7.7 Ethernet Communication (AFPX-COM5)

7.7.1 AFPX-COM5

Overview

The communication cassette AFPX-COM5 has an Ethernet interface at the COM1 port and a 3-wire RS232C interface at the COM2 port.

The Ethernet at the COM1 port supports the computer link and general-purpose serial communication, and the RS232C at the COM2 port supports the computer link, general-purpose serial communication and MODBUS RTU.

The use of the COM2 port is the same as other cassettes such as the AFPX-COM2, and it is selectable from the COM2 port or the FP-X USB communication.

Although the Ethernet interface is connected to other device via Ethernet, the AFPX-COM5 communicates with the FP-X via RS232C, and it functions as a converter between Ethernet and RS232C.

7.7.2 Functions of APFX-COM5

Port (Name)	Communication function
Ethernet (COM1 port) Note1)	- Computer link (Max. 1 connection (Client)) (Max. 3 connections (Server)) - General-purpose serial communication (Max. 1 connection)
RS232C (COM2 port)	- Computer link - General-purpose serial communication - MODBUS RTU (1:1)

Note1) For Ver1.10 or later, the PC (PLC) link function of the FP-X is available via Ethernet.

7.7.3 Additional Functions (Ver 1.10 or Later)

Ver 1.10 or later
New functions have been added for the AFPX-COM5 Ver1.10 or later.
The firmware can be upgraded from our website.

Note) Upgrading to Ver1.10 or later version is available from the tool software on out website (http:// panasonic-electric-works.net/ac) free of charge.

Additional functions
- **Support UDP/IP, too. As it supports two protocols, which are TCP/IP*1) and UDP/IP*2), communication with various devices on a network such as computers can be established.**

Broadcast transmission is available with UDP/IP communication. Also, the PC (PLC) link function of the FP-X is available using broadcast transmission.
-
- Data can be transmitted to multiple destinations for separate unit numbers (station numbers) (max. 99 units) (when selecting the computer link).
- **IP can be automatically get. (DHCP function)**
- **The information such as own IP address can be confirmed on the FP-X using the network information notification and confirmation functions.**

Differences between Ver1.00 and Ver1.10

TCP communication setting

Communication mode select	Operation mode select	Ver1.00	Ver1.10
Computer link	Client connection	Not available	Available
	Server connection	Available	Available
General-purpose communication	Client connection	Available	Available
	Server connection	Available	Available

UDP communication setting

Communication mode select	Operation mode select	Transmission method	Ver1.00	Ver1.10
Computer link	Client connection	Broadcast	Not available	Available
		Unicast	Not available	Available
	Server connection	Broadcast	Not available	Available
		Unicast	Not available	Available
General-purpose communication	Not selectable	Broadcast	Not available	Available
		Unicast	Not available	Available

Option setting

Communication mode select	Ver1.00	Ver1.10
Response timeout	Not available	Available
End code	Not available	Available
Judgment time without termination	Not available	Available
Network information notification	Not available	Available
Network information confirmation	Not available	Available
Connection information confirmation	Not available	Available
Target IP address for unit number	Not available	Available

7.7.4 Communication Tool Software Configurator WD (Ver1.10 or Later)

The communication tool software "Configurator WD" is required to set Ethernet communication for the AFPX-COM5. Install the Configurator WD before setting the AFPX-COM5.

The Configurator WD can be downloaded from our website free of charge.
http://panasonic-electric-works.net/ac
(Member registration is required. Free of charge)

The setting is saved in the AFPX-COM5.

IP address setting

Item	Description	Default
Obtain IP address automatically Note1)	When selecting "Obtain an IP address automatically", an IP address is obtained from the DHCP server. When selecting "Use the following IP address", an IP address is set manually.	Use the following IP address
Unit name	Unit name for Communication cassette AFPX-COM5 can be specified.	FPX_ET
IP address	IP address of Communication cassette AFPX-COM5 Set an IP address other than 0.0.0.0 and 255.255.255.255.	192.168.1.5
Subnet mask	Netmask of Communication cassette AFPX-COM5	255.255.255.0
Gateway	Gateway of Communication cassette AFPX-COM5	192.168.1.1

Note1) When an error occurs, the ERROR LED will be turned on.

Communication setting

	Item	Description	Default
Common setting	Communication protocol select	Communication protocol of AFPX-COM5 Select TCP or UDP.	TCP
	Communication mode	Communication mode of AFPX-COM5 Select Computer link or General communication.	Computer link
	Action mode	Connection mode of AFPX-COM5 Select Client mode or Server mode. When selecting Computer link for Communication mode, Client mode cannot be selected.	Server mode
	Baud rate Note3) (COM1)	Baud rate for communicating with the COM1 port of FP-X. Change the baud rate according to the baud rate for the COM1 port of FP-X. Select 9600 bps or 115200 bps.	9600 bps
	Transmission method	It is valid when selecting UDP in the communication protocol. Method for transmitting data to partner devices. Select UNICAST or BROADCAST.	UNICAST
Server setting Note1)	Source port No.	Port number that AFPX-COM5 opens. Setting range: 1025 to 32767	9094
	Time out	If AFPX-COM5 not communicate with a destination device during this setting time (seconds) in the state that connection is established, connection will be cut. Setting range: 0 to 1800 s When 0 is set, the connection will not be cut.	0
Client setting Note2)	Destination IP	IP address of a destination device Set an IP address other than 0.0.0.0 and 255.255.255.255.	192.168.1.100
	Destination port No.	Destination port number of a destination device Setting range: 1025 to 32767	9094
	Source port No.	Source port number of a destination device Setting range: 0, 1025 to 32767 When 0 is set, optional.	0
	Time out	If AFPX-COM5 not communicate with a destination device during this setting time (seconds) in the state that connection is established, connection will be cut. Setting range: 0 to 1800 s When 0 is set, the connection will not be cut.	0
	Retry time	When failed in the connection with a destination device. Setting range: 0 to 1800 s	15

Note1) Set when the server mode has been selected for the action mode.

Note2) Set when the client mode has been selected for the action mode.

Note3) As the communication between the FP-X and AFPX-COM5 is performed using serial communication, the baud rate for them should be set to the same value.

Option setting

Item		Description	Default
Response timeout (When selecting the computer link only)		Set the wait time for the response.	5000 ms
End code		This is the code for the AFPX-COM5 to confirm the end of the message (data) to be received from the FP-X. CR, CR+LF or NONE can be selected. Reception continues until the end of the message (CR, CR+LF) will be received. When selecting NONE, the end code is not confirmed.	CR
Judgment time without termination		Set the wait time for the end code. If the next message (data) is not received within the judgment time without termination (ms) after the last received message (data), the AFPX-COM5 judges that is no termination, and performs the following operation. (End code: when selecting CR, CR+LF) The received message (data) is discarded. For TCP, the connection is disconnected. (End code: when selecting NONE) The message (data) is transmitted to the connected destination.	20 ms
Network information	Information area first No.	Set the area of DT to be used for the network information and connection information. Setting range: 3000 to 12000	10000
	Network information notification	When the power turns on, the network information will be notified to the FP-X.	Invalid
	Network information conrfirmation	When using the computer link and client, the network information can be confirmed.	Invalid
	Connection information confirmation	When using the computer link and server, the connection information can be confirmed from the LAN side.	Invalid
Traget IP address for unit No.	Destination unit No. and IP address is specified.	A command is transmitted to the IP address corresponding to the unit number.	Invalid
	Unit No.	Select a unit number. Can be selected from the range of 1 to 99.	Invalid
	IP address	Set an IP address.	192.168.1.100

Reference: Configuration WD Operation Manual <Configurator WD Help → User's Manual>
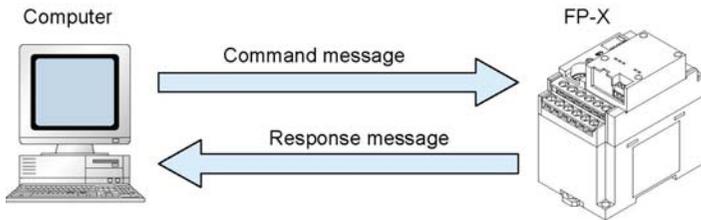
7.7.5 Communication Mode 1: Computer Link (Ethernet)

The supplement is described below to perform Ethernet communication by the computer link.

