



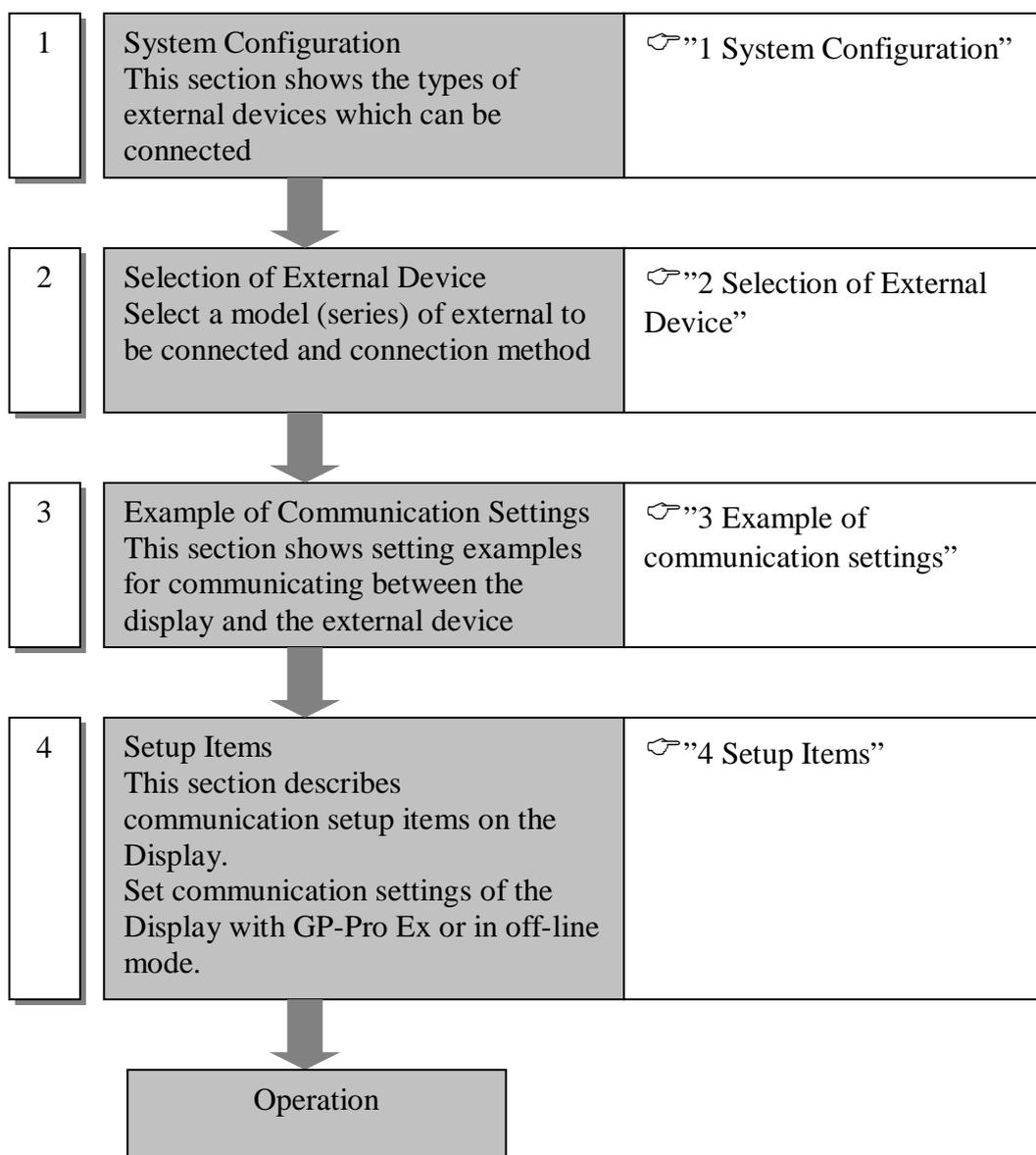
# MODBUS TCP Master Driver

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## Introduction

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

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



## 1. System Configuration

The following table lists system configurations for connecting a MODBUS-compatible External Device and the Display.

### ■ General Modbus

Series	CPU	Link I/F	SIO Type	Setting Example
MODBUS Slave Device			Ethernet (TCP)	Setting Example 1

### ■ Control Techniques (Modbus)

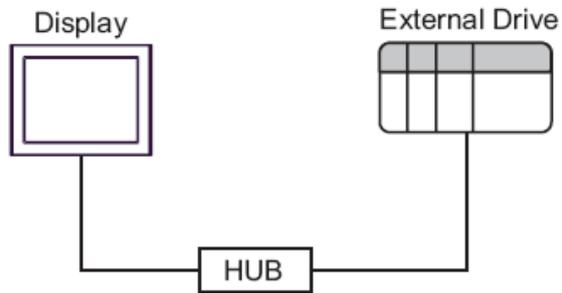
Series	CPU	Link I/F	Type	Setting Example
Unidrive SP	All	SM-Ethernet Module	Ethernet (TCP)	Setting Example 1

