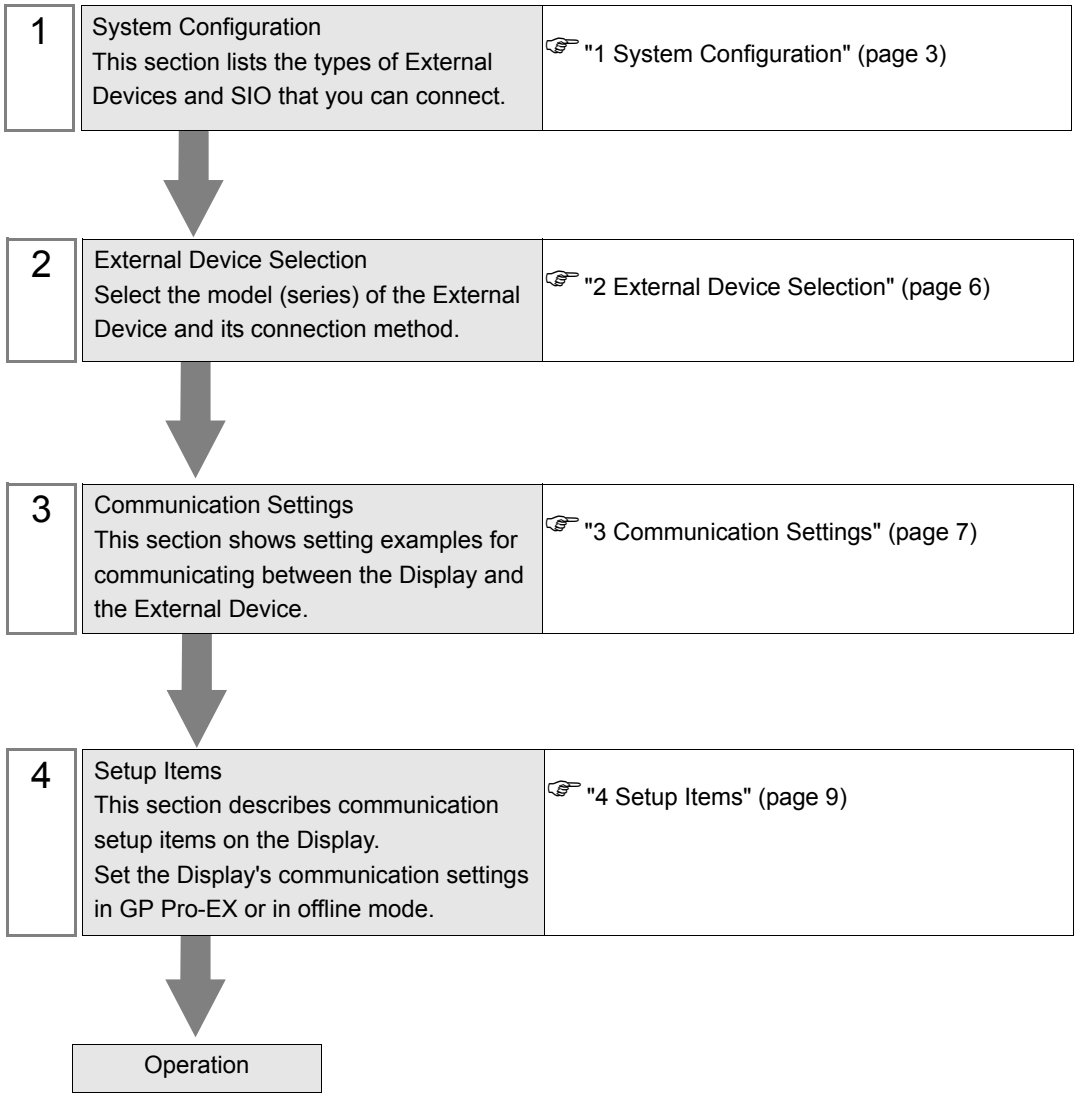
EtherNet/IP Explicit Messaging Driver

Introduction

This manual describes how to connect the Display and the External Device (target PLC).

In this manual, the connection procedure is described in the sections identified below:



1 System Configuration

The following table lists system configurations for connecting External Devices and the Display.

Driver	CPU	Link I/F	SIO Type	Setting Example
EtherNet/IP	Explicit message server	Ethernet port on the External Device	Ethernet (TCP)	Setting Example 1 (page 7)

NOTE

- The display unit operates as the Originator.

This driver is not certified by ODVA. Check the following when working with the driver.

- Implicit Messaging

  The equipment listed below has been tested and confirmed to operate. For the latest list, refer to our home page (http://www.pro-face.com/trans/en/manual/1056.html). If you use equipment that is not listed, fully test the equipment in an operation environment.

CPU	Link I/F
WAGO Corporation Model: 750-352	Model: 750-402 Model: 750-467 Model: 750-504 Model: 750-550
Phoenix Contact Model: IL EIP BK DI8 DO4 2TX-PAC	Ethernet/IP Bus Coupler's Ethernet/IP connector
SMC Model: EX600-8EN1	SI unit's BUS connector
Applied Motion Products Model: ST10-IP-EE	-
Schneider Electric Model: LMDCE571	-

- Explicit Messaging

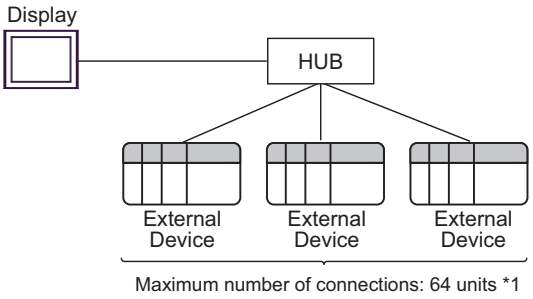
  The service codes and data sizes you can use are as follows.