Reference: <7.3.1 Computer Link>

Overview

- Communication is conducted between a computer and a PLC using Ethernet by the computer link.
- Remote programming and monitoring is possible via LAN line by using a programming tool such as FPWIN GR.

Outline of operation
- Establish connection between a computer and the FP-X.
- In that case, the connected computer is called "Client" and the connected FP-X is called "Server". After connection establishment, communication via TCP/IP is conducted. Up to 3 connections can be established at the specified source port.
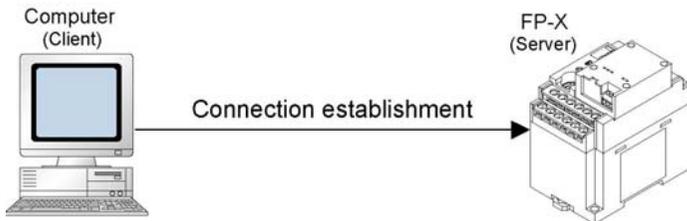
Setting of communication environment for Computer link (Ethernet)
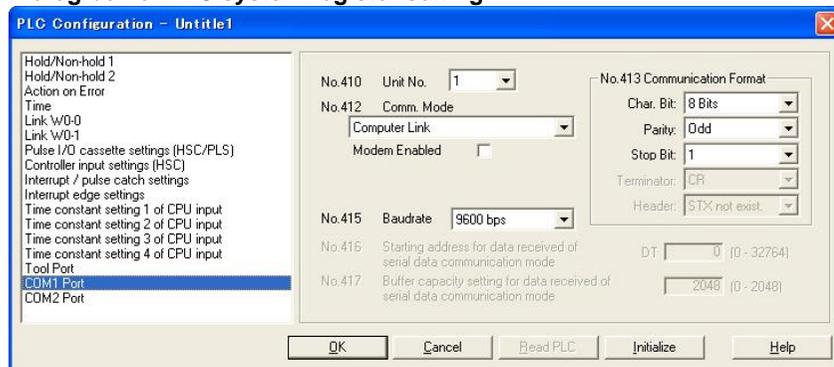**The following two settings for the FP-X and communication cassette AFPX-COM5 should be set.**
- Communication environment of FP-X
- Communication environment of Communication cassette AFPX-COM5

Setting communication environment of FP-X
The programming tool FPWIN GR is used to set the baud rate or communication format of the COM1
port. Select [Option] → [PLC Configuration] in the menu bar, and click [COM1 Port] tab.

Dialog box of PLC system register setting

COM1 port setting (AFPX-COM5)

No.	Setting item		Setting value
No.410	Unit number		1 to 99
No.412	Communication mode		Computer link
No.413	Communication format	Characer bit	8 bits
		Parity check	Odd
		Stop bit	1 bit
		Terminator	CR
		Header	STX not exist
No.415	Baud rate		115200 bps/9600 bps [Note1)]

Note1) Set the baud rate to match the baud rate (COM1 port) of the AFPX-COM5.

Setting Ethernet communication environment of Communication cassette AFPX-COM5

The Configurator WD is used to set Ethernet communication environment of the AFPX-COM5.
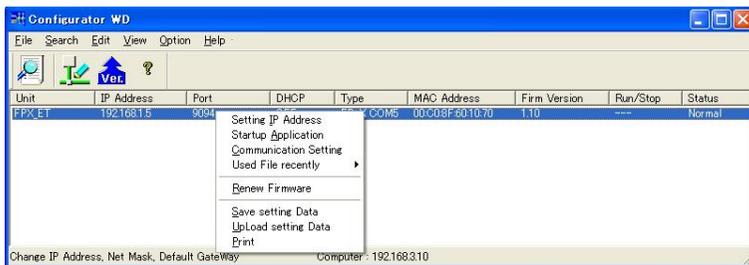
Reference: <7.7.3 Communication Tool Software Configurator WD>
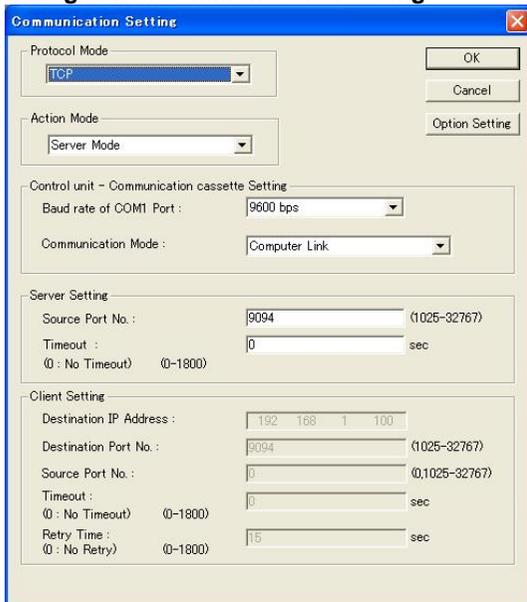
Start the Configurator WD.

Search the AFPX-COM5.

Select the AFPX-COM5 from the search result, and set an IP address to connect wit a computer.

After that, search again. Select the AFPX-COM5, and select [Edit] → [Communication Setting] in the menu, or right-click to select [Communication Setting].
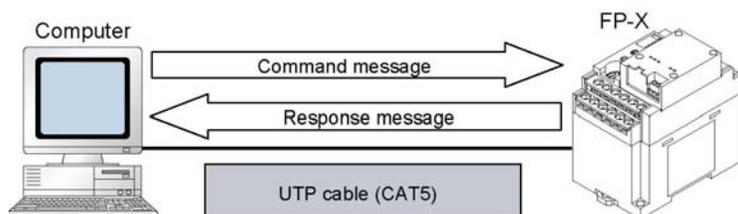

Dialog box of communication setting

Note:

If the TCP is selected for the communication protocol, up to three connections are established using the computer link (Ethernet), however, when using the programming tool FPWIN GR for connection (using registration monitor command, multi-frame), more than two connections cannot be established. Also, If the UDP is selected for the communication protocol, the UDP communication cannot be used as the programming tool FPWIN GR does not support it, although no restriction on connections.

## 7.7.6 Communication (Computer Link (Ethernet))

Overview

A 1:1 computer link connects the FP-X and a computer using a UTP cable (CAT5). Communication is conducted via commands from the computer and responses from the PLC.
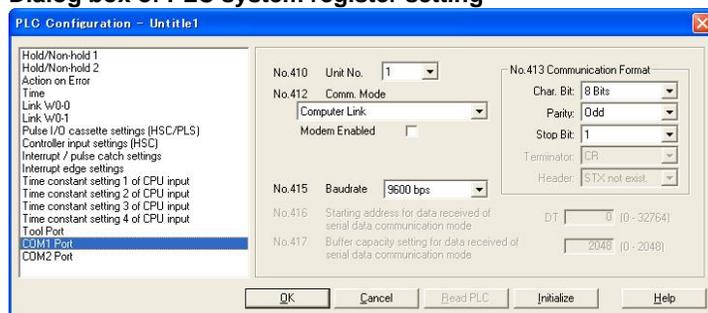

1:1 Communication setting (Computer link (Ethernet))

This setting enables the 1:1 communication between the FP-X and a computer using the computer link (Ethernet).
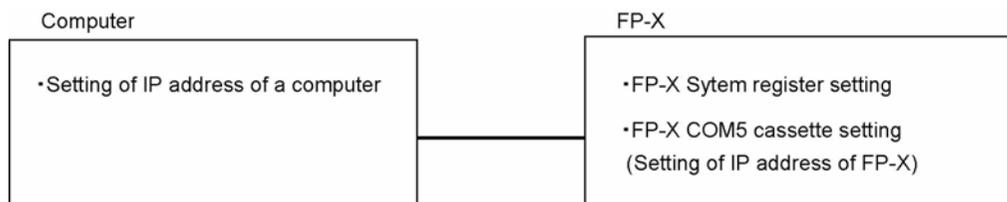
System register setting of FP-X (specified using FPWIN GR)

Dialog box of PLC system register setting

COM1 port setting (AFPX-COM5)

No.	Setting item		Setting value
No.410	Unit number		1
No.412	Communication mode		Computer link
No.413	Communication format	Char. bit	8 bits
		Parity check	Odd
		Stop bit	1 bit
		Terminator	CR
		Header	STX not exist
No.415	Baud rate		115200 bps/9600 bps

Setting of Communication cassette AFPX-COM5 (specified using Configurator WD)
IP address setting

Item	Default
Get IP address	Manual
Unit name	FPX_ET
IP address	192.168.1.5
Subnet mask	255.255.255.0
Default gateway	192.168.1.1

Communication setting

Item	Default
Communication protocol	TCP
Action mode	Server mode
Baud rate (COM1)	115200 bps/9600 bps
Communication mode	Computer link
Source port No.	9094
Time out	0

Note1) Specify the same baud rate as the
communication environment setting of the
COM1 port of the FP-X.