### ■ Control Techniques (Routing)

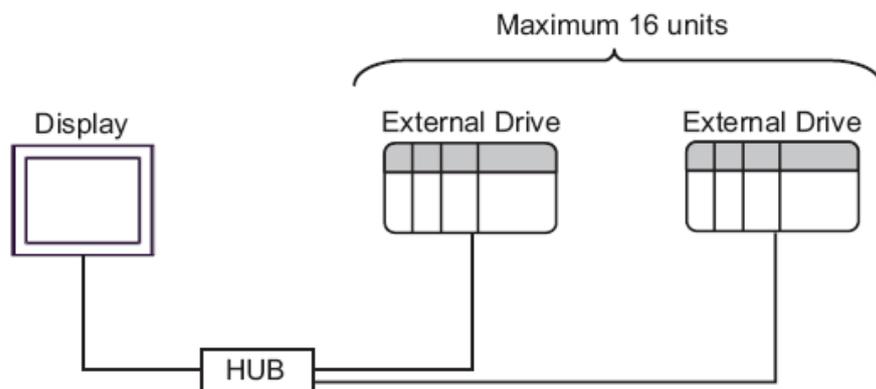
Series	CPU	Link I/F	Type	Setting Example
Unidrive SP	All	SM-Ethernet Module	Ethernet (TCP)	Setting Example 1

■ Connection Configuration

◆ 1:1 Connection

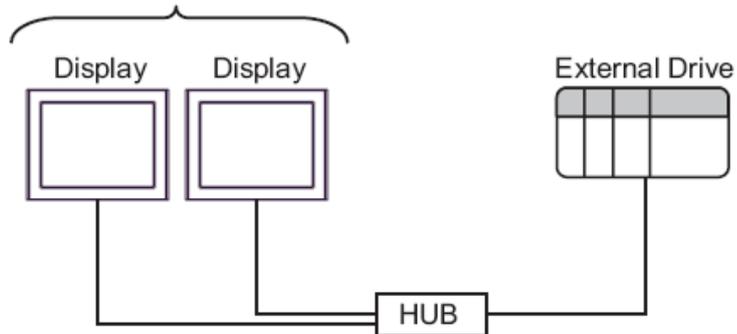


◆ 1: n Connection

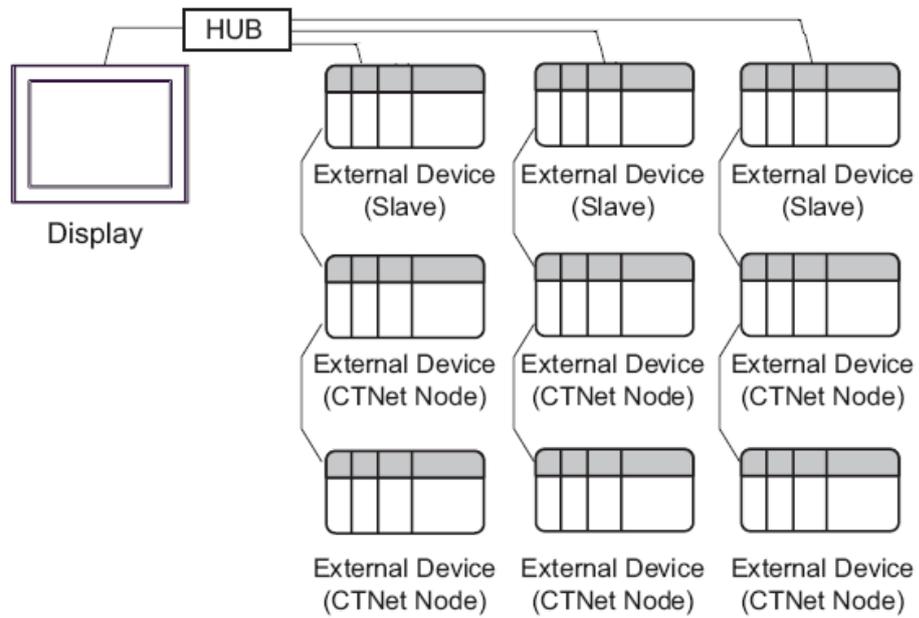


◆ n: 1 Connection

The number of connectable Displays depends on the External Device.



◆ 1:n Connection (Control Techniques (Routing))



