Mitsubishi Electric Corp.

Q/QnA Series Ethernet Driver

Introduction

This manual describes how to connect the display (GP3000 series) and the External Device (target PLC).

In this manual, the connection procedure will be described by following the below sections:

1	System Configuration This section shows the types of External Device and SIO type.	☞"1 System Configuration" (page 3)
2	Selection of External Device Select a model (series) of External Device to be connected and connection method.	☞"2 Selection of External Device" (page 5)
3	Example of Communication Settings This section shows setting examples for communicating between the display and the External Device.	☞"3 Example of Communication Setting" (page 6)
4	Setup Items This section describes communication setup items on the display device. Set communication settings of Display with GP-Pro Ex or in off-line mode.	☞"4 Setup Items" (page 20)

Operation

1 System Configuration

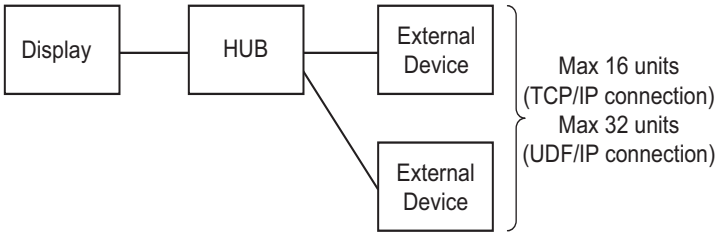
The system configuration in the case when the External Device of Mitsubishi Electric Corp. and the display are connected is shown.

Series	CPU	Link I/F	SIO Type	Setting Example
MELSEC Q Series	Q00 Q00J Q01 Q02 Q02H Q06H Q12H Q25H	QJ71E71	Ethernet (UDP)	Setting Example 1 (page 6)
			Ethernet (TCP)	Setting Example 2 (page 10)
		QJ71E71-B2	Ethernet (UDP)	Setting Example 1 (page 6)
			Ethernet (TCP)	Setting Example 2 (page 10)
		QJ71E71-100	Ethernet (UDP)	Setting Example 1 (page 6)
			Ethernet (TCP)	Setting Example 2 (page 10)
MELSEC QnA Series	Q2A Q2A-S1 Q3A Q4A Q4AR	AJ71QE71	Ethernet (UDP)	Setting Example 3 (page 14)
			Ethernet (TCP)	Setting Example 4 (page 17)
		AJ71QE71-B5	Ethernet (UDP)	Setting Example 3 (page 14)
			Ethernet (TCP)	Setting Example 4 (page 17)
	Q2AS Q2ASH Q2AS-S1 Q2ASH-S1	A1SJ71QE71-B2	Ethernet (UDP)	Setting Example 3 (page 14)
			Ethernet (TCP)	Setting Example 4 (page 17)
		A1SJ71QE71-B5	Ethernet (UDP)	Setting Example 3 (page 14)
			Ethernet (TCP)	Setting Example 4 (page 17)

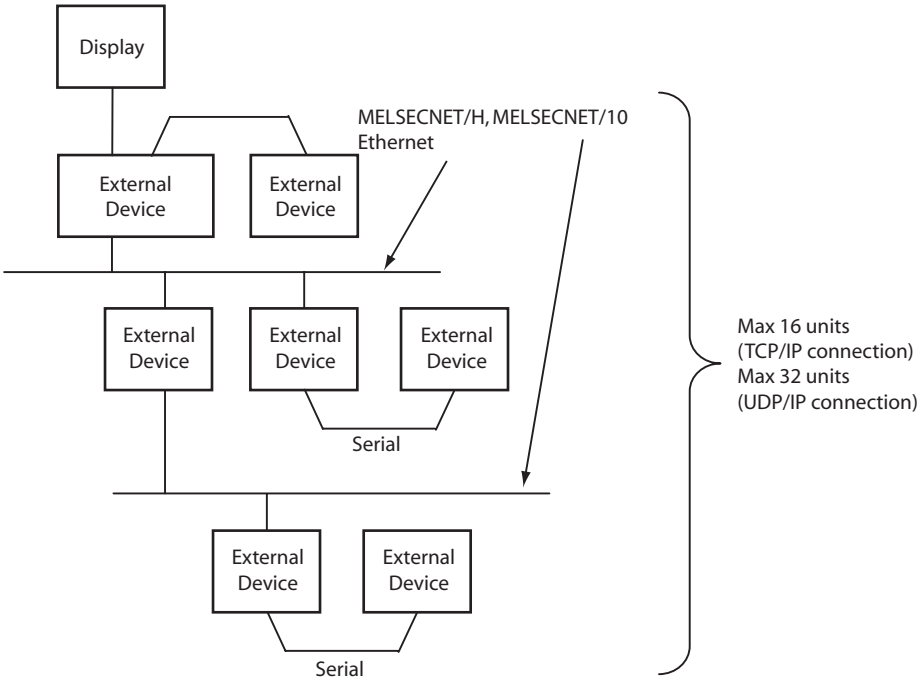
■ Connection Configuration

- 1:1 Connection

- 1:n Connection (when access station is source station)



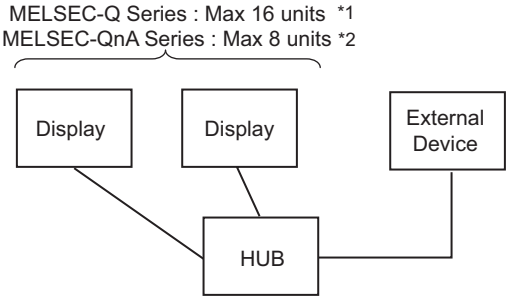
- 1:n Connection (access beyond network)



NOTE

- In case of communication via network,please set larger value than the response monitoring time of the relay station for timeout setteings.

