 1st task code has not executed, EH-ETH will reply "**busy response"** against the 2nd task code (2)'.



6.1.3 H series network address

At H series network system shown in figure 6.1.3.1, you must specify the CPU address according to the LUMP address rule as below.

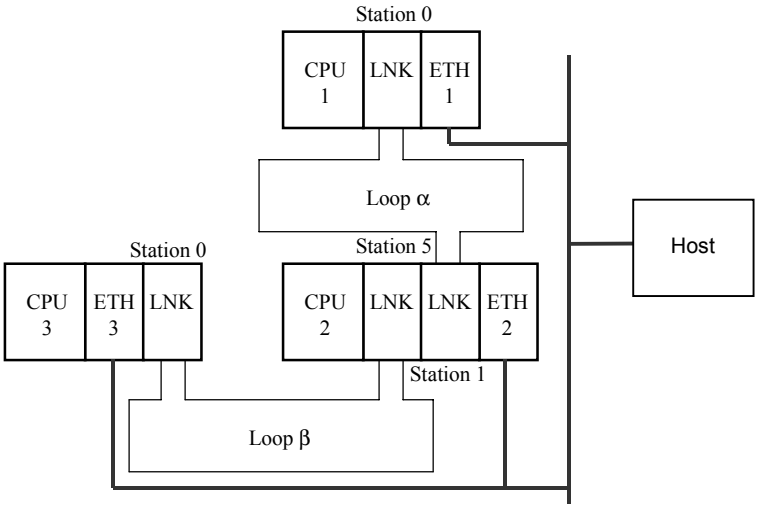
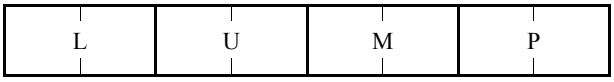


Figure 6.1.3.1 Example of H-series network system

Network address configuration is below.



L: Loop No. (CPU link number)

U: Unit No. (CPU link station number)

M: Module No.

P: Port No.

Figure 6.1.3.2 Network address

Table 6.1.3.1 Network address detail

(1) Loop No.(L)

Item	Loop No.
CPU LINK loop1	01H
CPU LINK loop2	02H
Without CPU LINK	FFH

(2) Unit No.(U)

Item	Unit No.
CPU LINK ST No.0	00H
CPU LINK ST No.63	3FH
Without CPU LINK	FFH

(Note) When loop No. is FFH, Unit No. must be FFH. Even the reverse is similar.

(3) Module No. (M)

Always "00H"

(4) Port No. (P)

Always "00H"

Table 6.1.3.2 shows the example of network address setting which CPU access each CPU, Figure 6.1.3.1

Table 6.1.3.2 Example of network address setting

No.	Via EH-ETH	CPU	Network address
1	ETH1	CPU1	HFFFF0000
2		CPU2	H01010000
3		CPU3	(No access)
4	ETH2	CPU1	H02000000
5		CPU2	HFFFF0000
6		CPU3	H01000000
4	ETH3	CPU1	(No access)
5		CPU2	H01050000
6		CPU3	HFFFF0000

6.2 Task code port

EH-ETH has four logical ports for task code communication.

Task code port supports **TCP** and **UDP** of data link layer. Table 6.2 shows the comparison to use.

Table 6.2 Task code port

Compression Item	TCP	UDP
Open request/ close request procedure	Host side: Need EH-ETH side: No	Host side: No EH-ETH side: No
Communication with LADDER Editor for Windows®	Possible	Not possible
Reliability of the data in a data link layer level	High	Low

[For host computer programmer]

- When you select TCP

  1.Because all task ports are "LISTEN" (passive), you need to open connection before sending task code.

- When you select UDP,

  1. UDP protocol does not have high reliability of communication, application program needs to confirm the response, and control re-sending and packet order.

  2. You do not have to open connection before issuing task code.

Caution

- Task code port can not transmit data actively regardless of TCP or UDP protocol.
- Task Code ports may stop responding, when a EH-ETH got a problem in network. Please set up a timeout value for Task Code ports, in order for you to avoid this problem.

Importance

[Retry action of Open request for active port]

When an other station to a response cannot be found to the open request that EH-ETH sends, EH-ETH sends the TCP packet which contains the "SYN" flag at intervals of the following time.

ARP packet sends->6s->12s->24s->48s->64s->64s->64s->64s->64s->64s->64s->64s

In other words, EH-ETH stops the retry action of open request after about 10 minutes, after sending an ARP packet.

(1). When "less than 10 minutes" is set as an ASR connection timeout value.

- When EH-ETH detects a timeout, ERR LED is turned on red.
- After a timeout is detected, the retry action of Open request is done continuously.

(2). When "10 minutes or more" is set as an ASR connection timeout value.

- When all the retry action of Open request is completed, ERR Light Emitting Diode lights up red.

6.3 Connection with LADDER EDITOR for Windows®

You can program CPU module via EH-ETH with LADDER EDITOR for Windows®.

This chapter explains at the setting of EH-ETH and PC shown in table 6.3.2. The setting of EH-ETH is default value. IP address of PC should be set at your network environment.

Table 6.3.2 Setting

Setting Item	EH-ETH	PC
IP address	192.168.0.1	192.168.0.128*
Subnet mask	255.255.255.0	255.255.255.0
Port number	3004	-

- Editing of **Hosts file**

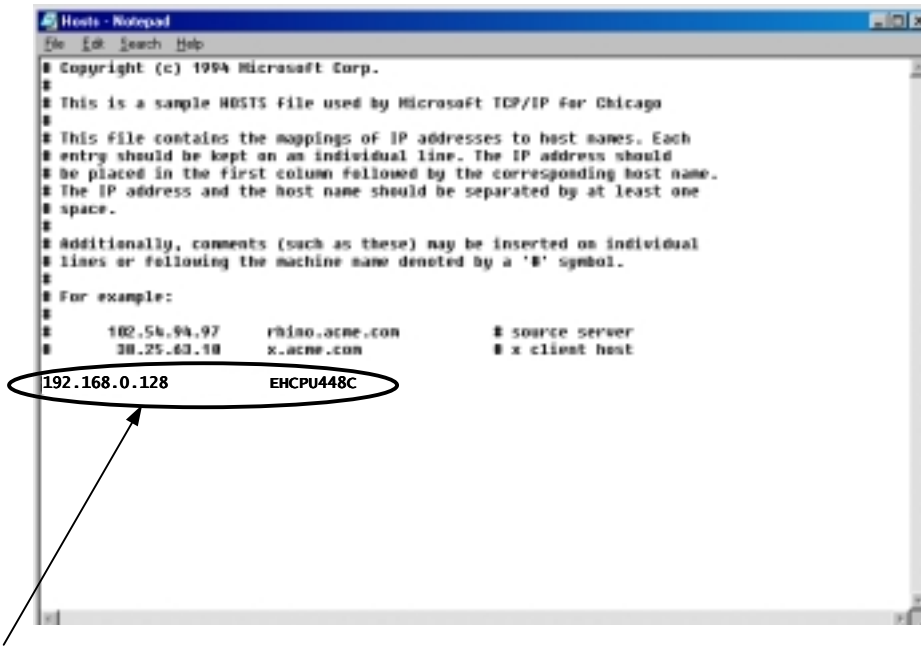
  Edit the file "host"(no extended code) in the directly (usually in ¥windows) which Windows95, 98 is installed by the following process.

  (1). To keep the current information, back up **Hosts file.**(Ex. Copy it as Hosts.org.)

  (2). Open the file **Hosts** by notepad or other text editor.

  (3). Type "Host IP address" and "Host name" which were set in EH-ETH to the last line. The host name must be same as the host name at the environment setting of LADDER EDITOR for Windows®*1. Here is "EH-CPU448C" as host name.

*1: Please types it carefully, because capital letter and small letter are distinguished.



192.168.0.128 EH-CPU448C

- Setting of LADDER EDITOR for Windows®

(1). Open LADDER EDITOR for Windows® and go off-line mode.

(2). Choose [Environment Set] in [Utility] menu in the offline mode.

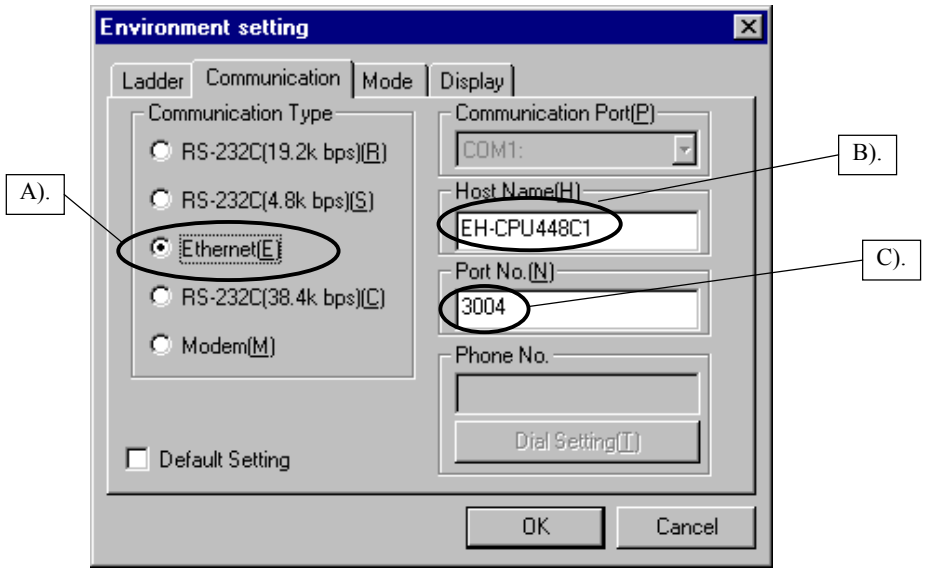
(3). Choose [Communication]dialog box.

A). Communication type : Ethernet

B). Host name : EH-CPU448C (Name in Hosts file)

C). Port number : 3004

After setting, click [OK] button.



(4).Choose [GRS] in [File] menu.

All setting are completed with this process.

After this, LADDER EDITOR for Windows® can communicate via EH-ETH in [Online] or [on-direct]

Caution

After setting Ethernet connection, it takes about 45 seconds to display “Communication Error” message in the following cases. This time period is due to Windows95, 98 internal processing.

(1). To try to go [online] or [on-direct] when the setting of EH-ETH is not correct, or to try to go [online] or [on-direct] when the setting of PC or LADDER EDITOR for Windows® is not correct,.

(2). To try to go [online] or [on-direct] to EH-ETH without the power.

(3). Power off EH-ETH during communication.

(4). To Change I/O assignment during communication.

(5). EH-ETH breaks down during communication.

(6). To disconnect 10BASE-T cable during communication or breaking wire.

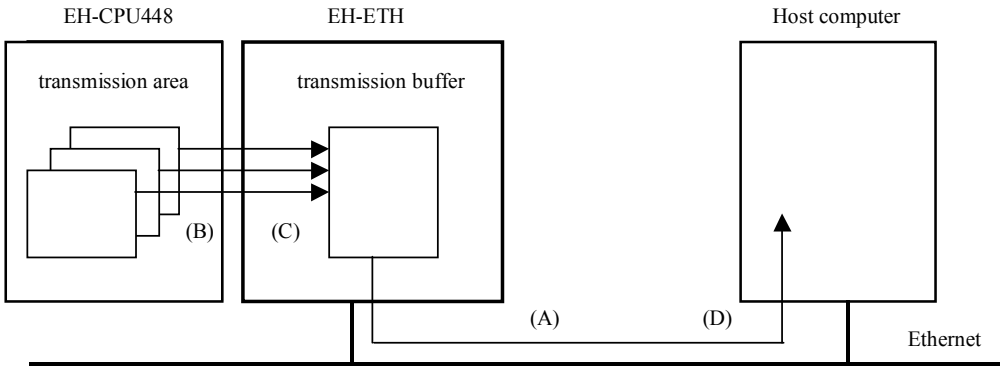
Chapter 7 Automatic Sending/Receiving function (ASR)

7.1 ASR

EH-ETH has ASR function. The detailed information is mentioned as follows.

7.1.1 Automatic data sending

An automatic sending function is a function to transmit the data of CPU module to other node. The outline of this function is shown as Figure 7.1.1.1. If you choose a cyclic sending, you can use an automatic data sending function. In case of the cyclic sending, you do not have to prepare ladder program for sending data from CPU to buffer area of EH-ETH.



(A). After the power ON, EH-ETH opens automatic sending connection (here after ASR connection) for EH-ETH and host computer.
(B). After the connection opened, EH-ETH waits for a request from ladder program or cyclic timing. Then EH-ETH reads designated data. Several kinds of I/O type can be set in the sending area. (1 connection is able to handle up to 10 entry.)
(C). The designated area data is written in a buffer area of EH-ETH.
(D). The data is sent to host computer.

Figure 7.1.1.1 Outline of automatic sending

The specification of automatic data sending is mentioned as below.

(1). ASR connection

A transmission route of TCP/IP is called connection. EH-ETH is able to handle up to 6 connections at the same time. One connection can transmit and receive data.

(2). Sending area

Sending area can be specified in Web page of "ASR I/O Area (Connection N) Setting". One connection can handle up to 10 sending areas. (One sending area is called as "Entry")

In case of sending several kinds of I/O areas, they are once sent to a sending buffer according to the setting in web browser. The following Figure 7.1.1.2 shows an example of R0 to R9 (10 bits) and WM0 to WM1 (2 words).

Send area information

No.	I/O	Top	Size
1	R	0	10
2	WM	100	2
… …			
9			
10			

Sending buffer

	MSB							LSB
H00	R0	R1	R2	R3	R4	R5	R6	R7
H01	R8	R9	0	0	0	0	0	0
H02	WM100 High Byte							
H03	WM100 Low Byte							
H04	WM101 High Byte							
H05	WM101 Low Byte							

Figurer 7.1.1.2 Sending area and sending buffer

Note

- 1 connection can handle up to 1454 bytes.
- When designated bit size is less than 8 bits (1 byte), the rest bits are all 0.

7.1.2 Automatic data receiving

This function is able to receive data from other EH-ETH or host PC to internal buffer and write to designated receiving area. Users do not have to prepare ladder program for sending the data from the buffer to receiving area in CPU.

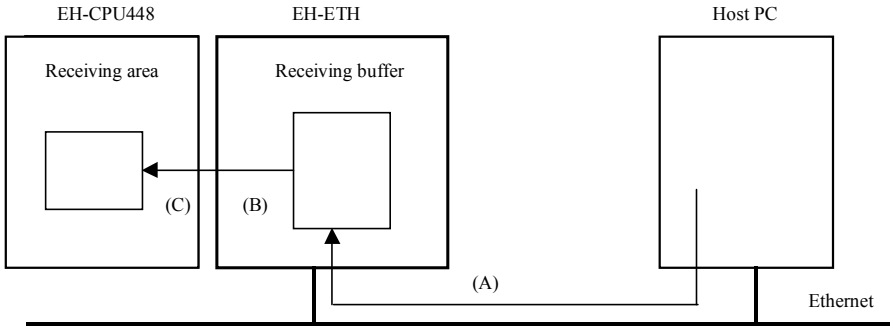


Figure 7.1.2.1 Outline of automatic receiving

(A). After the power ON, host PC opens ASR connection between EH-ETH and host PC.
(B). After the connection opened, EH-ETH waits data from other station.
(C). EH-ETH writes received data to receiving area of the CPU.

The specification of automatic data receiving is mentioned as below.

(1). ASR connection

Up to 6 connections are available for the automatic data receiving function. One ASR connection is able to handle both sending and receiving at the same time.

(2). Receiving area

The receiving area can be specified only by "ASR I/O Area (Connection N) Setting" in web page. The receiving area can be defined every ASR connection. Available I/Os are WL, WM, WR, WY.

Receive area information

No.	I/O	Top	Size
1	WR	0	10

	Receiving buffer
H00	DT1
H01	DT2
H02	DT3
H03	DT4
…	…
H12	DT19
H13	DT20

20 Byte

I/O	Receiving area	
WR0	DT2	DT1
WR1	DT4	DT3
WR2	DT6	DT5
WR3	DT8	DT7
…	…	…
WR9	DT18	DT17
WRA	DT20	DT19

10 Word

Figure7.1.2.2 Receiving buffer and receiving area (1)

Note

- 1 connection can handle up to 1454 bytes.
- When received data size is less than designated receiving area size, the rest area is not overwritten. The previous data is kept.
- When received data size is bigger than designated receiving data size, the excess area is omitted automatically.

Receive area information

No.	I/O	Top	Size
1	WR	0	10

	Receiving buffer
H00	DT1
H01	DT2
H02	DT3
H03	DT4
…	…
H0E	DT15
H0F	DT16

16 Byte

I/O	Receiving area	
WR0	DT2	DT1
WR1	DT4	DT3
…	…	…
WR7	DT16	DT15
WR8	DT(n+1)	DT(n)
WR9	DT(n+3)	DT(n+2)
WRA	DT(n+5)	DT(n+4)

10 Word

: Previous received data

Figure. 7.1.2.3 Receiving buffer and receiving area (2)

Receive area information

No.	I/O	Top	Size
1	WR	0	10

	Receiving buffer
H00	DT1
H01	DT2
H02	DT3
H03	DT4
…	…
H1E	DT31
H1F	DT32

32 Byte

I/O	Receiving area	
WR0	DT2	DT1
WR1	DT4	DT3
WR2	DT6	DT5
WR3	DT8	DT7
…	…	…
WR9	DT18	DT17
WRA	DT20	DT19

10 Word

: excess data

Figure. 7.1.2.4 Receiving buffer and receiving area (3)

7.2 Presetting

Before the data communication, you have to establish connection against to the other port. Here after, an enabled connection is called as “opened connection”, and a disabled connection is called as “closed connection”.

Caution

EH-ETH has 10 connections. **4 connections are only for task code communication, 6 connections are ASR connections for message communication.**

For reference : Other station "Specified" and "Optional"

To open or close TCP/IP connection is like telephone call in our daily life.

For instance, a telephone of A is assumed as EH-ETH, telephone of B as a host computer.

In case A calls B, when B is ready to receive, B can pick up the receiver. Now both A and B are ready to speak. On the other hand, when B is not ready to pick up the receiver, A must hang up the receiver and give up conversation.

This is replaced to TCP/IP communication. In order EH-ETH (A) to communicate with the host computer (B), EH-ETH (A), which is specified as active node, must request to open the connection with specifying the destination (IP address and port number of B).
If the host computer (B) is ready to receive the request, the communication is opened and ready to be talked.

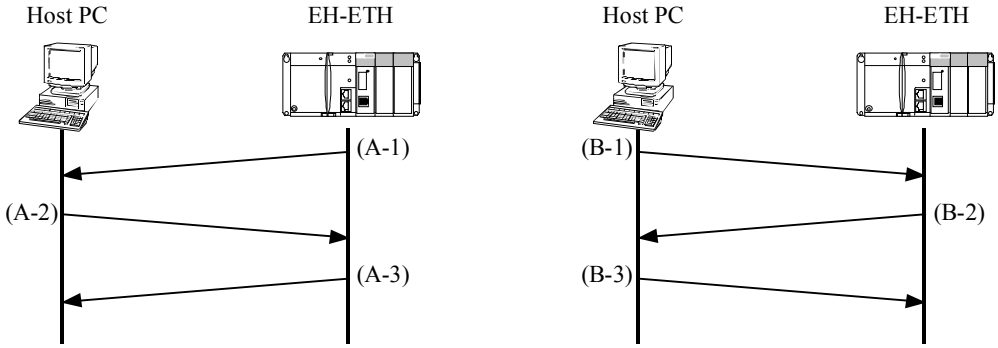
On the other hand, when the host computer (B) is not ready to open the connection, EH-ETH (A) must give up the request after connection time out. In this case, EH-ETH (A) can not communicate with host computer.

In addition, such receiving (passive) station (B in this case) can get any requests from other than A, and can answer (open) to all the requests. If B should open connection upon all the request, the setting “Other station” must be “Optional”. But if B should open connection upon the request from A only, this must be “Specified”, and the IP address and port number must be specified as well.

In short, a station specified as active must specify the destination. On the other hand, a station specified as passive can be selected "specified other station" or "optional other station".

7.2.1 Open connection

The procedure for opening connection is shown as Figure 7.2.1.1.



(A). In case of active open setting

(B). In case of passive open setting

(A). In case EH-ETH is in active open

	Description	Segment	EH-ETH status
(A-1)	EH-ETH requests active open against host PC of passive open status.	Sending SYN flag	Sending request to connect (SYN-SENT)
(A-2)	Host PC receives the request to connect from **EH-ETH,** sends a reply of ready to open connection to EH-ETH, and waits ACK from EH-ETH.	Sending SYN ACK flag	-
(A-3)	**EH-ETH** receives the reply from the host PC, and sends back ACK.	Sending ACK flag	Connection opened (ESTABLISHED)

(B). In case EH-ETH is in passive open

	Description	Segment	EH-ETH internal
(B-1)	Host PC requests active open against EH-ETH of passive open status.	Sending SYN flag	
(B-2)	EH-ETH receives the request to connect from Host PC, sends a reply of ready to open connection to Host PC, and waits ACK from Host PC.	Sending SYN ACK flag	Sending request to connect (SYN-RCVD)
(B-3)	Host PC receives the reply from the EH-ETH, and sends back ACK.	Sending ACK flag	Connection opened (ESTABLISHED)

Figure 7.2.1.1 Basic procedure to open connection

Caution

- In case of the task code communication, the way to open is fixed as passive open.
- In case of ASR connection, the way to open is selected as active or passive, which configured in Web setup page. You don't need program modification.