  - Service code: Get_Attribute_Single, Set_Attribute_Single
  - Data size: 16-Bit, 32-Bit

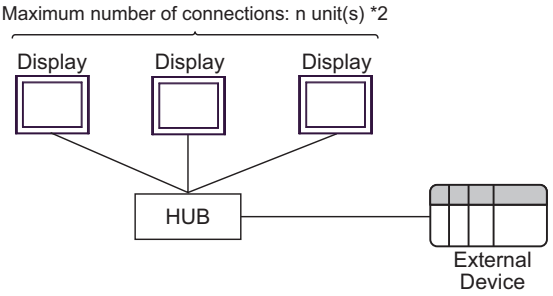
  Use Custom Explicit Message to implement different service codes or data sizes.

Connection Configuration

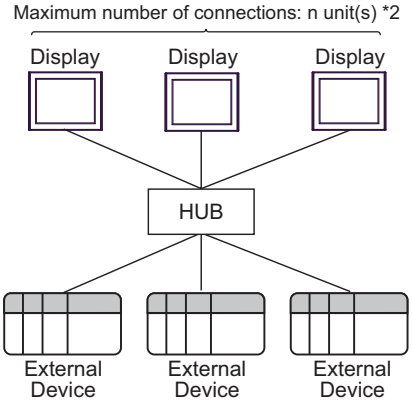
- 1:n Connection



- n:1 Connection



- n:m Connection



*1 When 33 or more External Devices are connected, it is necessary to check [Increase allowable number of Devices/PLCs].

☞"4.1 Setup Items in GP-Pro EX" (page 9)

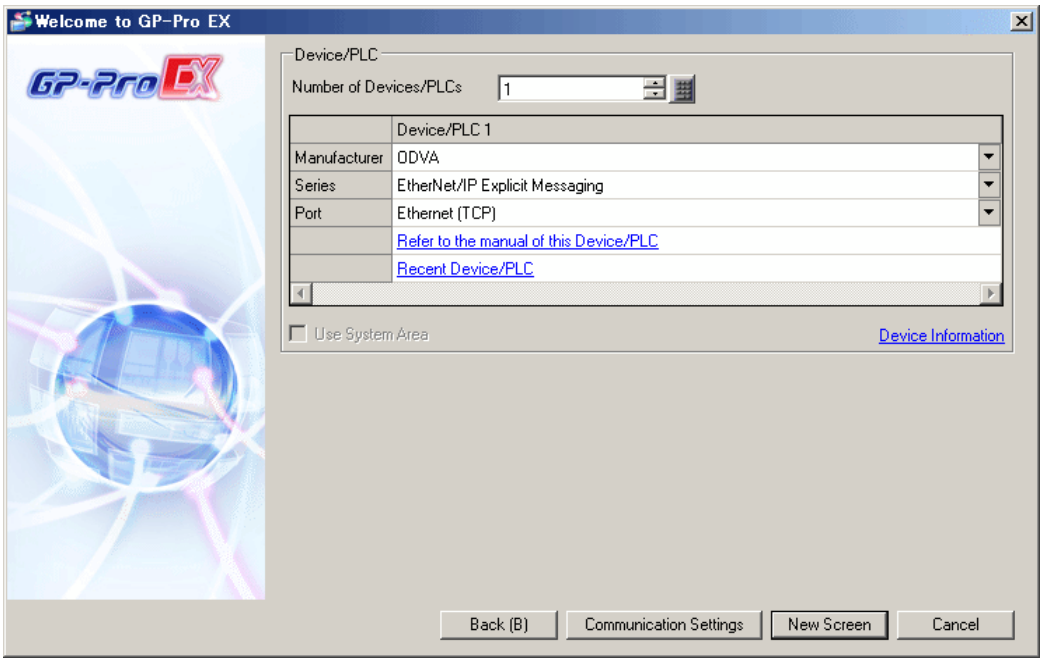
*2 The maximum number of connectable units varies depending on the External Device. Refer to your External Device manual for details.

NOTE

- Increasing the number of External Devices increases the communication load. If you use Implicit Messaging and the communication load is too high, you may not be able to get data. When that happens, to reduce the communication load, either increase the length of the Requested Packet Interval (RPI) or reduce the number of connected devices.
  Posted on the "Otasuke Pro!" (http://www.pro-face.com/trans/en/manual/1001.html) support site's download page for the ODVA EtherNet/IP Explicit Messaging driver is the configuration that worked in our test environment.
- For Implicit Messaging multicast communication, use communication speeds of 100BASE-TX or faster.

2 External Device Selection

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Number of Devices/ PLCs	Enter an integer from 1 to 4 to define the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to connect. Select "ODVA".
Series	Select the External Device model (series) and the connection method. Select "EtherNet/IP Explicit Messaging". In System configuration, make sure the External Device you are connecting is supported by "EtherNet/IP Explicit Messaging". ☞ "1 System Configuration" (page 3)
Port	Select the Display port to connect to the External Device.
Use System Area	Check this option to synchronize the system data area of the Display and the device (memory) of the External Device. When synchronized, you can use the External Device's ladder program to switch the display or display the window on the Display. Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This feature can also be set in GP-Pro EX or in the Display's offline mode. Cf. GP-Pro EX Reference Manual "System Settings [Display Unit] - [System Area] Settings Guide" Cf. Maintenance/Troubleshooting Guide "Main Unit - System Area Settings"