- n : 1 Connection

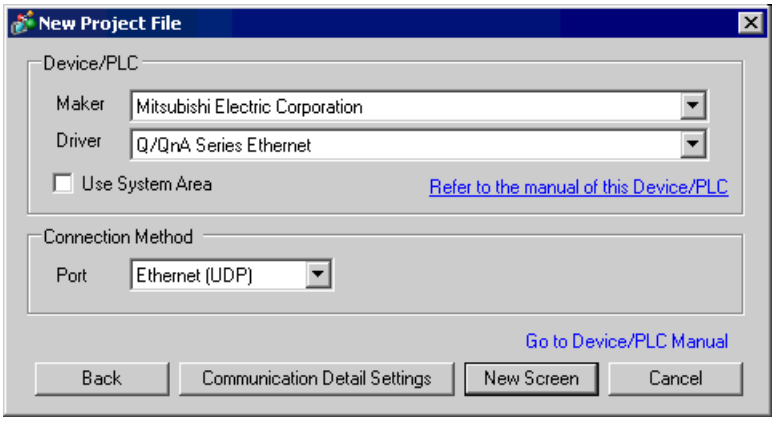


*1 When transmitting data via the External Device's OPEN Setting feature instead of the Auto OPEN UDP Port feature, up to 16 Display units can be connected. Also, when using the External Device's Auto Open UDP Port feature, there is no limitation for the number of Display units that can be connected.

*2 When transmitting data via the External Device's parameter setting instead of the Auto OPEN UDP Port feature, up to 8 Display units can be connected. Also, when using the External Device's Auto Open UDP Port feature, there is no limitation for the number of Display units that can be connected.

2 Selection of External Device

Select the External Device to be connected to the display.



Setup Items	Setup Description
Maker	Select the maker of the External Device to be connected. Select "Mitsubishi Electric Corporation".
Driver	Select a model (series) of the External Device to be connected and connection method. Select "Q/QnA Series Ethernet". Check the External Device which can be connected in "Q/QnA Series Ethernet" in system configuration. ☞ "1 System Configuration" (page 3)
Use System Area	Check this option when you synchronize the system data area of Display and the device (memory) of External Device. When synchronized, you can use the ladder program of External Device to switch the display or display the window on the display. Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (only for direct access method)" This can be also set with GP-Pro EX or in off-line mode of Display. Cf. GP-Pro EX Reference Manual " 6.13.6 Setting Guide of [System Setting Window]■[Main Unit Settings] Settings Guide◆System Area Setting" Cf. GP3000 Series User Manual "4.3.6 System Area Setting"
Port	Select the port of the display to be connected to the External Device from "Ethernet (UDP)" and "Ethernet (TCP)".

3 Example of Communication Setting

Examples of communication settings of the display and the External Device, recommended by Pro-face, are shown.

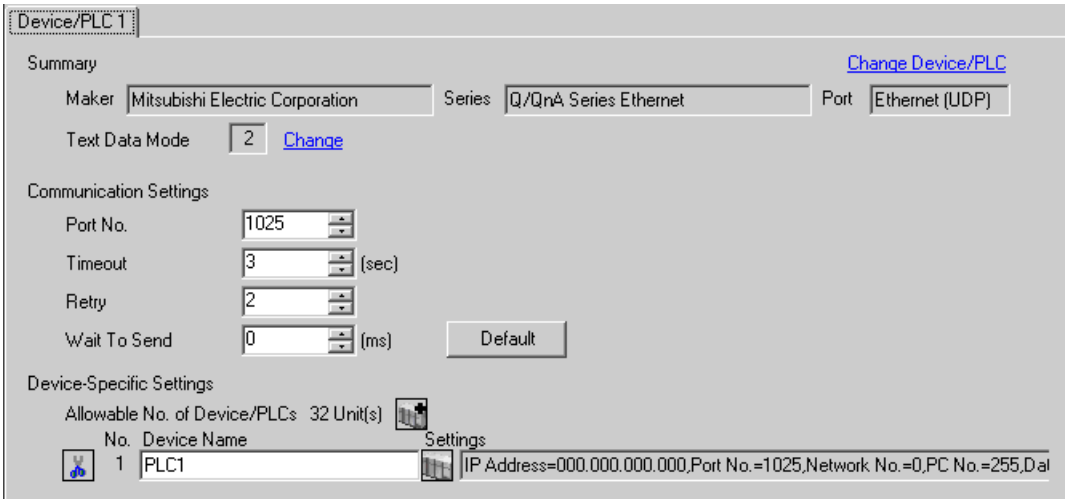
When you use the MELSEC Q/QnA Ethernet Series, use GP-Pro EX and the ladder software to set as below.

3.1 Setting Example 1

■ Setting of GP-Pro EX

◆ Communication Settings

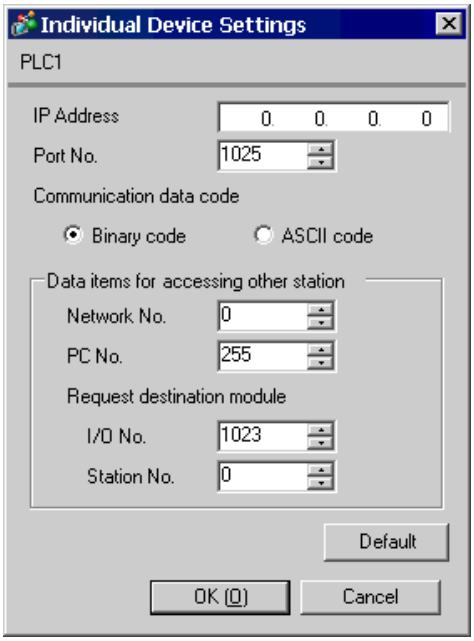
To display the setting screen, select [Device/PLC Settings] from [System setting window] in workspace.