The each ASR parameters are set properly and EH-ETH is in active mode to open ASR connection.
In this explanation, EH-ETH is own station and the other equipment is other station.
The following items are "**ASR information"**.

(1). Select communication protocol
(2). Select active open or passive open
(3). Configure own logical port number
(4). Select specified or optional other station.
(5). Configure IP address of the other station (Only in case the other station is "specified".)
(6). Configure Logical port number of the other station. (Only in case the other station is "specified".)

ASR parameters are set in "Set up page" of web browser. Please refer to chapter "5.4 ASR setting" in details.

There are two ways for EH-ETH (specified as active) to open ASR connection.

1. To send a request to open automatically after initializing of EH-ETH completed.
2. To send a request to open by user program.

Caution

ASR information must be set correctly to open ASR connection.

Table 7.2.1.1 The way to open ASR connection (Active port)

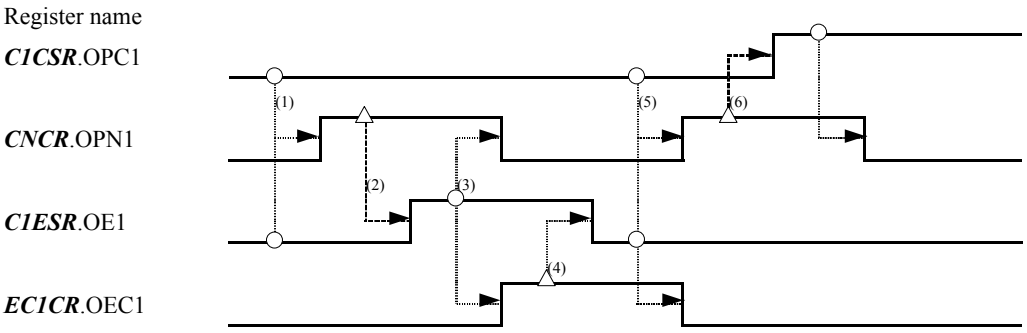
Conditions to open ASR connection	Description
Initializing (EH-ETH is initialized when ;) 1) At Power ON 2) Press the reset button 3) Software initializing (ladder program required)	A Request to open connection will be sent to specified station
Set 1 to “Request to open bit” (ladder program required)	

Caution

- In case of initializing, you do not need user program.
- In case you need to open the connection manually, you must use status register (SR) and control register (CR) with FUN201 command in your ladder program. Please refer to "chapter 8 register construction" in details about registers.
- In this manual, register and each bit are often described with abbreviation. For each abbreviation , please see "Chapter 8, table 8.2 register list (page 8 - 15)"
- In this manual, register and each bit are described as below format.
  [***register abbreviation***].[bit abbreviation]
  Ex. Connection control register (CNCR) connection 1 open request bit (OPN1)
  ***CNCR*.OPN1**

If a connection is opened by another station specified as active, the passive station is only waiting. So you do not need any program in the passive station.

EH-ETH is able to request to open connection to other stations by setting “Request to open bit” to high. The procedure to open ASR connection 1 is shown as Figure 7.2.1.2.



○ : By user, △ : By EH-ETH

Figure 7.2.1.2 Procedure to open connection

(1). Confirm ASR connection is not opened (***C1CSR***.OPC is 0) and the status is not open error (***C1CSR***.OPC is 0). Then set 1 to ***CNCR***.OPN1.

----------*Request to open*

(2). EH-ETH receives the request and set 1 to ***C1ESR***.OE1 because it is not ready to be opened.

---------- *Open error*

(3). Confirm the open error reply and set 0 to ***CNCR***.OPN1 and 1 to E***C1CR***.OEC1

---------- *Cancellation of the request to open and clear error bit*

(4). EH-ETH receives the request to clear and clear ***C1ESR***.OE1 by setting 0.

---------- *Clear the open error bit*

(5). Examine the error cause and remove. Then set 0 to ***EC1CR***.OEC1 and set 1 to ***CNCR***.OPN1 again after confirmation of ***C1CSR***.OPC=0 and ***C1ESR***.OE1=

---------- *Cancellation of the request to clear error bit, and request to open*

(6). EH-ETH receives the request and open the ASR connection 1 and set 1 to ***C1CSR***.OPC1

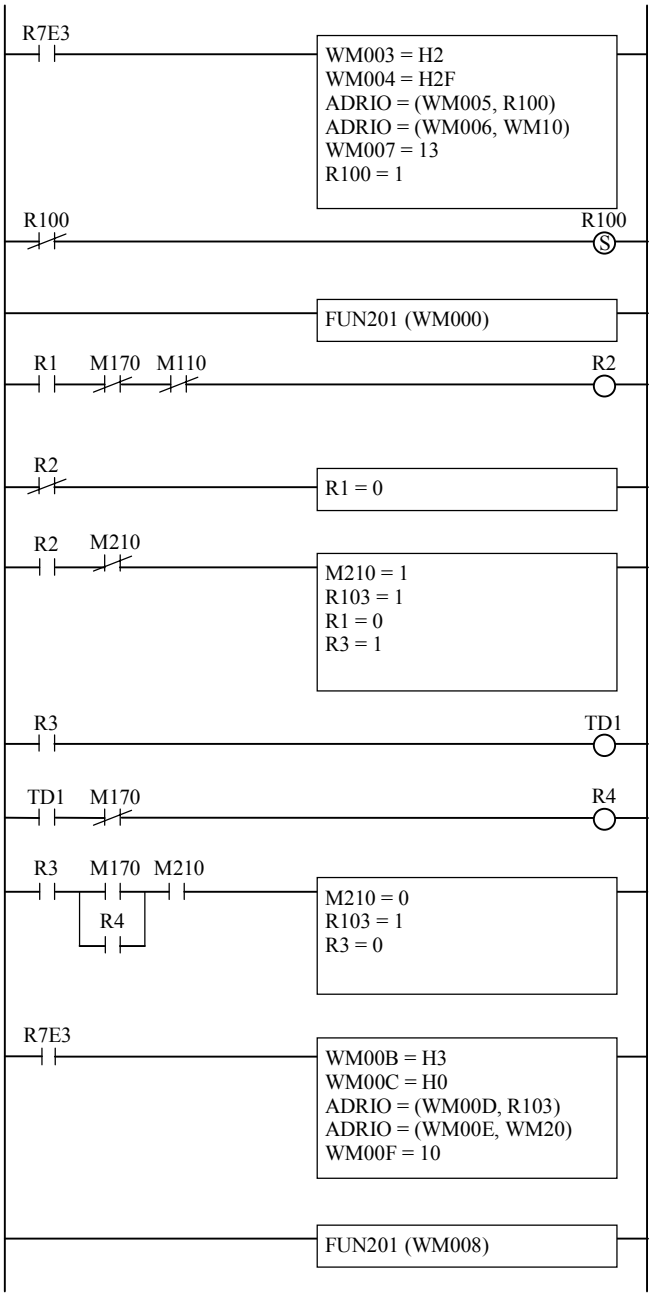
---------- *Connection opened*

(7). Confirm the connection opened (***C1CSR***.OPC=1) and cancel the request to open (***CNCR***.OPN1=0)

---------- *Cancellation of the request to open*

Sample program 3 In case EH-ETH requests to open connection to the other station

Slot No.	0	1	2
EH-ETH	*	-	-



(00001) Parameter area setting of FUN201(s) for reading out SR[*1].
Request to read out SR
Area setting (unit:0, slot:0)
Control bit address is R100
Transmission I/O address is starting from WM10
Transmission data size is 13 words
Setting 1 to control bit for reading SR.

(00002) Reading out SR at R100 = 1

(00003) FUN201 for reading out SR

(00004) Request to open connection 1 at R1 = 1.
Check status (M170) and error (M110) of connection 1

(00005) Cancellation the connection open if connection 1 is open (M170=1) or error (M110=1).

(00006) Set 1 to "request to open bit" of connection 1.
Set 1 to "request to write to CR[*2] bit"
Clear "OK flag for writing to CR"
Set 0 to "request to open contact" (R1).
Enable the circuit for cancellation the request to open.

(00007) Timer counting from the request to open.

(00008) Set 1 to R4 if the connection is not opened after 1 second.

(00009) Clear "request to open bit" for connection 1.
Set 1 to "request to write CR bit".
Clear "OK flag for writing CR".
Disable the circuit for cancellation the request to open.

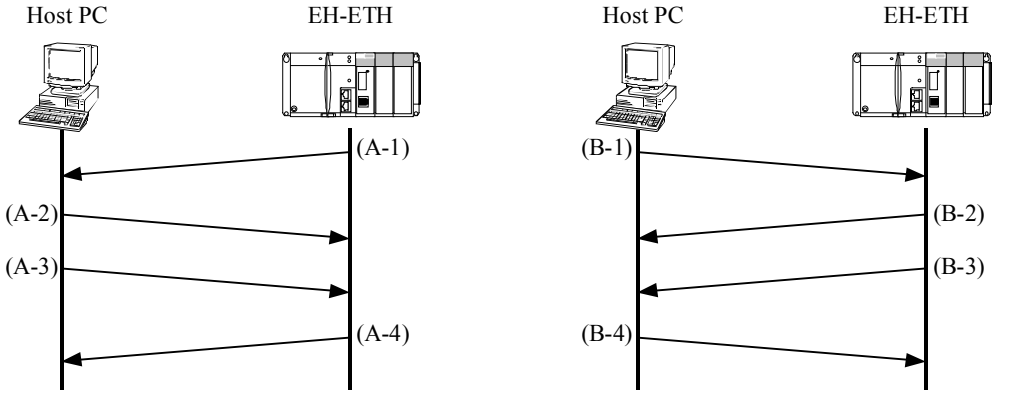
(00010) Parameter area setting of FUN201(s) for writing CR.
Request to write CR.
Area setting (unit:0, slot:0)
Control bit address is R103.
Transmission I/O address is starting from WM20.
Transmission data size is 10 words.

(00011) FUN 201 for writing CR.

*1: SR is abbreviation of status register
*2: CR is abbreviation of control register.
See "Chapter 8 Register construction" for detailed.

7.2.2 Close connection

The procedure for closing connection is shown as Figure 7.2.2.1.



(A). In case EH-ETH requests to close connection

(B). In case host PC requests to close connection

(A). In case EH-ETH requests to close connection

	Description	Segment	EH-ETH status
(A-1)	EH-ETH requests to close connection to the host PC.	Sending FIN flag	Connection opened (ESTABLISHED)
(A-2)	Host PC receives the request to close from **EH-ETH**, and replies back ACK.	Sending ACK flag	Waiting for a request to close1 (FIN WAIT-1)
(A-3)	When the host PC does not have data to send, it replies back FIN ACK.	Sending FIN ACK flag	Waiting for a request to close1 (FIN WAIT-2)
(A-3)	**EH-ETH** receives the FIN ACK and replies back ACK after waiting a time designated in TIME_WAIT value.	Sending ACK flag	Waiting (TIME WAIT), connection closed (CLOSED)

(B). In case Host PC requests to close connection.

	Description	Segment	EH-ETH status
(B-1)	Host PC requests to close connection to the EH-ETH.	Sending FIN flag	Connection opened (ESTABLISHED)
(B-2)	**EH-ETH** receives the request to close from Host PC, and replies back ACK	Sending ACK flag	Waiting for a request to close1 (FIN WAIT-1)
(B-3)	When the EH-ETH does not have data to send, it replies back FIN ACK.*1	Sending FIN ACK flag	Waiting for a request to close1 (FIN WAIT-2)
(B-3)	The host PC receives the FIN ACK and replied back ACK.	Sending ACK flag	Waiting (TIME WAIT), connection closed (CLOSED)

*1: This is only in case “Close mode control” is disabled. The “Close mode control” is mentioned in the followings.

Figure 7.2.1.1 Basic procedure to open connection

Caution

- In case of the task code communication connection, a host computer must send a request to close.

The conditions to close connection are ;

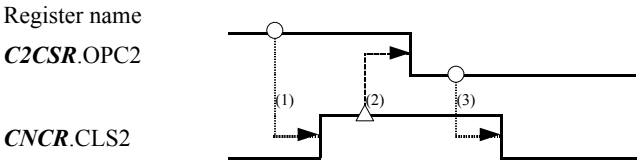
(1). EH-ETH receives a request to close from user program in own station during connection opened.

(2). EH-ETH receives a request to close from other stations during connection opened.

The following description is regarding the way to close connection from user program.

- In case EH-ETH requests to close to other station.

The time chart is shown below in Figure 7.2.2.2.



○ : By user, △ : By EH-ETH

Figure 7.2.2.2 Procedure to close connection (1)

(1). Confirm ASR connection 2 is opened (***C2CSR***.OPC2 is 0). Then set 1 to ***CNCR***.CLS2.

---------- *Request to close*

(2). EH-ETH receives the request and close the connection 2 and then set 0 to ***C2CSR***.OPC2.

---------- *Close connection*

(3). Confirm the connection closed (***C2CSR***.OPC2 is 0) and cancel the request to close (***CNCR***.CLS2=0).

---------- *Cancellation of request to close*

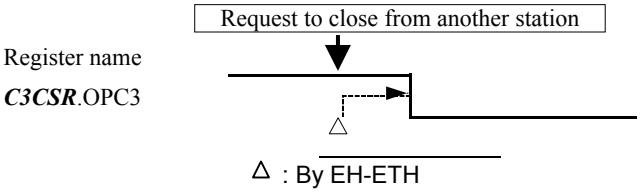
- **In case EH-ETH receives a request to close from another station.**

EH-ETH has two types of operation mode after receiving a request from another stations, which is called "Close mode control". This is switched by "Close mode control register bit (CMCR)".

(a). ***CMCR***.CMn = 0 ("Close mode control" is disabled. "n" is ASR connection number)

EH-ETH closes a requested connection from other station without any other conditions. This means user programs for monitoring status or for closing connection are not required.

The time chart to close connection 3 is shown in Figure 7.2.2.3.



△ : By EH-ETH

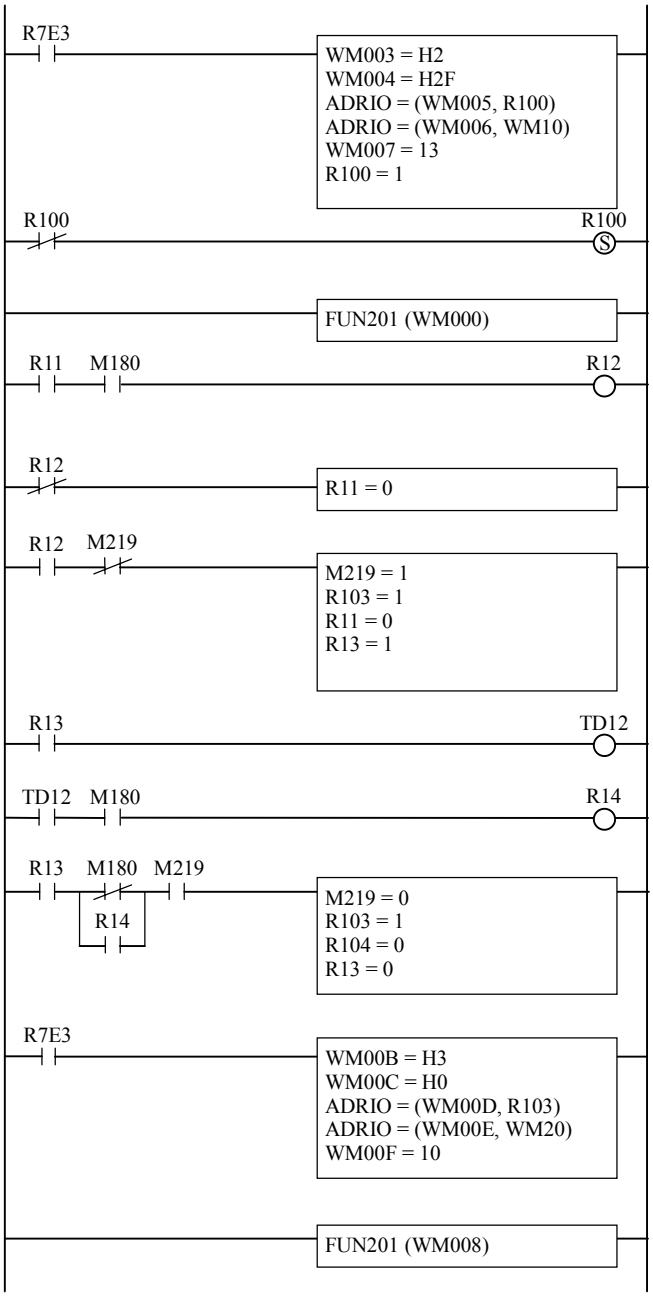
Figure 7.2.2.3 Procedure to close connection (2)

(1). EH-ETH closes the requested connection. After closing it, EH-ETH sets 0 to ***C3CSR***.OPC3

---------- *Close connection*

Sample program 4 In case EH-ETH requests to close connection to other station.

Slot No.	0	1	2
EH-ETH	*	-	-



(00001) Setting parameter of FUN201(s) for reading out SR[*1].
Request to read out SR
Area setting (unit:0, slot:0)
Control bit address is R100
Transmission I/O address is starting from WM10
Transmission data size is 13 words
Setting 1 to control bit for reading SR

(00002) Reading out SR at R100 = 1

(00003) FUN201 for reading out SR

(00004) Request to close connection 2 by R11 = 1.
Check the status of connection 2 (M171)

(00005) Cancellation the request to close if the connection 2 is closed (M180=0).

(00006) Set 1 to "Request to close bit" for connection 2
Set 1 to "request to write CR[*2] bit"
Clear "OK flag for writing CR"
Set 0 to "request to open contact" (R11).
Enable the circuit for cancellation the request to close.

(00007) Timer counting from the request to close.

(00008) Set 1 to R14 if the connection 2 is not closed after 1 second.

(00009) Clear "request to close bit" for connection 2.
Set 1 to "request to write CR bit".
Clear "OK flag for writing CR"
Disable the circuit for cancellation the request to close.

(00010) Parameter area setting of FUN201(s) for writing CR.
Request to write CR.
Area setting (unit:0, slot:0)
Control bit address is R103.
Transmission I/O address is starting from WM20.
Transmission data size is 10 words.

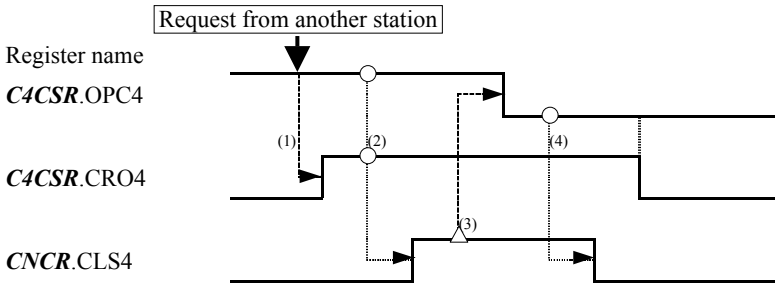
(00011) FUN 201 for writing CR.

*1: SR is abbreviation of status register
*2: CR is abbreviation of control register.
See "Chapter 8 Register construction" for detailed.

(b). ***CMCR***.CMn = 1 (“Close mode control” is enabled. “n” is ASR connection number)

Even if EH-ETH receives a request to close from other station, EH-ETH does not close the connection unless a user program is executed for closing the connection.

The time chart to close connection 4 is shown in Figure 7.2.2.4.



○ : By user, △ : By EH-ETH

Figure 7.2.2.4 Procedure to close connection (3)

(1). When EH-ETH receives a request to close connection 4 from another station, “Close requested bit” goes high. (***C4CSR***.CRO4 is 1)

----------*Receiving a request to close from another station*

(2). Confirm the connection opened (***C4CSR***.OPC4 is 1) and the request received (***C4CSR***.CRO4 is 1), and then set 1 to ***CNCR***.CLS4.

---------- *Request to close*

(3). When EH-ETH receives a request to close from user program, EH-ETH closes the connection 4 and clear ***C4CSR***.OPC4.