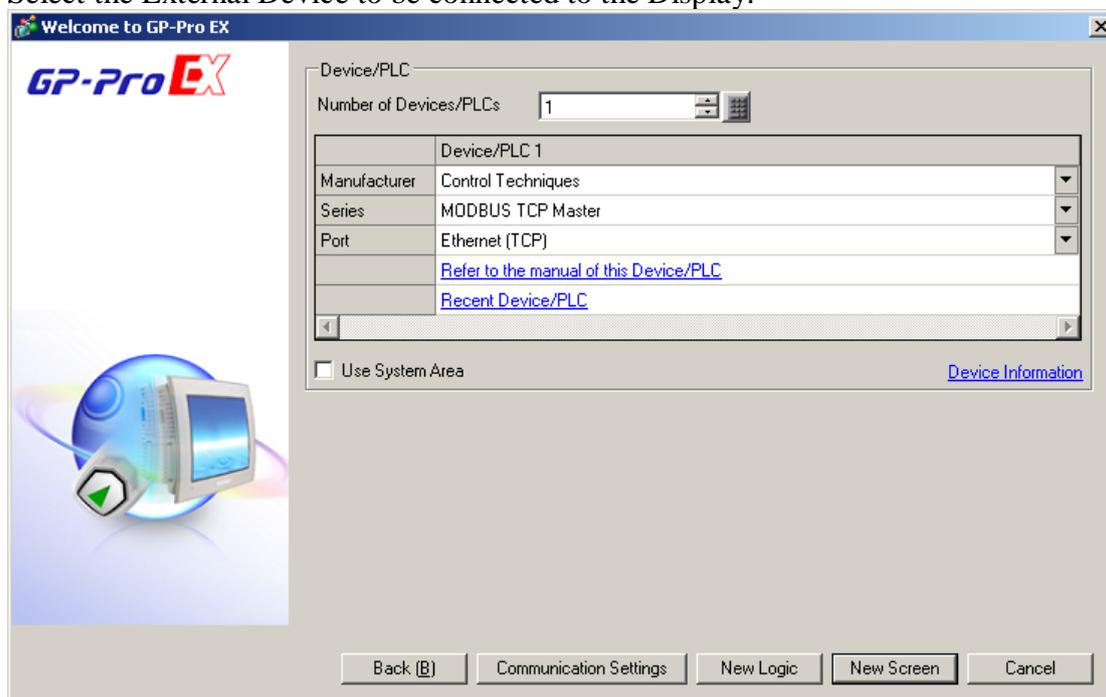
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**NOTE** The number of connectable Displays depends on the External device.  
Please refer to the manual of External device for more details.

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## 2. Selection of External Device

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 maker of the External Device to be connected. Select "Control Techniques"
Series	Select a model (series) of the External Device to be connected and connection method. Select "MODBUS TCP Master". Check the External Device which can be connected in system configuration. ☞ <a href="#">"System Configuration"</a>
Port	Select the Display port to be connected to the External Device. (Select Ethernet[TCP])
Use System Area	Check this option when you synchronize the system data area of the Display and the device (memory) of the External Device. When synchronized, you can use the ladder program of the External Device to switch the display or display the window on the Display.  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This can be also set with GP-Pro EX or in off-line mode of the Display.  Cf. GP-Pro EX Reference Manual "System Settings [Display Unit] - [System Area] Settings Guide" Cf. Maintenance/Troubleshooting Guide "Main Unit - System Area Settings"

### 3. Example of Communication Setting

Examples of communication settings of the display and the external device recommended by Pro-face are shown.

#### 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 Settings**

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

## [Equipment Configuration] Tab

PLC1

Equipment Configuration | Function Code and Max Query

Equipment Address

IP Address: 192 168 0 1

Port No.: 502

Unit ID: 255

Equipment Type

Slave Equipment Type: General Modbus

Bit manipulation (set/reset) to Holding Register

Rest of the bits in this word:  Clear  Do not clear

IEC61131 Syntax

Address Mode: 0-based (Default)

Variables

Double Word word order: Low word first(L/H)

Import Export Default OK (O) Cancel

## [Function Code and Max Query] Tab

PLC1

Equipment Configuration | Function Code and Max Query

Auto adjust to frame length  Custom

Frame Length: 258

Start Address	Range	Read	Boundary	Write	Boundary
000001	65536	01	2000	0F	800
100001	65536	02	2000	..	....
300001	65536	04	125	..	....
400001	65536	03	125	10	100

Import Export Default OK (O) Cancel

## ◆ 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

External Device settings vary depending on the device. Refer to your External Device manual for details.

## ◆ Notes

- Check with your network administrator about the IP address you want to use.
- Do not duplicate IP addresses on the same network.

## 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 7)

**NOTE** • Set the Display's IP address in off-line mode.

Cf. Maintenance/Troubleshooting Manual "2.5 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.

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="1"/>	<input type="text" value="PLC1"/>	<input type="button" value="Settings"/> IP Address=192.168.000.001,Port No.=502,Unit ID=255,Rest of the bits in this w

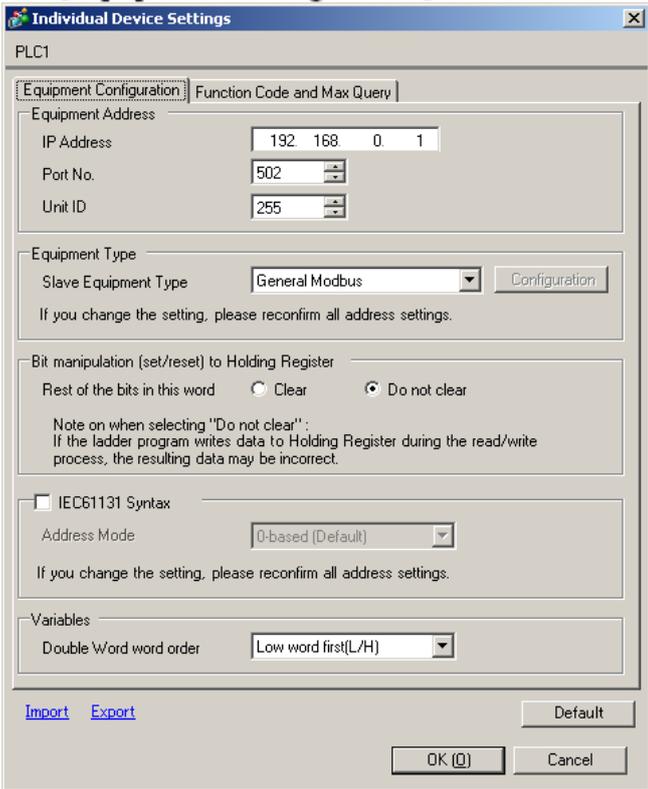
Setup Items	Setup Description
Port No.	Use an integer from 1024 to 65535 to enter the port No. of the Display. When you check the option of [Auto Assign], the port No. will be automatically set.
Timeout	Use an integer from 1 to 127 to enter the time (s) for which the Display waits for the response from 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 standby time (ms) for the Display from receiving packets to transmitting next commands.