3 Communication Settings

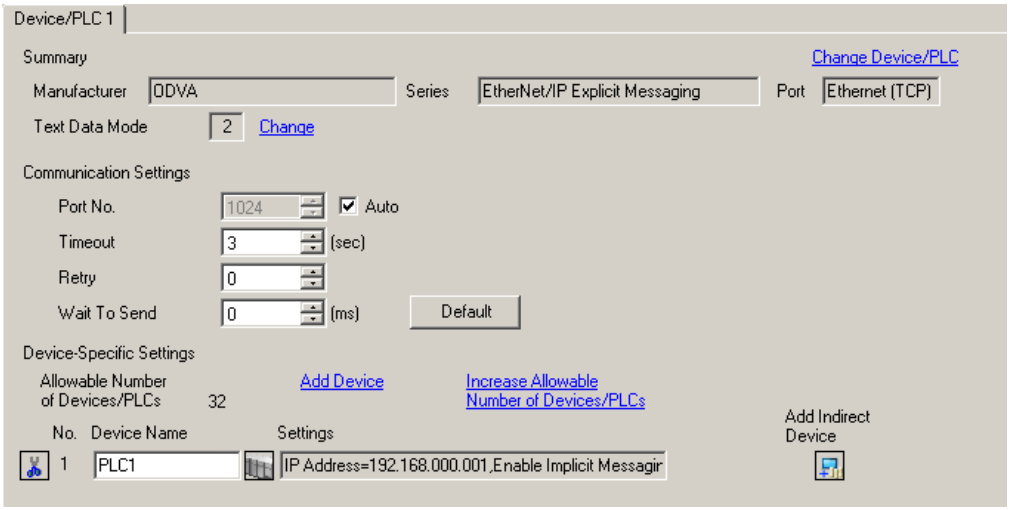
This section provides examples of communication settings recommended by Pro-face for the Display and the External Device.

3.1 Setting Example 1

■ GP-Pro EX Settings

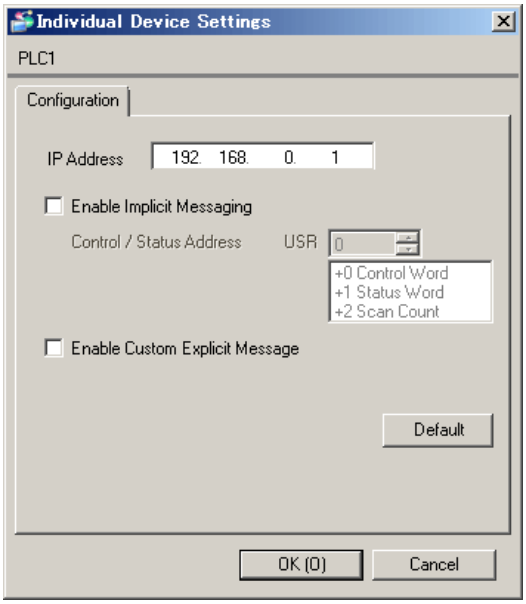
◆ Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].



◆ Device Setting

To display the [Individual Device Settings] dialog box, select the External Device and click [Settings] from [Device-Specific Settings] in the [Device/PLC] window.



■ Notes

- Check with your network administrator about the IP address you want to use. Do not duplicate IP addresses on the same network.
- In [Individual Device Settings], set the IP address of the External Device.
- Set the Display's IP address in offline mode.

■ External Device Settings

The communication settings vary depending on the External Device.

Refer to your External Device manual for details.

4 Setup Items

Set up the Display's communication settings in GP Pro-EX or in the Display's offline mode.

The setting of each parameter must match that of the External Device.

☞"3 Communication Settings" (page 7)

NOTE

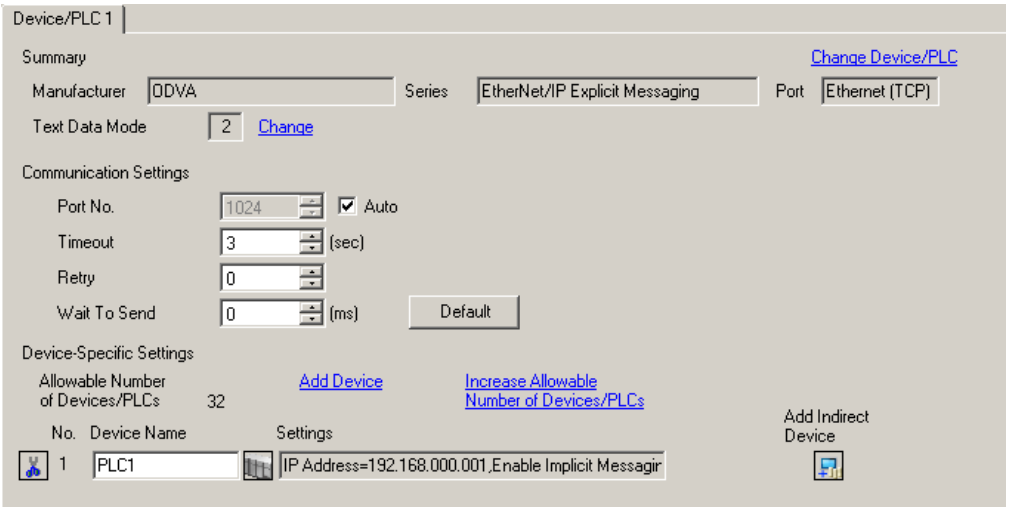
- You need to set the Display's IP address in offline mode.

  Cf. Maintenance/Troubleshooting Guide "Ethernet Settings"

4.1 Setup Items in GP-Pro EX

■ Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].



Setup Items	Setup Description
Port No.	Use an integer from 1024 to 65535 to enter the port number of the Display. When you check the option of [Auto Assign], the port number will be automatically set.
Timeout	Use an integer from 1 to 127 to enter the time (seconds) for which the Display waits for the response from the External Device.
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 the amount of standby time (milliseconds) the Display counts from the time it receives a packet to the time it transmits the next command.
Increase Allowable Number of Devices/ PLCs	When clicked, the [Increase Allowable Number of Devices/PLCs] dialog box is displayed. When you check [Increase allowable number of Devices/PLCs], the settings for [Allowable Number of Devices/PLCs] can be extended to "64". 