Setting of a computer
IP address setting

Item	Default
IP address	192.168.1.100 [Note]
Subnet mask	255.255.255.0
Default gateway	192.168.1.1

Note) The IP address of a computer is an example.
Set the IP addresses of the computer and
communication cassette AFPX-COM5
according to the network environment to be
used.

7.7.7 1:N Communication (Computer Link (Ethernet))

Overview
A computer is connected respective PLCs through Ethernet. The computer and the PLC communicate via commands and responses: The computer sends a command specifying the destination IP address, and the PLC with that IP address sends a response back to the computer.
It is no problem if the unit number of the PLC overlaps with other PLCs.
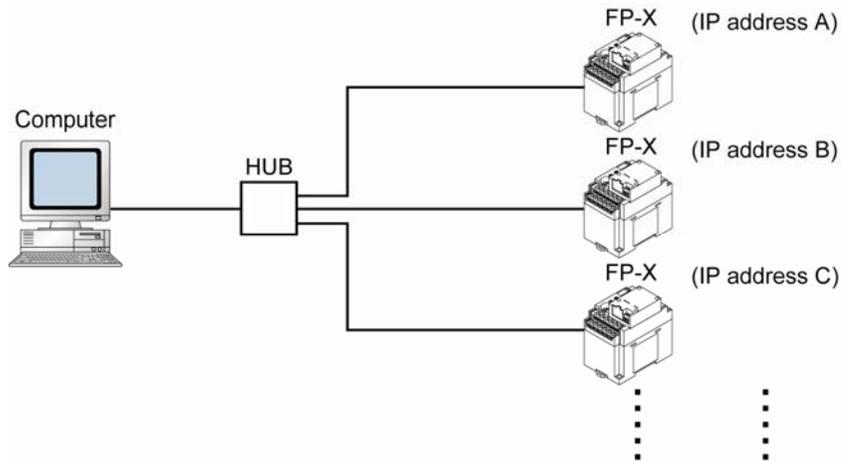
1:N Communication setting (Computer link (Ethernet))
The settings for the FP-X system register and communication cassette AFPX-COM5 are the same as the settings for the connection (computer link (Ethernet)) by a 1:1 communication.
However, set the IP address for a FP-X not to overlap with other FP-X units.

7.7.8 MEWTOCOL Master Communication Setting (Ver 1.10)

For using as the MEWTOCOL master, set the AFPX-COM5 to the compuer link and client. Also, specifying the simultaneous transmission by broadcast or the targe IP address for unit number in the option setting enables the communication with various PLCs.

MEWTOCOL master setting in TCP

Item	Default
Communication protocol	TCP
Action mode	Client connection
Baud rate (COM1)	15200 bps/9600 bps [Note]
Communication mode	Computer link
Destination IP address	IP address of destination
Destination port No.	1025 to 32767
Source port No.	0, 1025 to 32767
Timeout	0 to 1800 secs
Retry time	0 to 1800 secs

Note1) Specify the same baud rate as the communication environment setting of the COM1 port of the FP-X.

Note:

If you want to transmit data when connection is not established, the connection can be established from the AFPX-COM5 and data can be transmitted.

In the TCP, it takes some time for connection. The connection timeout for the AFPX-COM5 is the same as the response timeout value. Set the timeout time for the SEND/RECV instruction longer than the response timeout value to judge the connection timeout.

MEWTOCOL master setting in UDP

Item	Default
Communication protocol	UDP
Action mode	Client connection
Baud rate (COM1)	15200 bps/9600 bps Note1)
Communication mode	Computer link
Send type	UNICAST/BROADCAST Note2)
Destination IP address	IP address of destination
Destination port No.	1025 to 32767
Source port No.	0, 1025 to 32767

Note1) Specify the same baud rate as the communication environment setting of the COM1 port of the FP-X.

Note2) When selecting BROADCAST, the setting of the destination IP address is not required.

 Note:

After the AFPX-COM5 is pwered on, it will take about 5 seconds for initializing the Ethernet.
Until the Ehternet is initialized, data cannot be transmitted or received. For the Ethernet communication, programming is necessary to start the communication after 5 seconds since the power turned on.

Generally, as a router does not transmit a broadcast packet, communication over the router cannot be achieved. Using the broadcast, processing load is applied on all equipment on the network. Confirm that the broadcast does not affect other equipment before using it.

7.7.9 MEWTOCOL Master (Ethernet) (Sample Program) (Ver 1.10 or Later)

Overview

MEWTOCOL communication can be performed with the FP-X using the F145 and F146 instructions. The following sample program executes 4 MEWTOCOL commands in sequence for 2 slave units using the F145 and F146 instructions.

☞ **Note:** It is available for the transistor type and relay type of Ver 1.21 or later.
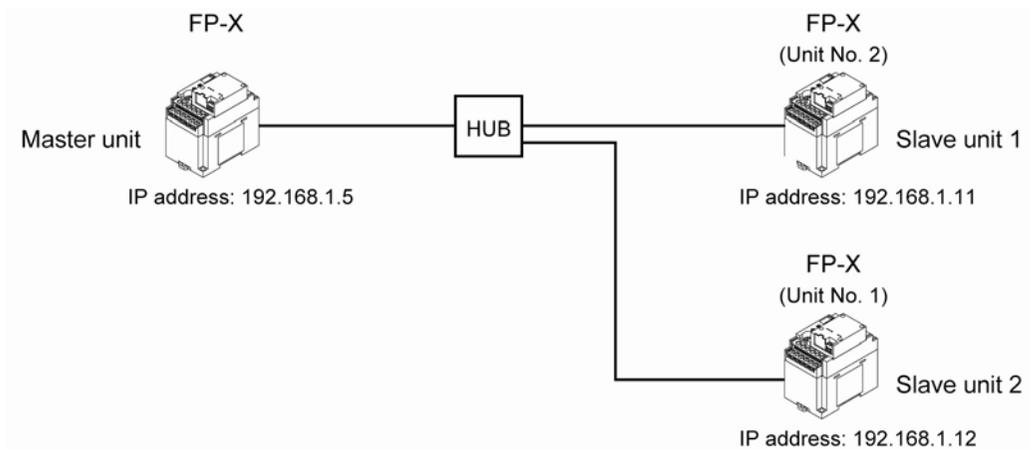
Description

R100: Stores the data for 10 words from DT1000 of the slave unit 1 into the area from DT100 of the master unit.

R101: Writes the data for 10 words from DT100 of the master unit to the area form DT1010 of the slave unit 1.

R102: Stores the data for 10 words from DT1000 of the slave unit 2 into the area from DT120 of the master unit.

R103: Writes the data for 10 words from DT130 of the master unit to the area form DT1010 of the slave unit 2.

Set the system registers for each units by a tool software (such as FPWIN GR).