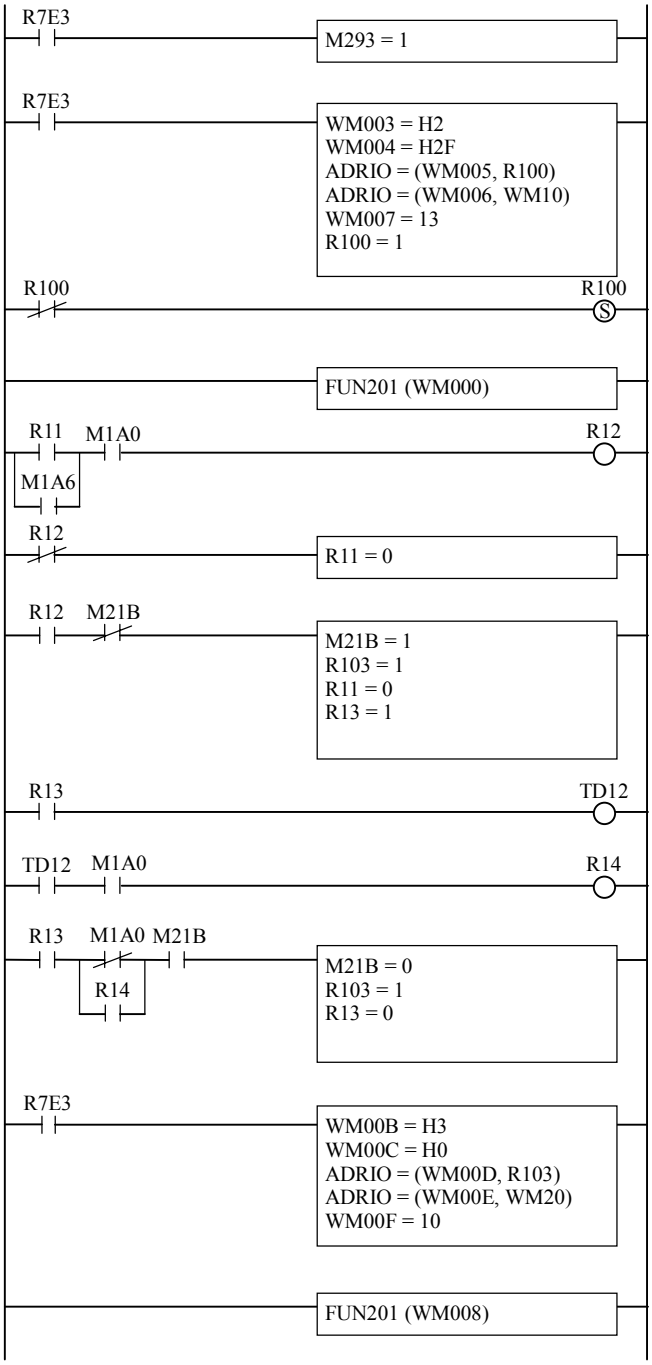
---------- *Clear “Request to close bit” and close the connection.*

(4). Confirm the connection closed (***C4CSR***.OPC4 is 0) and cancel the request to close (***CNCR***.CLS4 is 0)

---------- *Cancellation of request to close*

Sample program 5 To close connection with “Close mode control” enabled.

Slot No.	0	1	2
EH-ETH	*	-	-



“Close mode control” for connection 4 is enabled.

Setting parameter of FUN201(s) for reading out SR.
Request to read out SR
Area setting (unit:0, slot:0)
Control bit address is R100
Transmission I/O address is starting from WM10
Transmission data size is 13 words
Setting 1 to control bit for reading SR

Reading out SR at R100 = 1

FUN201 for reading out SR

Request to close connection 4 when R11 is 1 or EH-ETH receives a request from another station (M1A6=1).

Cancellation the request to close if the connection 2 is closed (M1A0=0).

Set 1 to “Request to close bit” for connection 4.
Set 1 to “request to write CR bit”.
Clear “OK flag for writing CR”.
Set 0 to “request to open contact” (R11).
Enable the circuit for cancellation the request to close.

Timer counting from the request to close.

Set 1 to R14 if the connection 4 is not closed after 1 second.

Clear “request to close bit” for connection 4.
Set 1 to “request to write CR bit”.
Clear “OK flag for writing CR”
Disable the circuit for cancellation the request to

Parameters setting of FUN201(s) for writing CR.
Request to write CR.
Area setting (unit:0, slot:0)
Control bit address is R103.
Transmission I/O address is starting from WM20.
Transmission data size is 10 words.

FUN 201 for writing CR.

7.3 ASR with user program

Without any user program, EH-ETH is able to send / receive data by using cyclic sending and receiving function. In addition to this function, you can achieve more precise data transmission by using above function with user program.

EH-ETH have sending function shown in table 7.3.1.

Table 7.3.1 Sending function

Sending type	Communication control program	Explanation
Cyclic sending	Not required*1	EH-ETH execute refresh of internal send buffer and data send **at every send cycle** automatically
Event sending	Required	User program controls refresh of internal send buffer and data send.

*1: Program for error detection of communication or other additional operation is required depending on the occasions.

EH-ETH have receiving function shown in table 7.3.2.

Table 7.3.2 Deceiving function

Receiving type	Receive mode	Communication control program	Explanation
Cyclic receiving	Normal	Not required*2	Receive buffer is refreshed **whenever data is received**. EH-ETH stored EH-ETH internal receive buffer data to receive area in CPU module automatically.
	Optional	Required	EH-ETH stored the receive data, which is permitted to receive by user program, to a receive buffer of EH-ETH. After that, EH-ETH refresh receive area in CPU module. When receive is not permitted, EH-ETH nullify received data.

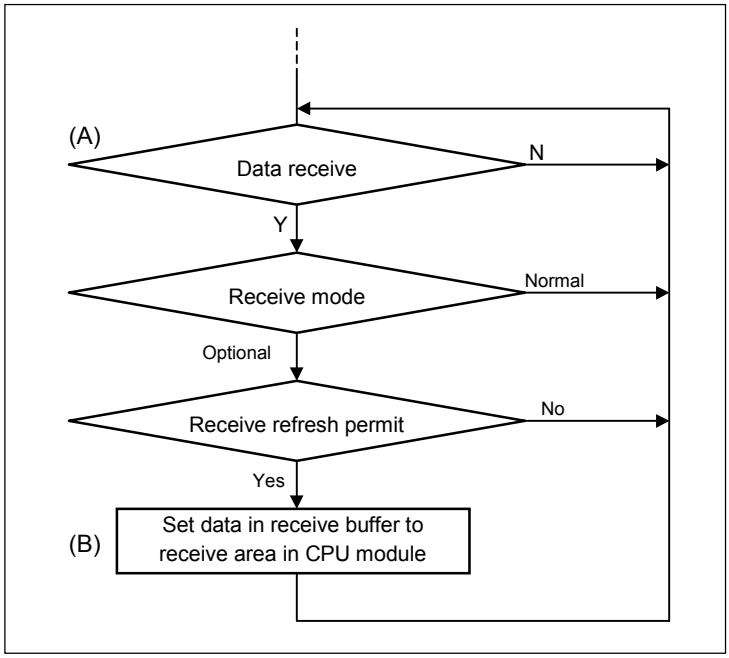
*2: Program for error detection of communication or other additional operation is required depending on the occasions.

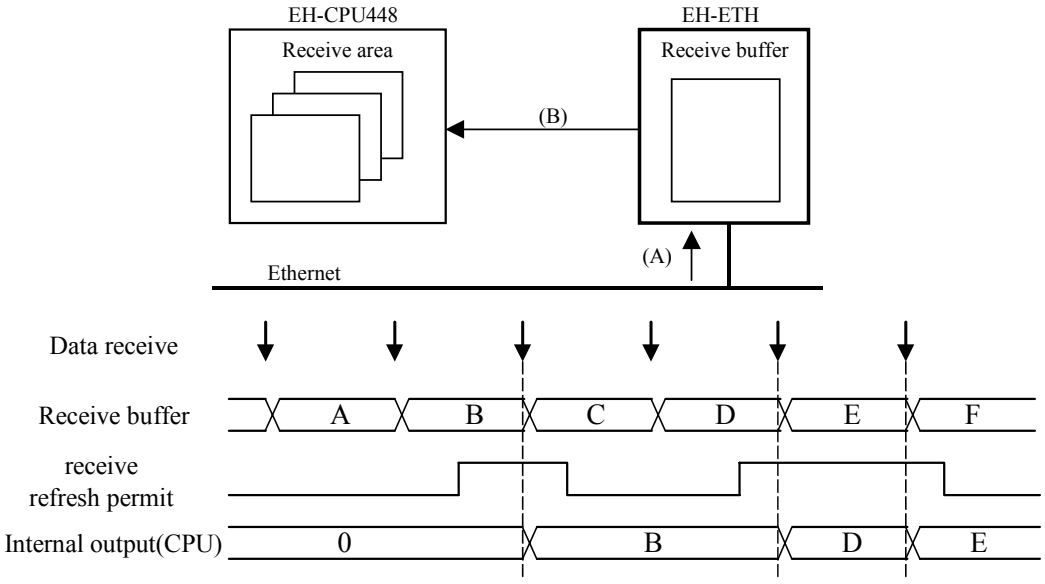
7.3.1 Optional data receiving

- Receive mode is **Optional receiving mode**

EH-ETH store data in receive buffer from "other station" to receiving area (CPU internal output) when user program "receive refresh permit".

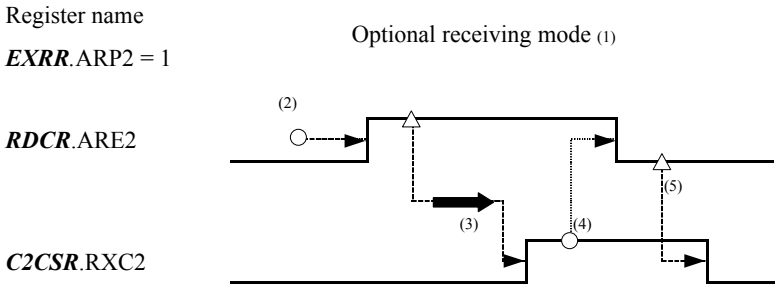
Outline and time chart of Optional receiving mode is shown in figure 7.3.2.1.





Figurer 7.3.1.1 Optional control outline and time chart of Automatic receive

Time chart for connection 2 is shown as Figure 7.3.1.2.



○ : By user, △ : By EH-ETH

Figure 7.3.1.2 Procedure of Optional receiving

(1). When receive mode is optional mode, set 1 to "receive mode change " bit (***EXRR***.ARP2).
----------*Select receive mode*

(2). When data should be refreshed, set 1 to "Ready to transmit" bit (***RECR***.ASE1).
----------*Request to refresh data*

(3). EH-ETH receives the request and sends designated data to CPU. After the sending completed, EH-ETH sets 1 to "Receiving completed" bit (***C2CSR***.RXC2).
----------*Receiving completed*

(4). Confirm sending completed by ***C2CSR***.RXC2=1, and cancel the "Ready to receive" bit (***RDCR***.ASE2). If data should be refreshed continuously, the cancellation is not necessary.
----------*Cancellation of a request to refresh*

(5). EH-ETH receives the request to cancel, and clear the "Receiving completion" bit (***C2CSR***.RXC2).
----------*Clear receiving completion bit*

- Receive mode is **Normal receiving mode**

When ETH receive data from other station, it set to the receive area(CPU internal output) specified by ASR Receive information. This series of action can be called "automatic receive". See "7.1.2 Automatic receive" for detailed.

The sample program uses the below internal I/O.

FUN 201 parameters for reading Status Register (SR)

I/O	Description
WM0	Result (Error code)
WM1	System area
WM2	
WM3	Control type (Read / write / etc)
WM4	EH-ETH slot number, and starting address for SR
WM5	Address of control bit for reading SR
WM6	Address of data for SR (Destination to read)
WM7	Data size for reading SR
R100	Execution bit for reading SR
R101	OK flag for reading SR
R102	Error flag for reading SR

FUN 201 parameters for writing Control Register

I/O	Description
WM8	Result (Error code)
WM9	System area
WMA	
WMB	Control type (Read / write / etc)
WMC	EH-ETH slot number, and starting address for CR
WMD	Address of control bit for writing CR
WME	Address of data for CR (Destination to read)
WMF	Data size for writing CR
R103	Execution bit for writing CR
R104	OK flag for writing CR
R105	Error flag for writing CR

Status register (SR) destination I/O

I/O	Description
WM10	Data to read from MDSR
WM11	Data to read from C1ESR
WM12	Data to read from C2ESR
WM13	Data to read from C3ESR
WM14	Data to read from C4ESR
WM15	Data to read from C5ESR
WM16	Data to read from C6ESR
WM17	Data to read from C1CSR
WM18	Data to read from C2CSR
WM19	Data to read from C3CSR
WM1A	Data to read from C4CSR
WM1B	Data to read from C5CSR
WM1C	Data to read from C6CSR

Control register (CR) source I/O

I/O	Description
WM20	Data to write to MDCR
WM21	Data to write to CNCR
WM22	Reserve
WM23	Data to write to RECR
WM24	Data to write to EXRR
WM25	Data to write to RDCR
WM26	Data to write to EC1CR
WM27	Data to write to EC2CR
WM28	Data to write to EC3CR
WM29	Data to write to CMCR

Setting for ASR connection

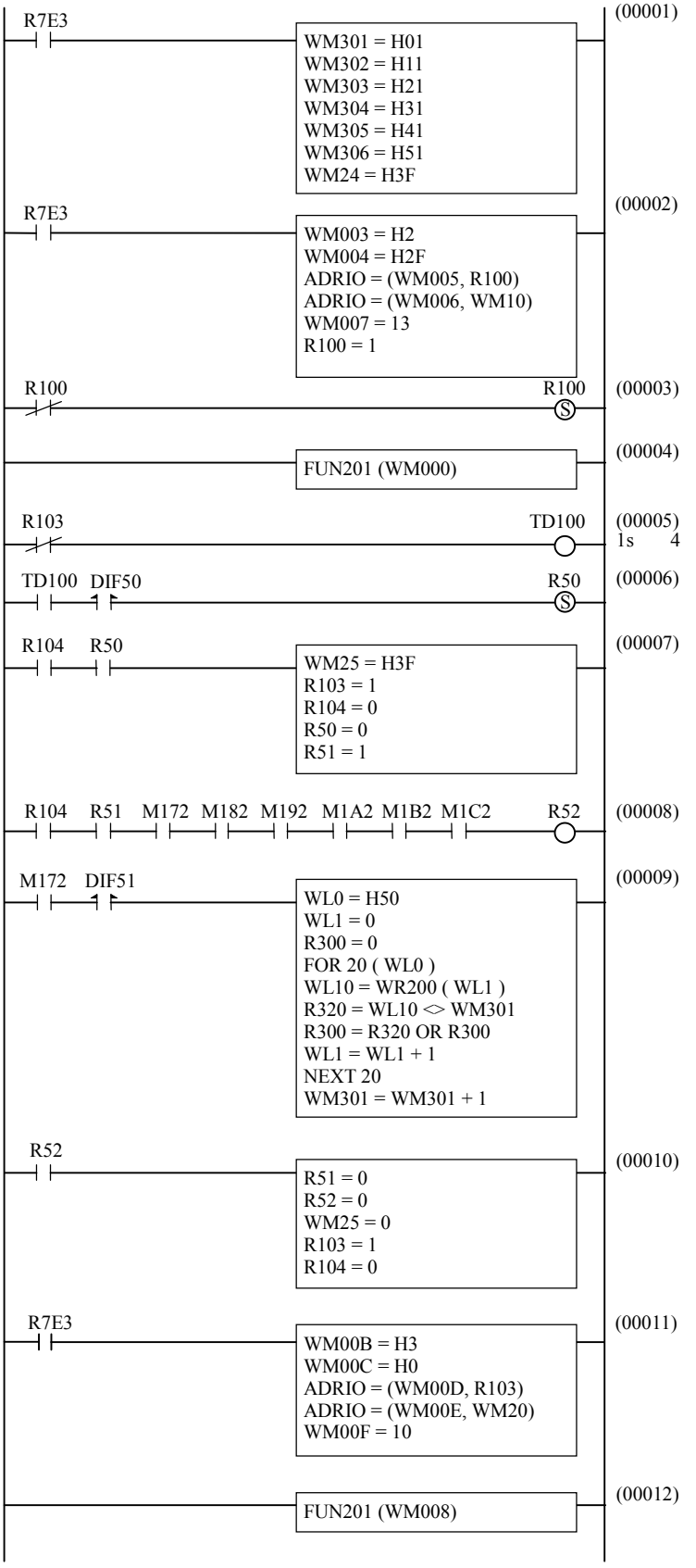
IP address: 192.168.0.10

Cn. No.	Usage	Protocol	Open Type	Port No.	IP	Port No.	Send Information	Cyclic time (s)	Send area Info.	Size (W)
Cn.1	Send	TCP/IP	*(*1)	4101	192.168.0.11	4111	Cyclic	2	WR000	80
Cn.2				4102		4112			WR050	
Cn.3				4103		4113			WR0A0	
Cn.4				4104		4114			WR100	
Cn.5				4105		4115			WR150	
Cn.6				4106		4116			WR1A0	

(*1): This can be set as Active or Passive.

Sample program 6 Register operation to refresh receiving area

Slot No.	0	1	2
EH-ETH	*	-	-



7.3.2 Event sending

This event sending function is able to send data at any requested timing. This setting is specified in Web page as below. Please refer to "5.4.2 ASR connection setting" for further information.

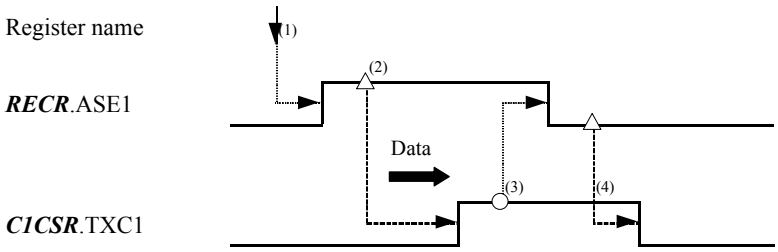
[Setting of Web page]

(1). Select “Event send” at the Type setting.

(2). Enter 0 at text box of Cycle Time.

[Programming]

Time chart of connection 1 is shown as below.



○ : By user, △ : By EH-ETH

Figure 7.3.2.1 Procedure of event sending.

(1). Ser 1 to “Execution bit for event sending” (***RECR***.ASE1).

---------- *Request for event sending*

(2). EH-ETH receives the request and sends designated data. After completed, EH-ETH sets 1 to ***C1CSR***.TXC1.

----------*Execution*

(3). Confirm if it is completed by ***C1CSR***.TXC1=1, and cancel the “Execution bit for event sending” (***RECR***.ASE1=0).

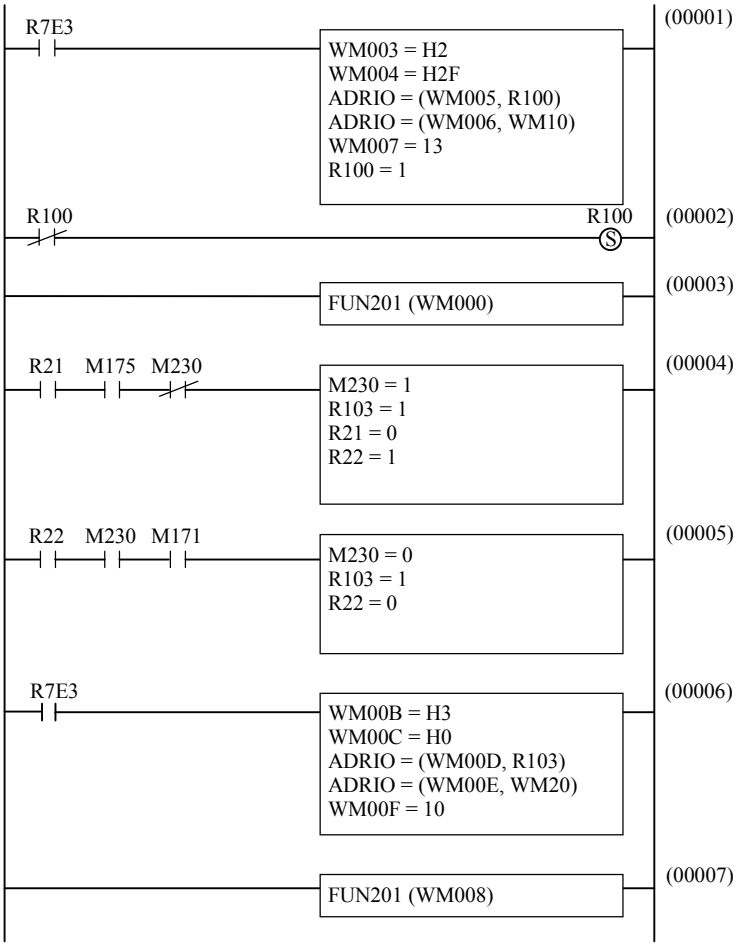
---------- *Cancellation of the request for event sending.*

(4). EH-ETH receives the request to cancel, and clear the completion flag (***C1CSR***.TXC1).