NOTE

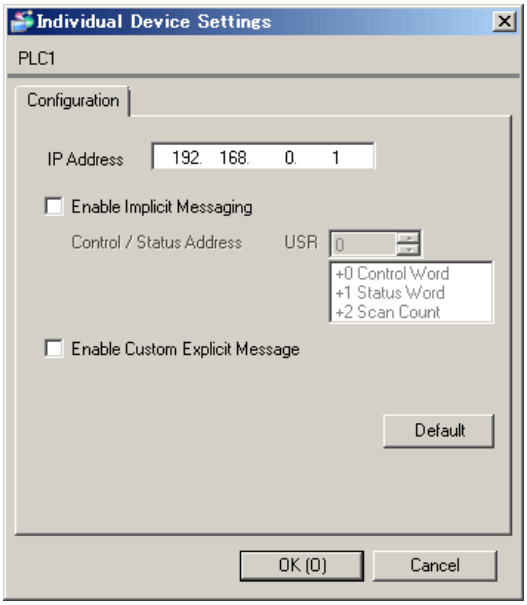
- Refer to the GP-Pro EX Reference Manual for Indirect Device.

Cf. GP-Pro EX Reference Manual "Changing the Device/PLC at Runtime (Indirect Device)"

■ Device Settings

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

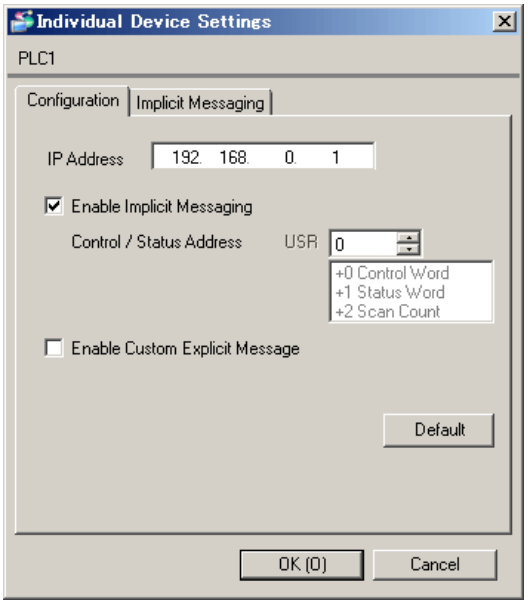
To connect multiple External Devices, from [Device-Specific Settings] in the [Device/PLC] window, click [Add Device] to add another External Device.



Setup Items	Setup Description
IP Address	Set the IP address of the External Device. **NOTE** • Check with your network administrator about the IP address you want to use. Do not duplicate IP addresses on the same network.
Enable Implicit Messaging	To use Implicit Messaging, select the [Enable Implicit Messaging] check box. The [Implicit Messaging] tab will appear.
Enable Custom Explicit Message	To use Custom Explicit Messages, select the [Enable Custom Explicit Message] check box. The [Custom Explicit Message] tab will appear.

◆ Implicit Messaging

- Configuration

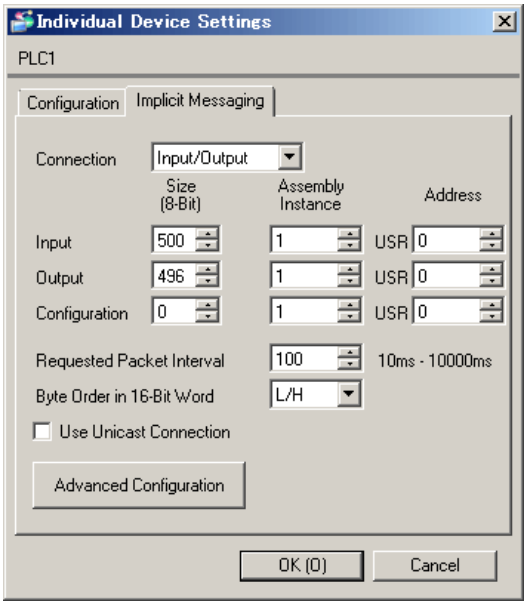


Setup Items	Setup Description
Control / Status Address	Set the address for control and status display. Three words from the defined address are used for control and status.

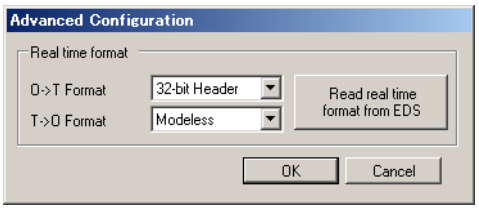
Description of Control / Status Addresses:

Address	Function	Description
+0	Control Word	Bit 0: I/O scanning control (1: Start, 0: Stop) Bit 1 - 15: Unused
+1	Status Word	Bit 0: I/O scanning control (1: Receiving, 0: Default or did not receive) Bit 1 - 15: Unused
+2	Scan Count	Counts up whenever new input data is received from the External Device.