	System register setting	
Master unit	No. 412:	Compuer link mode
	No. 415:	115200 bps
	No. 413:	8 bits, Odd, 1 bit
Slave unit 1	No. 410:	Unit No. 1
	No. 412:	Computer link mode
	No. 415:	115200 bps
	No. 143	8 bits, Odd, 1 bit
Slave unit 2	No. 410:	Unit No. 2
	No. 412:	Computer link mode
	No. 415:	115200 bps
	No. 413:	8 bits, Odd, 1 bit

1. When using the MEWTOCOL master function in TCP

Set as follows for each unit using Configurator WD.

	IP address setting	Communication setting	Option setting

Master unit	IP address: 192.168.1.5
	Netmask: 255.255.255.0
	Gateway: 192.168.1.1
		Communication protocol: TCP
		Action mode: Client connection
		Baud rate: 115200 bps
		Communication mode:
		  Computer link
		Destination IP address:
		  192.168.1.11
		Destination port No.: 9094
		Source port No.: 0
		Timeout: 0
		Retry time: 15
			Destination unit No. and IP address is specified: On
			
			Target IP address for unit No.:
			  No.1: 192.168.1.11
			  No.2: 192.168.1.12

Slave unit 1	IP address: 192.168.1.11 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: TCP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Source port No.: 9094 Timeout: 0	Not necessary.
Slave unit 2	IP address: 192.168.1.2 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: TCP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Source port No.: 9094 Timeout: 0	Not necessary.

2. When using the MEWTOCOL master function in UDP, UNICAST communication

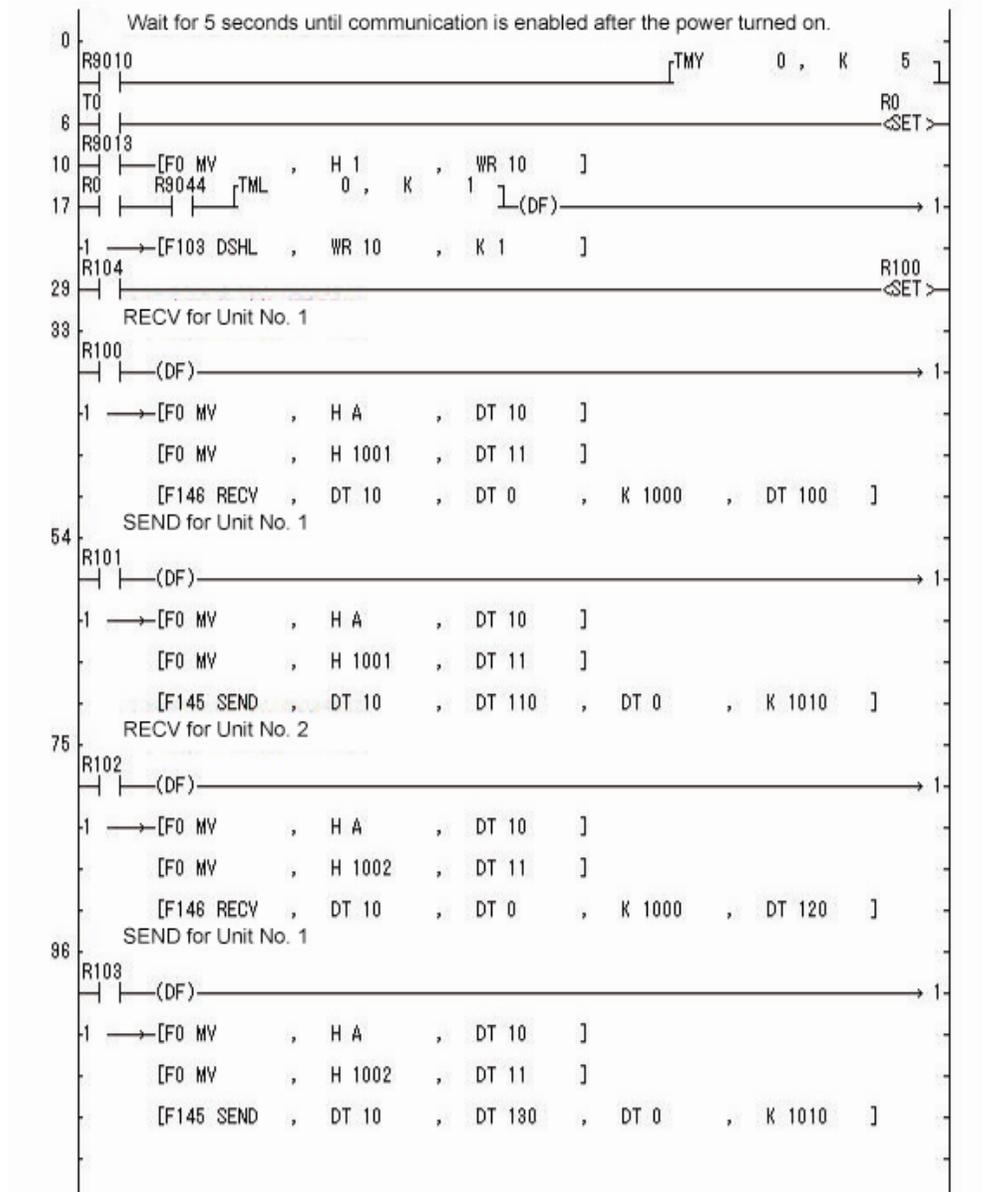Set as follows for each unit using Configurator WD.

	IP address setting	Communication setting	Option setting

Master unit	IP address: 192.168.1.5
	Netmask: 255.255.255.0
	Gateway: 192.168.1.1
		Communication protocol: UDP
		Action mode: Client connection
		Baud rate: 115200 bps
		Communication mode:
		  Computer link
		Send type: UNICAST
		Destination IP address:
		  192.168.1.11
		Destination port No.: 9094
		Source port No.: 0
			Destination unit No. and IP address is specified: On
			
			Target IP address for unit No.:
			  No.1: 192.168.1.11
			  No.2: 192.168.1.12

Slave unit 1	IP address: 192.168.1.11 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: UDP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Send type: UNICAST Source port No.: 9094	Not necessary.
Slave unit 2	IP address: 192.168.1.2 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: UDP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Send type: UNICAST Source port No.: 9094	Not necessary.

3. When using the MEWTOCOL master function in UDP, BROADCAST communication

Set as follows for each unit using Configurator WD.

	IP address setting	Communication setting	Option setting
Master unit	IP address: 192.168.1.5 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: UDP Action mode: Client connection Baud rate: 115200 bps Communication mode: Computer link Send type: BROADCAST Destination IP address: 192.168.1.11 Destination port No.: 9094 Source port No.: 0	Not necessary.
Slave unit 1	IP address: 192.168.1.11 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: UDP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Send type: BROADCAST Source port No.: 9094	Not necessary.
Slave unit 2	IP address: 192.168.1.2 Netmask: 255.255.255.0 Gateway: 192.168.1.1	Communication protocol: UDP Action mode: Server connection Baud rate: 115200 bps Communication mode: Computer link Send type: BROADCAST Source port No.: 9094	Not necessary.

