

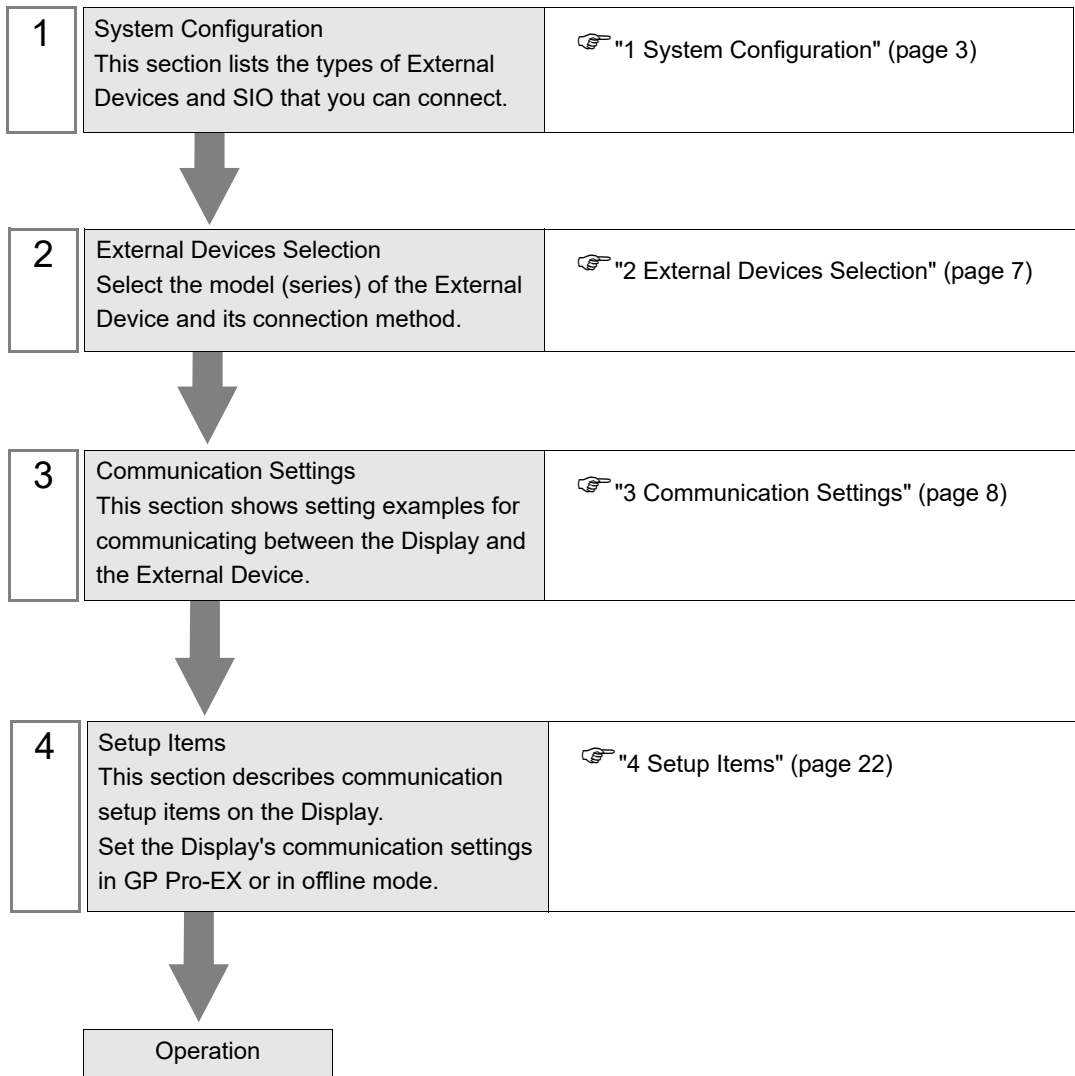
MODBUS TCP Master Driver

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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

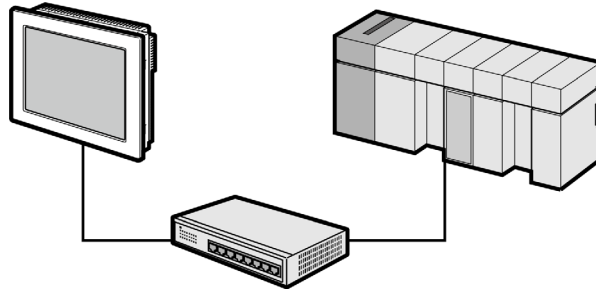
The system configuration in the case when the External Device and the Display are connected is shown.

1.1 Schneider Electric SA External Device

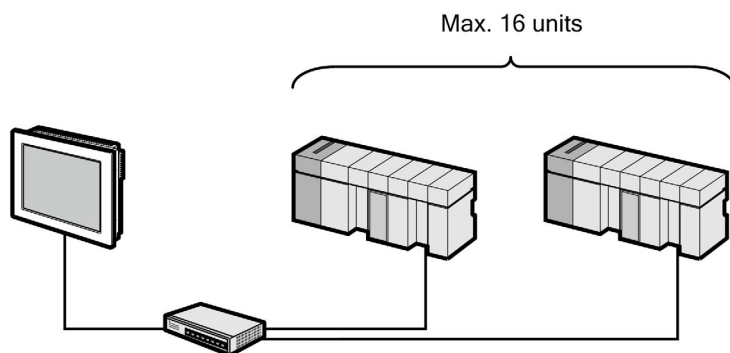
Driver	CPU	Link I/F	SIO Type	Setting Example
Premium	TSX P57 103M TSX P57 153M TSX P57 203M TSX P57 253M TSX P57 303M TSX P57 353M TSX P57 453M	TSX ETY 4102 TSX ETY 4103 TSX ETY 5102 TSX ETY 5103 TSX WMY 100 M	Ethernet (Modbus TCP)	Setting Example 1 (page 8)
	TSX P57 2623M TSX P57 2823M TSX P57 3623M TSX P57 4823M	-----		Setting Example 2 (page 10)
Quantum	140 CPU 113 02 140 CPU 113 03 140 CPU 434 12A 140 CPU 534 14A	140 NOE 771 00 140 NOE 771 10 140 NWM 100 00		Setting Example 3 (page 12)
	140 CPU 651 50 140 CPU 651 60	-----		Setting Example 4 (page 14)
M221	TM221CE16R TM221CE16T TM221CE16U TM221CE24R TM221CE24T TM221CE24U TM221CE40R TM221CE40T TM221CE40U	-----	Ethernet (SoMachine Basic Syntax)	Setting Example 6 (page 19)
	TM221ME16R TM221ME16RG TM221ME16T TM221ME16TG TM221ME32TK	-----		

■ Connection Configuration

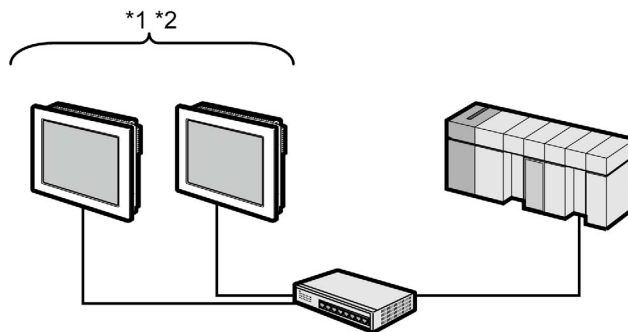
- 1:1 Connection



- 1:n Connection



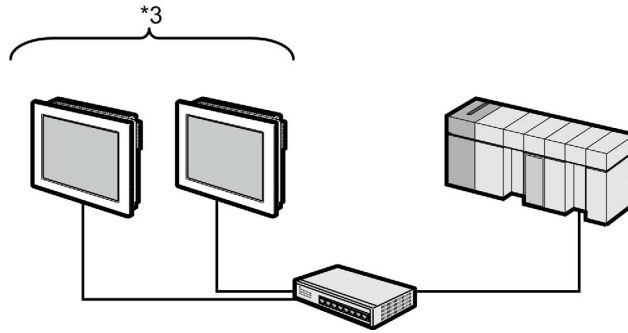
- n:1 Connection (Premium Series)



Maximum number of Display are 4.

- *1 You can connect max 1 unit of TSXP571**/TSXP572**, max 3 units of TSXP573**, max 4 units of TSXP574**.
- *2 Number of connecting units is the unit number when connecting the Display only. Number of connecting Display will be limited by the number of other External Devices which is connected by Ethernet.