- Implicit Messaging



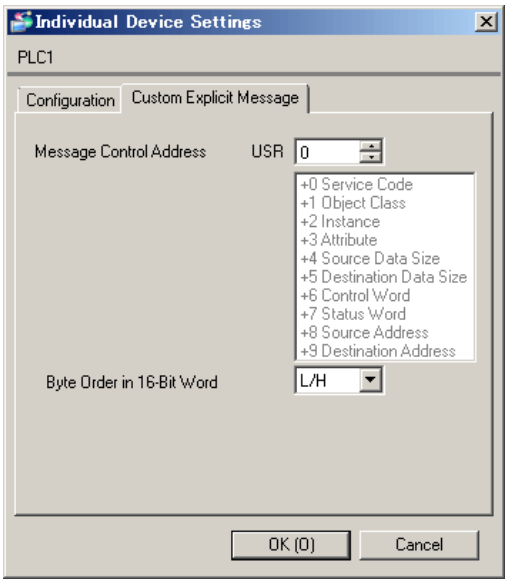
Setup Items	Setup Description
Connection	Select the connection type of the External Device. Select from the following items. • Input/Output Reads input data from the External Device. And, writes output data to the External Device. • Input Only Reads input data from the External Device. Sends a heartbeat every 250 milliseconds. • Listen Only Reads input data from the External Device. This option is available only when other External Devices are connected using [Input/Output] or [Input Only].
Input	• Size / Assembly Instance Set the output data size and instance from the External Device. The defined values must match the External Device. • Address Set the USR address for storing data output from the External Device. Starting from the defined USR address, stores the number of bytes of data as defined in the [Size (8-bit)] field.
Output	• Size / Assembly Instance Set the output data size and instance from the Display. The defined values must match the External Device. • Address Set the USR address for storing output data. Starting from the defined USR address, stores the number of bytes of data as defined in the [Size (8-bit)] field. Use this setting if you select [Input / Output] from the [Connection] list. Set [Size (8-bit)] to "0" to not use output.
Heartbeat	Set the instance of heartbeats. Use this setting if you select [Input Only] or [Listen Only] from the [Connection] list.

<table>
<tr><th>Setup Items</th><th>Setup Description</th></tr>
<tr><td>Configuration</td><td>• Size / Assembly Instance
Set the Configuration data size and instance. The defined values must match the External Device.
• Address
Set the address for storing configuration data. Starting from the defined USR address, stores the number of bytes of data as defined in the [Size (8-bit)] field.
Before starting communication, set the Configuration data on the Display.
NOTE
• Set [Size (8-bit)] to "0" to not use configuration.
• In the command for opening a connection (Forward_Open), if you do not include any parameters of the Configuration Instance in the Connection_Path, set the [Assembly Instance] to 0.</td></tr>
<tr><td>Requested Packet Interval</td><td>Set the interval of packets sent from the External Device.</td></tr>
<tr><td>Byte Order in 16-Bit Word</td><td>Set the data storage order of 16-bit word units.</td></tr>
<tr><td>Use Unicast Connection</td><td>To use unicast communication, select the [Use Unicast Connection] check box. To use multicast communication, clear the [Use Unicast Connection] check box.</td></tr>
<tr><td>Advanced Configuration</td><td>Set the [O->T Format] and [T->O Format]. These settings must match the External Device. You can load an EDS file to define these settings.
 

<table>
<tr><th>Setup Items</th><th>Corresponding Format</th></tr>
<tr><td>Modeless</td><td>Modeless format</td></tr>
<tr><td>Zero Idle</td><td>Zero length data format</td></tr>
<tr><td>Heartbeat</td><td>Heartbeat format</td></tr>
<tr><td>32-bit Header</td><td>32-bit header format</td></tr>
</table>
NOTE
• When the [Connection] is either [Input only] or [Listen only], the [O->T Format] is fixed to Heartbeat.
• If loading an EDS file, specify the [Connection] setting beforehand. When you change the [Connection] setting, [O->T Format] and [T->O Format] return to their default settings.</td></tr>
</table>

◆ Custom Explicit Message

- Custom Explicit Message



Setup Items	Setup Description
Message Control Address	Set the address to use for control. Ten words from the defined address are used for control.
Byte Order in 16-Bit Word	Set the data storage order of 16-bit word units.

Description of Message Control Addresses:

Address	Function	Description
+0	Service Code	-
+1	Object Class ID	-
+2	Instance	-
+3	Attribute	-
+4	Source Data Size (0 - 256)	Size of send data
+5	Destination Data Size (0 - 256)	Size of receive data
+6	Control Word	Bit 0: Command to send (data is sent on change from 0 to 1) Bit 1: Define whether to include the attribute in the send data (0: Include, 1: Exclude) Bit 2 - 15: Unused
+7	Status Word	Bit 0: Busy (1: Busy) Bit 1: Completion (1: Message received) Bit 2: Reserved Bit 3: Error flag (1: Error) Bit 4: Parameter error Bit 5: Communication error Bit 6: Timeout error Bit 7: Reserved Bit 8 - 15: Unused
+8	Source Address	Address on the Display that stores transmitted data.
+9	Destination Address	Address on the Display that stores received data.

4.2 Setup Items in Offline Mode

NOTE

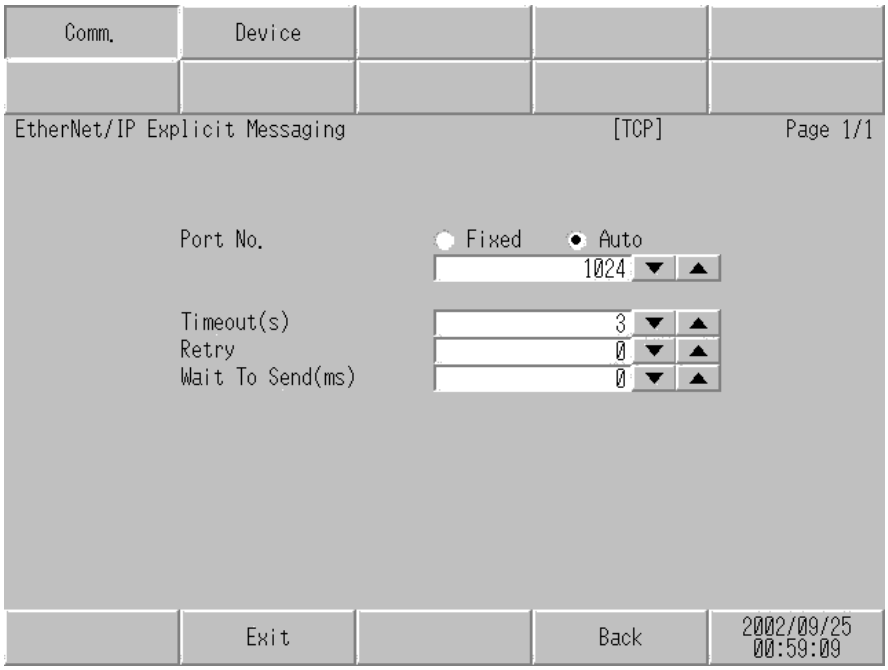
- Refer to the Maintenance/Troubleshooting guide for information on how to enter offline mode or about the operation.