◆ Device Setting

To display the setting screen, click ([Setting]) of External Device you want to set from [Device-Specific Settings] of [Device/PLC Settings].

When [Allowable No. of Device/PLCs] is multiple, click from [Device-Specific Settings] of [Device/PLC Settings] to add another External Device.



◆ Notes

- Check with a network administrator about IP address. Do not set the duplicate IP address.
- Set IP address on the External Device for IP address in Device-specific settings.
- You need to set IP address on the display in the off-line mode of the display.
- Limitations when you use UDP/IP to access the multiple PLCs via network are shown below.
  - When you set the retry frequency to zero, the error message of "Response timed out for initial communication command" is displayed at startup.
  - At startup, you cannot read the device data until timeout time elapses once.

■ Setting of External Device

Perform the settings of External Device in "Network Parameter" of the Parameter Settings of the ladder software.

◆ Network Parameter MNET/10H Ethernet Settings

Setup Items	Settings
Network Type	Ethernet
Head I/O No.	Option
Network No.	Option
Group No.	Option
Station No.	Option
Mode	On-line

◆ Ethernet Operation Settings

Setup Items	Settings
Communication Data Code Settings	Binary code communication
Initial Timing Settings	Always wait for OPEN
IP Address Setting	Option
Send Frame Settings	Ethernet (V2.0)
TCP Living Confirmation Settings	Option
Enable Write during RUN	Enable

◆ Open Settings

Setup Items	Settings
Protocol	UDP
Open Method	Unused
Source Port No.	Option*1
Destination IP Address	Option*1*2
Destination Port Number	Option*1*2
Fixed Buffer	Option
Update Procedure of Fixed Buffer	Option
Pairing Opening	Option
Living Confirmation	Option

*1 Check with a network administrator about setting value.

*2 Adjust to the setting on Display.

◆ Other Settings

The following settings are items only if necessary.

- Initial Settings

  Settings related to timer for TCP connection. Basically, communication is available with default settings. Change the settings when you want to customize (such as shortening timeout).

- Routing Information

  Set only when you use subnet mask or router.

- Auto Open UDP Port

  When you use the UDP port, you can communicate using the auto open UDP port (port No. 5000) on the PLC.

◆ Notes

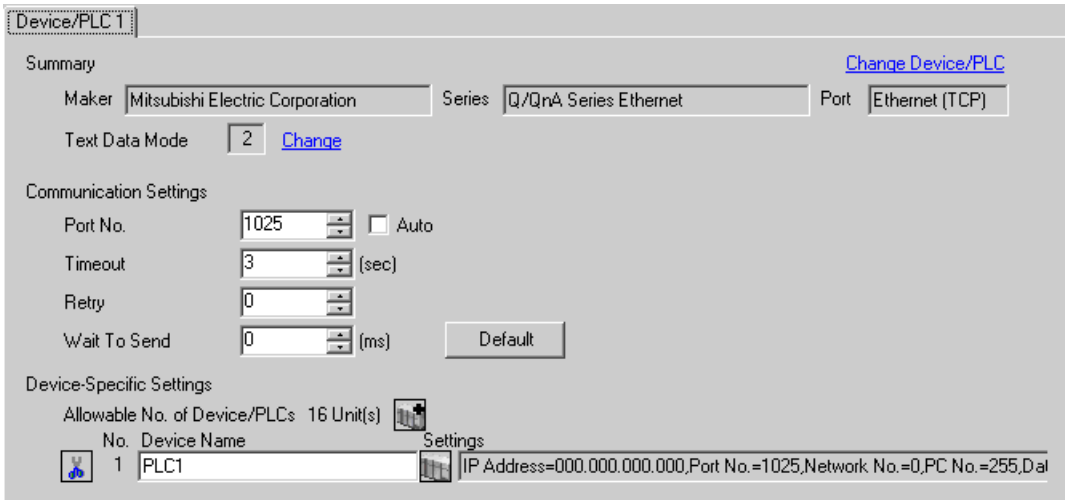
Check with a network administrator about IP address. Do not set the duplicate IP address.

3.2 Setting Example 2

■ Setting of GP-Pro EX

◆ Communication Settings

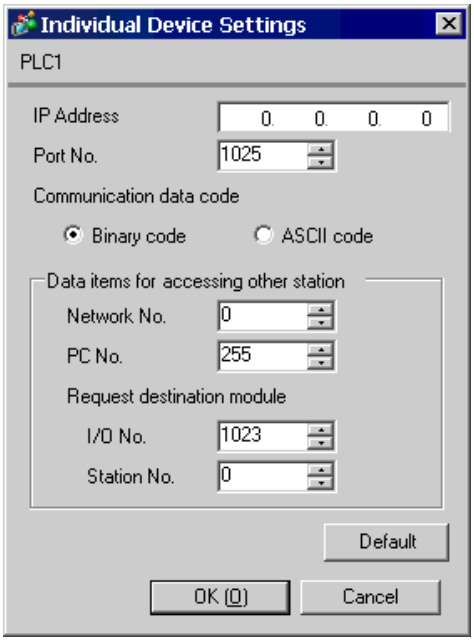
To display the setting screen, select [Device/PLC Settings] from [System setting window] in workspace.



◆ Device Setting

To display the setting screen, click ([Setting]) of External Device you want to set from [Device-Specific Settings] of [Device/PLC Settings].

When [Allowable No. of Device/PLCs] is multiple, click from [Device-Specific Settings] of [Device/PLC Settings] to add another External Device.



◆ Notes

- Check with a network administrator about IP address. Do not set the duplicate IP address.
- Set IP address on the External Device for IP address in Device-specific settings.
- You need to set IP address on the display in the off-line mode of the display.

■ Settings of External Device

Perform the settings of External Device in "Network Parameter" of the Parameter Settings of the ladder software.