---------- *Cancellation completed.*

Sample program 7 Event sending

Slot No.	0	1	2
EH-ETH	*	-	-



Parameters setting of FUN201(s) for reading out SR.
Request to read out SR
Area setting (unit:0, slot:0)
Control bit address is R100
Transmission I/O address is starting from WM10
Transmission data size is 13 words
Setting 1 to control bit for reading SR

Reading out SR at R100 = 1

FUN201 for reading out SR

Set 1 to "Request for event sending bit".
Set 1 to "request to write CR bit".
Clear "OK flag for writing CR".
This circuit disabled.
Next circuit enabled.

Clear "Request for event sending bit".
Set 1 to "request to write CR bit".
Clear "OK flag for writing CR".
This circuit disabled.

Parameters setting of FUN201(s) for writing CR.
Request to write CR.
Area setting (unit:0, slot:0)
Control bit address is R103.
Transmission I/O address is starting from WM20.
Transmission data size is 10 words.

FUN 201 for writing CR.

Chapter 8 Register Structure

The register structures of this module are described here.

EH-ETH has Status Register (SR) and Control Register (CR). The Status register is for reading only and mainly set communication status of each connection. The Control register is for writing only and used to control ASR operation.
User program is able to check communication status and control communication operation by these registers . **FUN201** command is used to read status register and write control register in ladder program.

8.1 Status Register

The information (communication parameter) related with communication of this module is shown by the status area. Figure 8.1 shows the map of the status area. The status area is structured with 12 kinds of resisters. Each register size is 1 word (16bits).
To get the data of this status area, **FUN201** command should be used in user ladder diagram program.

I/O No.	Status Registers	
+0	Module status	(*MDSR*)
+H1	Connection 1 error status	(*C1ESR*)
+H2	Connection 2 error status	(*C2ESR*)
+H3	Connection 3 error status	(*C3ESR*)
+H4	Connection 4 error status	(*C4ESR*)
+H5	Connection 5 error status	(*C5ESR*)
+H6	Connection 6 error status	(*C6ESR*)
+H7	Connection 1 communication status	(*C1CSR*)
+H8	Connection 2 communication status	(*C2CSR*)
+H9	Connection 3 communication status	(*C3CSR*)
+HA	Connection 4 communication status	(*C4CSR*)
+HB	Connection 5 communication status	(*C5CSR*)
+HC	Connection 6 communication status	(*C6CSR*)

Figure 8.1 The structure of status area

Module Status Register (*MDSR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+0	-	-	-	-	-	-	-	-	FAE	OPM	SME	EIE	AVR	ATR	IERR	ERR

Bit 15-8: Reserved

These bits are reserved bits. Usually "0" are set.

Bit 7: Fatal error bit (FAE)

This bit shows that fatal error occurs in the firmware of this module (TCP/IP, UDP/IP protocol). In case that this bit is “1” The reset operation is required with this module. (by reset button or FUN201)

Bit7: FAE	Description
0	There is no error.
1	There is fatal error in this module.

Bit 6: Operation mode bit (OPM)

The status of DIP-switch 1 is reflected on this bit.

Bit6: OPM	Description
0	Normal operation mode
1	Ethernet information configuration (set-up) mode.

Bit 5: SUM Error bit (SME)

The result of the sum check for FLASH memory which stores system program (Firmware).

Bit5: SME	Description
0	There is no error.
1	The sum error is detected. (FLASH memory may be damaged.)

Bit 4: Ethernet information configuration error bit (EIE)

Illegal Ethernet information is set. In the case of this bit set "1", I.ERR LED turns on.

Bit4: EIE	Description
0	There is no error.
1	The illegal Ethernet information configuration (set-up) is detected.

Bit 3: Existence response bit (AVR)

The result of general working check for EH-ETH. The data (IAV bit of control register) will be reflected here.

Bit3: AVR	Description
0	The data set in Existence confirmation Request bit (IAV) of Control area are reflected.
1	

Bit 2: Automatic Sending/Receiving enable bit (ATR)

This bit shows the current specified status of Automatic Sending/Receiving function is disable or enable.

Bit2: ATR	Description
0	Automatic Sending/Receiving function is disable.
1	Automatic Sending/Receiving function is enable.

Bit 1: I.ERR LED lighting condition bit (IERR)

This bit shows the current condition of I.ERR LED.

Bit1: IERR	Description
0	I.ERR LED is turned off.
1	I.ERR LED is turned on.

Bit 0: ERR LED lighting condition bit (ERR)

This bit show the current condition of ERR LED.

Bit0: ERR	Description
0	ERR LED is turned off.
1	ERR LED is turned on.

Connection *n* error status (*CnESR*) *n* = 1 to 6

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H1	-	-	-	-	-	-	-	-	-	ATE1	SNE1	RCE1	RAE1	DIS1	STE1	OE1
:																
+H6	-	-	-	-	-	-	-	-	-	ATE6	SNE6	RCE6	RAE6	DIS6	STE6	OE6

The error condition of each connection (1 to 6) is shown in this area.

Bit 15-7: Reserved

These bits are reserved. Normally "0" is set.

Bit 6: ASR table set-up error bit (ATE[6:1])

These bits show the error condition of Automatic Sending/Receiving (ASR) table set-up.

Bit6: ATE[6:1]	Description
0	No error is detected in ASR table set-up.
1	An error is detected in ASR table set-up.

Method to clear : To clear these bits to "0", please set the correct ASR table again.

Bit 5: Send error bit (SNE[6:1])

These bits are set below condition.

- At data send, there is a error of data transmission between EH-ETH and CPU module.
- A user program requires sending of data to EH-ETH before long EH-ETH has not completed the processing of data sending.

When “send data error” occurs, data in the sending area in CPU module is guaranteed, but data in the sending buffer in EH-ETH and receiving data at other station is not guaranteed.

Bit5: SNE[6:1]	Description
0	No error is detected during the data sending.
1	An error is detected during the data sending,

Method to clear : To clear these bits to "0", please set "1" to SNC[6:1] of EC3CR.

Bit 4: Receive error bit (RCE[6:1])

These bits are set below condition.

- At data receiving, there is a error of data transmission between EH-ETH and CPU module.
- Before receiving buffer data is set to receiving area in CPU module, EH-ETH receive next data.

When receive error occurs, receiving area data in CPU module and receiving buffer data in EH-ETH and receiving data at other station is not guaranteed.

Bit4: RCE[6:1]	Description
0	No error is detected during the data receiving.
1	An error is detected during the data receiving.

Method to clear: To clear these bits to "0", please set "1" to RCC[6:1] of EC3CR.

Bit 3: Receive area error bit (RAE[6:1])

These bits show the receiving data size is more than allowed size or not.

Bit3: RAE[6:1]	Description
0	Size of received data dose not exceed Receive area size.
1	Size of received data exceeds Receive area size.

Method to clear: To clear these bits to "0", please set "1" to RAC[6:1] of EC2CR.

Bit 2: Discard bit (DIS[6:1])

In case of optional mode in automatic receiving, if EH-ETH receives new coming data before the last data in the buffer is refreshed, this bit will go high.

Bit2: DIS[6:1]	Description
0	Received data has not been discarded.
1	Received data has been discarded.

Method to clear: To clear these bits to "0", please set "1" DIC[6:1] of EC2CR.

Bit 1: Send timeout error bit (STE[6:1])

These bit the timeout condition during sending data.

Bit1: STE[6:1]	Description
0	No timeout error is detected during sending data.
1	A timeout error is detected during sending data.

Method to clear: To clear these bits to "0", please set "1" to TEC[6:1] of EC1CR.

Bit 0: Open error bit (OE[6:1])

These bits show the condition during opening connection.

Bit0: OE[6:1]	Description
0	No error is detected during opening connection.
1	An error is detected during opening connection.

Method to clear: To clear these bits to "0", please set "1" to OEC[6:1] of EC1CR.

Connection *n* communication status (*CnCSR*) *n* = 1 to 6

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H7	-	-	-	-	-	-	-	-	-	CRO1	SMF1	-	ERF1	RXC1	TXC1	OPC1
:																
+HC	-	-	-	-	-	-	-	-	-	CRO6	SMF6	-	ERF6	RXC6	TXC6	OPC6

The connection condition of each connection is shown in this area.

Bit 15-7: Reserved

These bits are reserved. Normally "0" is set.

Bit 6: Close request from other station flag (CRO[6:1])

In case close mode bit(CM[6:1]) of close mode control register(CMCR) is 1, when there is a close request from other station, this bit is set 1.

When own station executes close procedure and connection is closed, system clear 0.

Bit6: CRO [6:1]	Description
0	There is no close request.
1	There is a close request from other station.

Bit 5: Send mode flag (SMF[6:1])

These flags show the specified condition of send mode whether Cyclic or Event for each connection.

Bit5: SMF[6:1]	Description
0	Cyclic send mode.
1	Event send mode.

Bit 4: Reserved

This bit is reserved. Normally "0" is set.

Bit 3: Exclusive receive control flag (ERF[6:1])

These flags show the specified condition of exclusive receive control whether enable or disable.

Bit3: ERF[6:1]	Description
0	Exclusive receive control is disable.
1	Exclusive receive control is enable.

Bit 2: Receive complete bit (RXC[6:1])

These bits are set at below condition.

- Automatic receiving mode is optional mode, and receive area refresh execute bit(ARE[6:1]) of refresh control register(RDCR) is "1".

These bits are not changed during normal mode of Automatic Receiving mode.

Bit2: RXC[6:1]	Description
0	Receive not completed.
1	Receive completed.

Bit 1: Transmit complete bit (TXC[6:1])

These bits show the condition of data transmit.

Bit1: TXC[6:1]	Description
0	Transmit not completed
1	Transmit completed.

Bit 0: An open condition bit (OPC[6:1])

Bit0: OPC[6:1]	Description
0	Open not completed. (Connection is not established)
1	Open completed. (Connection is established)

8.2 Control Register

The information to control this module operation are passed from CPU module to this module via Control area. Figure 8.2 shows the map of the control area. The control area is structured with 10 kinds of registers. Each register size is 1 word (16bits).

To put the data of this control area, FUN 201 command is prepared for user ladder diagram programming.

I/O No.	Control Registers	
+0	Module control	(*MDCR*)
+H1	Connection control	(*CNCR*)
+H2	Exclusive send control	(*EXSR*)
+H3	Ready/Event send control	(*RECR*)
+H4	Exclusive receive control	(*EXRR*)
+H5	Ready receive control	(*RDCR*)
+H6	Error clear1 control	(*EC1CR*)
+H7	Error clear2 control	(*EC2CR*)
+H8	Error clear3 control	(*EC3CR*)
+H9	Close mode control	(*CMCR*)

Figure 8.2 The structure of control area

Module Control Register (*MDCR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+0													AEN	IAV	EC1	EC0

Bit 15-4: Reserved

These bits are reserved. Please set "0" always.

Bit 3: Automatic Sending/Receiving enable bit (AEN)

To specify whether Automatic Sending/Receiving function is used or not.

Bit3: AEN	Description
0	Request to disable Automatic Sending/Receiving function. (Initial set)
1	Request to enable Automatic Sending/Receiving function.

The confirmation of this bit control can be confirmed referring ATR bit of Module Status Register (MDSR) bit2.

Bit 2: Request bit to confirm existence of the module (IAV)

This bit is used when to confirm this module is alive or not. The value specified this bit is reflected to AVR bit of Module Status Register(MDSR) bit3. If the set value is not reflected to AVR, some problem may be happen in this module. If this bit programmed to set by user ladder diagram, the value of this bit will not be reflected without starting run of CPU module.

Bit2: IAV	Description
0	Request to clear the existence response bit (AVR) of status area. (Initial set)
1	Request to set the existence response bit (AVR) of status area.

Bit 1: I.ERR LED indication/Clear bit (EC1)

This bit is used to turn I.ERR LED off. And also this bit clear IERR bit of Module Status Register bit1.

Bit1: EC1	Description
0	Nothing is done. (Initial set)
1	Request to turn I.ERR LED off and clear IERR bit to "0".

Bit 0: ERR LED indication/Clear bit (EC0)

This bit is used to turn ERR LED off. And also this bit clear ERR bit of Module Status Register bit0.

Bit0: EC0	Description
0	Nothing to done. (Initial set)
1	Request to turn ERR LED off and clear ERR bit to "0".

Connection Control Register (*CNCR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H1	-	-	CLS6	CLS5	CLS4	CLS3	CLS2	CLS1	-	-	OPN6	OPN5	OPN4	OPN3	OPN2	OPN1

"Open request" and "Close request" for each connection is handled using this register.

Bit 15, 14, 7, and 6: Reserved

These bits are reserved. Please set "0" always.

Bit 13-8: Request bit to close connection (CLS[6:1])

These bits request to close for each connection.

Bit13-8: CLS[6:1]	Description
0	Request to clear Close request. (Initial set)
1	Request to close connection.

Bit 5-0: Request bit to open connection (OPN[6:1])

These bits request to open for each connection.

Bit5-0: OPN[6:1]	Description
0	Request to clear Open request. (Initial set)
1	Request to open connection.

Event send Control Register (*RECR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H3	-	-	-	-	-	-	-	-	-	-	ASE6	ASE5	ASE4	ASE3	ASE2	ASE1

Bit 15-6: Reserved

These bits are reserved. Please set "0" always.

Bit 5-0: Event send request bit (ASE[6:1])

This bit works as an Event send request bit.

Bit5-0: ASE[6:1]	Description
0	(1) Request to clear Transmit complete bit (TXC) of Connection n communication status (CnCSR). (Initial set) (2) Event send is not done.
1	Request to execute Event sent to this module.

Automatic Receive mode control Register (*EXRR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H4	-	-	-	-	-	-	-	-	-	-	ARP6	ARP5	ARP4	ARP3	ARP2	ARP1

Bit 15-6: Reserved

These bits are reserved. Please set "0" always.

Bit 5-0: Automatic receive mode selective bit (ARP[6:1])

Bit5-0: ARP[6:1]	Description
0	ASR connection n is selected Normal mode. (Initial set)
1	ASR connection n is selected Optional mode.

Receive area refresh Register (*RDCR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H5	-	-	-	-	-	-	-	-	-	-	ARE6	ARE5	ARE4	ARE3	ARE2	ARE1

Bit 15-6: Reserved

These bits are reserved bits. Please set "0" always.

Bit 5-0: Receive Ready bit (ARE[6:1])

This bit is effective to the connection which is declared as the connection on which Automatic Sending/Receiving function is effective and Exclusive receive control set as enable. Therefore, this bit is ignored when the connection which is declared as the other condition.

Bit5-0: ARE[6:1]	Description
0	(1) Request to clear transmit complete bit (RXC) of Connection n communication status (CnCSR). (Initial set) (2) The received data in the buffer of this module is not transmit to receive area in CPU module. (This data is discarded in this module.)
1	Allow "Automatic Sending/Receiving function" to transmit data from receive buffer in this module to receive area of CPU module.

Error Clear Control 1 Register (*EC1CR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H6	-	-	TEC6	TEC5	TEC4	TEC3	TEC2	TEC1	-	-	OEC6	OEC5	OEC4	OEC3	OEC2	OEC1

This register is used for to clear the bits related to connection error.

Bit 15, 14, 7 and 6: Reserved

These bits are reserved bits. Please set "0" always.

Bit 13-8: STE[6:1]clear bit (TEC[6:1])

These bits request to clear Send timeout error bit (STE[6:1]) in Connection n error status register (CnESR).

Bit13-8: TEC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear STE[6:1] bits.

Bit 5-0: OE[6:1] clear bit (OEC[6:1])

These bits request to clear Open error bit (OE[6:1]) in Connection n error status register.

Bit5-0: OEC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear OE[6:1] bits.

Error Clear Control 2 Register (*EC2CR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H7	-	-	RAC6	RAC5	RAC4	RAC3	RAC2	RAC1	-	-	DIC6	DIC5	DIC4	DIC3	DIC2	DIC1

This register is used for to clear the bits related to connection error.

Bit 15, 14, 7 and 6: Reserved

These bits are reserved bits. Please set "0" always.

Bit 13-8: RAE[6:1]clear bit (RAC[6:1])

These bits request to clear Send timeout error bit (RAE[6:1]) in Connection n error status register (CnESR).

Bit13-8: RAC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear RAE[6:1] bits.

Bit 5-0: DIS[6:1] clear bit (DIC[6:1])

These bits request to clear Open error bit (DIS[6:1]) in Connection n error status register.

Bit5-0: DIC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear DIS[6:1] bits.

Error Clear Control 3 Register (*EC3CR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H8	-	-	SNC6	SNC5	SNC4	SNC3	SNC2	SNC1	-	-	RCC6	RCC5	RCC4	RCC3	RCC2	RCC1

This register is used for to clear the bits related to connection error.

Bit 15, 14, 7 and 6: Reserved

These bits are reserved bits. Please set "0" always.

Bit 13-8: SNE[6:1]clear bit (SNC[6:1])

These bits request to clear Send timeout error bit (SNE[6:1]) in Connection n error status register (CnESR).

Bit13-8: SNC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear SNE[6:1] bits.

Bit 5-0: RCE[6:1] clear bit (RCC[6:1])

These bits request to clear Open error bit (RCE[6:1]) in Connection n error status register.

Bit5-0: RCC[6:1]	Description
0	Nothing is done. (Initial set)
1	Request to clear RCE[6:1] bits.

Close Mode Control Register (*CMCR*)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
+H9	-	-	-	-	-	-	-	-	-	-	CM6	CM5	CM4	CM3	CM2	CM1

This is the register which chooses the handling when this module receives Close request from other station.

Bit 15-6: Reserved.

These bits are reserved bits. Please set "0" always.

Bit 13-8: Close mode bit (CM[6:1])

To specify the close mode for each connection.

Bit5-0: CM[6:1]	Description
0	The mode where this module Close connection as soon as this module receives close request from other station. (Initial set)
1	The mode where this module waits for close request from user ladder diagram when this module receives close request.

Table 8.2 The list of registers

Status Registers

Reg. name	I/O No.	Bit name 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MDSR	+0	-	-	-	-	-	-	-	-	FAE	OPM	SME	EIE	AVR	ATR	IERR	ERR
C1ESR	+H1	-	-	-	-	-	-	-	-	-	ATE1	SNE1	RCE1	RAE1	DIS1	STE1	OE1
C2ESR	+H2	-	-	-	-	-	-	-	-	-	ATE2	SNE2	RCE2	RAE2	DIS2	STE2	OE2
C3ESR	+H3	-	-	-	-	-	-	-	-	-	ATE3	SNE3	RCE3	RAE3	DIS3	STE3	OE3
C4ESR	+H4	-	-	-	-	-	-	-	-	-	ATE4	SNE4	RCE4	RAE4	DIS4	STE4	OE4
C5ESR	+H5	-	-	-	-	-	-	-	-	-	ATE5	SNE5	RCE5	RAE5	DIS5	STE5	OE5
C6ESR	+H6	-	-	-	-	-	-	-	-	-	ATE6	SNE6	RCE6	RAE6	DIS6	STE6	OE6
C1CSR	+H7	-	-	-	-	-	-	-	-	-	CRO1	SMF1	ESF1	ERF1	RXC1	TXC1	OPC1
C2CSR	+H8	-	-	-	-	-	-	-	-	-	CRO2	SMF2	ESF2	ERF2	RXC2	TXC2	OPC2
C3CSR	+H9	-	-	-	-	-	-	-	-	-	CRO3	SMF3	ESF3	ERF3	RXC3	TXC3	OPC3
C4CSR	+HA	-	-	-	-	-	-	-	-	-	CRO4	SMF4	ESF4	ERF4	RXC4	TXC4	OPC4
C5CSR	+HB	-	-	-	-	-	-	-	-	-	CRO5	SMF5	ESF5	ERF5	RXC5	TXC5	OPC5
C6CSR	+HC	-	-	-	-	-	-	-	-	-	CRO6	SMF6	ESF6	ERF6	RXC6	TXC6	OPC6

Control Registers

Reg. name	I/O No.	Bit name 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MDCR	+0	-	-	-	-	-	-	-	-	-	-	-	-	AEN	IAV	EC1	EC0
CNCR	+H1	-	-	CLS6	CLS5	CLS4	CLS3	CLS2	CLS1	-	-	OPN6	OPN5	OPN4	OPN3	OPN2	OPN1
	+H2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RECR	+H3	-	-	-	-	-	-	-	-	-	-	ASE6	ASE5	ASE4	ASE3	ASE2	ASE1
EXRR	+H4	-	-	-	-	-	-	-	-	-	-	ARP6	ARP5	ARP4	ARP3	ARP2	ARP1
RDCR	+H5	-	-	-	-	-	-	-	-	-	-	ARE6	ARE5	ARE4	ARE3	ARE2	ARE1
EC1CR	+H6	-	-	TEC6	TEC5	TEC4	TEC3	TEC2	TEC1	-	-	OEC6	OEC5	OEC4	OEC3	OEC2	OEC1
EC2CR	+H7	-	-	RAC6	RAC5	RAC4	RAC3	RAC2	RAC1	-	-	DIC6	DIC5	DIC4	DIC3	DIC2	DIC1
EC3CR	+H8	-	-	SNC6	SNC5	SNC4	SNC3	SNC2	SNC1	-	-	RCC6	RCC5	RCC4	RCC3	RCC2	RCC1
CMCR	+H9	-	-	-	-	-	-	-	-	-	-	CM6	CM5	CM4	CM3	CM2	CM1

8.3 How to access registers

You use **FUN201** command to access ETH register. The notation of the **FUN201** command specification and **FUN201** usage for this module are described here.