  Cf. Maintenance/Troubleshooting Guide "Offline Mode"

- The number of the setup items to be displayed for 1 page in the offline mode depends on the Display in use. Please refer to the Reference manual for details.

■ Communication Settings

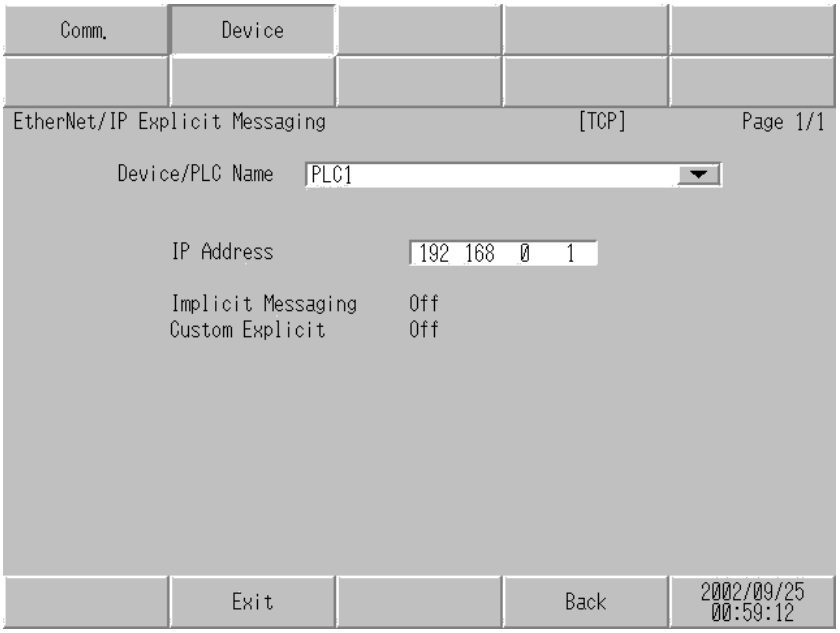
To display the setting screen, touch [Device/PLC Settings] from the [Peripheral Equipment Settings] tab in offline mode. Touch the External Device you want to set from the displayed list.



Setup Items	Setup Description
Port No.	Set the port number of the Display. Select either "Fixed" or "Auto". If you select [Fixed], use an integer from "1024 to 65535" to enter the port number of the Display. When you select [Auto], the port number will be automatically assigned regardless of the entered value.
Timeout	Use an integer from 1 to 127 to enter the time (seconds) for which the Display waits for the response from the External Device.
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 the amount of standby time (milliseconds) the Display counts from the time it receives a packet to the time it transmits the next command.

■ Device Settings

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



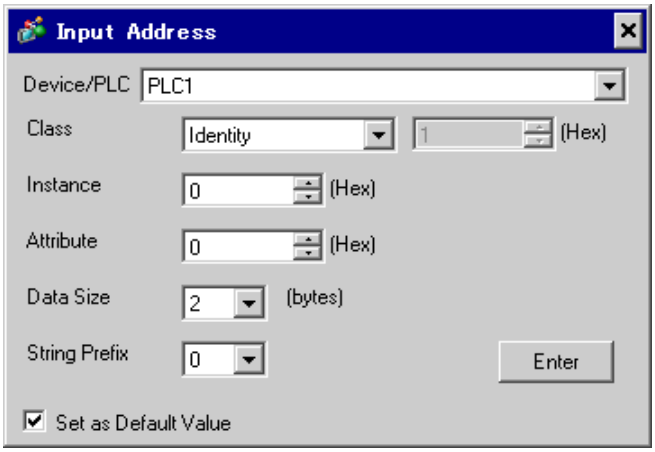
Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. Device/PLC name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
IP Address	Set the IP address of the External Device. **NOTE** Check with your network administrator about the IP address you want to use. Do not duplicate IP addresses on the same network.
Implicit Messaging	Shows the state for Implicit Messaging.
Custom Explicit	Shows the state for Custom Explicit Message.

5 Supported Device Addresses

The following section shows the range of supported device addresses. Please note that the actual 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.

Enter the External Device address in the dialog box below.