◆ Network Parameter MNET/10H Ethernet Settings

Setup Items	Settings
Network Type	Ethernet
Head I/O No.	Option
Network No.	Option
Group No.	Option
Station No.	Option
Mode	On-line

◆ Ethernet Operation Settings

Setup Items	Settings
Communication Data Code Settings	Binary code communication
Initial Timing Settings	Always wait for OPEN
IP Address Setting	Option
Send Frame Settings	Ethernet (V2.0)
TCP Living Confirmation Settings	Option
Enable Write during RUN	Enable

◆ Open Settings

Setup Items	Settings
Protocol	TCP
Open Method	Unpassive
Source Port No.	Option*1
Destination IP Address	Setting unnecessary
Destination Port Number	Setting unnecessary
Fixed Buffer	Option
Update Procedure of Fixed Buffer	Option
Pairing Opening	Option
Living Confirmation	Option

*1 Check with a network administrator about setting value.

◆ Other Settings

The following settings are items only if necessary.

- Initial Settings

  Settings related to timer for TCP connection. Basically, communication is available with default settings. Change the settings when you want to customize (such as shortening timeout).

- Routing Information

  Set only when you use subnet mask or router.

- Auto Open UDP Port

  When you use the UDP port, you can communicate using the auto open UDP port (port No. 5000) on the PLC.

◆ Notes

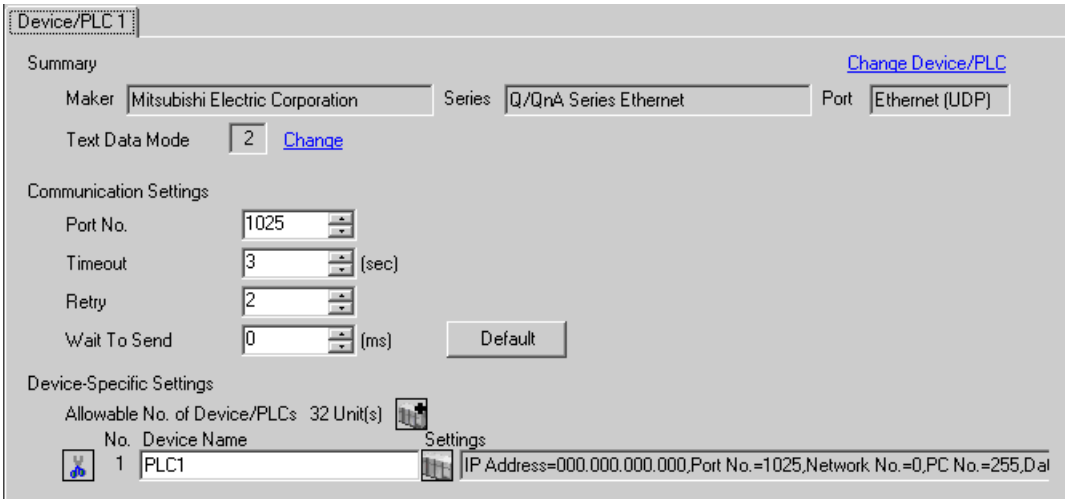
Check with a network administrator about IP address. Do not set the duplicate IP address.

3.3 Setting Example 3

■ Setting of GP-Pro EX

◆ Communication Settings

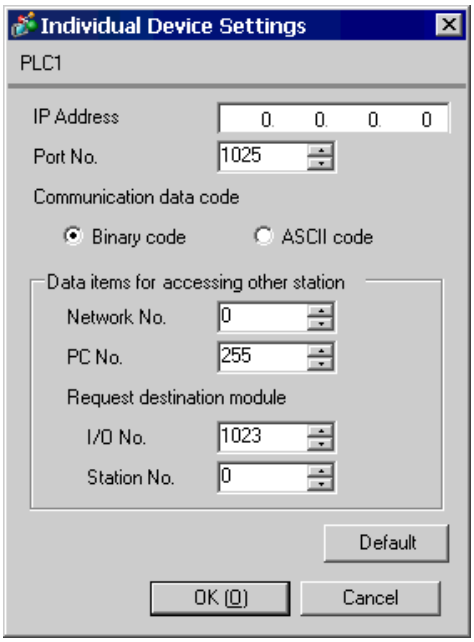
To display the setting screen, select [Device/PLC Settings] from [System setting window] in workspace.



◆ Device Setting

To display the setting screen, click ([Setting]) of External Device you want to set from [Device-Specific Settings] of [Device/PLC Settings].

When [Allowable No. of Device/PLCs] is multiple, click from [Device-Specific Settings] of [Device/PLC Settings] to add another External Device.



◆ Notes

- Check with a network administrator about IP address. Do not set the duplicate IP address.
- Set IP address on the External Device for IP address in Device-specific settings.
- You need to set IP address on the display in the off-line mode of the display.
- Limitations when you use UDP/IP to access the multiple PLCs via network are shown below.
  - When you set the retry frequency to zero, the error message of "Response timed out for initial communication command" is displayed at startup.
  - At startup, you cannot read the device data until timeout time elapses once.

■ Setting of External Device

You need the DIP switch settings and the ladder program for the setting of External Device.