FUN201 command	
Format	FUN 201 (s)
Parameter	Starting I/O No. of the S parameter area
Function	These are the commands to access registers.

- This is the command to read or write Status and Control register between CPU module and this module.
- The control type supported by this command is only “With hand shaking” for writing. Don’t specify and execute “Without hand shaking” for writing.
- When status register is read, select the control type “With hand shaking” or “Without hand shaking”. ("Without hand shaking" is recommended.)

The description of S parameter area

s + 0	(1) Error code
s + 1	(2) System area
s + 2	(Not be allowed to use by user)
s + 3	(3) Control type
s + 4	(4) The start of the area
s + 5	(5) Control bit I/O No. of starting sending or receiving
s + 6	(6) Starting I/O No. of Destination (or Source)
s + 7	(7) Size

The description of control bit table for writing or reading.

+ 0	(8) Starting execution flag
+ 1	(9) The completion flag without error
+ 2	(10) The completion flag with error

The description of the frame

The area should be set by user
The area inhibited to set by user

(8) Starting execution flag
When to start sending or receiving with FUN201 command, please set “1” by user program.
This bit will be reset by system execution when the sending or receiving is completed.

(9) The completion flag without error
This bit will be set to “1” when the sending or receiving by FUN201 command is completed without error. This will be reset by system when FUN201 start to execution.

(10) The completion flag with error
This bit will be set to “1” when the sending or receiving by FUN200 command is completed with error. This will be reset by system when FUN201 start to execution.

(1) Error code
The execution result of FUN201 command is set.
Completed without error -> = H0000
Completed with error -> != H0000

(2) System area
This area is used by system execution when FUN200 command is executed. Don’t use this area by user.

(3) Control type:
H0001: The request to get value from Status register (“With hand shaking” is supported.)
H0002: The request to get value from Status register (“Without hand shaking” is supported.)
H0003: The request to put value to Control register.
HA55A: Request to software reset.
Please don't set up any values other than the above.

(4) The start of the area :

b15	b11	b7	b0
Unit No.	Slot No.	The position of word	

Unit No.: Always “0” is required
Slot No.: One of 0 to 2 is required
The position of word: Always “0” is required
[When control type is selected H0001 or H0003]
Always “**0**” is required
[When control type is selected H0002]
Always “**H2F**” is required

(5) Control bit I/O No. of starting sending or receiving
The actual address value of R, L or M which has the starting I/O No. of the sending or receiving control bit area should be set using ADRIO command.

(6) Starting I/O No. of Destination (or Source)
The actual address value of WR, WL or WM which has the starting I/O No. of the source or destination area should be set using ADRIO command.

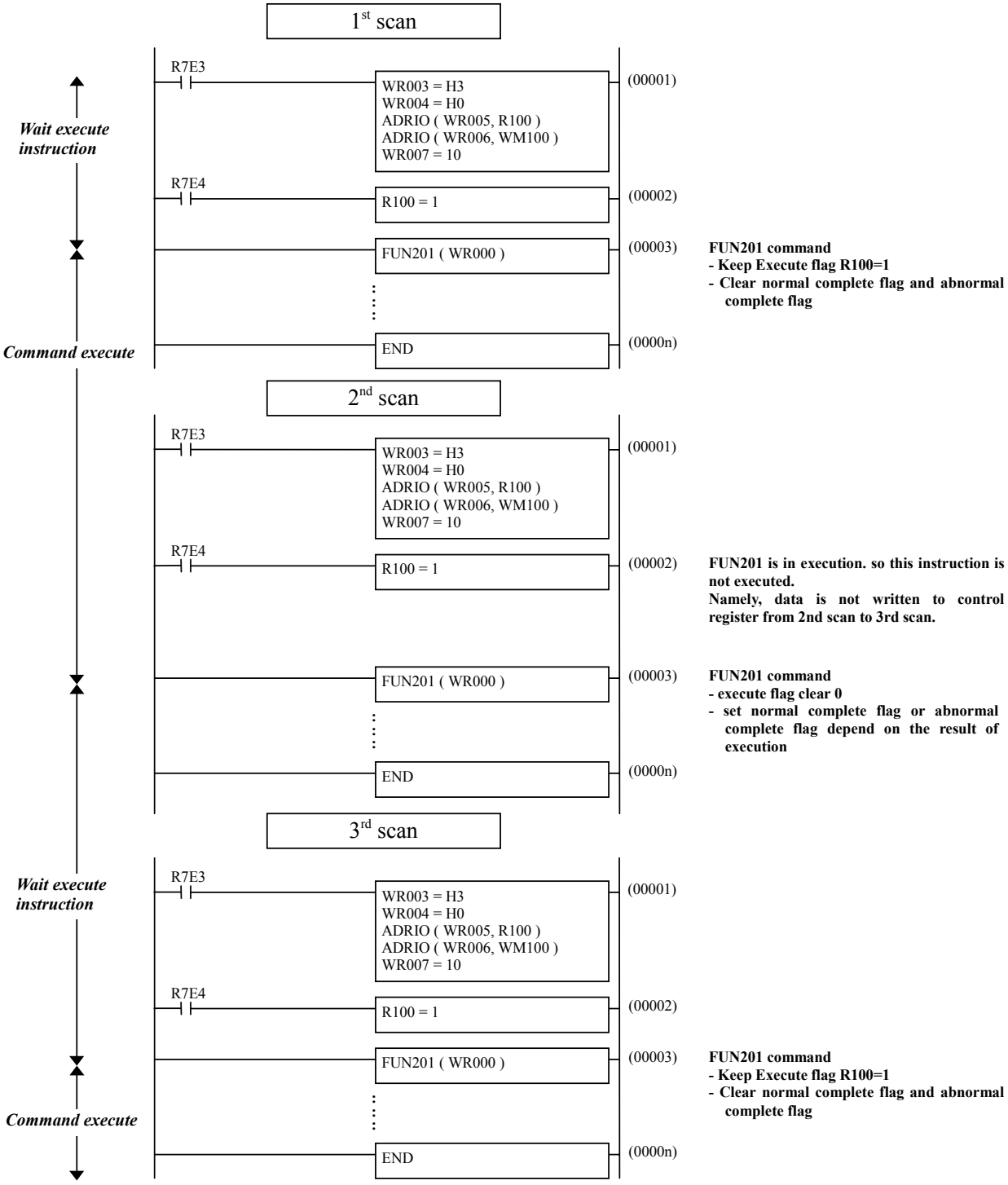
(7) Size
The size of using area for sending or receiving should be set. For this module, maximum size is 54 words.

8.3.1 FUN201command

[Operation condition]

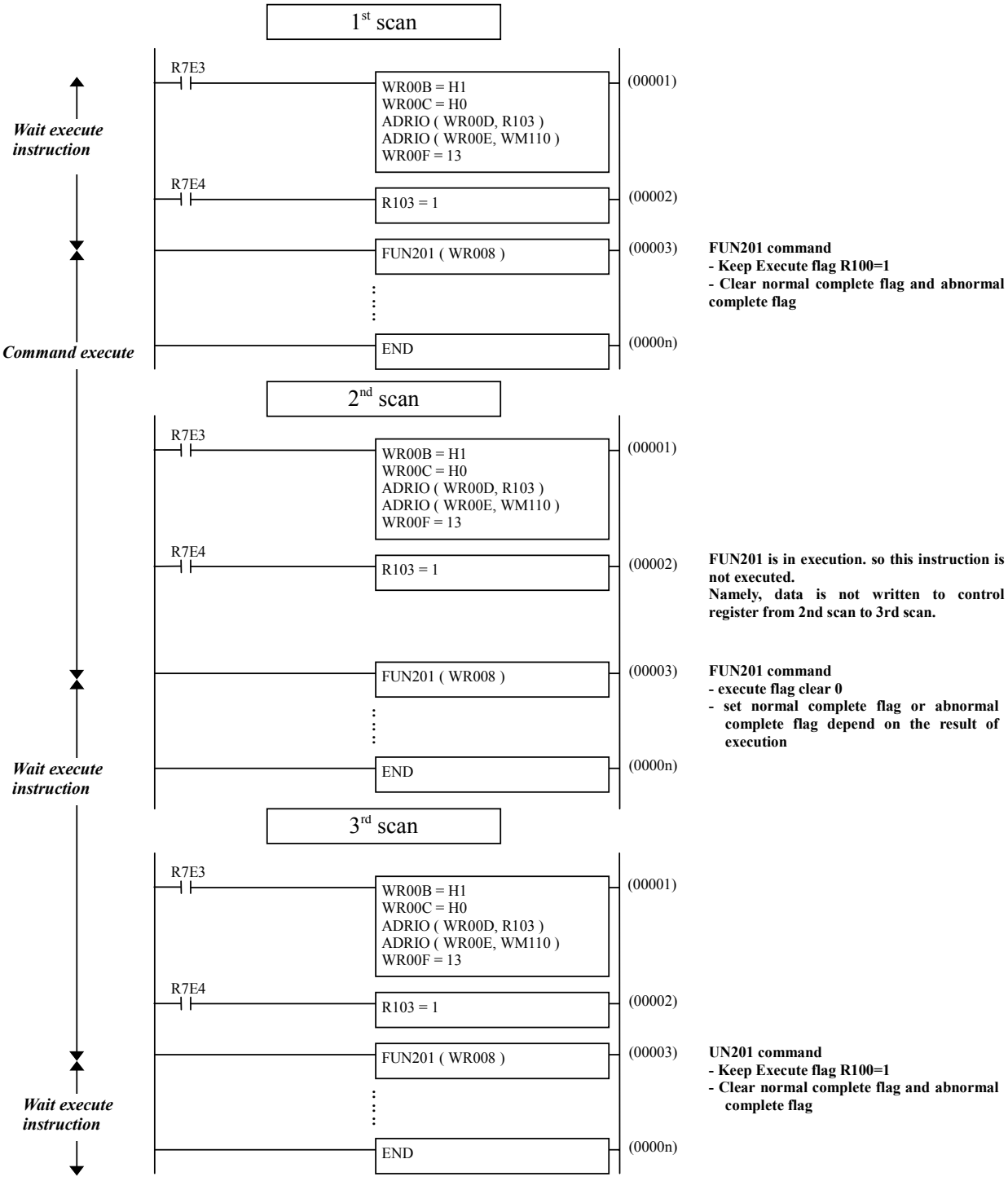
- FUN201 command is in function box without execute condition and in normal scan.
- When you write a data to control register in EH-ETH, set control type "H0003".
- When you read a data from status register in EH-ETH, set control type "H0001(handshake valid)" or "H0002(handshake invalid)".

[Basic operation 1]
To write Control register (Control type "H0003")



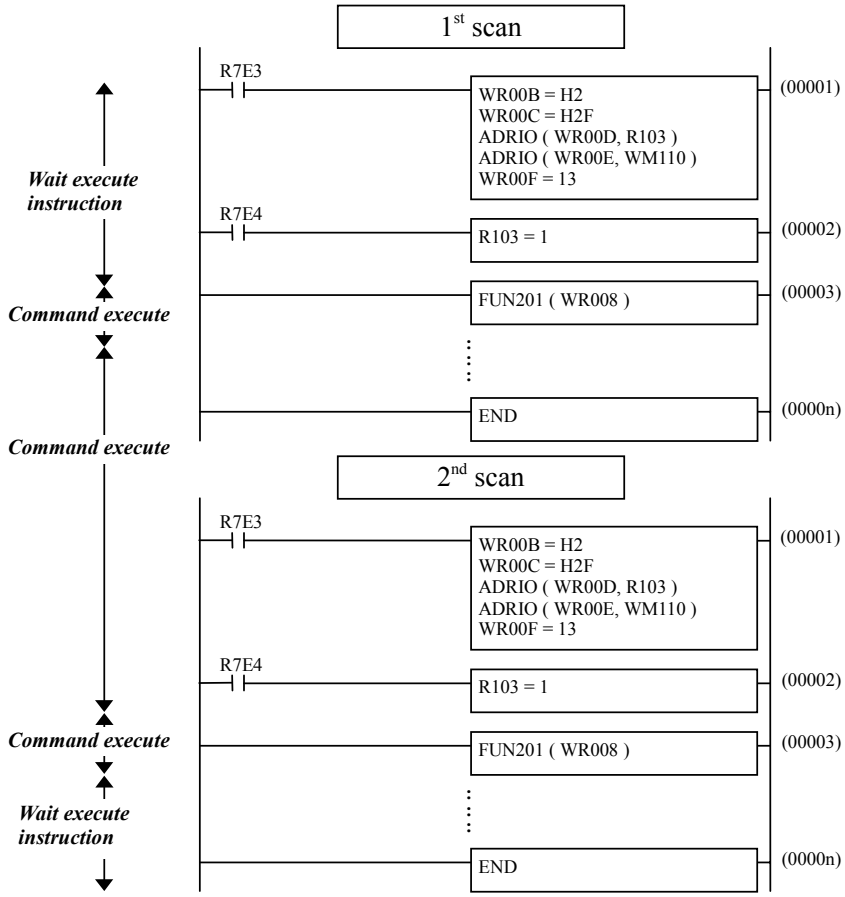
[Basic operation 2]

To read status register (Control type "H0001"(handshake valid))



[Basic operation 3]

To read status register (Control type "H0002"(handshake invalid))

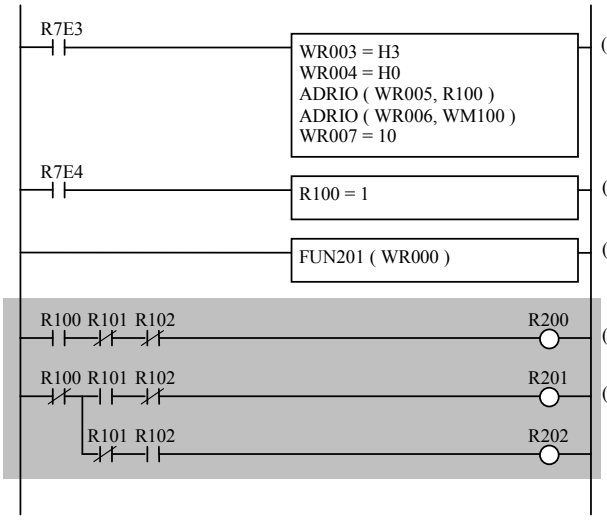


- Next circuit is not executed before completed of reading tatus register.
- After that, FUN201 clear execute flag.
- Set normal complete flag or abnormal complete flag depend on the result of execution.

- Next circuit is not executed before completed of reading tatus register.
- After that, FUN201 clear execute flag.
- Set normal complete flag or abnormal complete flag depend on the result of execution.

[Detect of command execution status]

When control type is "H0001" or "H0003" and you add the below two circuits just after FUN201 command circuit, you can detect of command execution status.



R200 is ON: During Command execution
(R200 = R100 && !R101 && !R102)

R201 is ON: Before command was completed normally and status of wait for instruction
(R201 = !R100 && R101 && !R102)
R202 is ON: Before command was completed abnormally and status of wait for instruction
(R202 = !R100 && !R101 && R102)

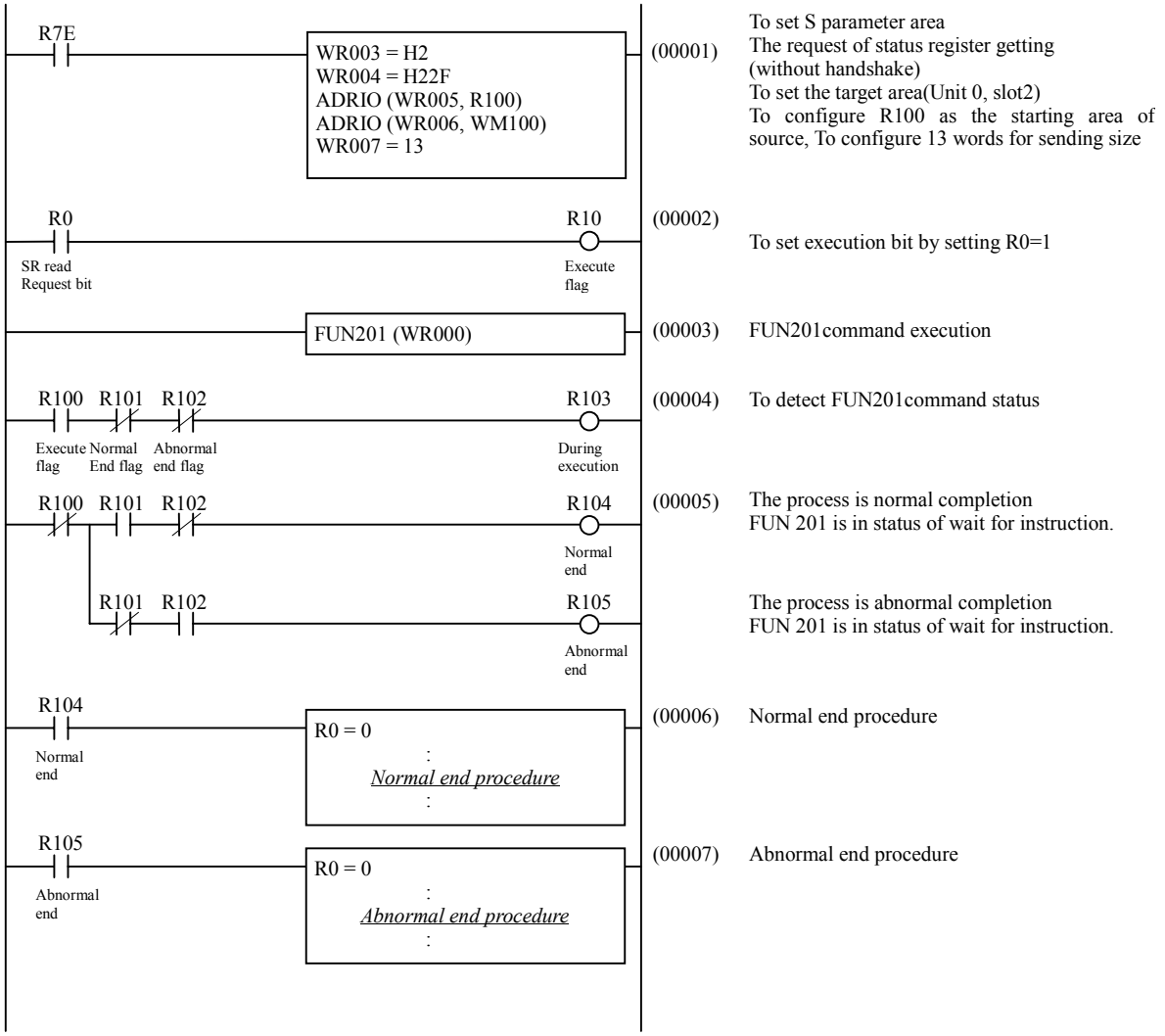
Caution:

- During execution of command, when system area(s+1, s+2) of s parameter is changed, execution of FUN201 command is not guaranteed.
- After execute flag set 1, FUN201 command is started to execute maximum 1 scan later.
- When execute flag is 0 and FUN201 is executed, read/write to the applied area is not execute.