- For word address

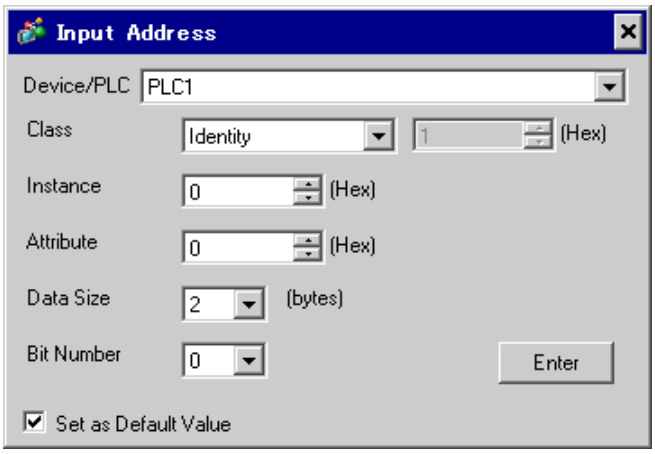


Class	Select the object class to which the explicit message is sent. When you select "Vendor defined", use "0000 to 04FF" to enter the class code.
Instance	Use "0000 to 0FFF" to enter the instance number that defines the instance of the class to receive the message.
Attribute	Use "0000 to 1FFF" to enter the value that defines the attribute (value) of the instance to be accessed.
Data Size	Select the data size from 2 or 4. Select "2" when the External Device object data size is 1. When the data is displayed on the Display, the upper 8 bits will be 0.
String Prefix	If the attribute to be accessed is a string, select the size (byte) of the area which stores the string length from 0, 1, 2, or 4. The string length varies depending on the attribute to be accessed. If the attribute to be accessed is other than a string, select "0".

NOTE

- If you check the [Set as Default Value] option, the set value for a new address entry will be displayed as the default value.

- For bit address



Class	Select the object class to which the explicit message is sent. When you select "Vendor defined", use "0000 to 04FF" to enter the class code.
Instance	Use "0000 to 0FFF" to enter the instance number that defines the instance of the class to receive the message.
Attribute	Use "0000 to 1FFF" to enter the value that defines the attribute (value) of the instance to be accessed.
Data Size	Select the data size from 2 or 4. Select "2" when the External Device object data size is 1. When the data is displayed on the Display, the upper 8 bits will be 0.
Bit Number	Select the bit number in the word. Select from "0 to 15" when the data size is 2, and from "0 to 31" when it is 4.

NOTE

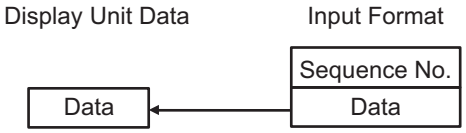
- If you check the [Set as Default Value] option, the set value for a new address entry will be displayed as the default value.

Communication format

This driver's communication format is as follows. If the communication format does not match the External Device, you cannot read or write data correctly.

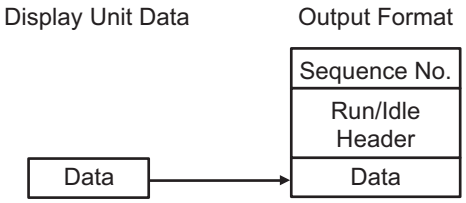
- Display Unit input format

  The "Sequence No." is added to the data. On data input, the Sequence No is removed.



- Display Unit output format

  The Sequence No and Run/Idle Header is added to output data.



Example communication operation

With Custom Explicit Message, when you read the data of address (0001,0000,0001)2:0, set the following value to Message Control Address (USR0). After set up, if Bit 0 of Control Word (USR00006) changes from 0 to 1, the 2 words of data that were read in are stored in the word address specified as the Destination Address (USR00200).

Address	Setting Value	Setup Description
USR00000	0x0E	Service Code
USR00001	0x01	Object Class
USR00002	0x00	Instance
USR00003	0x01	Attribute
USR00004	0x00	Source Data Size
USR00005	0x02	Destination Data Size
USR00006	0x00	Control Word
USR00007	0x00	Status Word
USR00008	0x64	Source Data
USR00009	0xC8	Destination Address

NOTE

- Because External Device communication uses binary data, set the Display setting to [Bin] when reading or writing text string data.
- Set the Message Control Address in the [Individual Device Settings] dialog box.

☞ " ■ Device Settings" (page 10)

Device	Bit Address	Word address	32 bits	Remarks
Class, Instance, Attribute, Bit Number, String Prefix, Data Size	Class: 0000h - 04FFh Instance: 0000h - 0FFFh Attribute: 0000h - 1FFFh Data Size: 2, 4 Bit Number: 00 - 31	Class: 0000h - 04FFh Instance: 0000h - 0FFFh Attribute: 0000h - 1FFFh Data Size: 2, 4 String Prefix: 0, 1, 2, 4	L / H or H / L *1	*2

*1 The high and low relationship of the stored data varies depending on the External Device. Refer to your External Device manual for details.

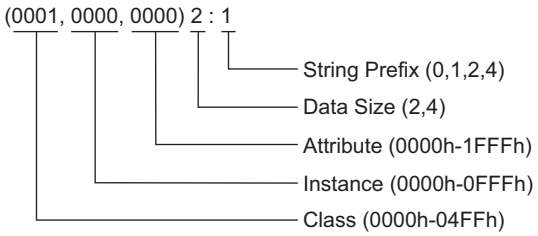
*2 You can set only Read Area Size for the system area available to use in the External Device. The size that can be used for the Read Area varies depending on the object to be specified.

NOTE

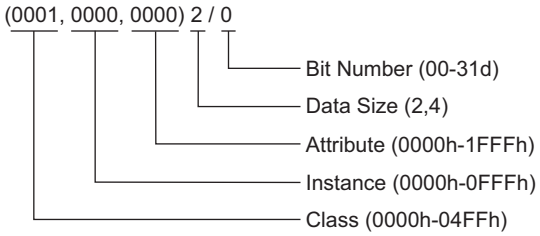
- Refer to the precautions on manual notation for icons in the table.
  ☞ "Manual Symbols and Terminology"
- The corresponding service codes are Get_Attribute_Single(0x0E) and Set_Attribute_Single(0x10).
- The device monitor function on the Display is not supported.
- The first 1 word of each attribute is displayed in map display of the External Device address.
- When the number of the word that is more than the specified attribute size is displayed in data displays, the data value of the exceeded word is "0".
- When using D-Script's "Copy Memory" command to copy multiple word data, set the attribute size so it fits in 128 words or less. If you exceed 128 words, data for excess words become 0. When copying word data exceeding 128 words, split up the word data.
- When the device is monitored using "Device Monitor" of Pro-Server EX, the data values for 128 words are displayed for 1 attribute. However, the actual data value is the same number as set for the attribute. The data value of the exceeded word is "0".