Master unit sample program

```
    Wait for 5 seconds until communication is enabled after the power turned on.
0
  R9010                                                    TMY     0 , K    5
  ┤├                                                     ┌┘
  T0                                                                      R0
6 ┤├                                                                  <SET>
  R9013
10├──[F0 MV      ,  H 1   ,  WR 10    ]
  R0     R9044   TML    0 ,  K    1
17┤├  ─┤├─ ┌┘              ┘(DF)─────────────────────────→ 1
  1 ──→[F103 DSHL  ,  WR 10   ,  K 1    ]
  R104                                                    R100
29┤├                                                                  <SET>
33      RECV for Unit No. 1
  R100
  ┤├ ─(DF)─────────────────────────────────────────────→ 1
  1 ──→[F0 MV      ,  H A   ,  DT 10    ]
      [F0 MV      ,  H 1001 ,  DT 11    ]
      [F146 RECV  ,  DT 10  ,  DT 0   ,  K 1000  ,  DT 100  ]
54      SEND for Unit No. 1
  R101
  ┤├ ─(DF)─────────────────────────────────────────────→ 1
  1 ──→[F0 MV      ,  H A   ,  DT 10    ]
      [F0 MV      ,  H 1001 ,  DT 11    ]
      [F145 SEND  ,  DT 10  ,  DT 110  ,  DT 0   ,  K 1010  ]
75      RECV for Unit No. 2
  R102
  ┤├ ─(DF)─────────────────────────────────────────────→ 1
  1 ──→[F0 MV      ,  H A   ,  DT 10    ]
      [F0 MV      ,  H 1002 ,  DT 11    ]
      [F146 RECV  ,  DT 10  ,  DT 0   ,  K 1000  ,  DT 120  ]
96      SEND for Unit No. 1
  R103
  ┤├ ─(DF)─────────────────────────────────────────────→ 1
  1 ──→[F0 MV      ,  H A   ,  DT 10    ]
      [F0 MV      ,  H 1002 ,  DT 11    ]
      [F145 SEND  ,  DT 10  ,  DT 130  ,  DT 0   ,  K 1010  ]
```

📖 **Reference:** For information on the F145(SEND) and F146(RECV) instructions, <7.7.3 Communication Tool Software Configurator WD>

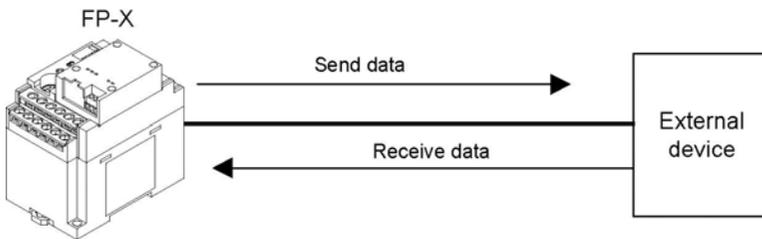## 7.7.10 Communication Function 2: General-purpose Serial Communication (Ethernet)

The supplement is described below to conduct Ethernet communication by the general-purpose serial communciation.

Reference: <7.4 Communication Function 2: General-purpose Serial Communication>

Overview
- Data can be sent and received between the FP-X and an external device using Ethernet.
- Data is read from and written to an external device connected to Ethernet by means of FP-X data registers, and the programs are required for the FP-X.

Outline of operation
- Connection with an external device is established using the general-purpose serial communication (Ethernet). Number of connection is one.
- Select either the client mode or server mode.
- In case of the client mode, connection is established by the AFPX-COM5 for a predetermined IP address after turning on the power supply of the FP-X.
- There are "Send data" and "Receive data" for the data transfer with an external device.

Setting for using the general-purpose serial communication (Ethernet)
The following two settings for the FP-X and communication cassette AFPX-COM5 should be set.
- Communication environment of FP-X
- Communication environment of Communication cassette AFPX-COM5

Setting communication environment of FP-X
The programming tool FPWIN GR is used to set the baud rate or communication format of the COM1
port. Select [Option] → [PLC Configuration] in the menu bar, and click [COM1 Port] tab.

Dialog box of PLC system register setting

COM1 port setting (AFPX-COM5)

No.	Setting item		Setting value
No.410	Unit number		1 to 99
No.412	Communication mode		General communication
No.413	Communication format	Characer bit	8 bits
		Parity check	Odd
		Stop bit	1 bit
		Terminator	CR, CR+LF, None
		Header	STX not exist, STX exists
No.415	Baud rate		115200 bps/9600 bps [Note1]

Note1) Set the baud rate to match the baud rate (COM1 port) of the AFPX-COM5.

Setting Ethernet communication environment of Communication cassette AFPX-COM5
The Configurator WD is used to set Ethernet communication environment of the AFPX-COM5.

Reference: <7.7.3 Communication Tool Software Configurator WD>

Start the Configurator WD.
Search the AFPX-COM5.
Select the AFPX-COM5 from the search result, and set an IP address to connect wit a computer.
After that, search again. Select the AFPX-COM5, and select [Edit] → [Communication Setting] in the
menu, or right-click to select [Communication Setting].

[When Communication cassette AFPX-COM5 is in the TCP client mode]
Dialog box of communication setting: Setting of AFPX-COM5

Item	Setting value
Communication protocol	TCP
Action mode	Client mode
Baud rate (COM1)	115200 bps/9600 bps [Note]
Communication mode	General communication
Destination IP No.	Destination IP address
Destination port No.	1025 to 32767
Source port No.	0, 1025 to 32767
Time out	0 to 1800 s
Retry time	0 to 1800 s

Note) Specify the same baud rate as the communication
environment setting of the COM1 port of the FP-X.

[When Communication cassette AFPX-COM5 is in the TCP server mode]
Dialog box of communication setting: Setting of AFPX-COM5

Item	Setting value
Communication protocol	TCP
Action mode	Client mode
Baud rate (COM1)	115200 bps/9600 bps [Note]
Communication mode	General communication
Destination port No.	1025 to 32767
Timeout	0 to 1800 s

Note) Specify the same baud rate as the communication
environment setting of the COM1 port of the FP-X.

[When Communication cassette AFPX-COM5 is in the UDP mode]
Dialog box of communication setting: Setting of AFPX-COM5

Item	Setting value
Communication protocol	UDP
Baud rate (COM1)	115200 bps/9600 bps [Note1]
Communication mode	General communication
Send type	UNICAST/BROADCAST [Note2]
Destination IP No.	Destination IP address
Destination port No.	1025 to 32767
Source port No.	0, 1025 to 32767

Note1) Specify the same baud rate as the communication environment setting of the COM1 port of the FP-X.

Note2) When selecting BROADCAST, the setting of the destination IP address is not required.

  Note:

Initializing Ethernet takes approx. 5 seconds on the AFPX-COM5 after turning on the power supply. Until it finishes, data cannot be sent or received. For Ethernet communication, programming is necessary to start communication after a lapse of 5 seconds after the power activation.

7.7.11 PC(PLC) Link Communication (Ethernet) (Ver 1.10 or Later)

Overview

Data sharing is available using the PC (PLC) link function of the FP-X via Ethernet.
How to use and set is the same as the PC(PLC) link via RS485.

Reference: <7.5 Communication Function 3: PC(PLC) Link>
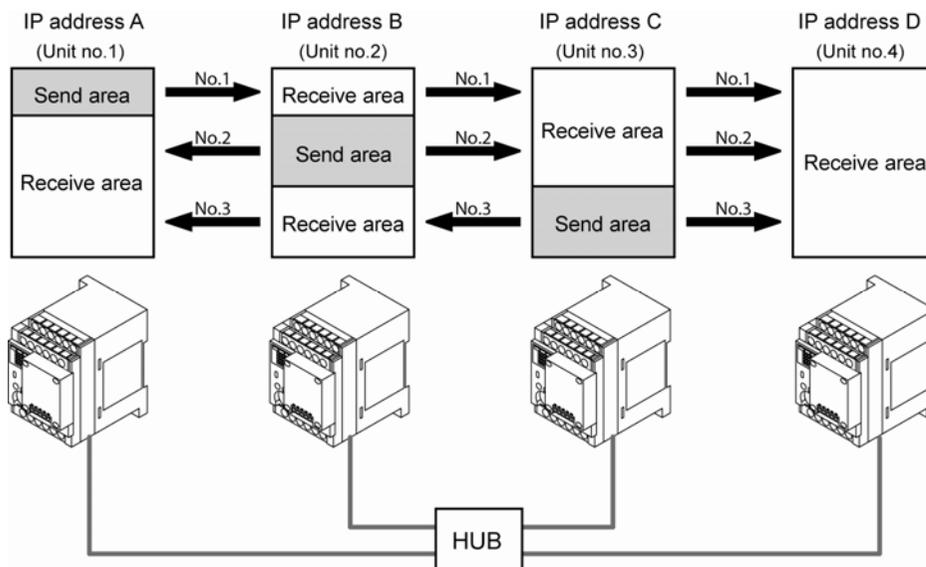
PC(PLC) link communication setting

When the PC(PLC) link function has been selected on the FP-X, the baud rate is automatically 115200 bps. Set the baud rate in the COM1 port communication setting for the AFPX-COM5 to 115200 bps as well.