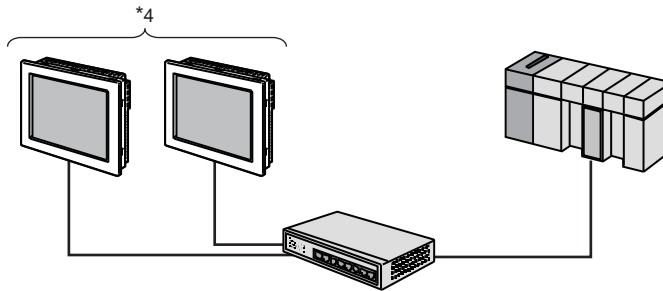
- n:1 Connection (Quantum Series)



Maximum number of Display are 32.

- *3 Number of connecting units is the unit number when connecting the Display only. Number of connecting Display will be limited by the number of other External Devices which is connected by Ethernet.

- n:1 Connection (M221 Series)



Maximum number of Display are 8.

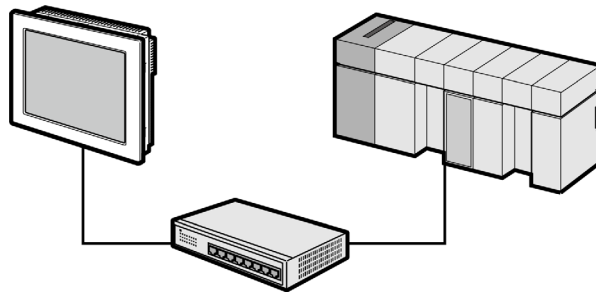
- *4 Number of connecting units is the unit number when connecting the Display only. Number of connecting Display will be limited by the number of other External Devices which is connected by Ethernet.

1.2 YOKOGAWA Electric Corporation External Device

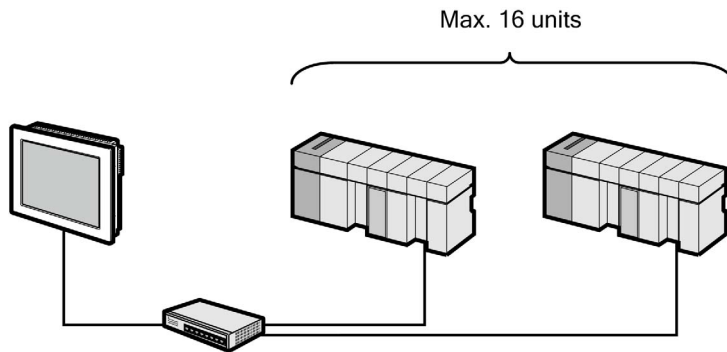
Driver	CPU	Link I/F	SIO Type	Setting Example
FCN	NFCP100-S00	Network interface on CPU	Ethernet (Modbus TCP)	Setting Example 5 (page 16)
FCJ	NFJT100-S100	Control network interface on the controller		Setting Example 5 (page 16)

■ Connection Configuration

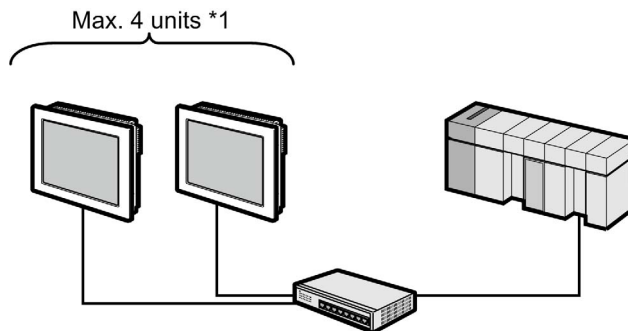
- 1:1 Connection



- 1:n Connection



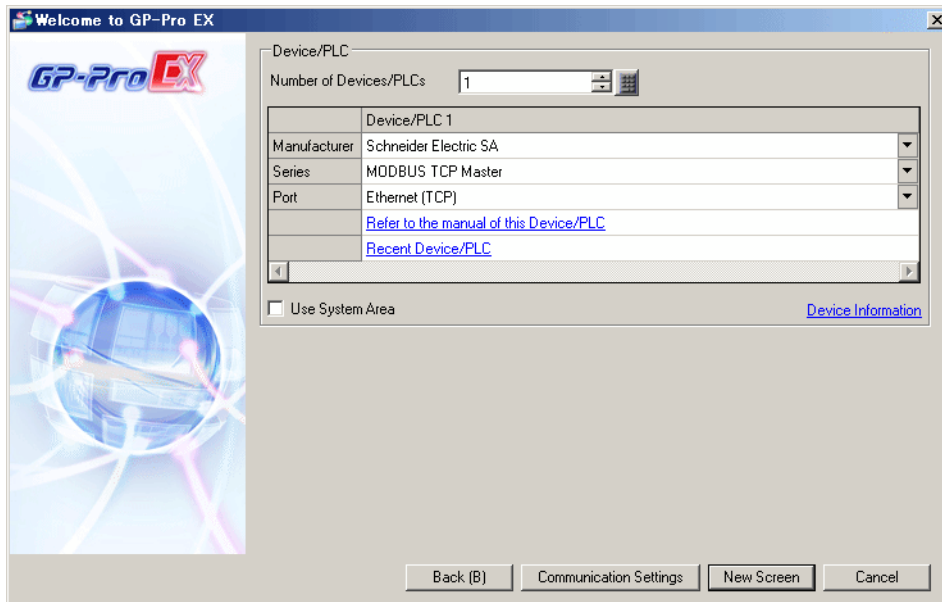
- n:1 Connection



*1 Number of connecting units is the unit number when connecting the Display only. Number of connecting Display will be limited by the number of other External Devices which is connected by Ethernet.

2 External Devices 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 "Schneider Electric SA".
Series	Select the External Device model (series) and the connection method. Select "MODBUS TCP Master". In System configuration, make sure the External Device you are connecting is supported by "MODBUS TCP Master". ☞ "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

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

3.1 Setting Example 1

■ Settings of GP-Pro EX

◆ Communication Settings

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

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer Schneider Electric SA Series MODBUS TCP Master Port Ethernet (TCP)

Text Data Mode 1 [Change](#)

Communication Settings

Timeout 3 (sec)

Retry 0


Wait To Send 0 (ms) [Default](#)

Device-Specific Settings

Allowable Number of Devices/PLCs 16 [Add Device](#)

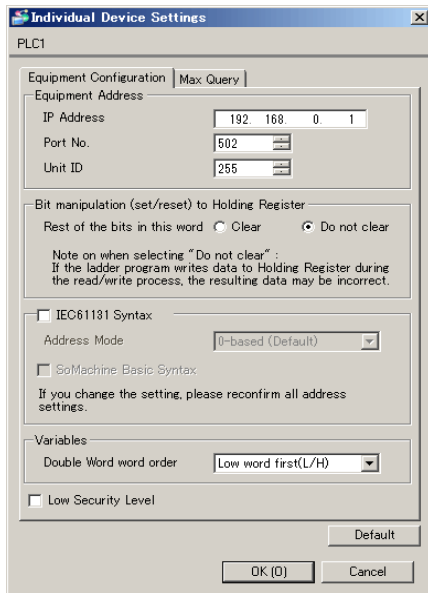
No.	Device Name	Settings	Add Indirect Device
1	PLC1	IP Address=192.168.000.001,Port No.=502,Unit ID=255	

◆ Device Setting

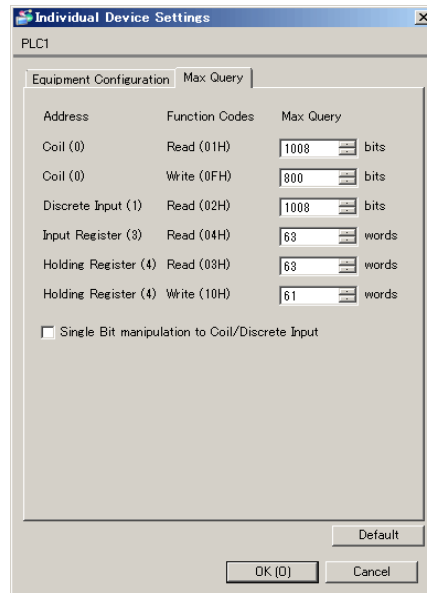
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings]  .

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

[Equipment Configuration]Tab



[Max Query] tab



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set IP address on the External Device for IP address in Device-specific settings.
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software "PL7 PRO" for communication settings.

Execute "Hardware Configuration" from "Configuration" in "Application Browser" of "PL7 PRO" to display the "Configuration" dialog box. Double-click the empty slot to display the "Add Module" dialog box. Select "Communication" in the "Family" field. Then select "Link Unit" display in the "Module" field to display the screen for setting.