## Device Setting

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

When connecting multiple External Devices, you can click from  [Device-Specific Settings] of [Device/PLC Settings] to add the External Device which is available to set.

- [Equipment Configuration] Tab



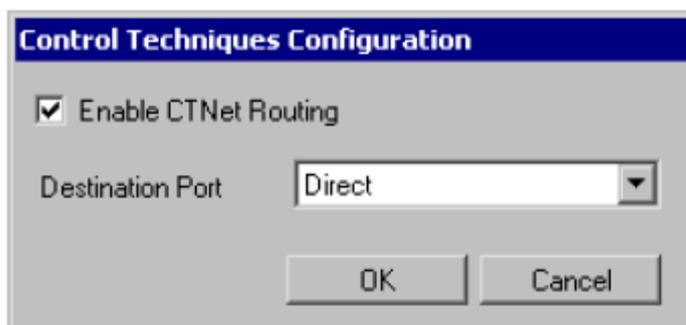
The screenshot shows the 'Individual Device Settings' dialog box for PLC1, with the 'Equipment Configuration' tab selected. The dialog is titled 'Individual Device Settings' and has a close button (X) in the top right corner. Below the title bar, it says 'PLC1'. The main content area is divided into several sections:

- Equipment Address:** Contains three input fields: 'IP Address' with the value '192.168.0.1', 'Port No.' with the value '502', and 'Unit ID' with the value '255'.
- Equipment Type:** Contains a dropdown menu for 'Slave Equipment Type' set to 'General Modbus' and a 'Configuration' button. Below it is a note: 'If you change the setting, please reconfirm all address settings.'
- Bit manipulation (set/reset) to Holding Register:** Contains two radio buttons: 'Clear' (unselected) and 'Do not clear' (selected). Below it is a note: 'Note on when selecting "Do not clear": If the ladder program writes data to Holding Register during the read/write process, the resulting data may be incorrect.'
- IEC61131 Syntax:** Contains a checkbox for 'IEC61131 Syntax' (unchecked) and a dropdown menu for 'Address Mode' set to '0-based (Default)'. Below it is a note: 'If you change the setting, please reconfirm all address settings.'
- Variables:** Contains a dropdown menu for 'Double Word word order' set to 'Low word first(L/H)'.

At the bottom of the dialog, there are buttons for 'Import', 'Export', 'Default', 'OK (O)', and 'Cancel'.

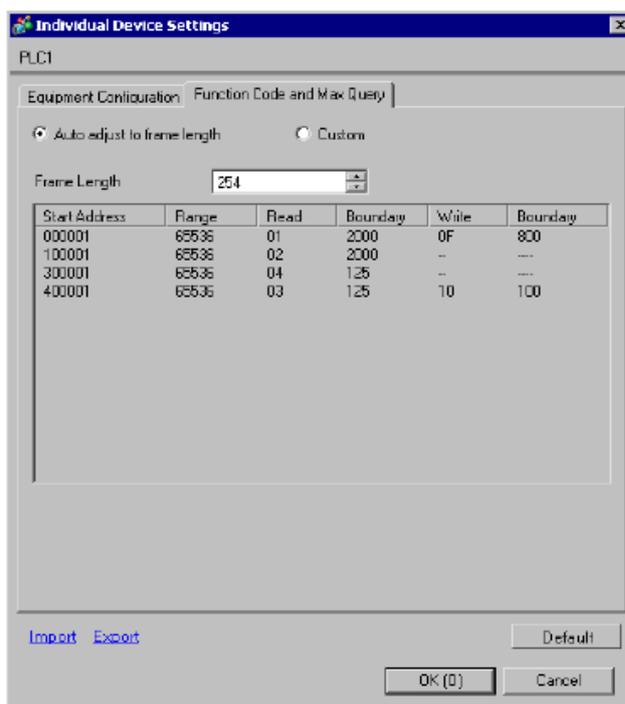
Setup Items	Setup Description
Slave Equipment Address	Use an integer from 1 to 247 to enter the slave equipment address of the External Device.
Slave Equipment Type	Select the slave type to use among "General Modbus", "Control Techniques (Modbus)", and "Control Techniques (Routing)". If you select "Control Techniques (Routing)", the [Configuration] option will be enabled to configure the CTNet settings. ☞ "• [Control Techniques Configuration] dialog box" (page 23)
Bit manipulation (set/reset) to Holding Register	Select how other bits in the same word are handled when you manipulate bits in the holding register, from "Clear" or "Do not clear".
Rest of the bits in the word	
IEC61131 Syntax	Select this check box when you use the IEC61131 grammar for variables. If you select this check box, select the address mode from "0-based" or "1-based".
Double Word word order	Select the order of storing double word data from "Low word first" or "High word first".
Import	Import the device setting information described in the xml file. ☞ "◆ Import Procedure in the Device Setting" (page 27)
Export	Export the device setting information described in the xml file. ☞ "◆ Export Procedure in the Device Setting" (page 27)

- [Control Techniques Configuration] dialog box



Setup Items	Setup Description
Enable CTNet Routing	Select this check box to enable the CTNet routing.
Destination Port	Select a port to connect the CTNet node.