Setting Ethernet communication environment of Communication cassette AFPX-COM5

The Configurator WD is used to set Ethernet communication environment of the AFPX-COM5.

Reference: <7.7.3 Communication Tool Software Configurator WD>

Dialog box of Communication setting

Setting item	Setting value
Communication protocol	UDP
Baud rate	115200bps
Communication mode	General-purpose communication
Send type	BROADCAST
Destination port No.	1025 to 32767
Source port No.	0、1025 to 32767

Note1) Specify the same number for the destination port No. and the source port No. for the AFPX-COM5 to be used in the PC(PLC) link.

Setting communication environment of FP-X

The programming tool FPWIN GR is used to set the baud rate or communication format of the COM1 port.

Select [Option] → [PLC Configuration] in the menu bar, and click [COM1 Port] tab.

Dialog box of PLC Configuration setting

No.	Setting item	Default
No.410	Unit No.	1
No.412	Communication mode	PC link

Do not use the same unit number for multiple FP-X units.

7.7.12 Applied Usage (Ethernet) (Ver 1.10 or Later)

- How to confirm the network information on the FP-X.

The network information (own IP address, destination IP address, destination port No., version) that has been set for the AFPX-COM5 can be confirmed from the FP-X by the option setting. The connection information (destination IP address, own IP address, version) of the AFPX-COM5 can be confirmed from the LAN side.

Dialog box of option setting

1. **Network information notification: Network information is notified to the FP-X from the AFPX-COM5. (Network information is written to the data register of FP-X by the AFPX-COM5.)**
2. **Network information confirmation: Network information on the AFP-COM5 can be confirmed from the FP-X. (The virtual data register within the AFP-COM5 is read from the FP-X.)**
3. **Connection information confirmation: Connection information on the AFPX-COM5 can be confirmed from a destination device from a device on a LAN. (The virtual data register within the AFPX-COM5 is read from a destination device on a LAN.)**

- Network information notification area
Set the area to be used for the network information notification, network information confirmation and connection information confirmation.
When DT1000 (default) is set for the network information notification area, the following areas will be used.

Network information notification and network information confirmation areas

Register No.	Description (Higher bytes)	Description (Lower bytes)	Explanation
DT10000	Error code Note1)	Own IP address (1st)	- When own IP address is 192.168.1.5, H00C0 (K192) is notified/confirmed in DT10000, and H00A8 (K168) is in DT10001.
DT10001	0x00 (reserve)	Own IP address (2nd)	
DT10002	0x00 (reserve)	Own IP address (3rd)	
DT10003	0x00 (reserve)	Own IP address (4th)	
DT10004	0x00 (reserve)	Destination IP address (1st)	- When destination port No. is 9094, H2386 (K9094) is notified/confirmed in DT10008.
DT10005	0x00 (reserve)	Destination IP address (2nd)	
DT10006	0x00 (reserve)	Destination IP address (3rd)	- When the version of AFPX-COM5 is 1.10, H1100 is notified/confirmed.
DT10007	0x00 (reserve)	Destination IP address (4th)	Note) The destination IP address and destination port No. can be notified/confirmed only when selecting the computer link and client setting.
DT10008	Destination port No.		
DT10009	Version of AFPX-COM5		

Note1) Error code: 0: Normal, 1: DHCP acquisition error, 2: IP address duplicate error
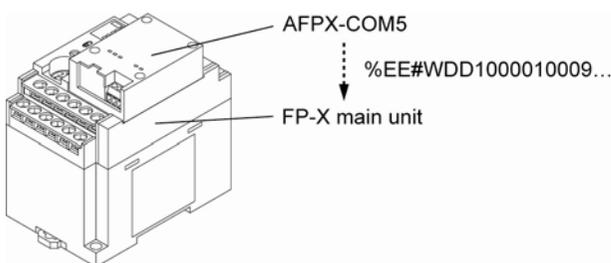

Connection information confirmation area

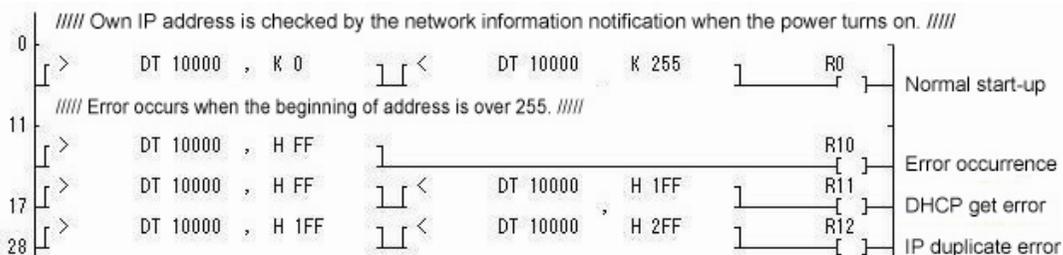| Register No.	Description (Higher bytes)	Description (Lower bytes)
DT10010	Error code Note1)	Destination IP address (1st)
DT10011	0x00 (reserve)	Destination IP address (2nd)
DT10012	0x00 (reserve)	Destination IP address (3rd)
DT10013	0x00 (reserve)	Destination IP address (4th)
DT10014	0x00 (reserve)	Own IP address (1st)
DT10015	0x00 (reserve)	Own IP address (2nd)
DT10016	0x00 (reserve)	Own IP address (3rd)
DT10017	0x00 (reserve)	Own IP address (4th)
DT10018	0x0000 (reserve)	
DT10019	Version of AFPX-COM5	

- Network information notification

If the network information notification setting is enabled, the AFPX-COM5 notifies the network information to the FP-X on completion of the initialization of Ethernet. (Ehternet is initialized after the power turns on, and when the unit is restareted after the change in settings.) The information is notified by the data area write command ("WD") of 10 words from the information area first number with MEWTOCOL. (For the memory area, "DT" is fixed. For the unit number, "EE" is fixed.) Using this notification enables the completion of the initialization of Ethernet to be confirmed in a ladder program and to start communication.)

When using the general-purpose communication, start the communication after receiving the data area write command for the network information notification and after the response timeout time.
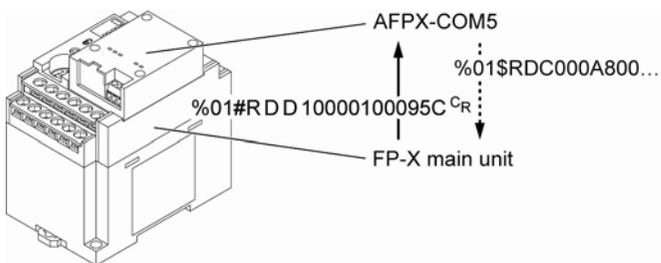

AFPX-COM5

%EE#WDD1000010009...

FP-X main unit

[Sample program] (Set DT10000 in the network information notification area.)

///// Own IP address is checked by the network information notification when the power turns on. /////

```
0   > DT 10000 , K 0      <  DT 10000  K 255      R0    Normal start-up
```

///// Error occurs when the beginning of address is over 255. /////

```
11  > DT 10000 , H FF                              R10   Error occurrence
17  > DT 10000 , H FF      <  DT 10000  H 1FF      R11   DHCP get error
28  > DT 10000 , H 1FF     <  DT 10000  H 2FF      R12   IP duplicate error
```

- Network information confirmation

When selecting the computer link and client setting, the network information can be confirmed from the FP-X by enabling the network information confirmation setting. It can be confirmed by reading the confirmation area by the MEWTOCOL data area read command ("RD"). (For the memory area, "DT" is fixed. The unit number is arbitrary.) If the network information confirmation setting is enabled, the AFPX-COM5 responds to the MEWTOCOL data area read command for the confirmation area regardless of unit numbers.

AFPX-COM5

%01$RDC000A800...