Setup Items	Setup Description
IP address configuration	Configured (Fixed)
IP address	Optional
Ethernet configuration	Ethernet II (Fixed)

◆ Notes

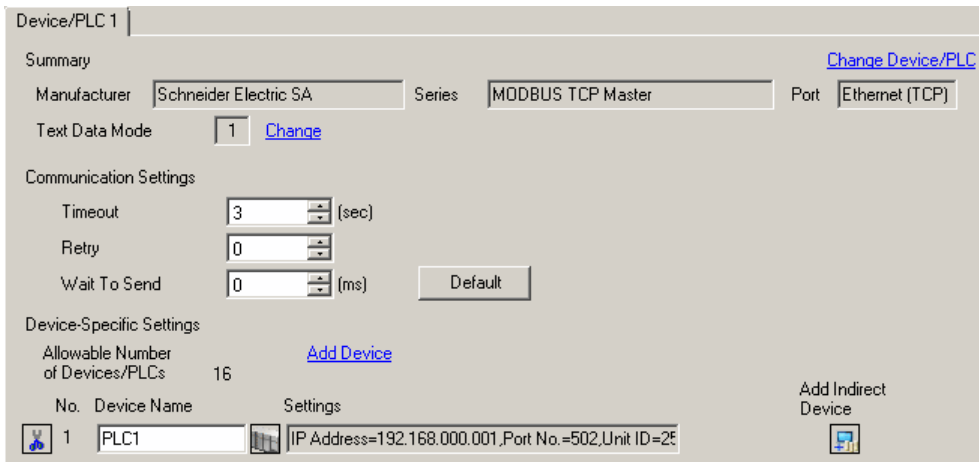
- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

3.2 Setting Example 2

■ Settings of GP-Pro EX

◆ Communication Settings

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

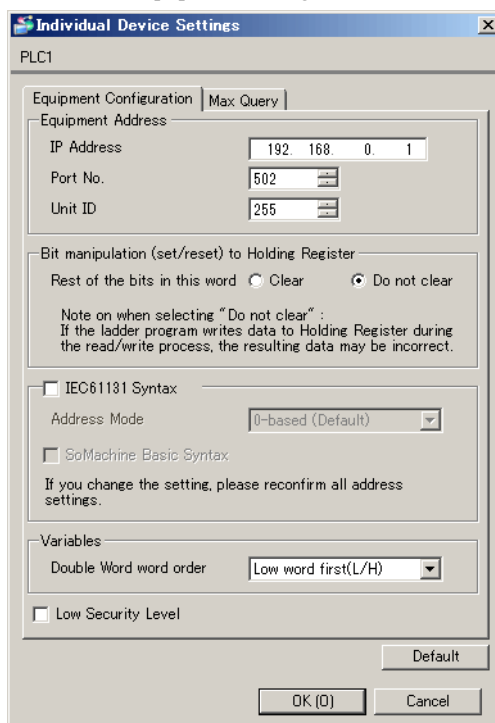


◆ Device Setting

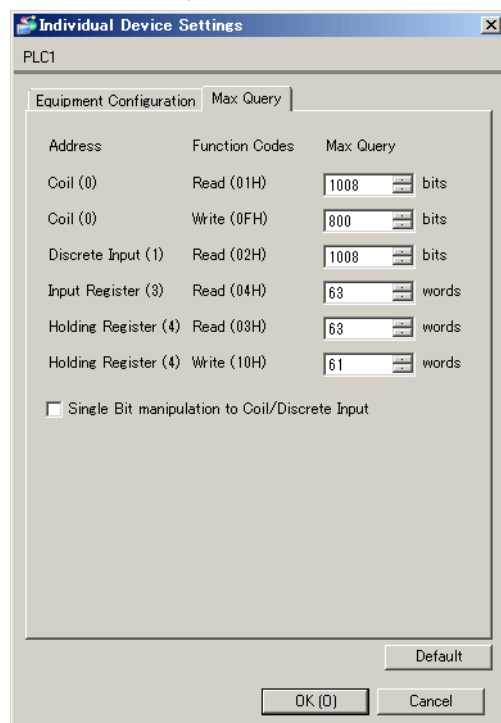
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration]Tab



[Max Query] tab



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set the IP address of the External Device under [Individual Device Settings].
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software "PL7 PRO" for communication settings.

For setting, go to "Configuration" in "Application Browser" of "PL7 PRO", "Hardware Configuration", and "ETY PORT" in this order.

Setup Items	Setup Description
IP address configuration	Configured (Fixed)
IP address	Optional
Ethernet configuration	Ethernet II (Fixed)

◆ Notes

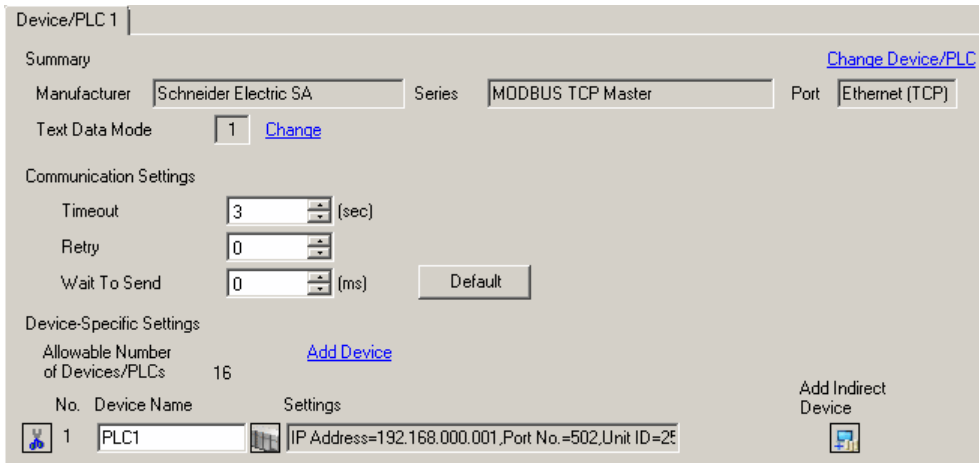
- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

3.3 Setting Example 3

■ Settings of GP-Pro EX

◆ Communication Settings

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

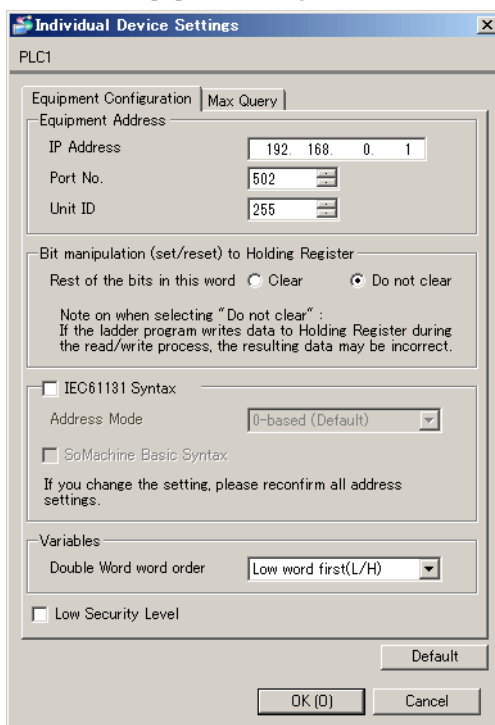


◆ Device Setting

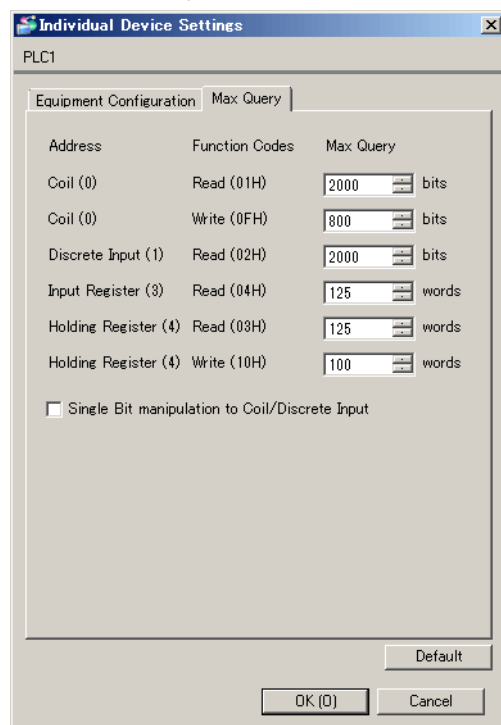
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Max Query] tab



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set the IP address of the External Device under [Individual Device Settings].
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software "Concept" for communication settings.