- ◆ [Function Code and Max Query] tab (when "Auto adjust to frame length" is selected)



Setup Items	Setup Description
Auto adjust to frame length	Automatically set each function code and the data boundary for one communication according to the frame length. Function codes cannot be changed. To change a function code, use "Custom".
Frame Length	Set the frame length from "6 to 254". After setting, click the device list to display the boundary.
Import	Import the device setting information described in the xml file. ☞ "◆ Import Procedure in the Device Setting" (page 27)
Export	Export the device setting information described in the xml file. ☞ "◆ Export Procedure in the Device Setting" (page 27)

**NOTE**

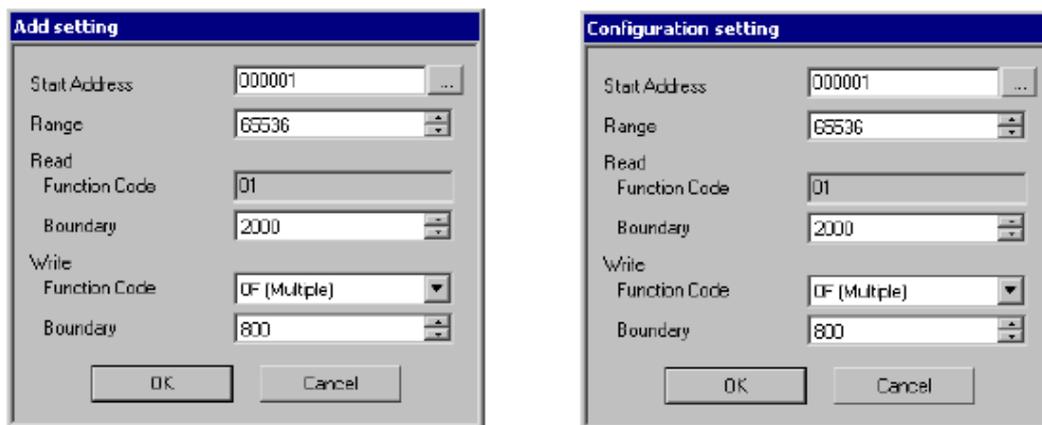
- When "Auto adjust to frame length" is selected, use the following function codes. The read/write boundary is automatically calculated according to "Frame Length".

Device	Function Code	
	Read	Write
Coil	01	0F: Force Multiple Coils
Discrete Input	02	Disabled
Input Register	04	Disabled
Holding Register	03	10: Preset Multiple Register

- Use "Custom" in the following cases:
  - When you use a different function code depending on an address.
  - When you use the function code "05: Force Single Coil" or "06: Preset Single Register".
  - When the read/write boundary depends on the device.



- [Add setting] dialog box / [Configuration setting] dialog box



Setup Items	Setup Description
Start Address	Set the start address of the device.
Range	Set the range of the device specified in the start address.
Read	Set the function codes to be used for read and the read boundary in one communication.
Function Code	The function code is assigned by the specified start address.
Boundary	The boundary depends on the device. Refer to the following table for details.
Write	Set the function code to be used for write and the write boundary in one communication.
Function Code	The function code depends on the device. Refer to the following table for details.
Boundary	The boundary depends on the device. Refer to the following table for details.

**NOTE**

- When "Custom" is selected, use the following function codes.

Device	Function Code (Boundary)		
	Read	Write	
		Multiple	Single
Coil	01(2000)	0F: Force Multiple Coils (800)	05: Force Single Coil (Fixed to 1)
Discrete Input	02(2000)	Disabled	Disabled
Input Register	04(125)	Disabled	Disabled
Holding Register	03(125)	10: Preset Multiple Register (100)	06: Preset Single Register (Fixed to 1)

- If the set device address is disabled to write, you cannot set the write function code and boundary.
- When you select the function code "05" or "06", the write boundary will be fixed to "1", and cannot be changed.

◆ Import Procedure in the Device Setting

- 1 Create the xml file based on the following format sample.
  - Format sample when "Auto adjust to frame length" is selected

```
<?xml version="1.0" encoding="utf-8" ?>
<ModbusConfiguration version="1">
  <ClearBits>OFF</ClearBits>
  <AddressMode>ModiconSyntax</AddressMode>
  <DWORD>L/H</DWORD>
  <FunctionCode>
    <Mode>AutoAdjust</Mode>
    <FrameLength>254</FrameLength>
  </FunctionCode>
</ModbusConfiguration>
```

