



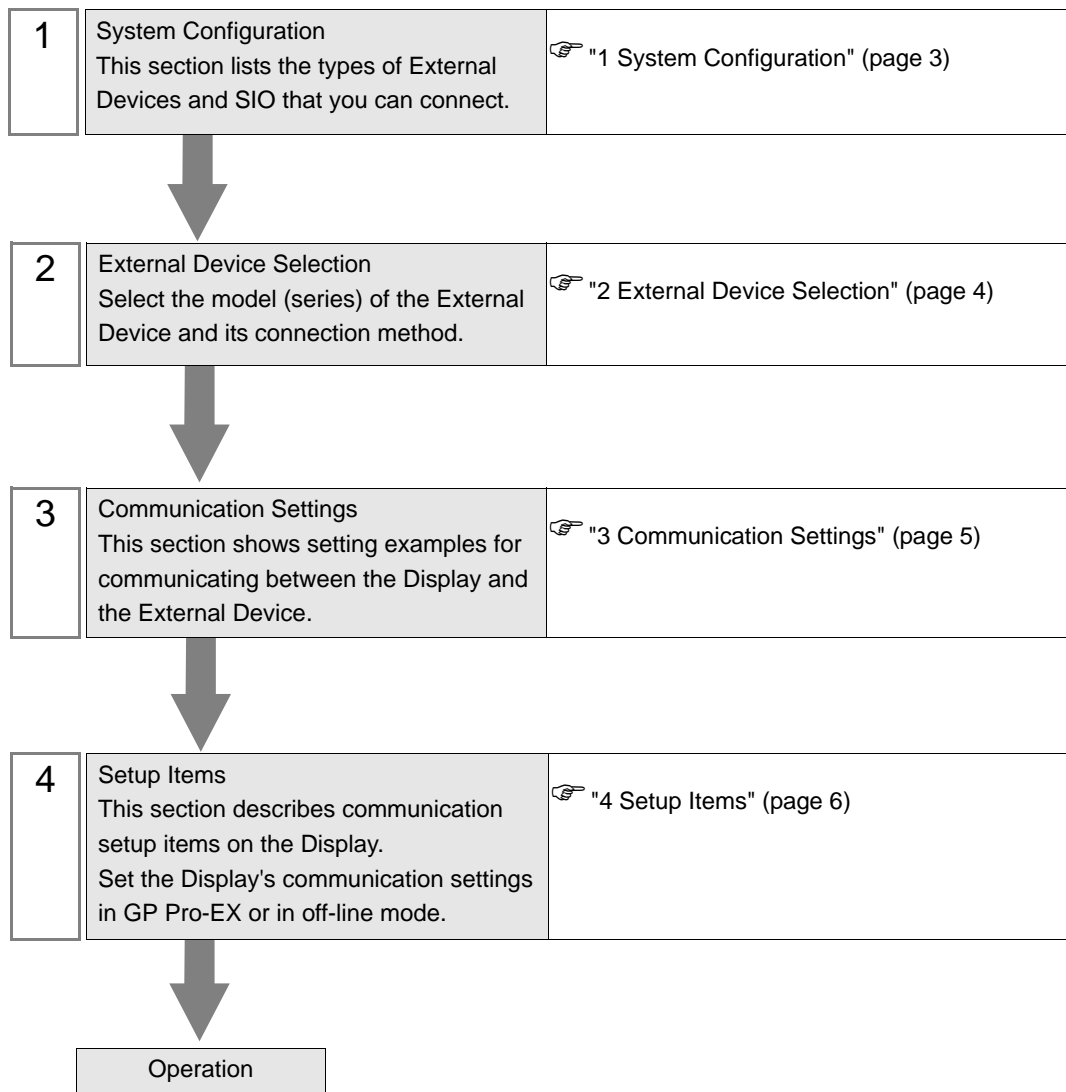
# EtherNet/IP Explicit Messaging Driver

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## 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:



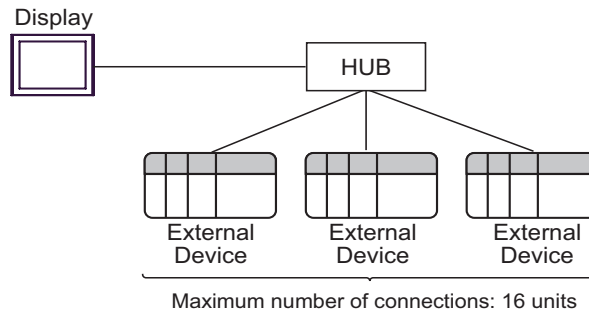
# 1 System Configuration

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

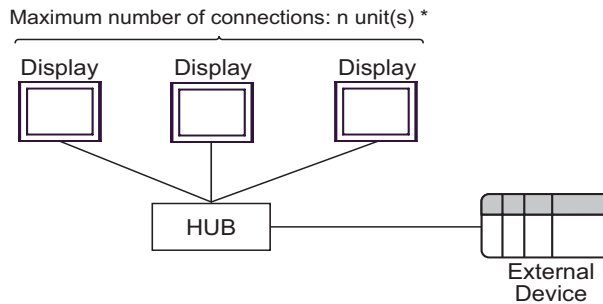
Driver	CPU	Link I/F	SIO Type	Setting Example
EtherNet/IP	Explicit message server	Ethernet port on the External Device	Ethernet (TCP)	Setting Example 1 (page 5)