After selecting PLC for the Quantum Series in "PLC Selection" of "Concept", select "Select Extensions" from "Config Extension". Set the number of Link Unit connected to "TCP/IP Ethernet" in the "Select Extensions" dialog box displayed next. Then, select "Ethernet /I/O Scanner" in "Config Extensions" and perform setting in the "Ethernet /I/O Scanner" dialog box.

Setup Items	Setup Description
Ethernet configuration	Specify IP Address (Fixed)
Internet Address	Optional
Frame Type	Ethernet II (Fixed)

◆ Notes

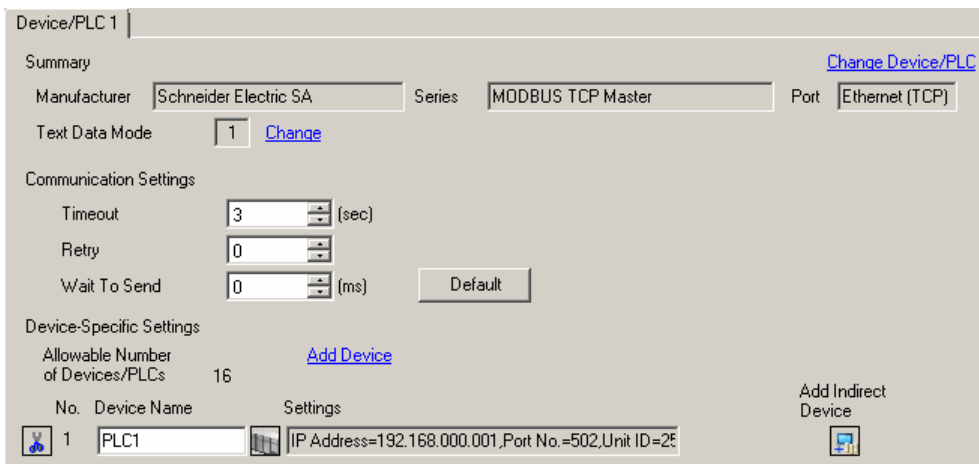
- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

3.4 Setting Example 4

■ Settings of GP-Pro EX

◆ Communication Settings

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

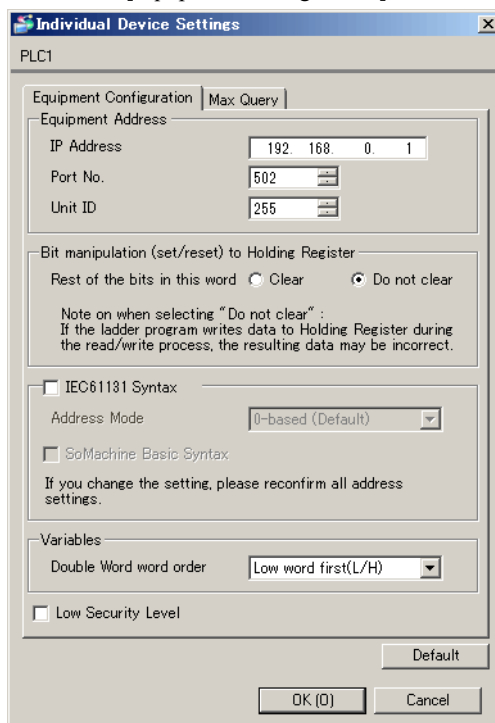


◆ Device Setting

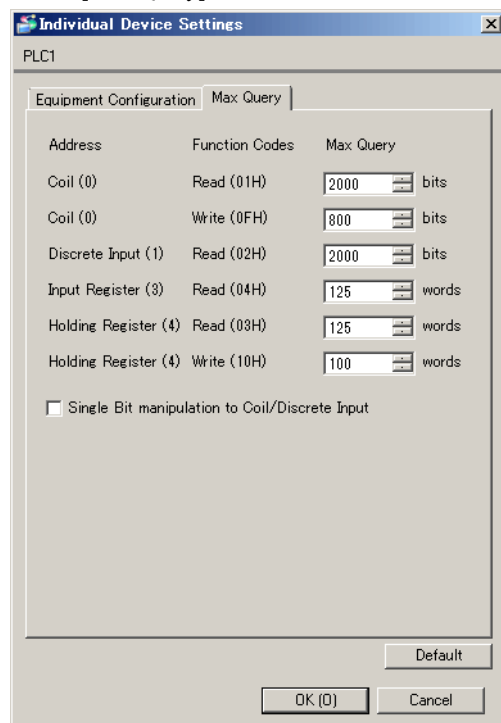
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Max Query] tab



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set the IP address of the External Device under [Individual Device Settings].
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software "Unity Pro XL" for communication settings.

Startup "Unity Pro XL". Select "New Project" and specify CPU (Quantum Series, 140 CPU 651 *0). Go to "Communication" in "Project Browser", and right-click on "Network" to select "New Network...". Then the Add Network window is displayed.

Set "List of available Networks" in the "Add Network" window to "Ethernet". Put the optional name in "Change Name" and press OK.

Check that the name you put in "Change Name" is displayed under "Network", "Communication" of "Project Browser". Double-click the displayed name to display the "(Your optional name) window" for setting.

Setup Items	Setup Description
IP address configuration	Configured (Fixed)
IP address	Optional
Ethernet configuration	Ethernet II (Fixed)

◆ Notes

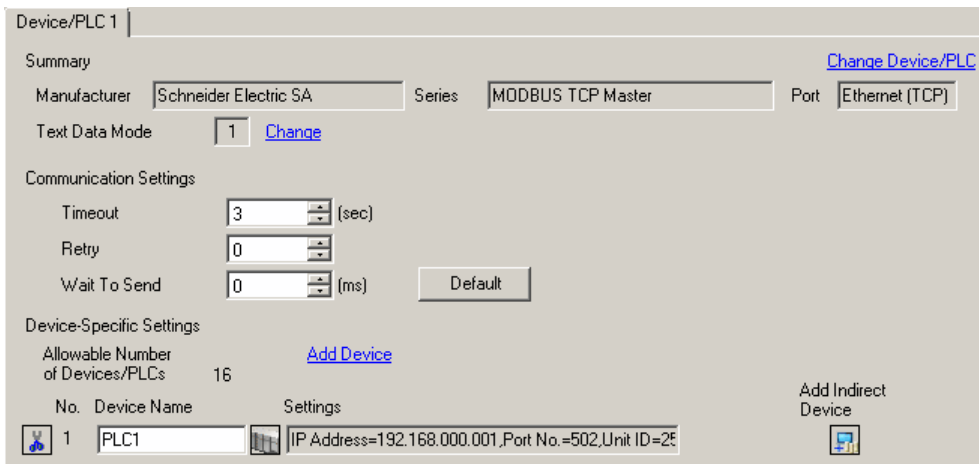
- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

3.5 Setting Example 5

■ Settings of GP-Pro EX

◆ Communication Settings

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

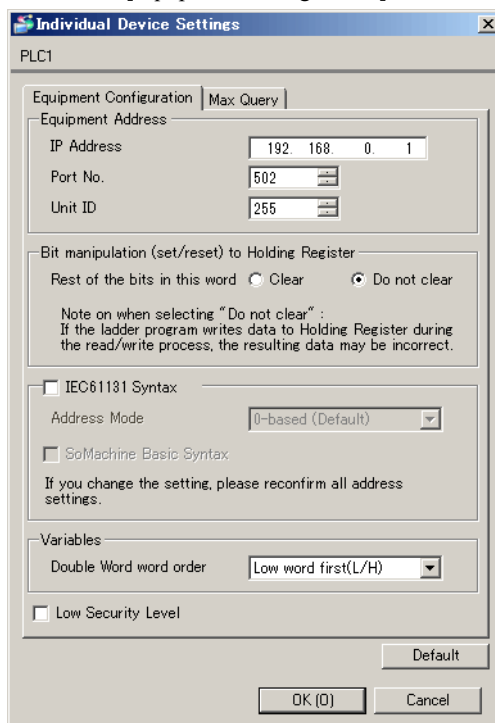


◆ Device Setting

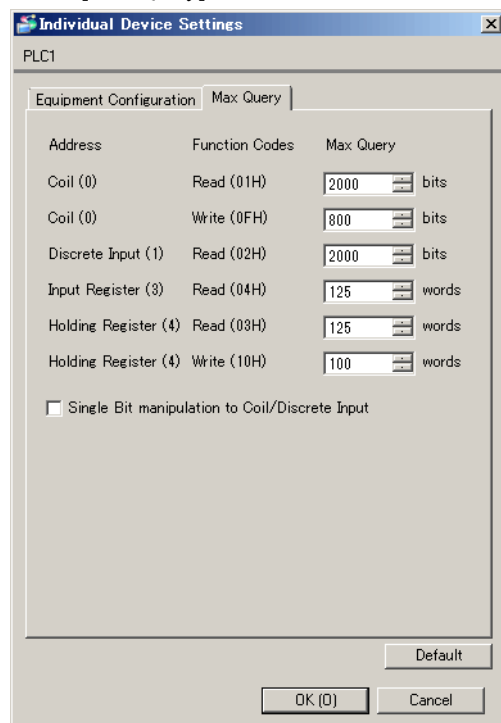
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Max Query] tab



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set the IP address of the External Device under [Individual Device Settings].
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software (Logic Designer) for communication settings. Refer to your External Device manual for details.