Bit manipulation to Holding Register  
 Address Mode  
 Double Word word order  
  
 Mode  
 Frame Length

- Format sample when "Custom" is selected

```
<?xml version="1.0" encoding="utf-8" ?>
<ModbusConfiguration version="1">
  <ClearBits>OFF</ClearBits>
  <AddressMode>ModiconSyntax</AddressMode>
  <DWORD>L/H</DWORD>
  <FunctionCode>
    <Mode>Custom</Mode>
    <Setting>
      <Address>000001</Address>
      <Range>65535</Range>
      <Read>
        <FunctionCode>01</FunctionCode>
        <Boundary>2000</Boundary>
      </Read>
      <Write>
        <FunctionCode>0F</FunctionCode>
        <Boundary>800</Boundary>
      </Write>
    </Setting>
  </FunctionCode>
</ModbusConfiguration>
```

Bit manipulation to Holding Register  
 Address Mode  
 Double Word word order  
  
 Mode  
  
 Start Address  
 Range  
  
 Read Function Code  
 Read Boundary  
  
 Write Function Code  
 Write Boundary

- 2 Click [Import] on the [Individual Device Settings] dialog box to display the [Open] dialog box.
- 3 Select the created xml file and click [Open].

◆ Export Procedure in the Device Setting

- 1 Click [Export] on the [Individual Device Settings] dialog box to display the [Save as] dialog box.
- 2 Enter a name and click [Save].

## 4.2. Settings in Off-Line Mode

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

Cf. Maintenance/Troubleshooting Manual "2.2 Off-line Mode"

### ■ Communication Settings

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

Comm.	Device			
MODBUS TCP Master		[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	2009/05/20 13:51:16	

Setup Items	Setup Description
Port No.	Set the Port No. of the Display. Select either of [Fixed] or [Auto]. When 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 (s) for which the Display waits for the response from the External Device.
Retry	In case of no response from the External Device, enter how many times the Display retransmits the command, from "0 to 255".
Wait To Send	Enter the standby time (ms) from when the Display receives packets until it transmits the next command, from "0 to 5000".

### ■ Device Setting

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 Settings].

Comm.	Device		
MODBUS TCP Master		[TCP]	Page 1/22
Device/PLC Name <input style="width: 100%;" type="text" value="PLC1"/>			
IP Address		<input style="width: 100%;" type="text" value="192 168 1 180"/>	
Port No.		<input style="width: 100%;" type="text" value="502"/> ▼ ▲	
Unit ID		<input style="width: 100%;" type="text" value="1"/> ▼ ▲	
Bit manipulation to HR		Rest of bits in word are not cleared	
Double Word word order		High word first	
IEC61131 Syntax		OFF	
Exit	Back	2009/05/20 13:52:42	

Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. The device 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. <b>NOTE</b> <ul style="list-style-type: none"> <li>Check with your network administrator about the IP address you want to use.</li> <li>Do not duplicate IP addresses on the same network.</li> </ul>
Port No.	Use an integer from "1 to 65535" to enter the port number of the External Device.
Unit ID	Use an integer from 1 to 247 (or 255) to enter the unit ID of the External Device.
Bit manipulation to HR	Displays how other bits in the same word are handled when you manipulate bits in the holding register, as "Rest of bits in word are cleared" or "Rest of bits in word are not cleared". (Not available to set in off-line mode.)
Double Word word order	Displays the currently set order of storing double word data as "Low word first" or "High word first". (Not available to set in off-line mode.)
IEC61131 Syntax	Displays the usage status of the currently set IEC61131 syntax in ON/OFF. (Not available in off-line mode.)

(Page 2/22)

Conn.	Device			
MODBUS TCP Master			[TCP]	Page 2/22
Device/PLC Name <input type="text" value="PLC1"/>				
Function Code and Max Query				
Auto adjust Setting <input type="checkbox"/> Auto adjust to Frame Length				
Frame Length <input type="text" value="256"/>				
				<input type="button" value="←"/> <input type="button" value="→"/>
Exit		Back		2008/06/13 09:49:36

Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. The device name is the title of the External Device set with GP-Pro EX.(Initial value [PLC1])
Function Code and Max Query	Displays the option to set the function code and boundary. (Not available to set in off-line mode.)
Auto adjust Setting	Displays the set frame length when "Auto adjust to frame length" is selected in the online mode. (Not available to set in off-line mode.)
Frame Length	

**NOTE**

- When "Custom" is selected, the setup items of the frame length are invalid.

(Page 3/22 to 22/22)

Comm.	Device			
MODBUS TCP Master			[TCP]	Page 3/22
Device/PLC Name <input type="text" value="PLC1"/>				
Custom Setting 1				
Start Address		000001		
Range		65536		
Read		01 / 2000		
Write		0F / 0000		
				← →
Exit		Back		2008/06/13 09:49:45

Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. The device name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Start Address	Displays the start address of the device. (Not available to set in off-line mode.)
Range	Displays the range of the device specified in the start address. (Not available to set in off-line mode.)
Read	Displays the device function codes and boundaries to be read for one communication. (Not available to set in off-line mode.)
Write	Displays the device function codes and boundaries to be written for one communication. (Not available to set in off-line mode.)

**NOTE**

- Page 3 and the following pages display the set descriptions in order.
- When "Auto adjust to frame length" is selected, the Custom setup items are invalid.

## 5. Supported Device Address

The following table 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.