◆ Switch Settings

Mode Setting Switch

Settings	Setup Items
0	On-line

Communication Condition Setting Switch

DIP Switch	Settings	Setup Items
SW1	OFF	Selection of line processing at TCP timeout error
SW2	OFF	Data Code Setting
SW3	OFF	Operate along Y19
SW4	OFF	Disable (Fixed to OFF)
SW5	OFF	Disable (Fixed to OFF)
SW6	OFF	Disable (Fixed to OFF)
SW7	ON	CPU Communication Timing Settings
SW8	OFF	Initial Timing Settings

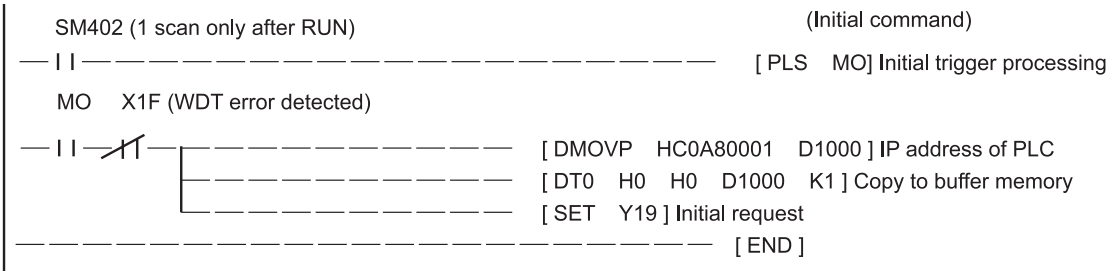
◆ Example of Ladder Program

Example when you communicate with the auto open UDP port No. (Default: 5000) is shown below.

- IP address of External Device: 192.168.0.1
- Port No. of External Device: 5000

NOTE

- You do not need to specify the IP address and the port No. on the PLC for communication with this function.



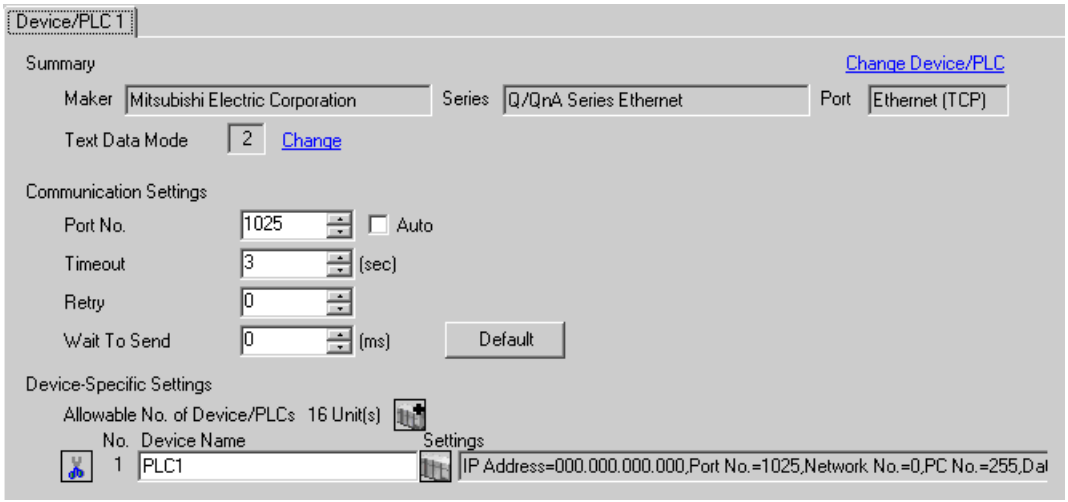
Above sample is the minimum ladder to enable UDP communication with Display. Please refer to the manual of External Device for more information about error processing and TCP communication, etc.

3.4 Setting Example 4

■ Setting of GP-Pro EX

◆ Communication Settings

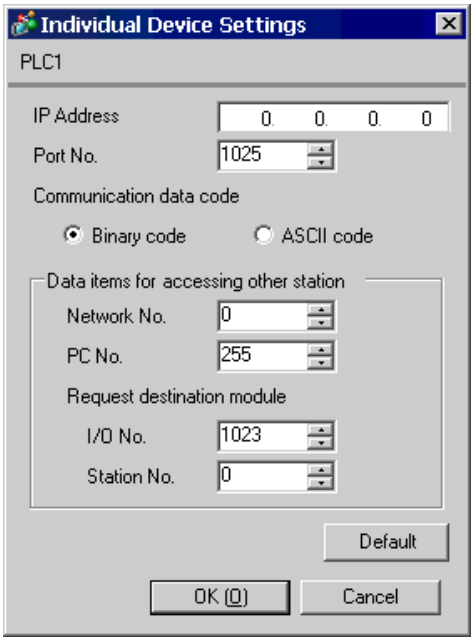
To display the setting screen, select [Device/PLC Settings] from [System setting window] in workspace.



◆ Device Setting

To display the setting screen, click  ([Setting]) of External Device you want to set from [Device-Specific Settings] of [Device/PLC Settings].

When you connect multipleExternal Device, click  from [Device-Specific Settings] of [Device/PLC Settings] to add another External Device.



◆ Notes

- Check with a network administrator about IP address. Do not set the duplicate IP address.
- Set IP address on the External Device for IP address in Device-specific settings.
- You need to set IP address on the display in the off-line mode of the display.

■ Settings of External Device

You need the DIP switch settings and the ladder program for the setting of External Device.

◆ Switch Settings

Mode Setting Switch

Settings	Setup Items
0	On-line

Communication Condition Setting Switch

DIP Switch	Settings	Setup Items
SW1	OFF	Selection of line processing at TCP timeout error
SW2	OFF	Data Code Setting
SW3	OFF	Operate along Y19
SW4	OFF	Disable (Fixed to OFF)
SW5	OFF	Disable (Fixed to OFF)
SW6	OFF	Disable (Fixed to OFF)
SW7	ON	CPU Communication Timing Settings
SW8	OFF	Initial Timing Settings

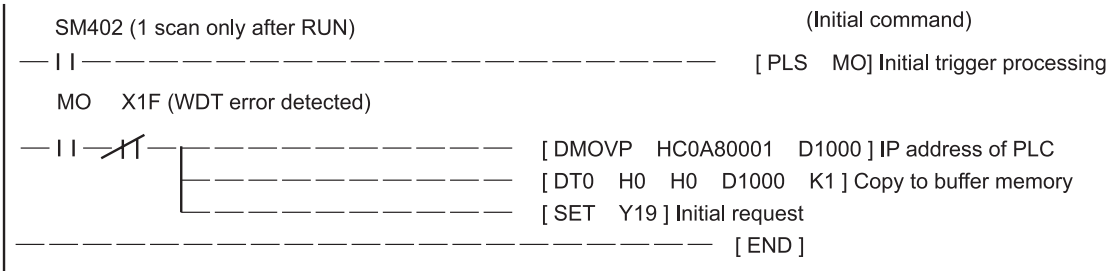
◆ Example of Ladder Program

Example when you communicate with the auto open UDP port No. (Default: 5000) is shown below.