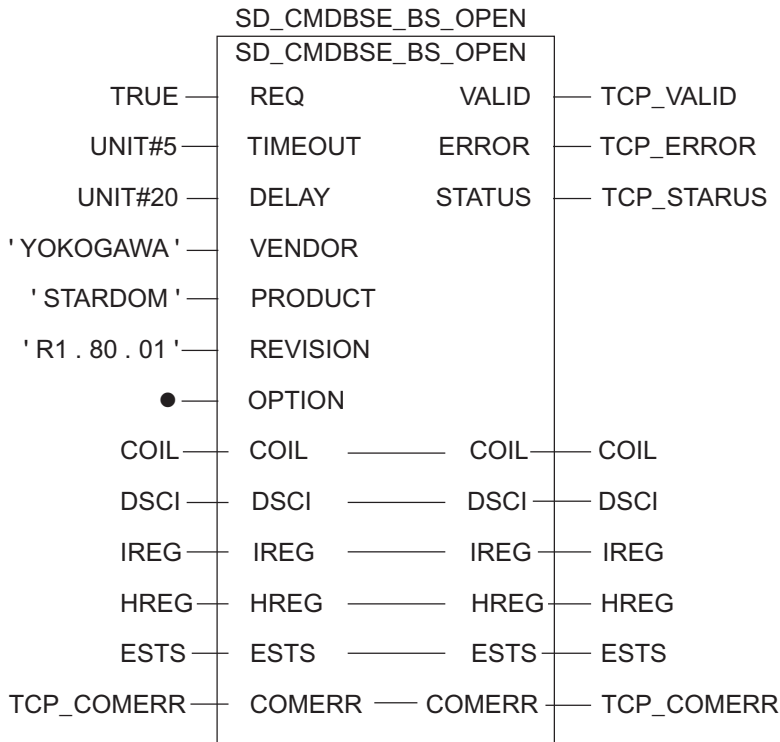
- 1 Start up the ladder software.
- 2 To start the MODBUS communication (RTU mode) slave function, create the control logic. For the example of control logic, refer to "Control Logic Example".

☞ ◆ Control Logic Example (page 17)

- 3 Select [Rebuild Project] from the [Build] menu.
- 4 Double-click [Target Setting] in the project tree Window to display the [Target] dialog box.
- 5 Enter "192.168.0.1" in [Host Name/IP Address].
- 6 Click [OK].
- 7 Download the communication settings to the External Device.
- 8 Reboot the External Device.

◆ Control Logic Example

To connect the Display to the External Device, the control logic is required.
The control logic example is shown below.



◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

3.6 Setting Example 6

■ Settings of GP-Pro EX

◆ Communication Settings

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

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer Series Port

Text Data Mode [Change](#)

Communication Settings

Timeout (sec)

Retry

Wait To Send (ms)

Device-Specific Settings


Allowable Number of Devices/PLCs 16 [Add Device](#)

No.	Device Name	Settings	Add Indirect Device
1	PLC1	IP Address=192.168.000.001,Port No.=502,Unit ID=255	<input type="button" value="Add"/>

NOTE

- Set [Text Data Mode] to 2.

◆ Device Setting

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.

Individual Device Settings

PLC1

Equipment Configuration

Equipment Address

IP Address

Port No.

Unit ID

Bit manipulation (set/reset) to Holding Register

Rest of the bits in this word Clear Do not clear

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

Address Mode

SoMachine Basic Syntax

If you change the setting, please reconfirm all address settings.

Variables

Double Word word order

◆ Notes

- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Set the IP address of the External Device under [Individual Device Settings].
- You need to set the IP address of the Display in its offline mode.

■ External Device Settings

Use the ladder software "SoMachine Basic" for communication settings.

When using LAN:

- 1 Start up the ladder software.
- 2 Click the [Commissioning] tab.
- 3 The IP address of the detected External Device is displayed in [Ethernet Devices]. Select the IP address of the External Device to configure.
- 4 From [Ethernet Devices], click the wrench icon to change the setup value.
- 5 Set [Ethernet] as follows.

Setup Items	Setup Description
IP Mode	Fixed IP address
IP address	192.168.0.1
Subnet mask	255.255.255.0
Gateway address	0.0.0.0

- 6 Select the [Write to post configuration file (machine.cfg)] check box, and click [Apply].

When using USB:

- 1 Start up the ladder software.
- 2 From the [Configuration] tab, select [ETH1].
- 3 Set [Ethernet] as follows.

Setup Items	Setup Description
IP Mode	Static IP address
IP address	192.168.0.1
Subnet mask	255.255.255.0
Gateway address	0.0.0.0
Programming protocol enabled.	Select the check box.
Modbus server enabled	Select the check box.

- 4 Download the communication settings to the External Device.
- 5 Reboot the External Device.

◆ Notes

- After configuring the External Device over LAN, set up is not possible over USB.
To use USB for set up, from the [Commissioning] tab, select [Erase in controller] from the [Memory management] and delete the "machine.cfg" file.
- Check with the network administrator about the IP address. Do not duplicate IP addresses.
- Please refer to the manual of the ladder software for details on other settings.

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 8)

NOTE

- You need to set the IP address of the Display in its 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].

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer Series Port

Text Data Mode [Change](#)

Communication Settings

Timeout (sec)

Retry

Wait To Send (ms)

Device-Specific Settings

Allowable Number of Devices/PLCs [Add Device](#)

No.	Device Name	Settings	Add Indirect Device
1	PLC1	IP Address=192.168.000.001,Port No.=502,Unit ID=255	<input type="button" value="+"/>


Setup Items	Setup Description
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 the next commands.

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 Setting

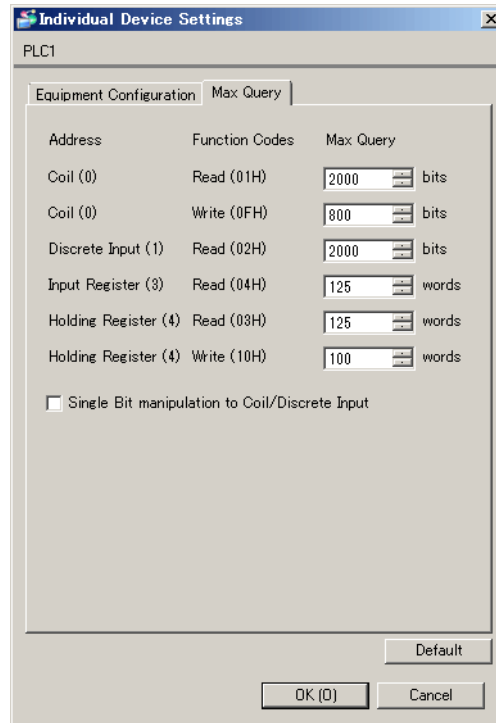
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings]  .

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

[Equipment Configuration]Tab

Setup Items	Setup Description
IP Address	Set IP address of the External Device. NOTE • Check with the network administrator about the IP address. Do not duplicate IP addresses.
Port No.	Use an integer from "1 to 65535" to enter the port No. of the External Device.
Unit ID	Use an integer from 1 to 247 to enter the unit ID of the External Device.
Bit manipulation (set/reset) to Holding Register Other bits in this word	Select how other bits in the same word are handled when you manipulate bits in the holding register, from "Clear" or "Do not clear".
IEC61131 Syntax	Check this item when you use the IEC61131 grammar for variables. If you check this item, select the address mode from [0-based] or [1-based].
SoMachine Basic Syntax	Check this item when you use SoMachine Basic syntax for variables. Use this setting with M221 series only.
Double Word word order	Select the order of checking double word data from "Low word first" or "High word first".
Low Security Level	Check this option to decrease the format check level.