Sample program 8 Read status register

Slot No.	0	1	2
EH-ETH	-	-	*

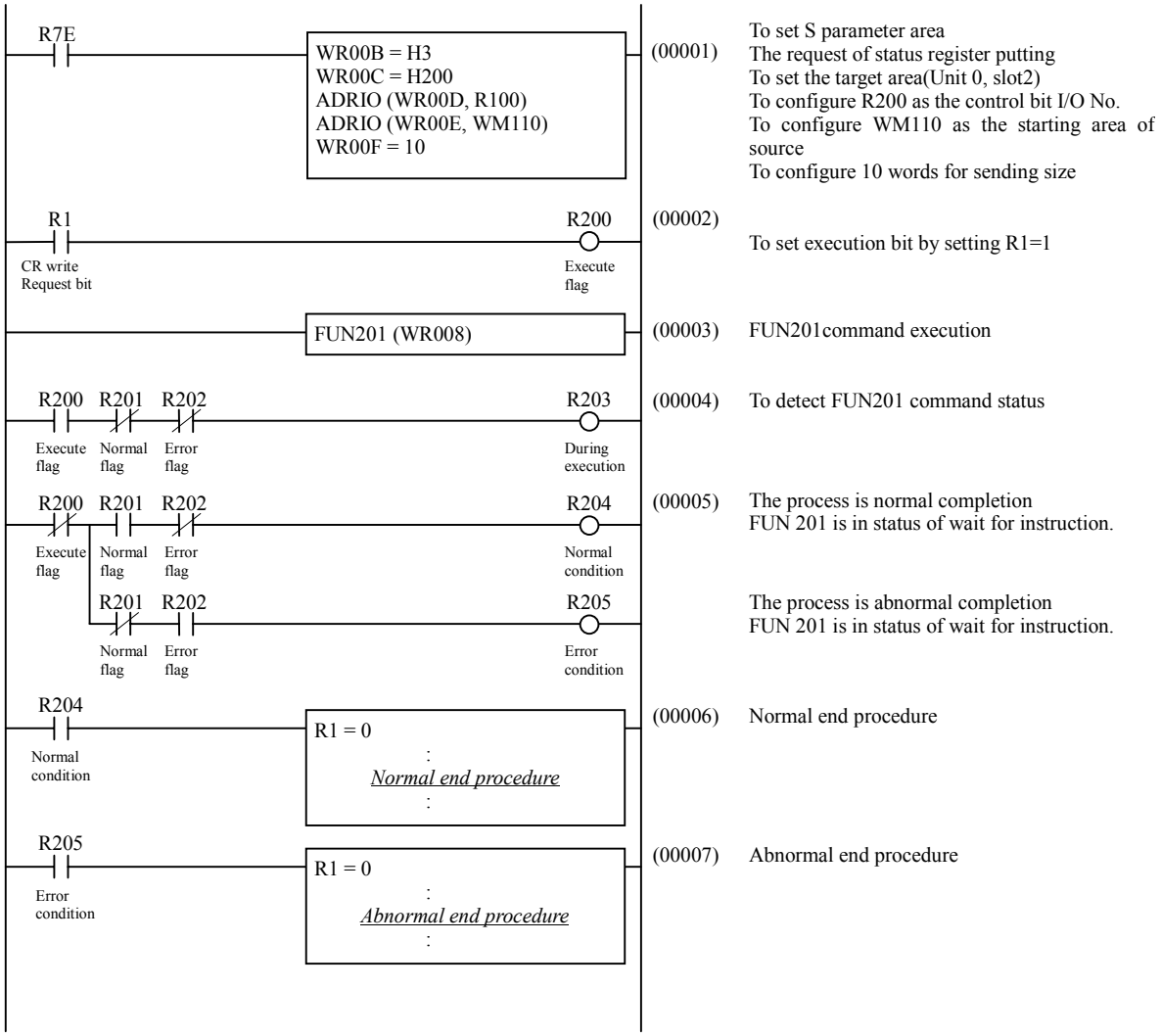
When FUN201 is executed at R100=1, the value of status register will be putting on WM100 to WM10C.



Sample program 9	Write to control register

Slot No.	0	1	2
EH-ETH	-	-	*

When FUN201 command is executed at R200 = 1, WM110 to WM119 will be putting on control register.



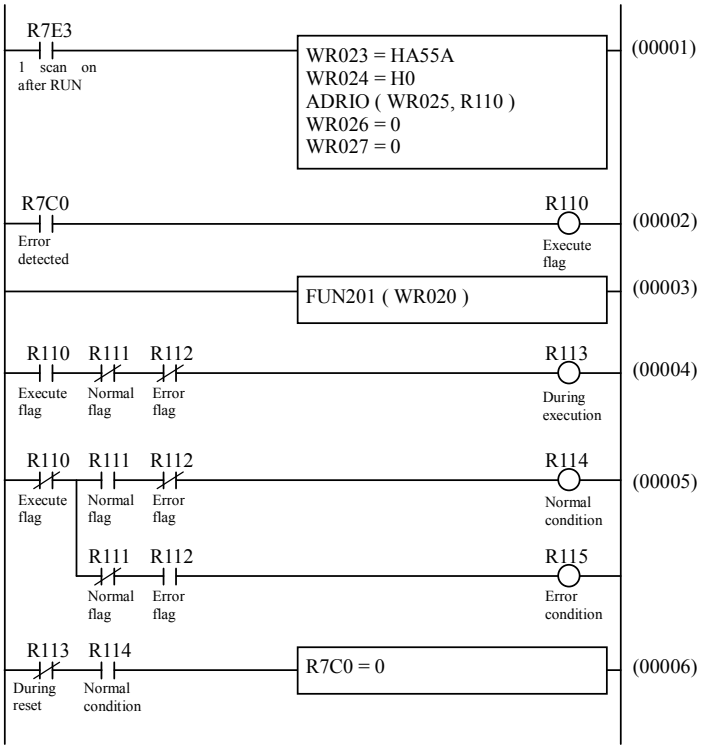
8.3.2 Software reset function

EH-ETH support software reset function by FUN201 command.

The below is the sample program of software reset.

Sample program 10 Execution of software reset

Slot No.	0	1	2
EH-ETH	*	-	-



The average time to complete initial procedure after EH-ETH receive software reset request is approx. 6 seconds.

Chapter 9 Maintenance, Check, Error

Check the module dairy or regularly in order to use EH-ETH in best condition and keep the system run normally.

9.1 Dairy Check

Check the following items in operation.
AS to EH-150 series PLC, see the application manual “EH-150 application manual(NJI-280B)”

Table 9.1 Dairy check item

Check item	LED	Method	Normal	Typical cases of the problem
Status LED	POW	Visual check	ON (Green)	Cable
	I.ERR		OFF	Ethernet setting
	ERR		OFF	Connection open error or communication error
	STATUS		ON (Green)	ON (red): system software error Flickering (Green/red): Error *1

*1: EH-ETH indicates the error content of module by the color and flash interval.
See “chapter 4 LED indication” for detailed information.

9.2 Regular Check

Take the following check items with power off the PLC and external I/O circuit at least once in half of a year or more frequently according to your condition.

Table 9.2 Regular check

Check item	Details	Measure	Action
Installation	(1) Connection between module and base (2) Connectors (3) Screws (4) Cables	Check if it is no problem.	Tighten the screws Connect firmly Tighten the screws
Connection of transmission cable	Is the cable disconnected?	Check if POW LED lighting.	Change the cable.
	Is the cable applied irregular weight or tension?	Check if it is no problem	Check the wiring route and if it’s fixed properly.
Appearance	Is the module very dusty? Is there any unusual point?	Check if it is no problem	Cleaning up and implement maintenance
Environment	(1) temperature (2) humidity (3) the others	0 to 55 (C 20 to 90% RH (no condensing) No dust, foreign matter, vibration	Be sure to install in appropriate condition
Spare module	Number of unit, storage condition	Check if it is no problem	-
Program	Check program	The final programs in CPU and in PC must be the same.	Check both master and backup program.

* Be careful not to change the module setting switch by mistake when you clean the module.

9.3 Error LED and measure

Following table shows the indication and the measure in case an error occurs in communication between EH-ETH and other station.

9.3.1 ERR confirmation by LED indication

The LED indications on the module give you information about your network and the module.

Table 9.3 LED indication and Error content

No.	Error content	LED name	Cause of error and measurement
1	A fault of hardware	STATUS	Supply the power or reset by RES switch to initialize
2	Setting of Ethernet information, ASR information is wrong.	I.ERR STATUS	Correct the setting according to the contests of status register or status register
3	Temporary IP address is 192.168.0.0.		Set IP address in the range from 192.168.0.1 to 192.168.0.63.
4	Wrong cable	POW or Tx/Rx	(1). Wrong kind of cable Check if the using cable is straight or cross type. (2). Wrong connection of cable Check if the cable is plugged in a connector firmly. Check if it is not breaking wire.
5	Connection opening error (active open station)*1	ERR	(1). The requested station is not in network. - Check if the station is in the same network. - Check the cables for both own and the other station. (2). Wrong setting at the own station - Check if the IP address and logical port number at the own station. (3). Wrong setting at the other station - Check if the other station is in passive open.
6	Error at data sending		Before the current transmission completed, EH-ETH is requested next transmission. - Configure the cyclic transmission period to be longer. - Configure the data size for sending to be smaller.
7	Error at data receiving		Before the current communication completed, EH-ETH receives next data. - Configure the transmission period of the other station to be longer. - Configure the data size for receiving to be smaller.

*1: A connection specified passive station does not detect the abnormality below a data link level layer. Therefore, the other station should have detection of error when the connection specified passive station is not open.

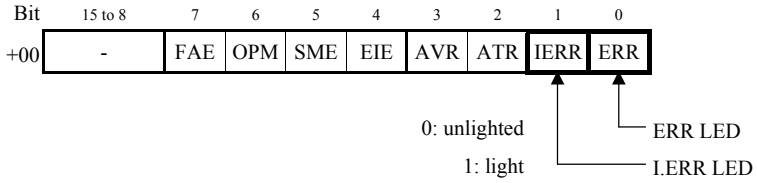
9.3.2 How to turn off LED

The status of ERR LED and I.ERR LED can be read out or turned off by ladder program.

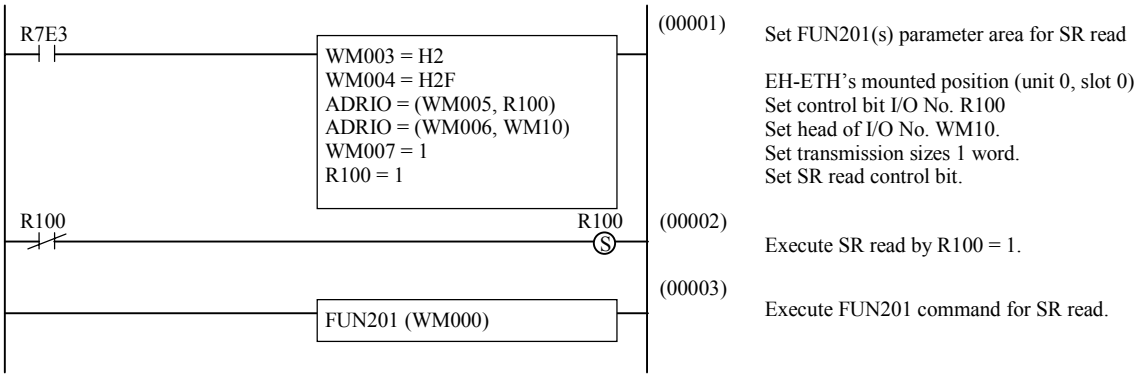
(1) Confirm LED light

Ladder program can confirm the status(light or unlighted) of ERR and I.ERR.
The status of each LED is stored in module status register(MDSR) in EH-ETH.

Module status register (MDSR)



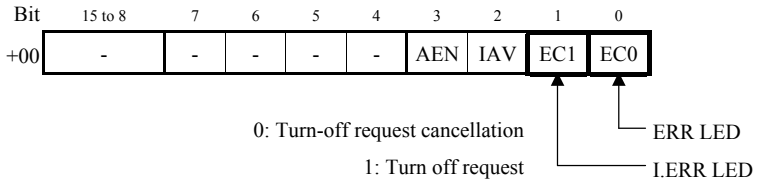
You can read the value of MDSR to WM10 by the below ladder program. As a result, M100 means the status of ERR LED and M101 means status of I.ERR LED.



(2) How to turn off LED

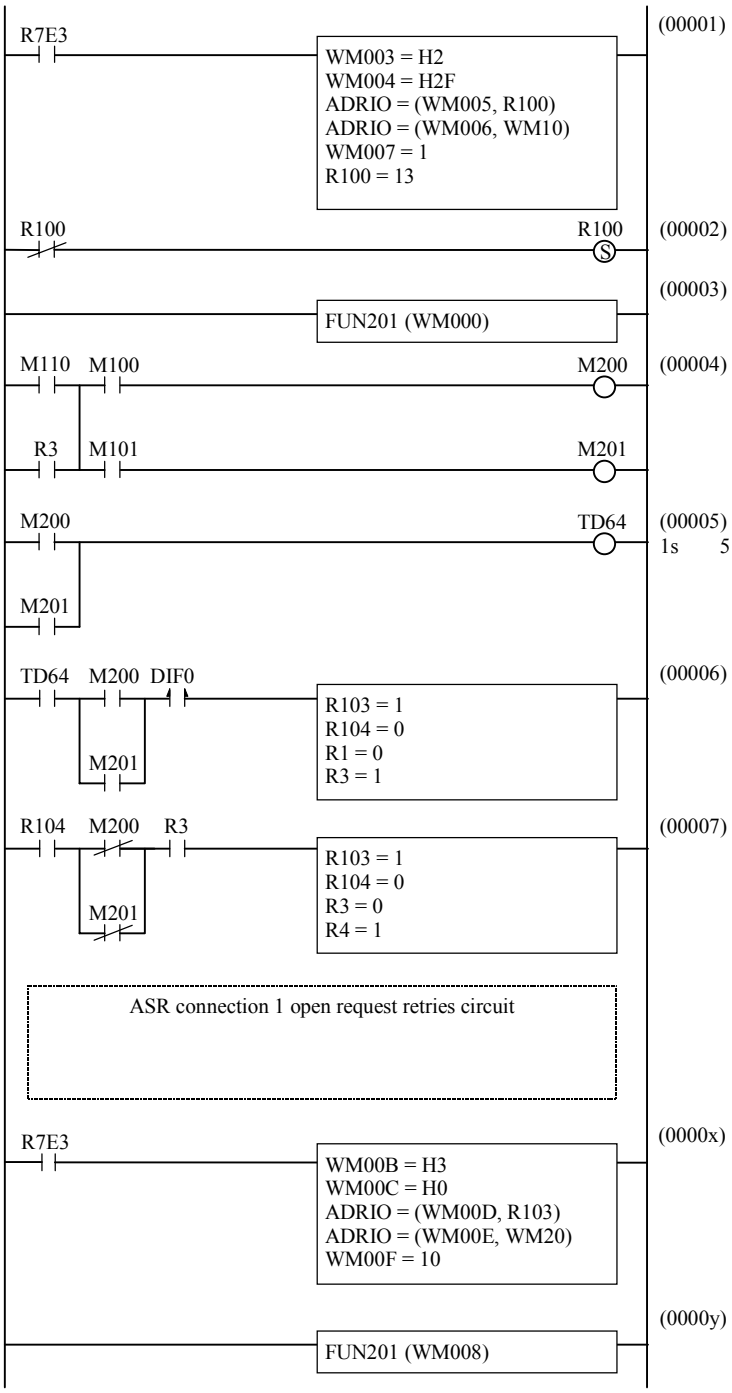
Ladder program can turn off ERR and I.ERR LEDs. To turn each LED off, set module control register(MDCR).

Module control register (MDCR)



The below ladder program can monitor the status of ERR and I.ERR LEDs, and turn off LED automatically by the light of LED. This sample program is in case the “open error” happens on ASR connection 1, which is specified as positive station.

Set EC0 bit of MDCR to internal output M200 and EC1 bit to internal output M201 as well.



SET FUN201(s) parameter area.

Request to SR read
Set EH-ETH installation position(unit 0, slot0)
Set control I/O No. R100.
Set head of I/O No. WM10.
Set read size 1 word
Set SR read control bit 1.

9.3.3 Confirm error by status register (SR)

EH-ETH has internally status register(SR) which stores communication status for each ASR connection. You can monitor this SR and program the retry circuit when the communication error occurs. See the “chapter 8 Register” for detailed status register information.

(1) Open error detected

When open error occurs at the ASER connection of passive station, bit 0 of Error status register(CnESR): open error bit(OEn) is 1.

To confirm if error occurs in open procedure, read this open error bit as occasion demand.

(2) Transmission error detected

When transmission error occurs at the ASR connection, error status register(CnESR) bit 5: transmission error bit 1.

(3) Receive error detected

When receive error occurs at ASR connection, error status register(CnESR) bit 4: receive error bit 1.

(4) Discard receiving data detected

When data in receiving buffer is broken at ASR connection, error status register(CnESR) discard bit(DISn) 1.

CAUTION

The following errors can not be detected in the status register.

Breaking wire or hardware connection error during on line communication (connection open)

Trouble on other stations during on line communication (connection open)

9.4 Special Internal Outputs in the CPU module

The status information on an EH-ETH module is stored in the special internal outputs area of CPU module shown in Table 9.4.1.

Table9.4.1 Status information on an EH-ETH module

I/O No.	Target slots No.
WRF020	Slot 0
WRF021	
WRF022	Slot 1
WRF023	
WRF024	Slot 2
WRF025	

[WRF020, WRF022, WRF024]

Bit	Explanation	
0	ASR1 connection status bit	0: Closed, 1: Open
1	ASR2 connection status bit	
2	ASR3 connection status bit	
3	ASR4 connection status bit	
4	ASR5 connection status bit	
5	ASR6 connection status bit	
6	ASR1 close request bit	0: No request, 1: Request
7	ASR2 close request bit	
8	ASR3 close request bit	
9	ASR4 close request bit	
10	ASR5 close request bit	
11	ASR6 close request bit	
12	Task code port1 status bit	0: Closed, 1: Open
13	Task code port2 status bit	
14	Task code port3 status bit	
15	Task code port4 status bit	

[WRF021, WRF023, WRF025]

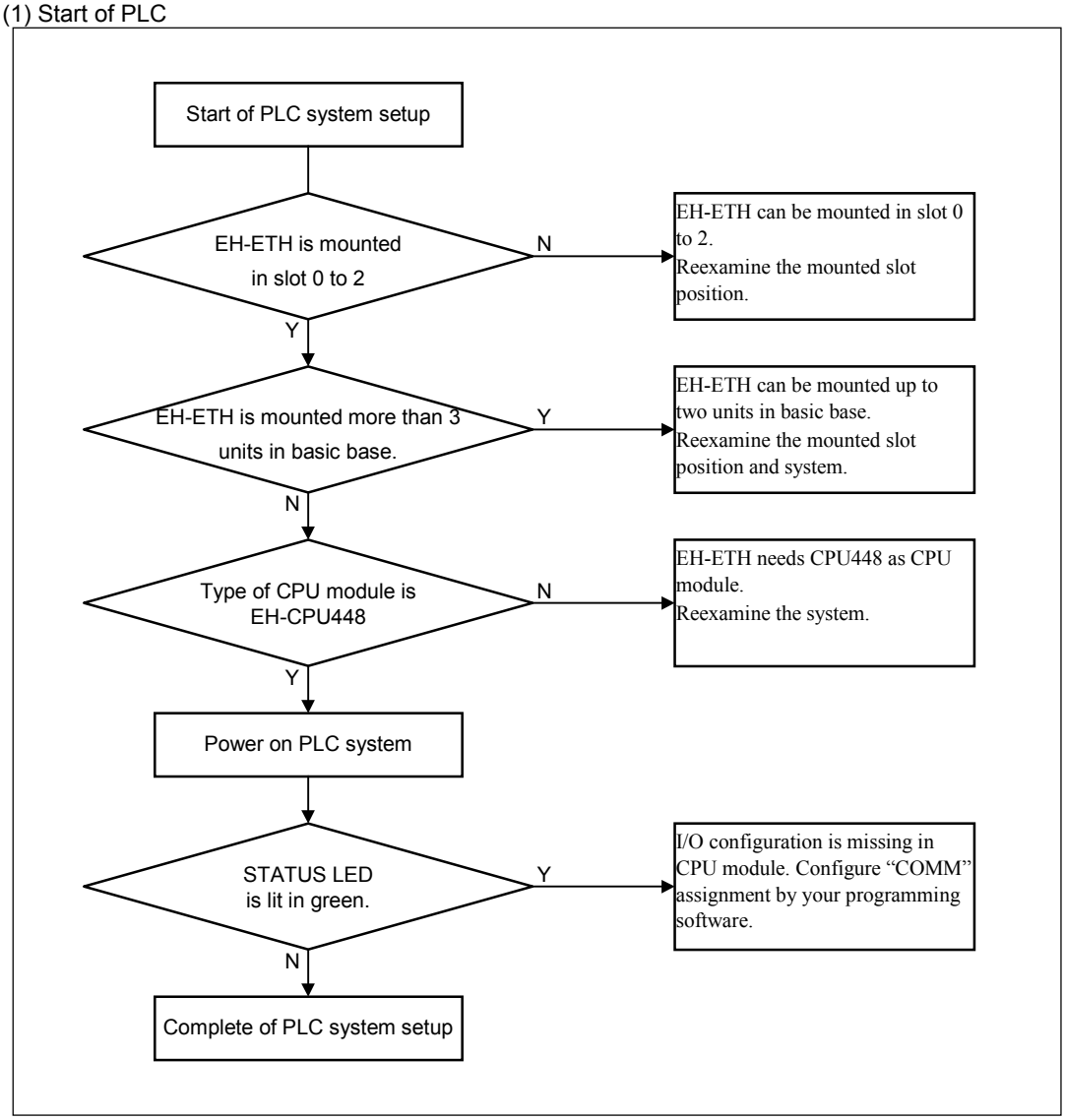
Bit	Explanation	
0	ASR1 open error status bit	0: Without error, 1: Error
1	ASR2 open error status bit	
2	ASR3 open error status bit	
3	ASR4 open error status bit	
4	ASR5 open error status bit	
5	ASR6 open error status bit	
6, 7	Reserved	Always "0"
8	ERR LED status bit	0: Turn off 1: Turn on
9	I.ERR LED status bit	
10	ASR enable status bit	0: Disable 1: Enable
11	AVR flag display bit	The AVR flag of MDSR is displayed.
12	Ethernet information error bit	0: Without error 1: Error
13	Sum error bit	
14	Operation mode bit	0: Normal 1: IP address setting mode
15	Fatal error bit	0: Without error 1: Error