- IP address of External Device: 192.168.0.1
- Port No. of External Device: 5000

NOTE

- You do not need to specify the IP address and the port No. on the PLC for communication with this function.



Above sample is the minimum ladder to enable UDP communication with AGP. Please refer to the manual of External Device for more information about error processing and TCP communication, etc.

4 Setup Items

Set communication settings of the display with GP-Pro Ex or in off-line mode of the display.

The setting of each parameter must be identical to that of External Device.

☞"3 Example of Communication Setting" (page 6)

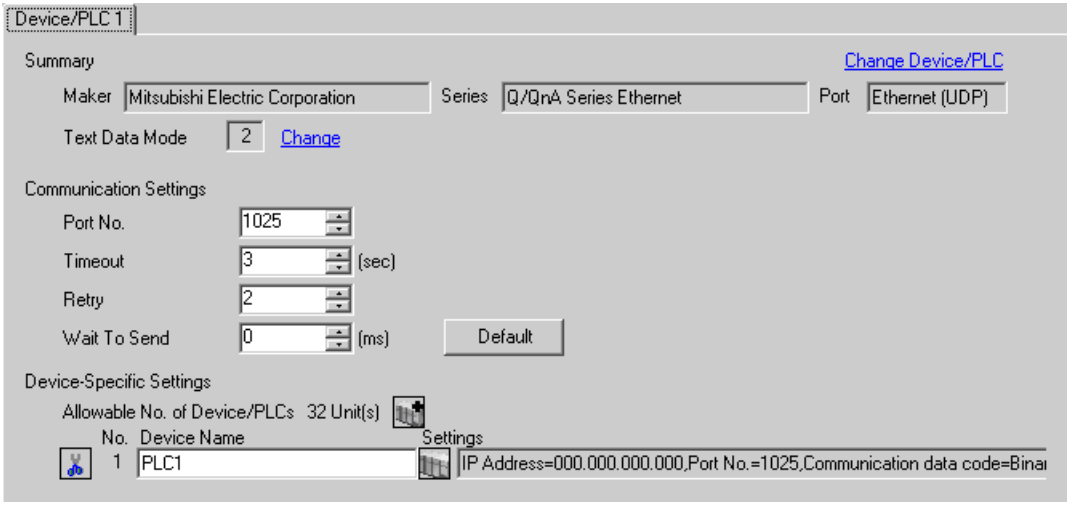
IMPORTANT

- You need to set IP address on the display in the off-line mode of the display.
  Cf. GP3000 Series User Manual "4.3.7 Ethernet Settings"

4.1 Setup Items in GP-Pro EX

■ Communication Settings

To display the setting screen, select [Device/PLC Settings] from [System setting window] in workspace.

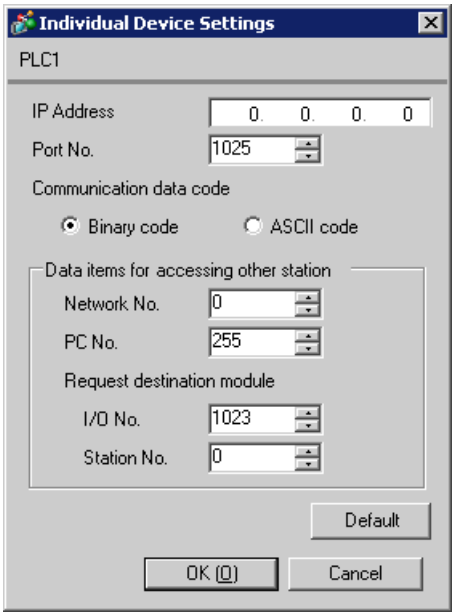


Setup Items	Setup Description
Port No.	Use an integer from 1024 to 65535 to enter the port No. of the display. When you check the option of [Auto Assign], the port No. will be automatically set. **NOTE** • [Auto Assign] option is available to set only when you select "Ethernet (TCP)" in [Connecting Method].
Timeout	Use an integer from 1 to 127 to enter the time (s) for which Display waits for the response from External Device. **NOTE** • In case of communicating via network,please set larger value than the response monitoring time of the relay station for timeout settings.
Retry	In case of no response from the External Device, use an integer from 0 to 255 to enter how many times the display retransmits the command.
Wait To Send	Use an integer from 0 to 255 to enter standby time (ms) for the display from receiving packets to transmitting next commands.

■ Device Setting

To display the setting screen, click ([Setting]) of External Device you want to set from [Device-Specific Settings] of [Device/PLC Settings].

When [Allowable No. of Device/PLCs] is multiple, click from [Device-Specific Settings] of [Device/PLC Settings] to add another External Device.



Setup Items	Setup Description
IP Address	Set IP address of the External Device. **NOTE** • Check with a network administrator about IP address. Do not set the duplicate IP address.
Port No.	Use an integer from 1025 to 65535 to enter the port No. of the External Device. **IMPORTANT** • Do not use the following port No. because Ethernet unit reserves them in the system. UDP connection: 5001-5002 TCP connection: 5000-5002
Network No.	Set PC No. when you communicate via network. Use an integer from 0 to 239 to enter network No. of the External Device to communicate. If you do not communicate via network, enter 0.
PC No.	Set PC No. when you communicate via network. Use an integer from 0 to 64 to enter PC No. of the External Device to communicate. If you do not communicate via network, enter 255.
Data Code	Select the data format to communicate with the External Device from "Binary code communication" or "ASCII code communication".
I/O No.	Set PC No. when you communicate via network. Use an integer from 0 to 511 to enter I/O No. of the External Device to communicate. If you do not communicate via network, enter 1023.
Station No.	Enter a station number of the External Device, using 0 to 31.