[Max Query] tab



Setup Items	Setup Description
Coil Read	Set the number of max data for device [coil] that can be read for one communication, using 16 to 2000 bits. NOTE • If you check [Single Bit Manipulation in Coil/Discrete Input], set the max query using 1 to 2000.
Coil Write	Set the number of max data for device [coil] that can be written for one communication, using 1 to 800 bits.
Discrete Input Read	Set the number of max data for device [discrete input] that can be read for one communication, using 16 to 2000 bits. NOTE • If you check [Single Bit Manipulation in Coil/Discrete Input], set the max query using 1 to 2000.
Input Register Read	Set the number of max data for device [input register] that can be read for one communication, using 1 to 125 words.
Holding Register Read	Set the number of max data for device [holding register] that can be read for one communication, using 1 to 125 words.
Holding Register Write	Set the number of max data for device [holding register] that can be written for one communication, using 1 to 100 words.
Single Bit manipulation to Coil/Discrete Input	Check this option to read or write the coil or discrete input in bit units.

4.2 Setup Items in Offline Mode

NOTE

- Refer to the Maintenance/Troubleshooting manual 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 [Peripheral Equipment Settings] in offline mode. Touch the External Device you want to set from the list that appears.

Comm.	Device			
MODBUS TCP Master		[TCP]	Page 1/1	
Timeout(s)		3	▼	▲
Retry		0	▼	▲
Wait To Send(ms)		0	▼	▲
	Exit		Back	2018/03/15 16:25:06

Setup Items	Setup Description
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 the next commands.

■ 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].

(1/2)

Comm.	Device			
MODBUS TCP Master		[TCP]	Page 1/2	
Device/PLC Name [PLC1] ▼				
IP Address		192	168	0 1
Port No.		502 ▼ ▲		
Unit ID		255 ▼ ▲		
Bit manipulation to HR		Rest of bits in word are not cleared		
IEC61131 Syntax		OFF		
SoMachine Syntax		OFF		
Double Word word order		Low word first		
Low Security Level		OFF		
				➔
Exit		Back		2018/03/15 16:25:12

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 IP address of the External Device. NOTE • Check with the network administrator about the IP address. Do not duplicate IP addresses.
Port No.	Use an integer from "1 to 65535" to enter the port No. of the External Device.
Unit ID	Use an integer from 1 to 247 to enter the unit ID of the External Device.
Bit manipulation to HR	Indicates how other bits in the same word are handled when you manipulate bits in the holding register, by "Rest of bits in word are cleared" or "Rest of bits in word are not cleared".(Not available to set in offline mode.)
IEC61131 Syntax	Indicates the usage status of the currently set IEC61131 syntax by ON/OFF. (Not available to set in offline mode.)
SoMachine Syntax	Indicates the usage status of the currently set SoMachine Basic syntax by ON/OFF. (Not available to set in offline mode.)
Double Word word order	Indicates the currently set order of storing double word data displaying "Low word first" or "High word first". (Not available to set in offline mode.)
Low Security Level	Indicates whether the format check level is decreased by ON/OFF. If decreased, ON is displayed. (Not available to set in offline mode.)

(2/2)

Comm.	Device			
MODBUS TCP Master		[TCP]	Page 2/2	
Device/PLC Name <input type="text" value="PLC1"/>				
Max Query				
Read Coil	2000 bits			
Write Coil	800 bits			
Read Discrete Input	2000 bits			
Read Input Register	<input type="text" value="125"/>	▼	▲	
Read Holding Register	<input type="text" value="125"/>	▼	▲	
Write Holding Register	<input type="text" value="100"/>	▼	▲	
Single Bit manipulation OFF				
				
Exit		Back		2018/03/15 16:25:17

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])
Read Coil	Displays the number of max data for device [coil] that can be read for one communication.(Not available to set in offline mode.)
Write Coil	Displays the number of max data for device [coil] that can be written for one communication.(Not available to set in offline mode.)
Read Discrete Input	Displays the number of max data for device [discrete input] that can be read for one communication.(Not available to set in offline mode.)
Read Input Register	Set the number of max data for device [input register] that can be read for one communication, using 1 to 125 words.
Read Holding Register	Set the number of max data for device [holding register] that can be read for one communication, using 1 to 125 words.
Write Holding Register	Set the number of max data for device [holding register] that can be written for one communication, using 1 to 100 words.
Single Bit manipulation	Indicates whether to read or write the coil or discrete input in bit units by displaying ON/OFF. If ON is displayed, you can read or write in bit units. (Not available to set in offline mode.)

5 Supported Devices

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.

5.1 Premium/Quantum/M221 Series

 : This address can be specified as system data area.

Device	Bit Address	Word address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521	<div style="border: 1px solid black; padding: 2px; display: inline-block;">L / H</div> or <div style="border: 1px solid black; padding: 2px; display: inline-block;">H / L</div> *1	+1B+1
Discrete Input	100001 - 165536	100001 - 165521		+1B+1 *2
Input Register	-----	300001 - 365536		Bit15 *2
Holding Register	400001,0 - 465536,15 ^{*3}	400001 - 465536		Bit15

*1 You can set the data storing order in word unit of 32-bit data in the Device Setting dialog box.

*2 Write disabled.

*3 An access method at the time of Bit Set varies depending on the [Rest of the bits in this word] setting of [Device Setting].

- Clear..... Bit15

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

NOTE • When the [Single Bit manipulation to Coil/Discrete Input] check box is selected in the [Individual Device Settings] dialog box, GP-Pro EX simulation does not synchronize the coil bit address and word address values.

5.2 FCN/FCJ Series

 : This address can be specified as system data area.

Device	Bit Address	Word address	32 bits	Remarks
Coil	000001 - 009984	000001 - 009969		+16+ 1 *2
Discrete Input	100001 - 109984	100001 - 109969	L / H	+16+ 1 *2 *3
Input Register	300001.00 - 309999.15	300001 - 309999	or	B i t 15 *3
Holding Register	400001.00 - 409999.15 *4	400001 - 409999	H / L *1	B i t 15

- *1 You can set the data storing order in word unit of 32-bit data in the Device Setting dialog box.
- *2 The device access range of the External Device is specified as 1 to 9999, that of the Display, however, as up to 9984, since the Display device is accessible in 16-bit units.
- *3 Write disabled.
- *4 An access method at the time of Bit Set varies depending on the [Rest of the bits in this word] setting of [Device Setting].
 - Clear..... B i t 15
 - Do not clear400001,00 - 409999,15

NOTE • When the [Single Bit manipulation to Coil/Discrete Input] check box is selected in the [Individual Device Settings] dialog box, GP-Pro EX simulation does not synchronize the coil bit address and word address values.

5.3 Supported Function Codes

The supported function code list is shown below.

Function Code (Hex)	Description
FC01(0x01)	Read the ON/OFF status of the slave coil (0X).
FC02(0x02)	Read the ON/OFF status of the slave discrete input (1X).
FC03(0x03)	Read the description of the slave holding register (4X).
FC04(0x04)	Read the description of the slave input register (3X).
FC05(0x05)	Change (Write) the slave coil (0X) status to either ON or OFF.
FC06(0x06)	Change (write) the description of the slave holding register (4X).
FC15(0x0F)	Change (Write) the slave consecutive multiple coils (0X) status to either ON or OFF.
FC16(0x10)	Change (write) the descriptions of the slave consecutive multiple holding registers (4X).
FC90(0x5A)	Used when SoMachine Basic syntax is selected.

NOTE • FC15/FC16 are used for writing. FC05/FC06 are used for the External Devices that do not support the function codes mentioned on the left.

5.4 IEC61131Syntax 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 start		1 start	
					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 65535 j=0 to 15	%MW00001 :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 "-Undefined-".
-

5.5 SoMachine Basic syntax

SoMachine Basic syntax is available only for M221 series.