### 5.1. General Modbus

 : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521		
Discrete Input	100001 - 165536	100001 - 165521	<b>L/H</b>	 *2
Input Register	-----	300001 - 365536	or	 *2
Holding Register	400001,00 - 465536,15	 400001 - 465536	<b>H/L</b>	 *3
Input Register	-----	D300001 - D365535	*1	 *2
Holding Register	D400001,00 - D465535,31	D400001 - D465535		 *4

\*1 Whether the data is stored as higher or lower is determined by the [Double Word word order] setting in [Individual Device Settings].

 "4.1 GP-Pro EX Setup Items" (page 20)

\*2 Write disabled.

\*3 When defining individual bits, the access method is different depending on the selected option in the [Individual Device Settings] dialog box's [Rest of the bits in this word] field.

"Clear"..... 

"Do not clear"..... 400001,00 - 465536,15

\*4 When defining individual bits, the access method is different depending on the selected option in the [Individual Device Settings] dialog box's [Rest of the bits in this word] field.

"Clear"..... 

"Do not clear"..... D400001,00 - D465535,31

**NOTE** • GP-Pro EX simulation does not synchronize the coil bit address and word address values.

■ IEC61131 Syntax Address Description

The following table shows the equivalence between IEC61131 syntax and MODBUS syntax address descriptions.

Device	MODBUS Syntax			IEC61131 Syntax				
	Format	Range	First element	Format	0-based		1-based	
					Range	First element	Range	First element
Coil	000001+i	i = 0 to 65535	000001	%Mi	i = 0 to 65535	%M00000	i = 1 to 65536	%M00001
Discrete Input	100001+i	i = 0 to 65535	100001	-	-	-	-	-
Input Register (Word)	300001+i	i = 0 to 65535	300001	-	-	-	-	-
Input Register (Word bit)	300001+i,j	i = 0 to 65535 j = 0 to 15	300001,00	-	-	-	-	-
Holding Register (Word)	400001+i	i = 0 to 65535	400001	%MWi	i = 0 to 65535	%MW00000	i = 1 to 65536	%MW00001
Holding Register (Word bit)	400001+i,j	i = 0 to 65535 j = 0 to 15	400001,00	%Mwi: Xj	i = 0 to 65535 j=0 to 15	%MW00000 :X00	i = 1 to 65536 j=0 to 15	%MW00001 :X00
Input Register (D Word)	D300001+i	i = 0 to 65534	D300001	-	-	-	-	-
Input Register (D Word bit)	D300001+i,j	i = 0 to 65534 j = 0 to 31	D300001,00	-	-	-	-	-
Holding Register (D Word)	D400001+i	i = 0 to 65534	D400001	%MDi	i = 0 to 65534	%MD00000	i = 1 to 65535	%MD00001
Holding Register (D Word bit)	D400001+i,j	i = 0 to 65534 j = 0 to 31	D400001,00	%MDi:Xj	i = 0 to 65534 j=0 to 31	%MD00000 :X00	i = 1 to 65535 j=0 to 31	%MD00001 :X00

**NOTE**

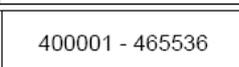
- The addresses 100000 and 300000 cannot be accessed using IEC61131 syntax.
- If you apply IEC61131 syntax to a project that has a discrete input or input register already set, the addresses become invalid and display as "-Undefined-".

**NOTE**

- For system data area, refer to the GP-Pro EX Reference Manual.
- Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- Refer to the precautions on manual notation for icons in the table.  
 "Manual Symbols and Terminology"

## 5.2. Control Techniques (Modbus)

 : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521		
Discrete Input	100001 - 165536	100001 - 165521	[L / H]	 *2
Input Register	----	300001 - 365536	or	 *2
Holding Register	400001,00 - 465536,15	 400001 - 465536	[H / L]	 *3
Input Register	----	D300001 - D365535	*1	 *2
Holding Register	D400001,00 - D416384,31	D400001 - D416384		 *4

\*1 Whether the data is stored as higher or lower is determined by the [Double Word word order] setting in [Individual Device Settings].

 "4.1 GP-Pro EX Setup Items" (page 20)

\*2 Write disabled.

\*3 When defining individual bits, the access method is different depending on the selected option in the [Individual Device Settings] dialog box's [Rest of the bits in this word] field.

"Clear"..... 

"Do not clear"..... 400001,00 - 465536,15

\*4 When defining individual bits, the access method is different depending on the selected option in the [Individual Device Settings] dialog box's [Rest of the bits in this word] field.

"Clear"..... 

"Do not clear"..... D400001,00 - 416384,31

**NOTE** • GP-Pro EX simulation does not synchronize the coil bit address and word address values.

■ IEC61131 Syntax Address Description

The following table shows the equivalence between IEC61131 syntax and MODBUS syntax address descriptions.