The address input area is shown below.

- For word address



- For bit address



6 Device Code and Address Code

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

NOTE

- For device code and address code, the address whose instance number is "0" can be used.

Class Name	Class Code (HEX)	Device Code (HEX)	Address Code
Identity	0001	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Message Router	0002	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
DeviceNet	0003	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Assembly	0004	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Connection	0005	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Connection Manager	0006	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Register	0007	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Discrete Input Point	0008	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Discrete Output Point	0009	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Analog Input Point	000A	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Analog Output Point	000B	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Presence Sensing	000E	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Parameter	000F	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80

Class Name	Class Code (HEX)	Device Code (HEX)	Address Code
Parameter Group	0010	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Group	0012	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Discrete Input Group	001D	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Discrete Output Group	001E	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Discrete Group	001F	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Analog Input Group	0020	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Analog Output Group	0021	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Analog Group	0022	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Position Sensor	0023	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Position Controller Supervisor	0024	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Position Controller	0025	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Block Sequencer	0026	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Command Block	0027	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Motor Data	0028	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Control Supervisor	0029	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80

Class Name	Class Code (HEX)	Device Code (HEX)	Address Code
AC/DC Drive	002A	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Acknowledge Handler	002B	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Overload	002C	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Softstart	002D	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Selection	002E	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Device Supervisor	0030	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Analog Sensor	0031	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Analog Actuator	0032	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Single Stage Controller	0033	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Gas Calibration	0034	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Trip Point	0035	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
File	0037	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
S-Partial Pressure	0038	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Connection Configuration	00F3	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Port	00F4	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80

Class Name	Class Code (HEX)	Device Code (HEX)	Address Code
TCP/IP Interface	00F5	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
EtherNet Link	00F6	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80
Vendor defined	Other class codes than noted above	Value of (Class code × 0x10) + Set value of the string prefix	Value of Attribute × 0x80

7 Error Messages

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

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

Example of an Error Message

"RHAA035: PLC1: Error has been responded for device write command (Error Code: 1[01H])"

NOTE
- Refer to your External Device manual for details on received error codes.
- Refer to "Display-related errors" in "Maintenance/Troubleshooting Guide" for details on the error messages common to the driver.

■ Error Codes Unique to External Device

NOTE
- The general status codes and extended status codes are defined in the ODVA document. Refer to your ODVA manual for details.
  The code to be used varies depending on the External Device. Refer to your External Device manual for details.

General status code	Extended status code	Description
0x01	0x0100 - 0xFCFF	Connection failure
0x02		Resource unavailable
0x03		Invalid parameter value
0x04		Path segment error
0x05		Path destination unknown
0x06		Partial transfer
0x07		Connection lost
0x08		Service not supported
0x09	Index to element	Invalid attribute data detected
0x0A		Attribute list error

General status code	Extended status code	Description
0x0B		Already in requested mode/state
0x0C		Object state conflict
0x0D		Object already exists
0x0E		Attribute not settable
0x0F		Privilege violation
0x10		Device state conflict
0x11		Reply data too large
0x12		Fragmentation of a primitive value
0x13		Not enough data
0x14		Attribute not supported
0x15		Too much data
0x16		Object does not exist
0x17		Service fragmentation sequence not in progress
0x18		No stored attribute data
0x19		Store operation failure
0x1A		Routing failure, request packet too large
0x1B		Routing failure, response packet too large
0x1C		Missing attribute list entry data
0x1D		Invalid attribute value list
0x1E		Embedded service error
0x1F		Vendor specific error
0x20		Invalid parameter
0x21		Write-once value or medium already written
0x22		Invalid reply received
0x23		Reserved
0x24		Reserved
0x25		Key failure in path
0x26		Path size invalid
0x27		Unexpected attribute in list
0x28		Invalid member ID
0x29		Member not settable
0x2A		Group 2 only server general failure
0x2B		Reserved
:		
0xCF		
0xD0		Reserved
:		
0xFF		

■ Error Messages Unique to External Device

Error No.	Error Message	Description
RHxx130	(Node Name): Error has been responded for device read command (General status: [Hex], Extended status [Hex])	Displayed when error occurs by device read command. Please check the specifications or settings by referring to the External Device manual.
RHxx131	(Node Name): Error has been responded for device write command (General status: [Hex], Extended status [Hex])	Displayed when error occurs by device write command. Please check the specifications or settings by referring to the External Device manual.
RHxx133	(Node Name):Error has been received for Implicit Open command (General status[(Hex]], Extended status:[(Hex)])	Displays when an error occurs on opening the Implicit I/O connection. Make sure the Implicit I/O settings are correct.
RHxx134	(Node Name):Error has been received for Implicit Close command (General status[(Hex]], Extended status:[(Hex)])	Displays when an error occurs on closing the Implicit I/O connection. Make sure the Implicit I/O settings are correct.
RHxx135	(Node Name):Illegal Response for Implicit Open Command	Displays when there is a problem with the response for an Implicit open command.
RHxx136	(Node Name):Illegal Response for Implicit Close Command	Displays when there is a problem with the response for an Implicit close command.
RHxx137	(Node Name):Illegal Response for Custom Explicit Message	Displays when there is a problem with the response for a Custom Explicit Message.

NOTE

- For the error without the Extended Status code, "0" is displayed.