- TM221ME16R•/TM221ME16T•

Device	Bit Address	Word Address	32 bits	Notes
Memory bits	%M00000 - %M01023	-----		
Memory words	%MW00000.00 - %MW07999.15	%MW00000 - %MW07999		 *2 *3
Constant words	%KW00000 - %KW00511.15	%KW00000 - %KW00511		*4 *5
Digital inputs	%I000.000 - %I000.007	-----		*5 *6
	%I001.000 - %I014.031	-----		*5 *6 *7
Digital outputs	%Q000.000 - %Q000.007	-----		*6
	%Q001.000 - %Q014.031	-----		*6 *7
Analog inputs	%IW000.000.00 - %IW000.001.15	%IW000.000 - %IW000.001	L/H	*5 *6
	%IW001.000.00 - %IW014.007.15	%IW001.000 - %IW014.007	or H/L	*5 *6 *7
Analog outputs	%QW001.000.00 - %QW014.003.15	%QW001.000 - %QW014.003	*1	*6 *7
System bits	%S00000 - %S00159	-----		
System words	%SW00000.00 - %SW00233.15	%SW00000 - %SW00233		 *3
Input channel status	%IWS000.000.00 - %IWS000.001.15	%IWS000.000 - %IWS000.001		*5 *6
	%IWS001.000.00 - %IWS014.007.15	%IWS001.000 - %IWS014.007		*5 *6 *7
Output channel status	%QWS001.000.00 - %QWS014.003.15	%QWS001.000 - %QWS014.003		*5 *6 *7

*1 High and low relationship of the stored data is specified by the [Double Word word order] setting of [Device Setting].

 "4.1 Setup Items in GP-Pro EX" (page 22)

*2 To use addresses %MD00000 - %MD07998 and %MF00000 - %MF07998 on the External Device, select addresses %MW00000 - %MW07998. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

*3 The access method for Bit Set varies depending on the [Rest of the bits in this word] setting in the [Individual Device Setting] dialog box.

- Clear..... **15**

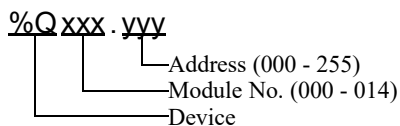
- Do not clear..... When bits are written, the Display reads the corresponding word address from the External Device, sets particular bits of that word address ON, and then returns the resulting word address to the External Device. Note that the resulting data may not be correct if you write to the word address from the External Device while the Display is reading from and writing to the External Device.

*4 To use addresses %KD00000 - %KD00510 and %KF00000 - %KF00510 on the External Device, select addresses %KW00000 - %KW00510. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

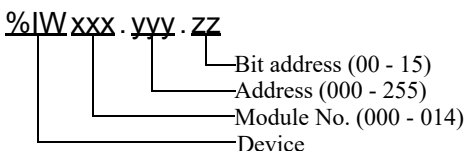
*5 Write disabled

*6 The device address structure is as follows.
The module number is mapped to the attached unit.

Bit device







Word device



*7 Available for use only when an I/O module is connected.

- TM221ME32TK


Device	Bit Address	Word Address	32 bits	Notes
Memory bits	%M00000 - %M01023	-----		
Memory words	%MW00000.00 - %MW07999.15	%MW00000 - %MW07999		 *2 *3
Constant words	%KW00000 - %KW00511.15	%KW00000 - %KW00511		*4 *5
Digital inputs	%I000.000 - %I000.015	-----		*5 *6
	%I001.000 - %I014.031	-----		*5 *6 *7
Digital outputs	%Q000.000 - %Q000.015	-----		*6
	%Q001.000 - %Q014.031	-----		*6 *7
Analog inputs	%IW000.000.00 - %IW000.001.15	%IW000.000 - %IW000.001		*5 *6
	%IW001.000.00 - %IW014.007.15	%IW001.000 - %IW014.007	or 	*5 *6 *7
Analog outputs	%QW001.000.00 - %QW014.003.15	%QW001.000 - %QW014.003	*1	*6 *7
System bits	%S00000 - %S00159	-----		
System words	%SW00000.00 - %SW00233.15	%SW00000 - %SW00233		 *3
Input channel status	%IWS000.000.00 - %IWS000.001.15	%IWS000.000 - %IWS000.001		*5 *6
	%IWS001.000.00 - %IWS014.007.15	%IWS001.000 - %IWS014.007		*5 *6 *7
Output channel status	%QWS001.000.00 - %QWS014.003.15	%QWS001.000 - %QWS014.003		*5 *6 *7

*1 High and low relationship of the stored data is specified by the [Double Word word order] setting of [Device Setting].

 "4.1 Setup Items in GP-Pro EX" (page 22)

*2 To use addresses %MD00000 - %MD07998 and %MF00000 - %MF07998 on the External Device, select addresses %MW00000 - %MW07998. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

*3 The access method for Bit Set varies depending on the [Rest of the bits in this word] setting in the [Individual Device Setting] dialog box.

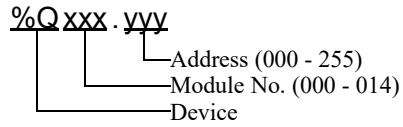
- Clear..... 

- Do not clear..... When bits are written, the Display reads the corresponding word address from the External Device, sets particular bits of that word address ON, and then returns the resulting word address to the External Device. Note that the resulting data may not be correct if you write to the word address from the External Device while the Display is reading from and writing to the External Device.

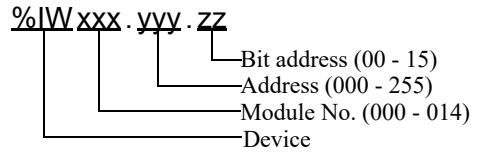
*4 To use addresses %KD00000 - %KD00510 and %KF00000 - %KF00510 on the External Device, select addresses %KW00000 - %KW00510. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

- *5 Write disabled
- *6 The device address structure is as follows.
The module number is mapped to the attached unit.

Bit device







Word device



- *7 Available for use only when an I/O module is connected.

• TM221CE16•

Device	Bit Address	Word Address	32 bits	Notes
Memory bits	%M00000 - %M01023	-----		
Memory words	%MW00000.00 - %MW07999.15	%MW00000 - %MW07999		 *2 *3
Constant words	%KW00000 - %KW00511.15	%KW00000 - %KW00511		*4 *5
Digital inputs	%I000.000 - %I000.008	-----		*5 *6
	%I001.000 - %I014.031	-----		*5 *6 *7
Digital outputs	%Q000.000 - %Q000.006	-----		*6
	%Q001.000 - %Q014.031	-----		*6 *7
Analog inputs	%IW000.000.00 - %IW000.001.15	%IW000.000 - %IW000.001		*5 *6
	%IW001.000.00 - %IW014.007.15	%IW001.000 - %IW014.007		*5 *6 *7
	%IW000.100.00 - %IW000.101.15	%IW000.100 - %IW000.101	L/H	*5 *6 *8
Analog outputs	%QW001.000.00 - %QW014.003.15	%QW001.000 - %QW014.003	H/L	 *3 *6 *7
	%QW000.100.00 - %QW000.101.15	%QW000.100 - %QW000.101	*1	 *3 *6 *9
System bits	%S00000 - %S00159	-----		
System words	%SW00000.00 - %SW00233.15	%SW00000 - %SW00233		 *3
Input channel status	%IWS000.000.00 - %IWS000.001.15	%IWS000.000 - %IWS000.001		*5 *6
	%IWS001.000.00 - %IWS014.007.15	%IWS001.000 - %IWS014.007		*5 *6 *7
	%IWS000.100.00 - %IWS000.101.15	%IWS000.100 - %IWS000.101		*5 *6 *8
Output channel status	%QWS001.000.00 - %QWS014.003.15	%QWS001.000 - %QWS014.003		*5 *6 *7
	%QWS000.100.00 - %QWS000.101.15	%QWS000.100 - %QWS000.101		*5 *6 *9

*1 High and low relationship of the stored data is specified by the [Double Word word order] setting of [Device Setting].

 "4.1 Setup Items in GP-Pro EX" (page 22)

*2 To use addresses %MD00000 - %MD07998 and %MF00000 - %MF07998 on the External Device, select addresses %MW00000 - %MW07998. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

*3 The access method for Bit Set varies depending on the [Rest of the bits in this word] setting in the [Individual Device Setting] dialog box.

- Clear..... **15**

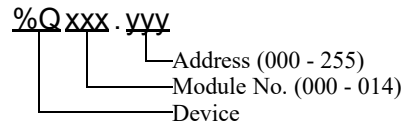
- Do not clear..... When bits are written, the Display reads the corresponding word address from the External Device, sets particular bits of that word address ON, and then returns the resulting word address to the External Device. Note that the resulting data may not be correct if you write to the word address from the External Device while the Display is reading from and writing to the External Device.

*4 To use addresses %KD00000 - %KD00510 and %KF00000 - %KF00510 on the External Device, select addresses %KW00000 - %KW00510. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

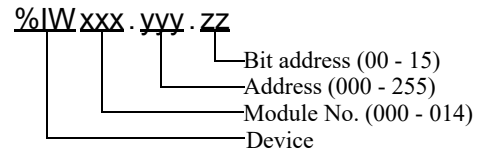
*5 Write disabled

*6 The device address structure is as follows.
The module number is mapped to the attached unit.