%01#R D D 10000100095C ^CR

FP-X main unit

[Sample program] (Set DT10000 in the network information notification area.)

```
          ///// Confirms network information when switching RUN/PRO. /////
          ///// Reads the network information confirmation area. /////
   0   R9010
       ├──┤ ├──[F0 MV     ,   H A     ,   DT 10    ]
       │       [F0 MV     ,  H 1001   ,   DT 11    ]
       │   R9044  R9020  R0      ┌TML     0 ,  K     1
  12   ├──┤ ├───┤ ├───┤/├───┤                          ├────────────────────→ 1─
  ─1   ┤ ──→[F146 RECV   ,   DT 10    ,   DT 0    ,   K 10000   ,   DT 10000  ]
          ///// Own IP address is checked by the network information notification when the power turns on. /////
  29   ┌ >        DT 10000 ,  K 0    ┐┌ <      DT 10000    K 255   ┐        R0
       │                             ,                              │       ─[ ]─     Normal start-up,
                                                                                      COmmunication start OK
          ///// Error occurs when the beginning of address is over 255. /////
  40   ┌ >        DT 10000 ,  H FF   ┐                                       R10
       │                             │                                      ─[ ]─     Error occurrence
  46   ┌ >        DT 10000 ,  H FF   ┐┌ <      DT 10000    H 1FF   ┐        R11
       │                             ,                              │       ─[ ]─     DHCP get error
  57   ┌ >        DT 10000 ,  H 1FF  ┐┌ <      DT 10000    H 2FF   ┐        R12
       │                             ,                              │       ─[ ]─     IP duplicate error
```
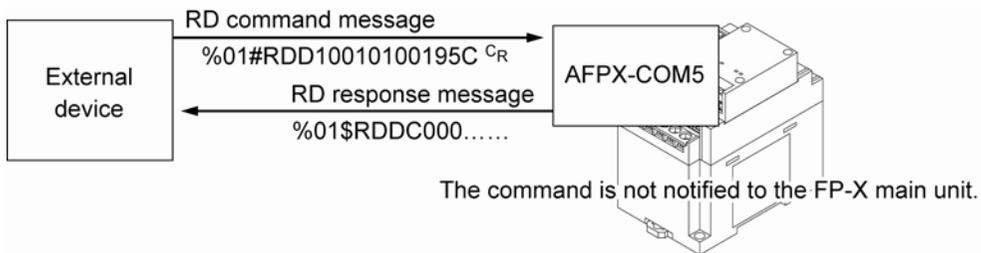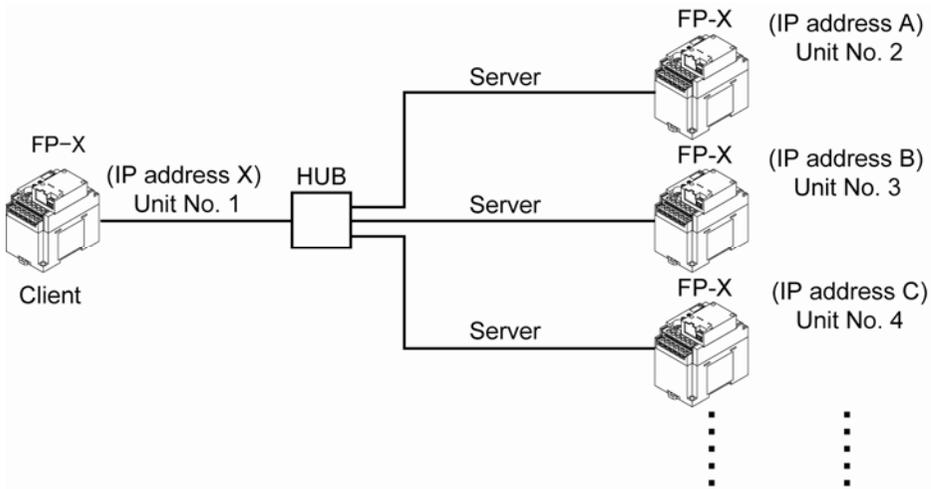
- Connection information confirmation

When selecting the computer link and server setting, the connection information can be confirmed from the LAN side by enabling the connection information confirmation setting. It can be confirmed by reading the confirmation area by the MEWTOCOL data area read command ("RD") from the LAN. (For the memory area, "DT" is fixed.) If the connection information confirmation setting is enabled, the AFPX-COM5 responds to the MEWTOCOL data area read command for the confirmation area regardless of unit numbers.

External device

RD command message
%01#RDD10010100195C ^{C}R

RD response message
%01$RDDC000……

AFPX-COM5

The command is not notified to the FP-X main unit.

**- How to transmit a command message to each unit**

- Target IP address for unit number
If "Destination unit number and IP address is specified" is checked, a command can be sent to the IP address corresponding to each unit number.

Settable conditions
- When selecting the client and computer link
- When selecting the UDP and general-purpose communication
- When selecting the broadcast (IP address takes priority, and a command is transmitted via unicast.)

Setting method
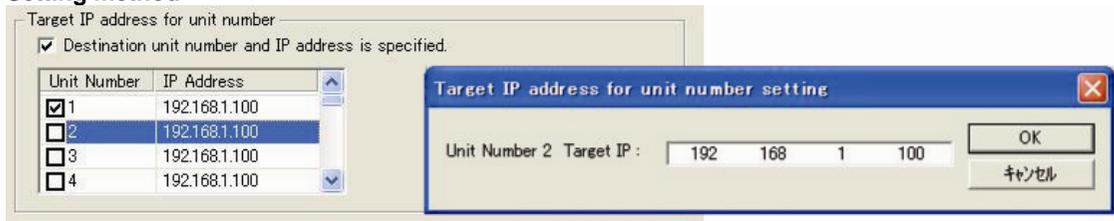
1. Check "Destination unit number and IP address is specified." in the [Option] dialog box.
2. Check the destination unit number you want to set, and double-click the IP address.
   (Unit numbers 1 to 99)
3. Specify the destination IP address that is corresponding to the unit number.

Note) When connecting to the IP corresponding to a unit number via TCP, a new connection should be established after disconnecting the existing connection.

7.7.13 Example of Connections (Ethernet) (Ver 1.10 or Later)

- Connection with FP2 ET-LAN unit

Overview
Connection can be established with a maximum of 8 FP-X simultaneously using a FP2 ET-LAN unit, and transmission is performed by the computer link.

Example of connection
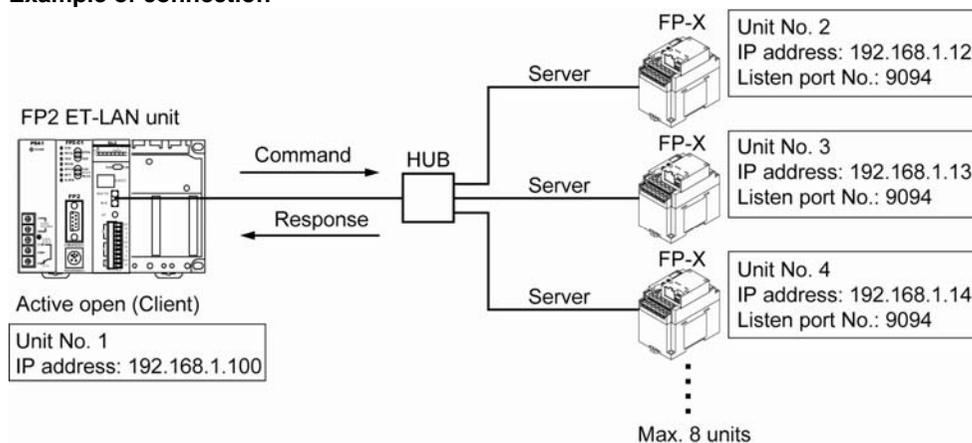
- Setting of FP2 ET-LAN unit

Item	Setting value
Communication method	TCP/IP
Open method	Active open
Application in which connection is used	General-purpose communication (Transparent communication)
Source node port No.	Arbitrary
Destination node IP address	IP address of the detination FP-X
Destination node port No.	9094 (can be changed.)