Chapter 10 Troubleshooting

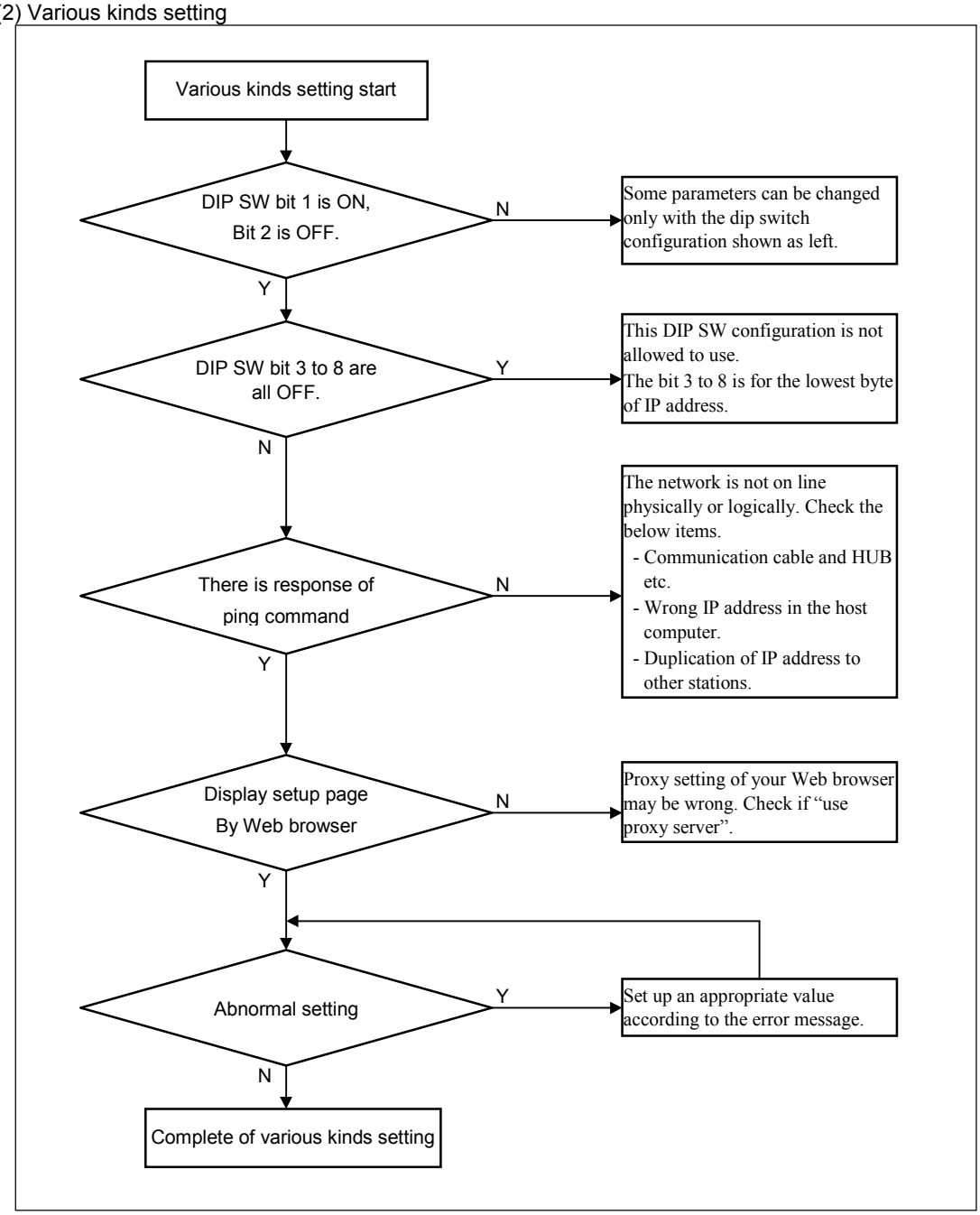
This chapter explains the trouble shooting in case a system using EH-ETH.

10.1 Troubleshooting follow

(1) Start of PLC



(2) Various kinds setting



For reference

In order to check the network connection, the "ping" command is useful.

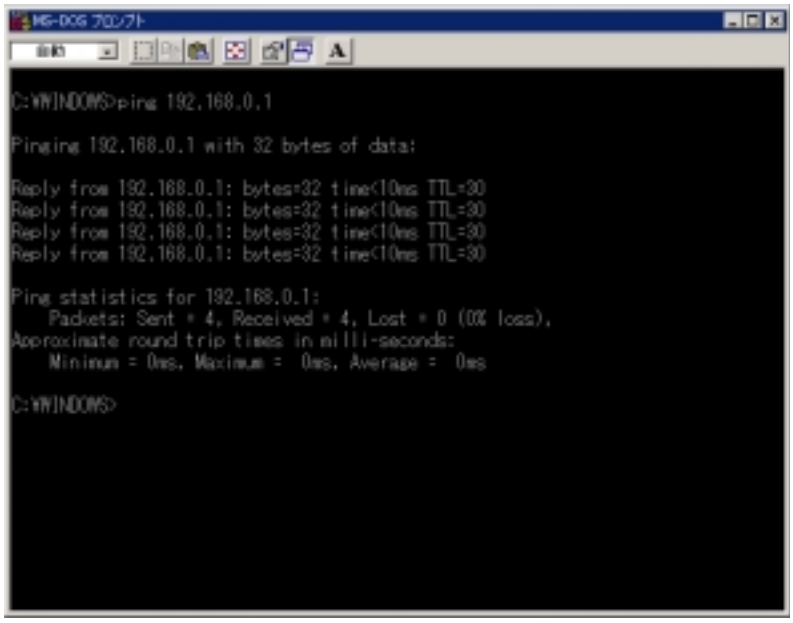
You can simply type “ping” and IP address in DOS prompt. If the network is on line, the requested station will reply as below. In this sample, the DIP Switch configuration is Bit 1=ON, Bit 8=ON, the other=OFF, which means temporal IP address is 192.168.0.1.

[Procedure]

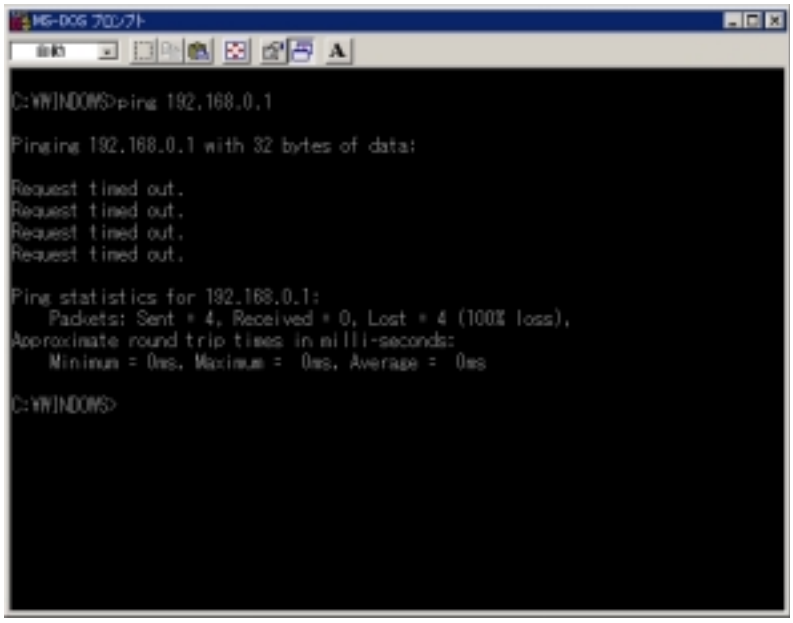
(1). Select [start]-[program(P)]-[MS-DOS prompt]

(2). Type “ **ping 192.168.0.1** “

(3-1). If the network is on line, EH-ETH will reply as below.



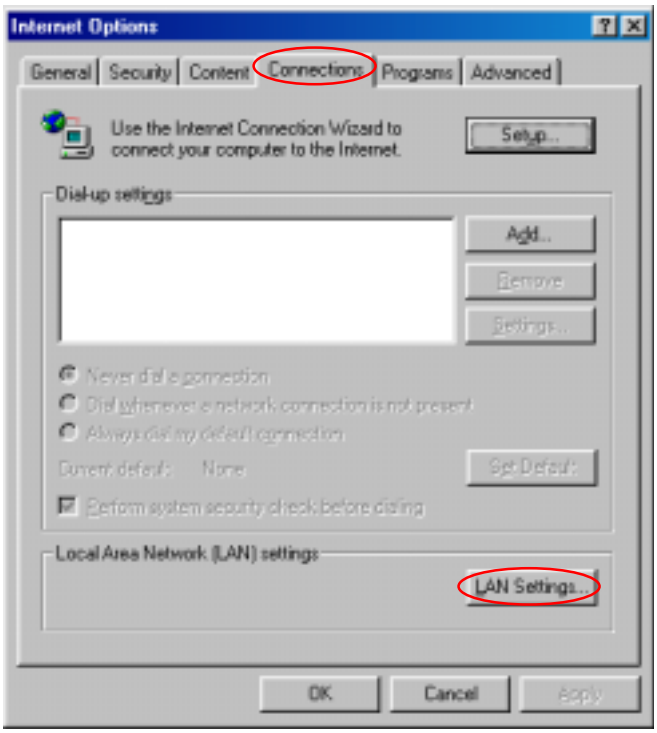
(3-2). If the network is off line, EH-ETH will reply as below.



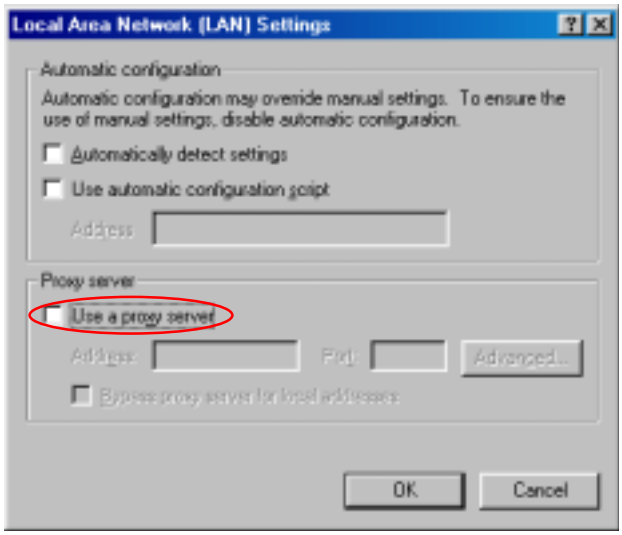
Trouble shoot

When setup page is not displayed, please confirm "proxy setting" of your Web browser.

[How to confirm the setting of proxy]
<Internet Explorer5.0>
(1). Select [Tools]→[Internet Options…]
(2) Select [Connections] tag and click [LAN settings] button.

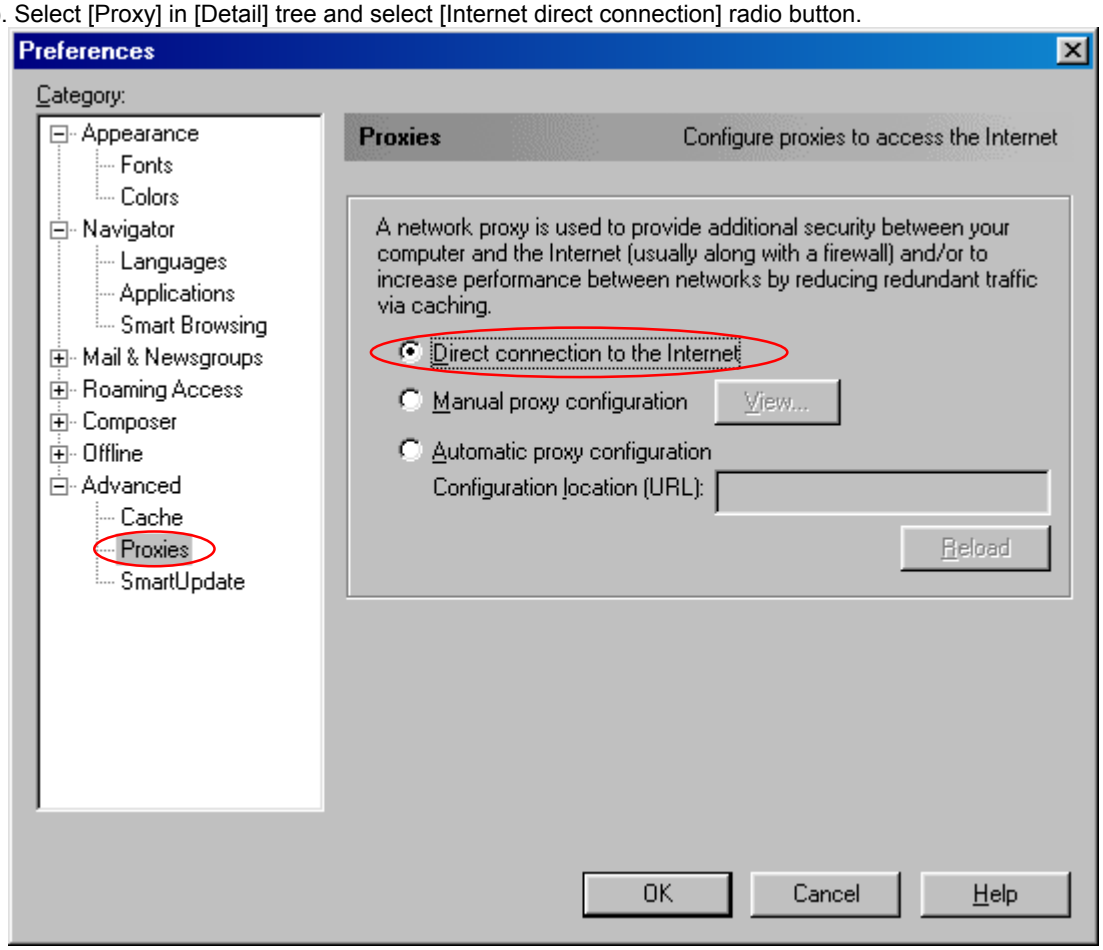


(3). Be sure to check “use a proxy server” should NOT be activated.

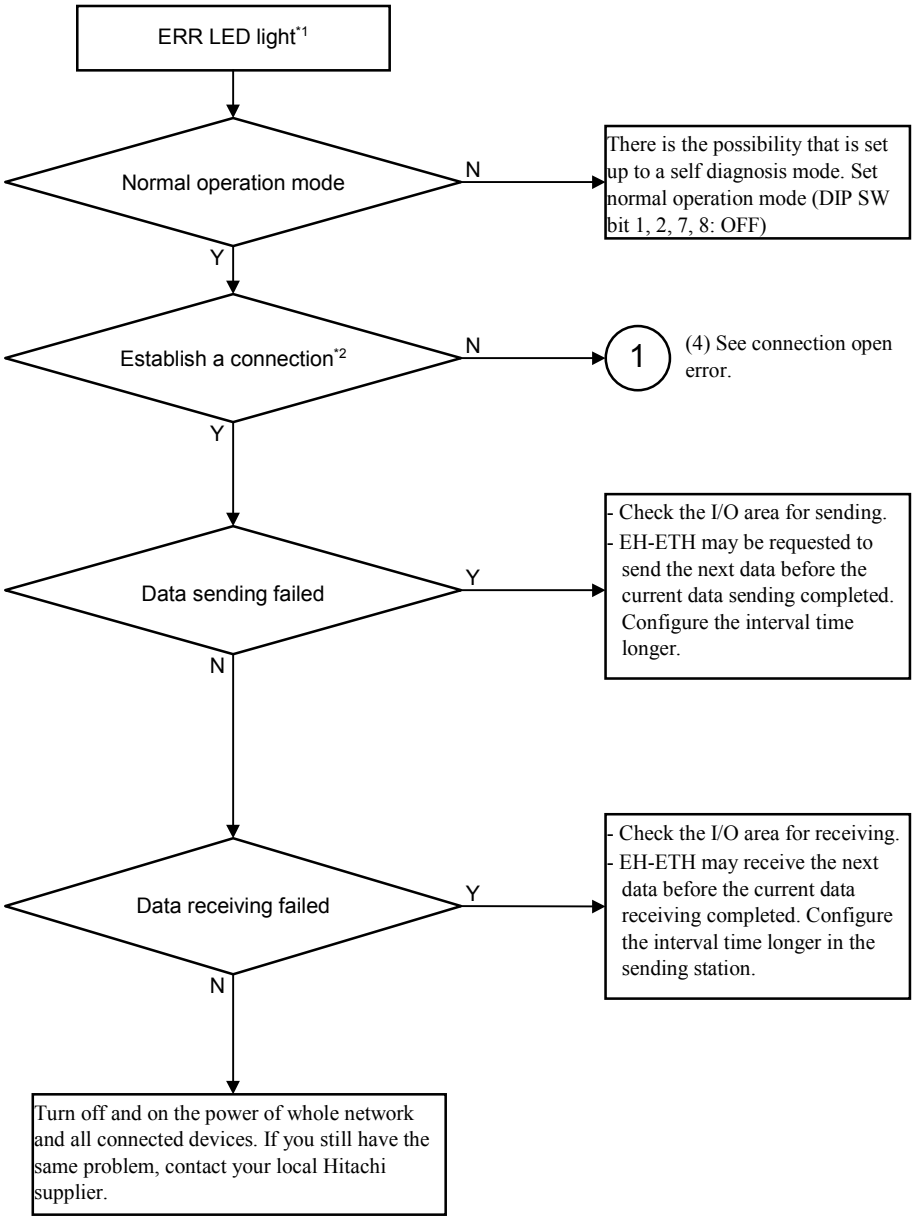


(Continued)

Trouble shoot (Continue)
<Netscape Navigator4.0>
(1). Select [Edit(E)] -> [Setting(E)]
(2). Select [Proxy] in [Detail] tree and select [Internet direct connection] radio button.



(3) ERR LED light

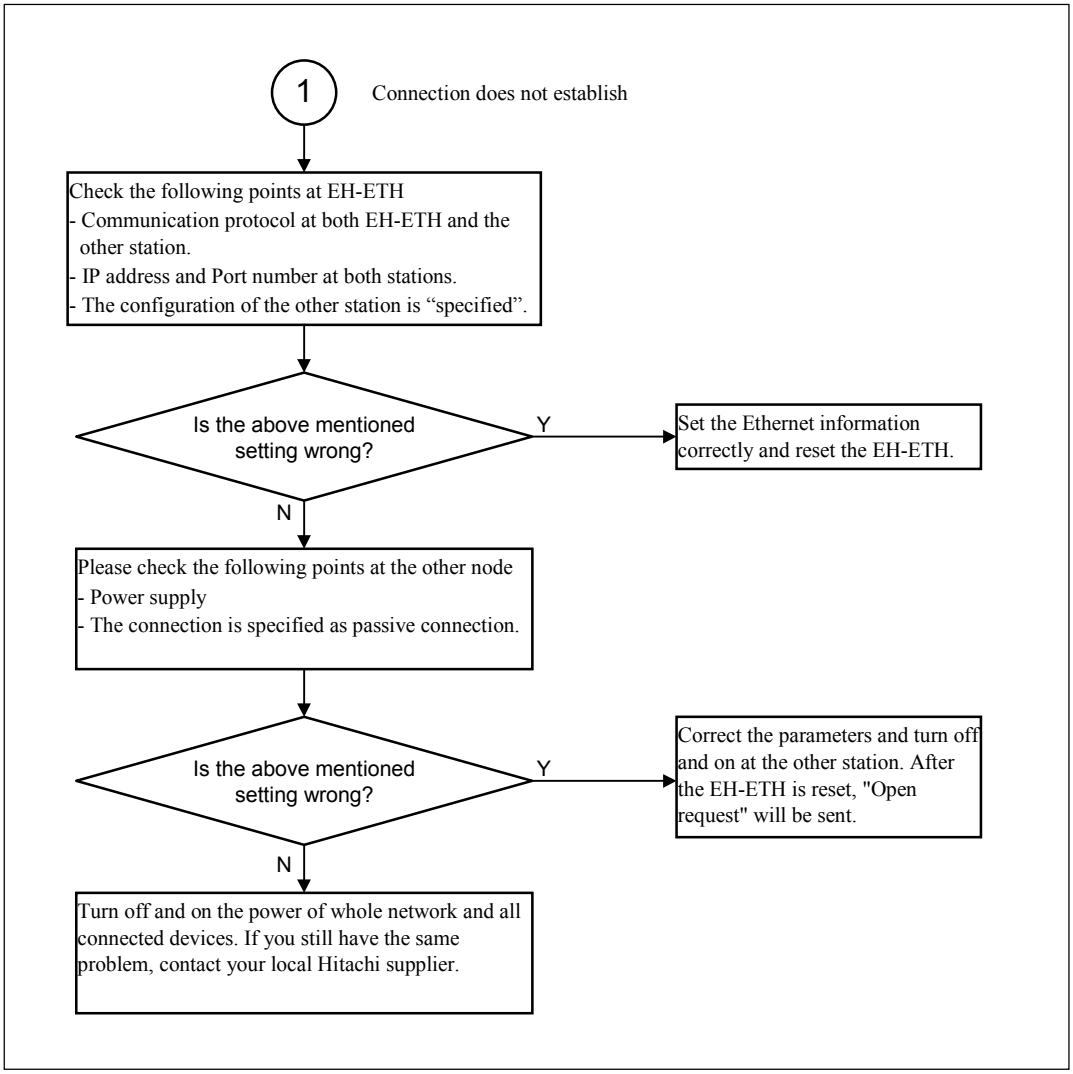


*1: Depending on the timeout setting, it takes several minutes to detect an error.