## Connection Configuration

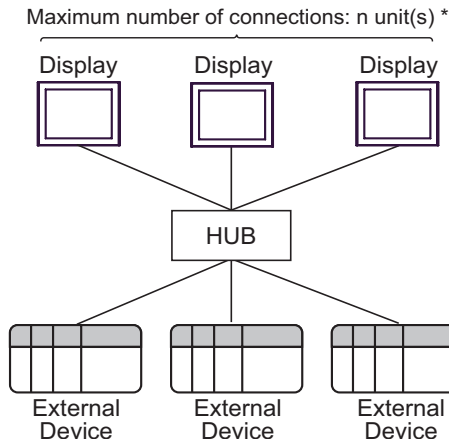
- 1:n Connection



- n:1 Connection



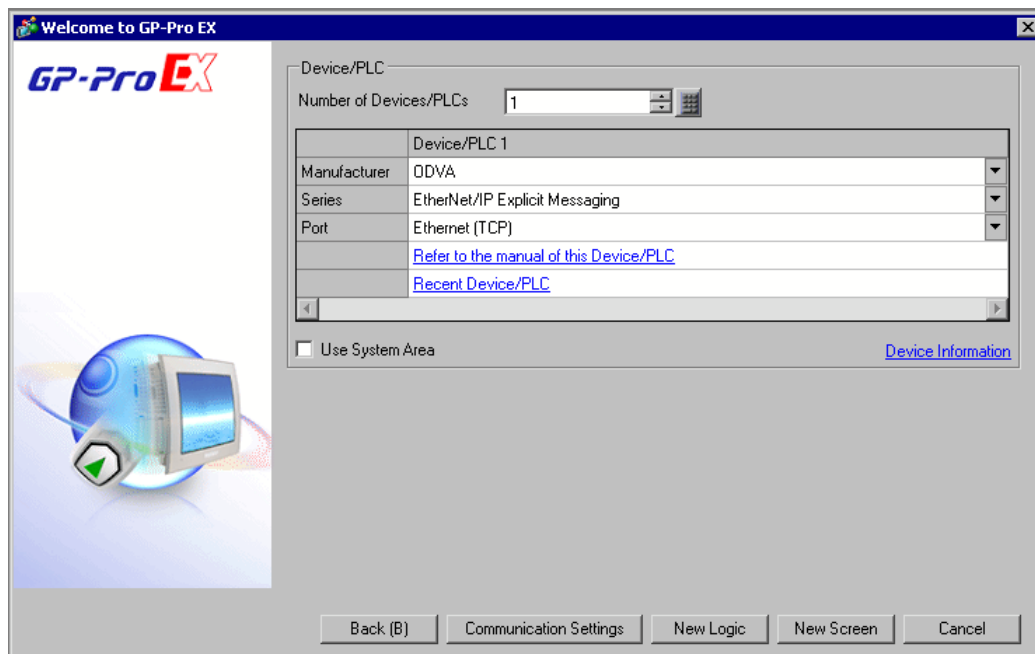
- n:m Connection



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

## 2 External Device Selection

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Number of Devices/PLCs	Use an integer from 1 to 4 to enter the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to be connected. Select "ODVA".
Series	Select the model (series) of the External Device to be connected and connection method. Select "EtherNet/IP Explicit Messaging". Check the connection configuration in "EtherNet/IP Explicit Messaging" in system configuration. ☞ "1 System Configuration" (page 3)
Port	Select the Display port to be connected 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 "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 [System Settings] workspace, select [Device/PLC].

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer  Series  Port

Text Data Mode  [Change](#)

Communication Settings

Port No.   Auto

Timeout  (sec)

Retry

Wait To Send  (ms)

Device-Specific Settings

Allowable Number of Devices/PLCs 16

Number	Device Name	Settings
<input type="button" value="Remove"/> 1	<input type="text" value="PLC1"/>	<input type="button" value="Settings"/> IP Address=192.168.0.001

##### ◆ 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.

**Individual Device Settings**

PLC1

IP Address

#### ■ 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 off-line 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 off-line mode.

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

 "3 Communication Settings" (page 5)

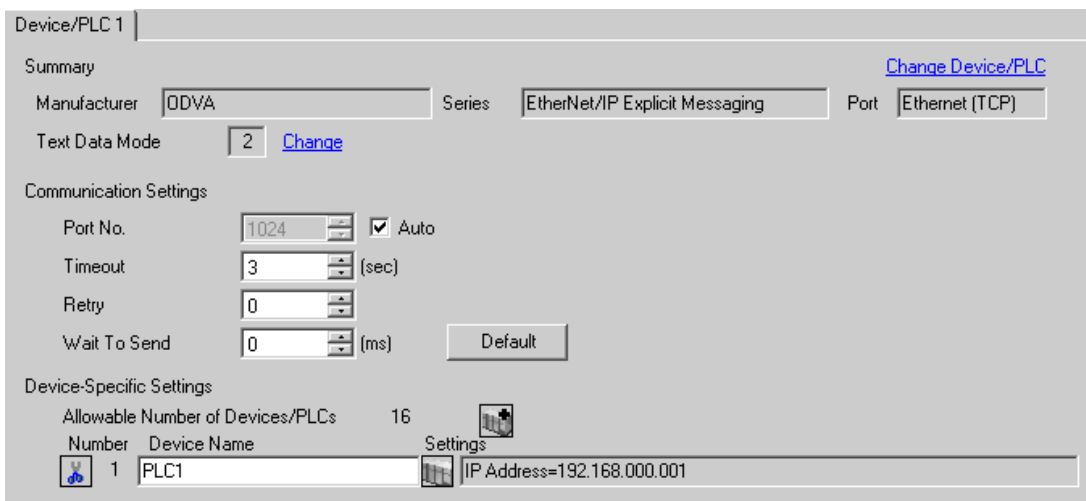
**NOTE** • You need to set the Display's IP address in off-line mode.

Cf. Maintenance/Troubleshooting Guide "Ethernet Settings"

### 4.1 Setup Items in GP-Pro EX

#### ■ Communication Settings

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



Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer  Series  Port

Text Data Mode  [Change](#)

Communication Settings


Port No.   Auto


Timeout  (sec)

Retry

Wait To Send  (ms)


Device-Specific Settings


Allowable Number of Devices/PLCs 16 

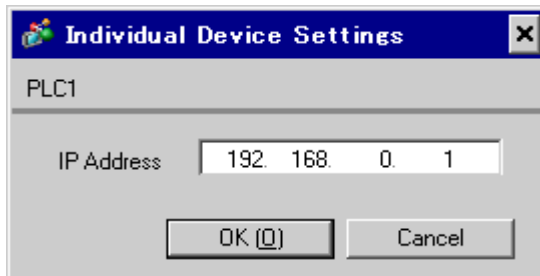
Number	Device Name	Settings
 1	<input type="text" value="PLC1"/>	<input type="text" value="IP Address=192.168.000.001"/>

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.