Reference: For information of the setting method of FP2 ET-LAN unit,
                                                                     <FP2 ET-LAN Unit Manual>
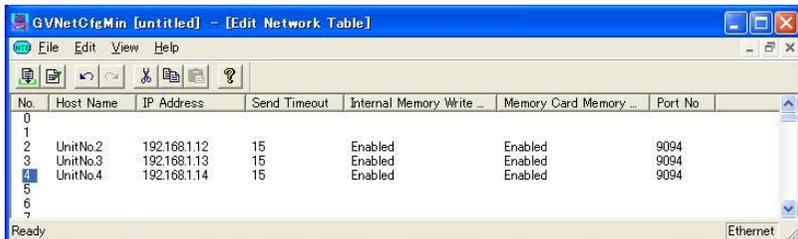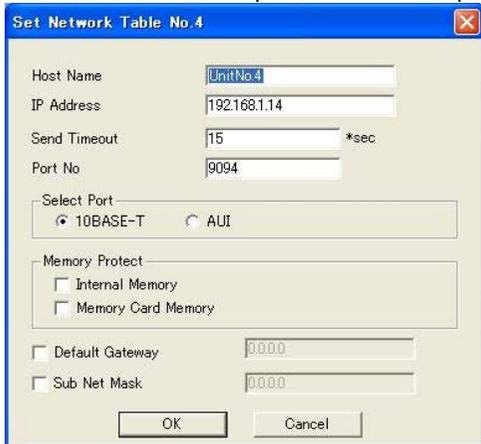   <FP2 ET-LAN Unit Manual (Additional Version)>

- Setting of FP-X

1) FP-X System register setting
  No. 412: Computer link mode

2) Setting of AFPX-COM5

Item	Setting value
Communication protocol	TCP
Action mode	Server mode
Communication mode	Computer link
Source port No.	9094
Time out	0

UDP/IP can be used for the communication method.
In that case, change the communication method of the FP2 ET-LAN unit to UDP/IP.
Set the communication protocol of the AFP-COM5 to UDP, and set the send type to UNICAST.

Note:

For MEWTOCOL master function of the FP2 ET-LAN unit, MEWTOCOL-COM is not available. For communicating with the FP-X by the computer link, transmit the MEWTOCOL-COM data format using the transparent communication on the FP2 ET-LAN unit. In this case, an exclusive header is not required for the ET-LAN unit.

- Connection with GV series via Ethernet
Overview
Connect the FP-X to the GV series via Ethernet. Transmission is performed by sending a response from the FP-X to the command issued by the GV. The operation with a programmable display can be performed only by specifying communication settings for each unit without any program for communication.

Example of connection
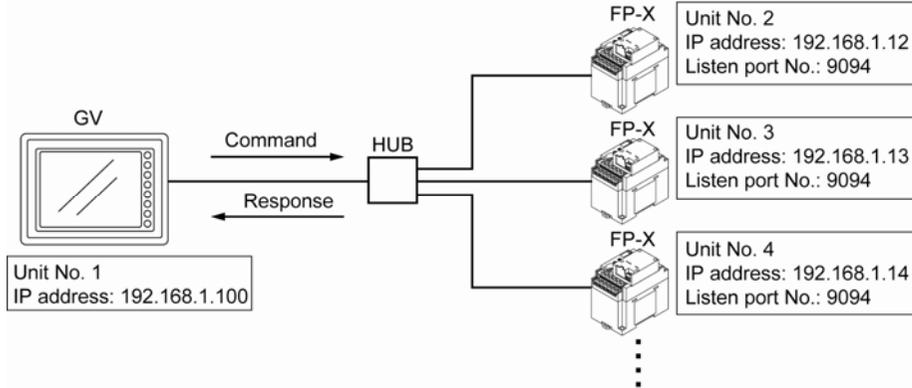
- Setting of GV
Use the GV Programmable Operator Terminal CVWIN to specify the Ethernet setting for the GV.
Select [FP series (Ehternet TCP/IP)] in the dialog box of [Select PLC type] when creating a new file, or select it from [PLC Type Setting] under [System Setting] in the menu bar
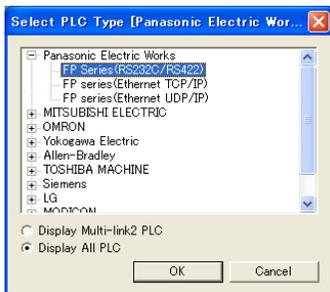
Select [Unit Setting] under [System Setting] in the menu bar, and click the [IP Address Setting] tab to set the IP address of GV.
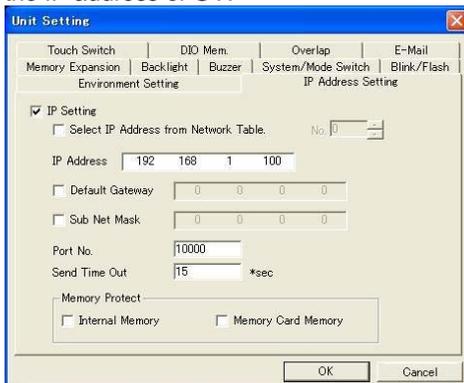
Select [Comm. Parameter] under [System Setting] in the menu bar, and select [FP series (Ehternet TCP/IP)]. Then, click the [Detail] tab, and select 1:n for the connection to set the local number.

Select [Comm. Parameter] under [System Setting] in the menu bar, and select [Network Table Setting] → [Ethernet] to open the screen to edit the network. The network table number corresponds to the unit number of the FP-X.

Set the IP address and port number corresponding to the unit number of the connected FP-X.

Reference: For the details of the settings for the GV,
<GV42/GV52/GV62 Terminal GVWIN Additional Specifications>
<GV series Communication Unit Manual Ethernet>

- Setting of FP-X

1) FP-X System register setting

No. 412: Computer link mode

2) Setting of AFPX-COM5

Item	Setting value
Communication protocol	TCP
Action mode	Server mode
Communication mode	Computer link
Source port No.	9094
Time out	0

UDP/IP can be used for the communication method.

In that case, change the setting for [PLC Type Setting] of the GV to [FP series (Ethernet UDP/IP)].

Set the communication protocol of the AFP-COM5 to UDP, and set the send type to UNICAST.

Note:

For the Ethernet communication with the GV, the computer link is used. The GV is the master and the FP-X is the slave. It cannot be used if setting the FP-X as the master. Note that the unit numbers for the GV and FP-X are not duplicated.

7.7.14 Initialization Procedure

Overview

• The Ethernet communication environment setting of the AFPX-COM5 can be initialized.

Initialization procedure
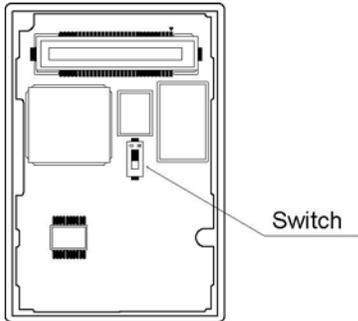
Switch

1. Turn on the switch at the back of the AFPX-COM5.
2. Install the AFPX-COM on the FP-X and turn on the power supply.
3. The ERR. LED of the AFPX-COM5 flashes every 5 seconds. (Initialization completes.)
4. Turn off the power supply of the FP-X. Remove the AFPX-COM5.
5. Turn off the switch at the back of the AFPX-COM5.
6. Install the AFPX-COM5 on the FP-X, and turn on the power supply.

Note) The Ethernet communication setting (including the IP address) cannot be changed when the switch at the back of the AFPX-COM5 is on. Always turn it off after initialization.

Setting for initialization

IP address setting

Item	Default
Get IP address	Manual
Unit name	FPX_ET
IP address	192.168.1.5
Subnet mask	255.255.255.0
Default gateway	192.168.1.1

Communication setting

Item	Default
Communication protocol	TCP
Action mode	Server mode
Baud rate (COM1)	9600 bps
Communication mode	Computer link
Source port No.	9094
Time out	0