4.2 Setup Items in Off-Line Mode

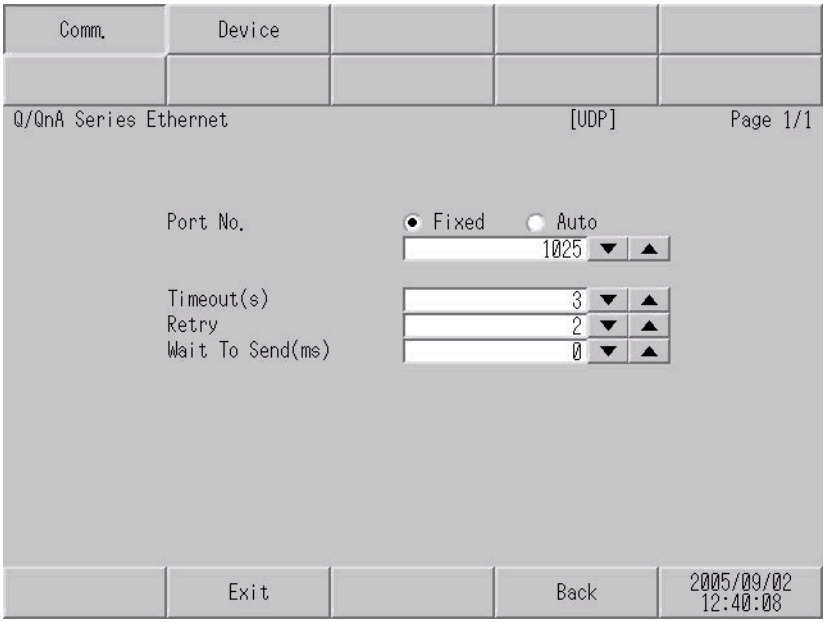
NOTE

- Please refer to GP3000 Series User Manual for more information on how to enter off-line mode or about operation.

  Cf. GP3000 Series User Manual "Chapter 4 Setting"

■ Communication Settings

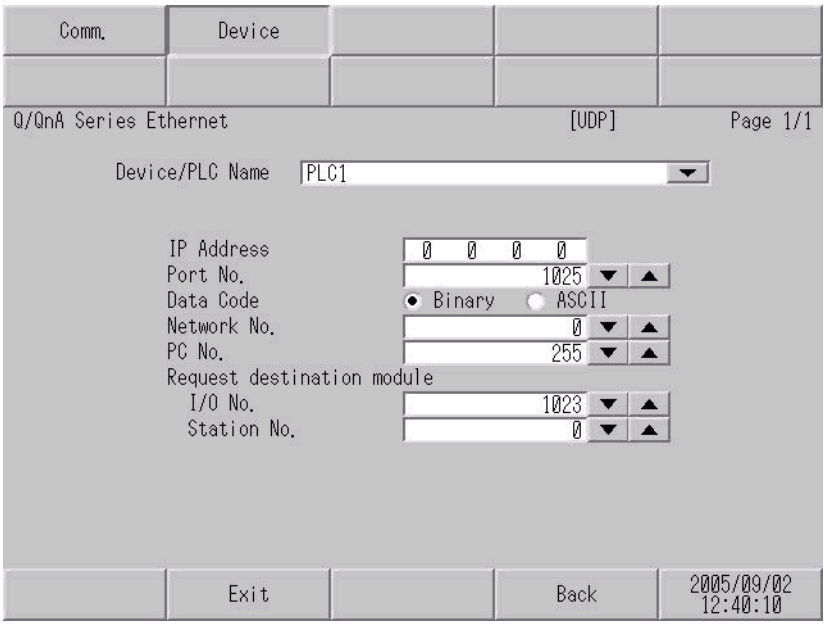
To display the setting screen, touch [Device/PLC Settings] from [Peripheral Settings] in off-line mode. Touch the External Device you want to set from the displayed list.



Setup Items	Setup Description
Port No.	Set the Port No. of the display. In UDP connection, entered port No. will be assigned regardless of whether you select [Fixed] or [Auto]. In TCP connection, select either of [Fixed] or [Auto]. When you select [Fixed], use an integer from 1024 to 65535 to enter the port No. of the display. When you select [Auto], the port No. will be automatically assigned regardless of the entered value.
Timeout	Use an integer from 1 to 127 to enter the time (s) for which Display waits for the response from External Device. **NOTE** • In case of communicating via network,please set larger value than the response monitoring time of the relay station for timeout settings.
Retry	In case of no response from the External Device, use an integer from 0 to 255 to enter how many times the display retransmits the command.
Wait To Send	Use an integer from 0 to 255 to enter standby time (ms) for the display from receiving packets to transmitting next commands.

■ Device Setting

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Settings]. Touch the External Device you want to set from the displayed list, and touch [Device].