## ■ Device Settings

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

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



Setup Items	Setup Description
IP Address	Set the IP address of the External Device. <b>NOTE</b> <ul style="list-style-type: none"> <li>• Check with your network administrator about the IP address you want to use. Do not duplicate IP addresses on the same network.</li> </ul>

## 4.2 Setup Items in Off-line Mode

- NOTE** • Refer to the Maintenance/Troubleshooting guide for information on how to enter off-line mode or about the operation.

Cf. Maintenance/Troubleshooting Guide "Off-line Mode"

### ■ Communication Settings

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

Comm.	Device			
EtherNet/IP Explicit Messaging		[TCP]	Page 1/1	
Port No.	<input type="radio"/> Fixed <input checked="" type="radio"/> Auto	<input type="text" value="1024"/> ▼ ▲		
Timeout(s)	<input type="text" value="3"/> ▼ ▲			
Retry	<input type="text" value="0"/> ▼ ▲			
Wait To Send(ms)	<input type="text" value="0"/> ▼ ▲			
Exit		Back		2009/03/31 19:14:22

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].

Comm.	Device			
EtherNet/IP Explicit Messaging		[TCP]	Page 1/1	
Device/PLC Name		[PLC1] ▼		
IP Address		[192 168 0 1]		
Exit		Back		2009/03/31 19:14:34

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. <div style="border: 1px solid black; padding: 2px; display: inline-block;"><b>NOTE</b></div> Check with your network administrator about the IP address you want to use. Do not duplicate IP addresses on the same network.

## 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.

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	 or  *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**

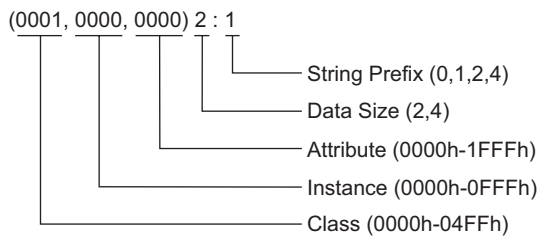
- Refer to the precautions on manual notation for icons in the table.

 "Manual Symbols and Terminology"

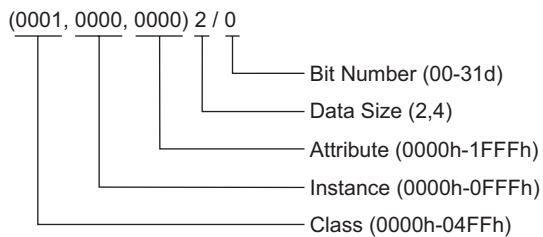
- The corresponding service codes are Get\_Attribute\_Single(0x0E) and Set\_Attribute\_Single(0x10).
- The device monitor function on the Display is not supported.
- The first 1 word of each attribute is displayed in map display of the External Device address.
- When the number of the word that is more than the specified attribute size is displayed in data displays, the data value of the exceeded word is "0".
- When copying the two or more word data using "Copy Memory" of D-Script, set the number of the word that is the same attribute value or less. If more number of the word is set, the data value of the exceeded word is "0".
- 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	<p>Displays the IP address or device address of the External Device where an error has occurred, or error codes received from the External Device.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Received error codes are displayed as "Decimal [Hex]".</li> <li>Device addresses are displayed as "Address: Device address".</li> <li>IP addresses are displayed as "IP address (Decimal): MAC address (Hex)".</li> </ul>

Example of an Error Message

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

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- 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.
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### ■ Error Codes Unique to External Device

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- 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

Continued on next page.

General status code	Extended status code	Description
0x0A		Attribute list error
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.

**NOTE**

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