Device	MODBUS Syntax			IEC61131 Syntax				
	Format	Range	First element	Format	0-based		1-based	
					Range	First element	Range	First element
Coil	000001+i	i = 0 to 65535	000001	%Mi	i = 0 to 65535	%M00000	i = 1 to 65536	%M00001
Discrete Input	100001+i	i = 0 to 65535	100001	-	-	-	-	-
Input Register (Word)	300001+i	i = 0 to 65535	300001	-	-	-	-	-
Input Register (Word bit)	300001+i,j	i = 0 to 65535 j = 0 to 15	300001,00	-	-	-	-	-
Holding Register (Word)	400001+i	i = 0 to 65535	400001	%MWi	i = 0 to 65535	%MW00000	i = 1 to 65536	%MW00001
Holding Register (Word bit)	400001+i,j	i = 0 to 65535 j = 0 to 15	400001,00	%Mwi: Xj	i = 0 to 65535 j=0 to 15	%MW00000 :X00	i = 1 to 65536 j=0 to 15	%MW00001 :X00
Input Register (D Word)	D300001+i	i = 0 to 65534	D300001	-	-	-	-	-
Input Register (D Word bit)	D300001+i,j	i = 0 to 65534 j = 0 to 31	D300001,00	-	-	-	-	-
Holding Register (D Word)	D400001+i	i = 0 to 65534	D400001	%MDi	i = 0 to 65534	%MD00000	i = 1 to 65535	%MD00001
Holding Register (D Word bit)	D400001+i,j	i = 0 to 65534 j = 0 to 31	D400001,00	%MDi:Xj	i = 0 to 65534 j=0 to 31	%MD00000 :X00	i = 1 to 65535 j=0 to 31	%MD00001 :X00

**NOTE**

- The addresses 100000 and 300000 cannot be accessed using IEC61131 syntax.
- If you apply IEC61131 syntax to a project that has a discrete input or input register already set, the addresses become invalid and display as "-Undefined-".

**NOTE**

- For system data area, refer to the GP-Pro EX Reference Manual.
- Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- Refer to the precautions on manual notation for icons in the table.  
 "Manual Symbols and Terminology"

### 5.3. Control Techniques (Routing)

Device		Bit Address	Word Address	32 bits	Remarks
Menu.Parameter	CTNet Routing Disabled	00.00.00 - 99.99.31	00.00 - 99.99		
	CTNet Routing Enabled	001:00.00.00 - 255:99.99.31	001:00.00 - 255:99.99		

**NOTE**

- For system data area, refer to the GP-Pro EX Reference Manual.
- Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- 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 set "Device Type & Address" for the address type of the data display or other devices.

### ■ General Modbus

Device	Device Name	Device Code (HEX)	Address Code
Coil	0	0080	Value of (word address - 1) divided by 16
Discrete Input	1	0081	Value of (word address - 1) divided by 16
Input Register	3	0001	Value of (word address - 1)
Holding Register	4	0000	Value of (word address - 1)
Input Register	D3	0002	Value of (word address - 1) divided by 2
Holding Register	D4	0003	Value of (word address - 1) divided by 2

### ■ Control Techniques (Modbus)

Device	Device Name	Device Code (HEX)	Address Code
Coil	0	0080	Value of (word address - 1) divided by 16
Discrete Input	1	0081	Value of (word address - 1) divided by 16
Input Register	3	0001	Value of (word address - 1)
Holding Register	4	0000	Value of (word address - 1)
Input Register	D3	0002	Value of (word address - 1)
Holding Register	D4	0003	Value of (word address - 1)

### ■ Control Techniques (Routing)

Device	Device Name	Device Code (HEX)	Address Code
Menu Parameter	-	00A0	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	Requirements
No.	Error No.
Device Name	Name of the External Device where error occurs. Device name is a title of the 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 the External Device where error occurs, or error codes received from the External Device. <div style="border: 1px solid black; padding: 2px; display: inline-block;"><b>NOTE</b></div> <ul style="list-style-type: none"> <li>• IP address is displayed such as "IP address(Decimal): MAC address( Hex)".</li> <li>• Device address is displayed such as "Address: Device address".</li> <li>• Received error codes are displayed such as "[Hex]".</li> </ul>

Display Examples of Error Messages

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

**NOTE**

- Refer to your External Device manual for details on received error codes.
- Refer to "When an error is displayed (Error Code List)" in "Maintenance/Troubleshooting manual" for details on the error messages common to the driver.

### ■ Error Codes Specific to the External Device

Please refer to the manual of the External Device for error codes specific to the External Device.

General MODBUS error codes are shown below.

Error Code (HEX)	Description
01	Does not support the corresponding Function Code.
02	The specified data address does not exist.
03	Data value error.

■ Error Messages Specific to the External Device

ID	Error Message	Description
RHxx128	(Node Name): (Device Address) can't be read because of the limitation of the Read boundary	When reading the coil or discrete input as a word address while the boundary is less than 16 bits, or accessing the input or holding register as a double word while the boundary is set to 1 word, an error will be displayed.
RHxx129	(Node Name): (Device Address) can't be written because of the limitation of the Write boundary	When writing the coil as a word address while the boundary is less than 16 bits, or accessing the holding register as a double word while the boundary is set to 1 word, an error will be displayed.
RHxx130	(Node Name): (Device Address) is not defined on Function Code and Max Query setting	When accessing the device out of the defined area, an error will be displayed.
RHxx131	(Node Name): (Device Address) can't be read because of the limitation of the Device Range setting	When reading the coil or discrete input as a word address while the range is less than 16 bits, or accessing the input or holding register as a double word while the range is set to 1 word, an error will be displayed.
RHxx132	(Node Name): (Device Address) can't be written because of the limitation of the Device Range setting	When writing the coil as a word address while the range is less than 16 bits, or accessing the holding register as a double word while the range is set to 1 word, an error will be displayed.