Setup Items	Setup Description
Device/PLC Name	Select the External Device for device setting. Device name is a title of External Device set with GP-Pro EX.(Initial value [PLC1])
IP Address	Set IP address of the External Device. **NOTE** • Check with a network administrator about IP address. Do not set the duplicate IP address.
Port No.	Use an integer from 1025 to 65535 to enter the port No. of the External Device. IMPORTANT • Do not use the following port No. because Ethernet unit reserves them in the system. UDP connection: 5001-5002 TCP connection: 5000-5002
Data Code	Select the data format to communicate with the External Device from "Binary code communication" or "ASCII code communication".
Network No.	Set PC No. when you communicate via network. Use an integer from 0 to 239 to enter network No. of the External Device to communicate. If you do not communicate via network, enter 0.
PC No.	Set PC No. when you communicate via network. Use an integer from 0 to 64 to enter PC No. of the External Device to communicate. If you do not communicate via network, enter 255.
I/O No.	Set PC No. when you communicate via network. Use an integer from 0 to 511 to enter I/O No. of the External DeviceExternal Device to communicate. If you do not communicate via network, enter 1023.
Station No.	Enter a station number of the External Device, using 0 to 31.

5 Supported Device

Range of supported device address is shown in the table below. Please note that the actually supported range of the devices varies depending on the External Device to be used. Please check the actual range in the manual of your External Device.

This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Notes
Input Relay	X0000 - X1FFF	X0000 - X1FF0		*** 0
Output Relay	Y0000 - Y1FFF	Y0000 - Y1FF0		*** 0
Internal Relay	M00000 - M32767	M00000 - M32752		÷ 16
Special Relay	SM0000 - SM2047	SM0000 - SM2032		÷ 16
Latch Relay	L00000 - L32767	L000000 - L32752		÷ 16
Annunciator	F00000 - F32767	F00000 - F32752		÷ 16
Edge Relay	V00000 - V32767	V00000 - V32752		÷ 16
Step Relay	S0000 - S8191	S0000 - S8176		÷ 16
Link Relay	B0000 - B7FFF	B0000 - B7FF0		*** 0
Special Link Relay	SB000 - SB7FF	SB000 - SB7F0		*** 0
Timer (Contact)	TS00000 - TS23087	------		
Timer (Coil)	TC00000 - TC23087	------		
Retentive Timer (Contact)	SS00000 - SS23087	------		
Retentive Timer (Coil)	SC00000 - SC23087	------	L / H	
Counter (Contact)	CS00000 - CS23087	------		
Counter (Coil)	CC00000 - CC23087	------		
Timer (Current Value)	------	TN00000 - TN23087		
Retentive Timer (Current Value)	------	SN00000 - SN23087		
Counter (Current Value)	------	CN00000 - CN23087		
Data Register	------	D00000 - D25983		Bit F
Special Register	------	SD0000 - SD2047		Bit F
Link Register	------	W0000 - W657F		Bit F
Special Link Register	------	SW000 - SW7FF		Bit F
File Register (Normal)	------	R00000 - R32767		Bit F
File Register (Block switching is not necessary)	------	ZR00000000 - ZR1042431		Bit F

Device	Bit Address	Word Address	32 bits	Notes
File Register (0R - 31R)*1	------	0R0000 - 0R32767	L / H	Bit F
	------	1R0000 - 1R32767		
	------	2R0000 - 2R32767		
	:	:		
	------	30R0000 - 30R32767		
	------	31R0000 - 31R26623		

*1 Set the block No. on the head of device name. This is the device name for conversion with GP-Pro/PBIII for Windows. When you newly specify the device, we recommend that you should use the file register (Block switching is not necessary).

NOTE

- Please refer to the GP-Pro EX Reference Manual for system data area.
  Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (only for direct access method)"
- Please refer to the precautions on manual notation for icons in the table.
  ☞ "Manual Symbols and Terminology"

6 Device Code and Address Code

Use device code and address code when you select "Device & Address" for the address type in data displays.

Device	Device Name	Device Code (HEX)	Address Code
Input Relay	X	0080	Value of word address divided by 0x10
Output Relay	Y	0081	Value of word address divided by 0x10
Internal Relay	M	0082	Value of word address divided by 16
Special Relay	SM	0083	Value of word address divided by 16
Latch Relay	L	0084	Value of word address divided by 16
Annunciator	F	0085	Value of word address divided by 16
Edge Relay	V	0086	Value of word address divided by 16
Step Relay	S	0087	Value of word address divided by 16
Link Relay	B	0088	Value of word address divided by 0x10
Special Link Relay	SB	0089	Value of word address divided by 0x10
Timer (Current Value)	TS	0060	Word Address
Retentive Timer (Current Value)	SN	0062	Word Address
Counter (Current Value)	CN	0061	Word Address
Data Register	D	0000	Word Address
Special Register	SD	0001	Word Address
Link Register	W	0002	Word Address
Special Link Register	SW	0003	Word Address
File Register (Normal)	R	000F	Word Address
File Register (Block switching is not necessary)	ZR	000E	Word Address

continued to next page

Device	Device Name	Device Code (HEX)	Address Code
File Register (0R - 31R)	R	000F	Word Address
	ZR	000E	Word Address
	0R	0010	Word Address
	1R	0011	Word Address
	2R	0012	Word Address
	3R	0013	Word Address
	4R	0014	Word Address
	:	:	:
	27R	002B	Word Address
	28R	002C	Word Address
	29R	002D	Word Address
	30R	002E	Word Address
	31R	002F	Word Address

7 Error Messages

Error messages are displayed on the screen of Display as follows: "No. : Device Name: Error Message (Error Occurrence Area)". Each description is shown below.

Item	Description
No.	Error No.
Device Name	Name of External Device where error occurs. Device name of External Device is a title of External Device set with GP-Pro EX.(Initial value [PLC1])
Error Message	Displays messages related to the error which occurs.
Error Occurrence Area	Displays IP address or device address of External Device where error occurs, or error codes received from External Device. NOTE • Received error codes are displayed such as "Decimal [Hex]". • IP address is displayed such as "IP address (Decimal): MAC address (Hex)".

Display Examples of Error Messages

"RHAA035: PLC1: Error has been responded for device write command (Error Code: 2 [02])"

NOTE • Please refer to the manual of External Device for more detail of received error codes.