*2: If connection status (open or close) to be checked, an additional ladder program is required

(4) Connection open error

EH-ETH can detect the connection open error in case of ASR connection specified as active node. When the connection is not established in case of ASR connection specified as passive node or task code connection, check the connection at the other node (active side).



Importance

[Retry action of Open request for active port]

When an other station to a response cannot be found to the open request that EH-ETH sends, EH-ETH sends the TCP packet which contains the "SYN" flag at intervals of the following time.

ARP packet sends->6s->12s->24s->48s->64s->64s->64s->64s->64s->64s->64s->64s

In other words, EH-ETH stops the retry action of open request after about 10 minutes, after sending an ARP packet.

(1). When "less than 10 minutes" is set as an ASR connection timeout value.

- When EH-ETH detects a timeout, ERR LED is turned on red.
- After a timeout is detected, the retry action of Open request is done continuously.

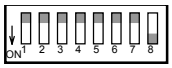
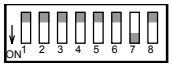
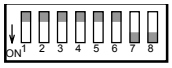
(2). When "10 minutes or more" is set as an ASR connection timeout value.

- When all the retry action of Open request is completed, ERR Light Emitting Diode lights up red.

10.2 Diagnostic function

This function is to check the communication circuit of EH-ETH module. Please set the dip switch as below and initialize the EH-ETH. The self-diagnosis function will start. EH-ETH is initialized only when power on or pressing reset button. Please note that the self-diagnosis will not start only by changing the dip switch. The detail of self-diagnosis is shown in Table 10.2.1.

Table 10.2. Self diagnosis setting

Name of diagnostic function	Setting of dip switch
Internal loop back test	
External loop back test	
Send/receive test	

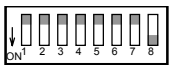
Importance

When the diagnostic results in "abnormal", EH-ETH may be broken. In this case please contact our service department.

(1) Internal loop back test

[Outline] To check the internal circuit of EH-ETH

[Dip switch setting]

Only Bit8 ON


[Test procedure]

(a) Set the dip switch as above. Disconnect communication cable.

(b) Turn on the power to PLC or press the reset button.

[Test time] Approximate 70 seconds

[Result] See table 10.2.2.

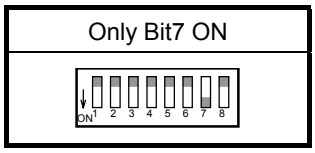
Table 10.2.2 Result of internal loop back test

I.ERR	STATUS	ERR	Status or the diagnosis result
Solid Green	Green, flickering	Turn-off	On testing
		Solid Green	One time passed
	Solid Green	Solid Green	Passed
	Turn-off	Solid Red	Failure

(2) External loop back test

[Outline] Communication circuit test using actual signal via loop back connector.

[Dip switch setting]



[Test procedure]

(a) Prepare a special loop back connector as below.

(b) Set the dip switch as above and plug in the loop back connector to EH-ETH.

(c) Turn on the power to PLC or press the reset button.

[Test time] Approximate 70 seconds

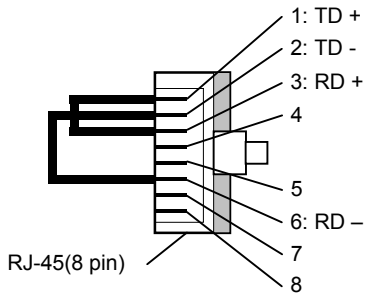


Figure 10.2.1 Wiring connection of loop back connector

[Result] Sown in Table 10.2.3

Table 10.2.3 2 Result of external loop back test

POW	I.ERR	STATUS	ERR	Condition or the diagnosis result
Off	-	-	-	Loop back connector missing
Solid Green	Solid Green	Green, flickering	Off	On testing
			Solid Green	One time passed
		Solid Green	Solid Green	Passed
		Off	Solid Red	Failure

* During test, Tx/RX LED turns on because EH-ETH send test packet.

Importance

Be sure to use check the wiring connection of your loop back connector.

(3) Send/ receive test

- In case of using 2 times of EH-ETH modules.

[Outline]

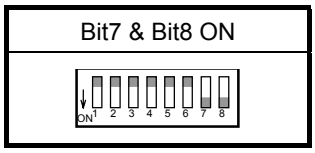
UDP message is communicated between the one EH-ETH for test and the other EH-ETH in normal operation.

[UDP massage format]

The UDP message format which EH-ETH sends network is below.

0	1	2	3	4	5	…….	1023 Byte
Command	Message transmission number	Message					
H01	H0000	H00	H01	H02	…….		HFC

[Dip switch setting]



[Test procedure]

(a) Set communication parameter according to the Figure 10.2.2 as below.

(b) Press the reset button of EH-ETH-2.

(c) Download the sample program in the next page to the CPU module with EH-ETH-2. (In this sample, both EH-ETH are used with the same CPU)

(d) Switch to RUN mode.

(e) Press the rest button of EH-ETH-1. The test will start.

*1: Right I/O assignment is set to CPU module.

[Test time] Approximate 70 seconds

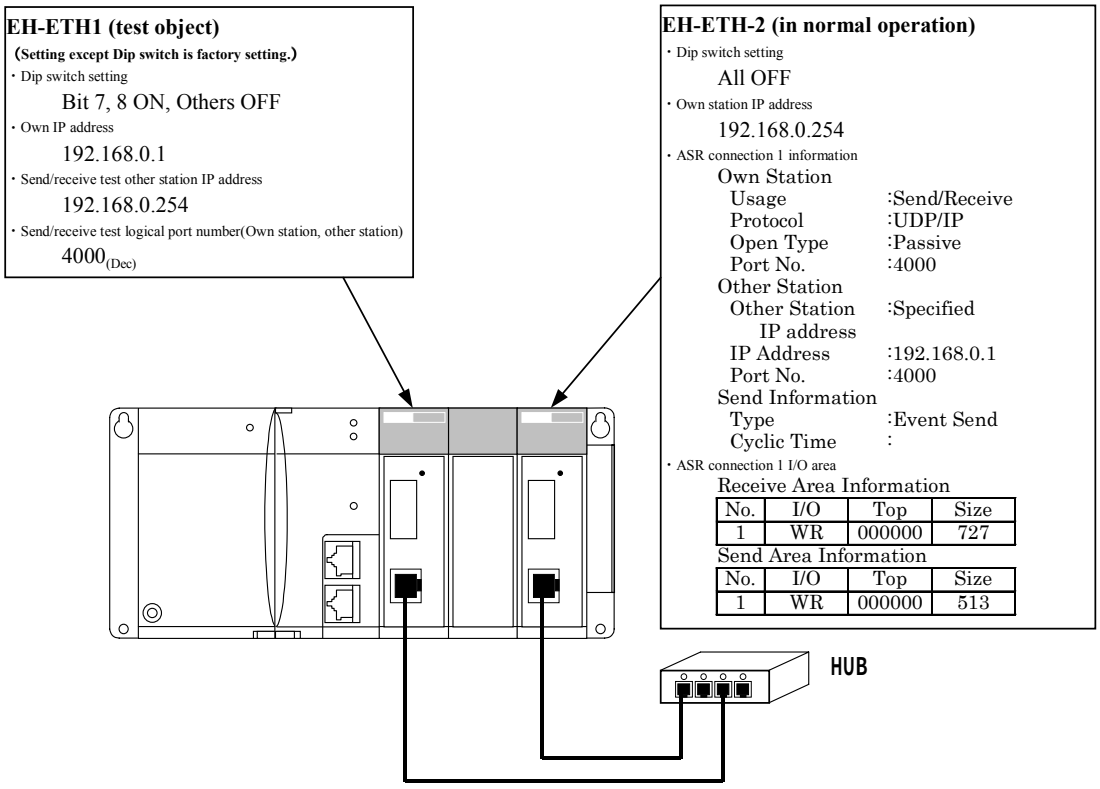
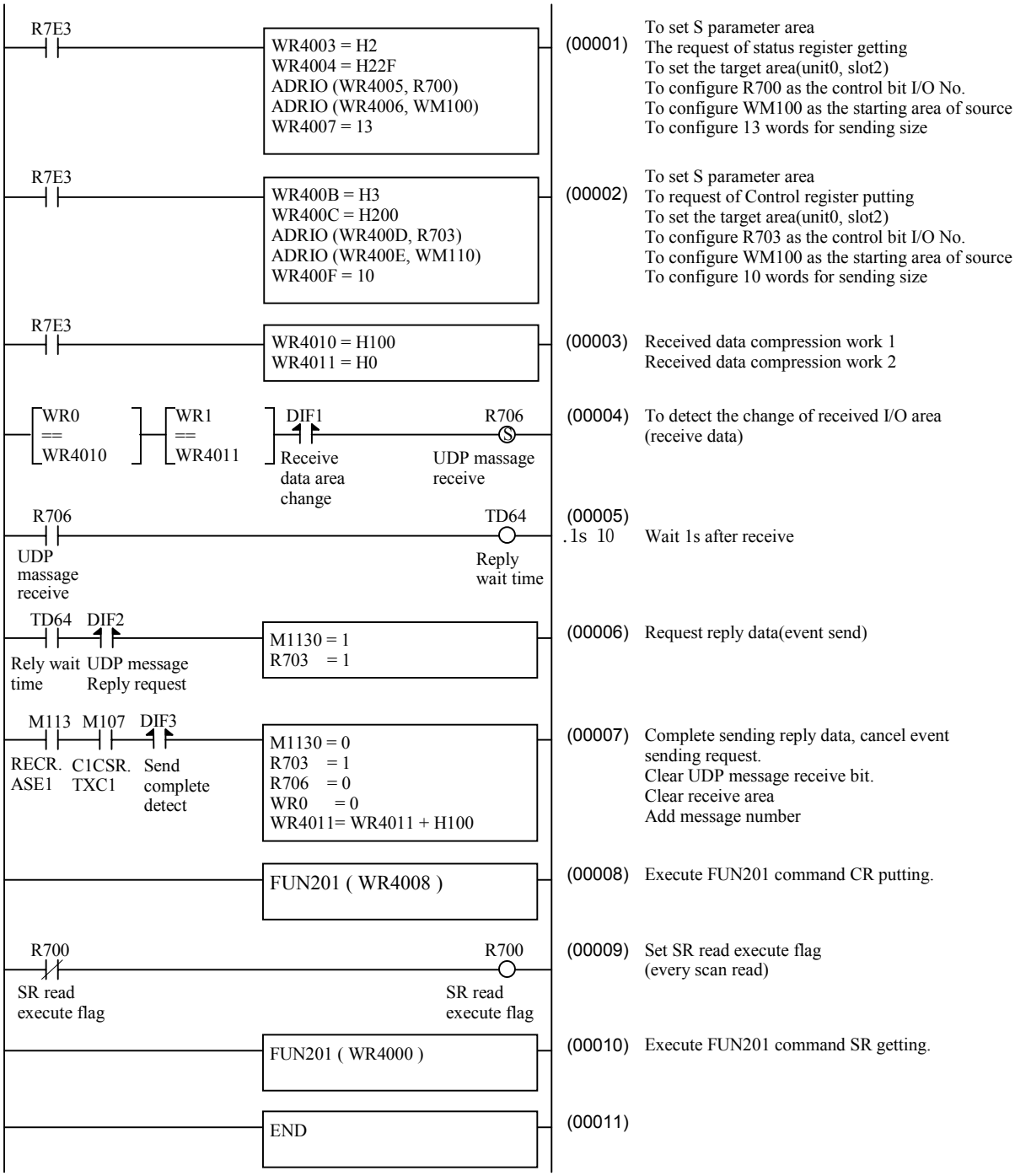


Figure 10.2.2 System configuration of communication test (1)

Sample program Ladder program for send/receive test

Please assign I/O configuration as slot-0 “COMM”, slot-2 “COMM” and others “Empty 16”.



[Result] Shown in Table 10.2.4

Table 10.2.4 Result of communication test

I.ERR	STATUS	ERR	Condition or the diagnosis result
Solid Green	Green, flickering	Off	On testing
		Solid Green	One time Passed
	Solid Green	Solid Green	Passed
	Off	Solid Red	Failure

- When you use a set of PLC with EH-ETH and host computer.

[Test content]

The UDP message is returned between EH-ETH of test mode and application software which supports communication specification.

[Communication specification]

- Communication protocol is UDP/IP.
- The application software return the massage which the EH-ETH of test mode sends to it.

[Test procedure]

(a) Set communication parameter according to the Figure 10.2.3.
(b) Execute the application which support the communication specifications.
(c) When you reset the EH-ETH, the send/receive test will start.

[Test time] Approximate 70 seconds

[Result] shown in Table 10.2.4

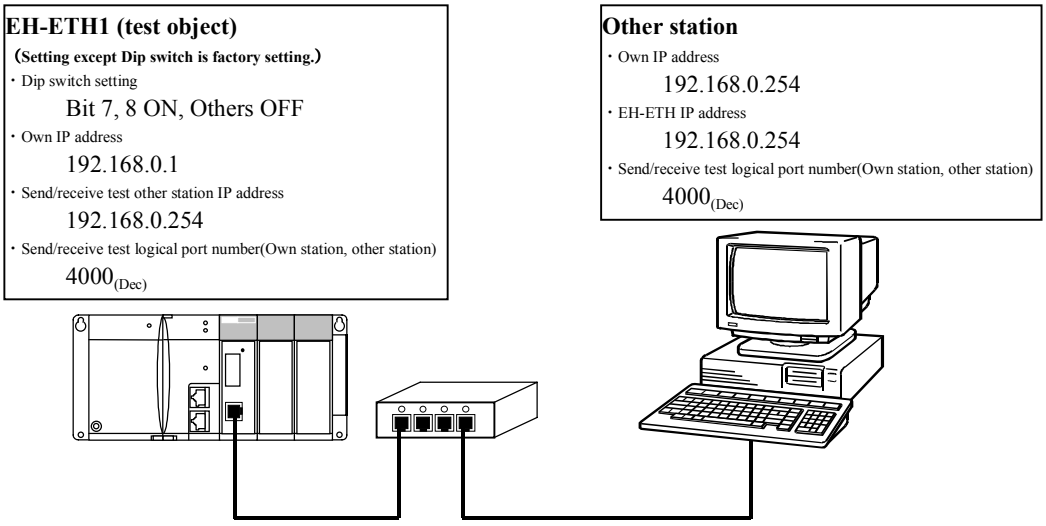


Figure 10.2.3 System configuration of communication test (2)

Appendix Fundamentals of TCP/IP

A.1 IP address

In general, 32 bits logical address called IP address is used in TCP/IP and UDP/IP protocol. IP address is consisted by Network address and Host address. The boundary of Network address and Host address has three types upper 8bits, 16bits or 24bits. Each types are called Class A, B and C.

In general, Class C is mainly used in industrial field.

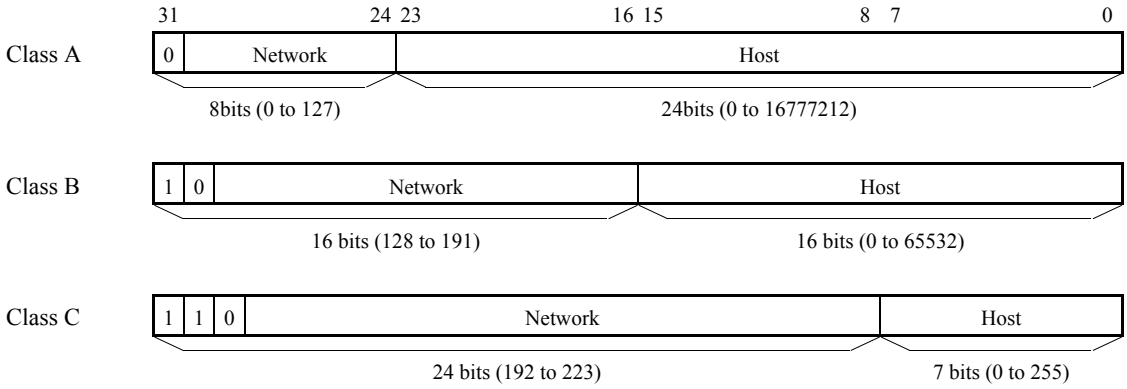


Figure A..1.1.1 Classification of IP address

And then, IP address is indicated by decimal with dot character "." every 8 bits. For example, IP address of Class C is indicated as follow.

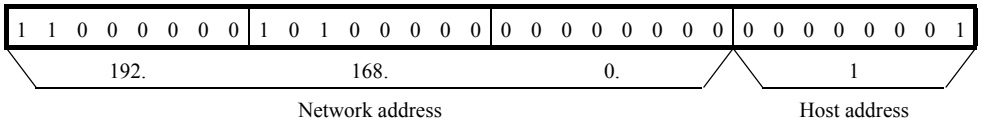


Figure A.1.1.2 The example of Class C IP address Ethernet

In general, it is possible to use the address area called "private internet address" when to make the local network system. (Following is the description of RFC1918)

Class A :	10.0.0.0	-	10.255.255.255
Class B :	172.16.0.0	-	172.31.255.255
Class A :	10.255.255.255	-	10.255.255.255
Class B :	172.16.0.0	-	172.31.255.255
Class C :	192.168.0.0	-	192.168.255.255

A.2 Sub net mask

Sub Net is used for specifying how many bits of Host address be used as Network address among of the IP address with each Class. Sub Net Mask has 32 bits and is used for specifying how many bits among IP address be used as Network address. Network address can be calculated by logical and operation this Sub Net Mask value and IP address.

- IP address

192. 11000000	168. 10101000	10. 00001010	129 10000001

- Sub Net mask

255. 11111111	255. 11111111	255. 11110000	128 10000000

- Network IP address 192.168.10.128
- Host IP address 192.168.10.1

Figure A.2.1 The configuration method for Sub Net Mask

A.3 IP(Internet Protocol) and routing table

IP sends an IP packet having IP header and Data to the destination Host or the Router exists on the route way to the destination Host by using the Link layer standing for the Ethernet. The reliability is not so good, because there are no confirmation of response, retry of sending, detecting of error and connection on the IP level. But the reliability becomes better to use with TCP described in later.

Routing means the selection of the pass when the IP packet is sent to the destination Host. To select the pass the Router is the one of the equipment. This Router is set on the aliment of networks and forwards the packet to the host on the network or to the other network.
Static Routing and Dynamic Routing are available for the method of selecting the pass. The method of Static Routing, the information of pass is set into the table of the communication equipment before to use the network. On the other hand, the information of pass is saved into the table of the communication equipment dynamically is the method of Dynamic Routing.

A.4 User Datagram Protocol (UDP)

UDP is very simple protocol and handle the limited transport service only. Therefore, there are no confirmation of response and retry of sending, the error control should be taken care by the upper layer protocol using UPD.

A.5 Transmission Control Protocol (TCP)

TCP is the protocol of transport layer with connection and stream type.

With the connection type, a logical connection is established before starting transmission of data and the transmission of data is done under this status. It is required to release the logical connection if the data transmission is completed. Be careful it is not recommended to repeat the establishing and releasing the connection within short term when the data transmission under TCP protocol in general. Because there is the status which called “TIME_WATE status” and during this status, the other connection can’t be established at this moment.

With the stream type, this means that it is possible to send or receive the sequential data stream.
The difference of TCP and UDP is shown in table 5.1.

Table 5.1 The difference of TCP and UDP

	TCP	UDP
Connection style	1:1 only	1:1 or 1:n are possible
Method of specifying by application	Port number of TCP	Port number of UDP
Unit of transmission	Stream	Packet
Guarantee of transfer to the destination	Yes	No
The operation after the error on sending	Automatically retrying	Losing the packet
Establishing the logical connection	Need	No need

A.6 Port number

It is required to specify the port number. The port number is used both for destination and source to connect UDP or TCP. The port number has the function to combine the application software with each protocol. The application software makes communication using UDP or TCP. The well used server applications software is called “Well-known Port” in both protocol and the reserved port number is used for this.