Bit device



Word device







*7 Available for use only when an I/O module is connected.

*8 Available for use only when TMC2AI2, TMC2HOIS01, TMC2PACK01 or TMC2TI2 is connected.

*9 Available for use only when TMC2AQ2V or TMC2AQ2C is connected.

• TM221CE24•

Device	Bit Address	Word Address	32 bits	Notes
Memory bits	%M00000 - %M01023	-----		
Memory words	%MW00000.00 - %MW07999.15	%MW00000 - %MW07999		 *2 *3
Constant words	%KW00000 - %KW00511.15	%KW00000 - %KW00511		*4 *5
Digital inputs	%I000.000 - %I000.013	-----		*5 *6
	%I001.000 - %I014.031	-----		*5 *6 *7
Digital outputs	%Q000.000 - %Q000.009	-----		*6
	%Q001.000 - %Q014.031	-----		*6 *7
Analog inputs	%IW000.000.00 - %IW000.001.15	%IW000.000 - %IW000.001		*5 *6
	%IW001.000.00 - %IW014.007.15	%IW001.000 - %IW014.007		*5 *6 *7
	%IW000.100.00 - %IW000.101.15	%IW000.100 - %IW000.101	[L/H]	*5 *6 *8
Analog outputs	%QW001.000.00 - %QW014.003.15	%QW001.000 - %QW014.003	[H/L]	 *3 *6 *7
	%QW000.100.00 - %QW000.101.15	%QW000.100 - %QW000.101	*1	 *3 *6 *9
System bits	%S00000 - %S00159	-----		
System words	%SW00000.00 - %SW00233.15	%SW00000 - %SW00233		 *3
Input channel status	%IWS000.000.00 - %IWS000.001.15	%IWS000.000 - %IWS000.001		*5*6
	%IWS001.000.00 - %IWS014.007.15	%IWS001.000 - %IWS014.007		*5 *6 *7
	%IWS000.100.00 - %IWS000.101.15	%IWS000.100 - %IWS000.101		*5 *6 *8
Output channel status	%QWS001.000.00 - %QWS014.003.15	%QWS001.000 - %QWS014.003		*5 *6 *7
	%QWS000.100.00 - %QWS000.101.15	%QWS000.100 - %QWS000.101		*5 *6 *9

*1 High and low relationship of the stored data is specified by the [Double Word word order] setting of [Device Setting].

 "4.1 Setup Items in GP-Pro EX" (page 22)

*2 To use addresses %MD00000 - %MD07998 and %MF00000 - %MF07998 on the External Device, select addresses %MW00000 - %MW07998. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

*3 The access method for Bit Set varies depending on the [Rest of the bits in this word] setting in the [Individual Device Setting] dialog box.

- Clear..... **15**

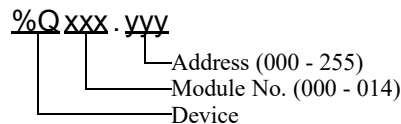
- Do not clear..... When bits are written, the Display reads the corresponding word address from the External Device, sets particular bits of that word address ON, and then returns the resulting word address to the External Device. Note that the resulting data may not be correct if you write to the word address from the External Device while the Display is reading from and writing to the External Device.

*4 To use addresses %KD00000 - %KD00510 and %KF00000 - %KF00510 on the External Device, select addresses %KW00000 - %KW00510. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).

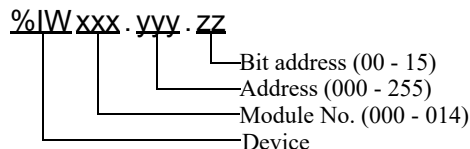
*5 Write disabled

*6 The device address structure is as follows.
The module number is mapped to the attached unit.

Bit device



Word device







*7 Available for use only when an I/O module is connected.

*8 Available for use only when TMC2AI2, TMC2HOIS01, TMC2PACK01 or TMC2TI2 is connected.

*9 Available for use only when TMC2AQ2V or TMC2AQ2C is connected.

• TM221CE40•

Device	Bit Address	Word Address	32 bits	Notes	
Memory bits	%M00000 - %M01023	-----	L/H or H/L *1		
Memory words	%MW00000.00 - %MW07999.15	%MW00000 - %MW07999			 *2 *3
Constant words	%KW00000 - %KW00511.15	%KW00000 - %KW00511			*4 *5
Digital inputs	%I000.000 - %I000.023	-----			*5 *6
	%I001.000 - %I014.031	-----			*5 *6 *7
Digital outputs	%Q000.000 - %Q000.015	-----			*6
	%Q001.000 - %Q014.031	-----			*6 *7
Analog inputs	%IW000.000.00 - %IW000.001.15	%IW000.000 - %IW000.001			*5 *6
	%IW001.000.00 - %IW014.007.15	%IW001.000 - %IW014.007			*5 *6 *7
	%IW000.100.00 - %IW000.101.15 %IW000.200.00 - %IW000.201.15	%IW000.100 - %IW000.101 %IW000.200 - %IW000.201			*5 *6 *8
Analog outputs	%QW001.000.00 - %QW014.003.15	%QW001.000 - %QW014.003			 *3 *6 *7
	%QW000.100.00 - %QW000.101.15 %QW000.200.00 - %QW000.201.15	%QW000.100 - %QW000.101 %QW000.200 - %QW000.201			 *3 *6 *9
System bits	%S00000 - %S00159	-----			
System words	%SW00000.00 - %SW00233.15	%SW00000 - %SW00233			 *3
Input channel status	%IWS000.000.00 - %IWS000.001.15	%IWS000.000 - %IWS000.001			*5 *6
	%IWS001.000.00 - %IWS014.007.15	%IWS001.000 - %IWS014.007		*5 *6 *7	
	%IWS000.100.00 - %IWS000.101.15 %IWS000.200.00 - %IWS000.201.15	%IWS000.100 - %IWS000.101 %IWS000.200 - %IWS000.201		*5 *6 *8	
Output channel status	%QWS001.000.00 - %QWS014.003.15	%QWS001.000 - %QWS014.003		*5 *6 *7	
	%QWS000.100.00 - %QWS000.101.15 %QWS000.200.00 - %QWS000.201.15	%QWS000.100 - %QWS000.101 %QWS000.200 - %QWS000.201		*5 *6 *9	

- *1 High and low relationship of the stored data is specified by the [Double Word word order] setting of [Device Setting].
☞ "4.1 Setup Items in GP-Pro EX" (page 22)
- *2 To use addresses %MD00000 - %MD07998 and %MF00000 - %MF07998 on the External Device, select addresses %MW00000 - %MW07998. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).
- *3 The access method for Bit Set varies depending on the [Rest of the bits in this word] setting in the [Individual Device Setting] dialog box.
 - Clear..... Bit 15
 - Do not clear..... When bits are written, the Display reads the corresponding word address from the External Device, sets particular bits of that word address ON, and then returns the resulting word address to the External Device. Note that the resulting data may not be correct if you write to the word address from the External Device while the Display is reading from and writing to the External Device.
- *4 To use addresses %KD00000 - %KD00510 and %KF00000 - %KF00510 on the External Device, select addresses %KW00000 - %KW00510. Then, set the [Data type] to either [32bit Dec]/[32bit Hex](%MD) or [32bit Float](%MF).
- *5 Write disabled
- *6 The device address structure is as follows.
 The module number is mapped to the attached unit.

Bit device

%Q xxx . yyy

Word device

%IW xxx . yyy . zz
- *7 Available for use only when an I/O module is connected.
- *8 Available for use only when TMC2AI2, TMC2HOIS01, TMC2PACK01 or TMC2TI2 is connected.
- *9 Available for use only when TMC2AQ2V or TMC2AQ2C is connected.

NOTE

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

6.1 Premium/Quantum/M221 Series

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)

6.2 FCN/FCJ Series

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)

6.3 SoMachine Basic Syntax

Device	Device Name	Device Code (HEX)	Address Code
Memory words	%MW	0000	Value of word address
Constant words	%KW	0002	Value of word address
Analog inputs	%IW	0008	Value of word address
Analog outputs	%QW	0009	Value of word address
System words	%SW	0004	Value of word address
Input channel status	%IWS	000A	Value of word address
Output channel status	%QWS	000B	Value of word address

7 Error Messages

Error messages are displayed on the screen of the 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 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>NOTE</p> <ul style="list-style-type: none"> • IP addresses are displayed as "IP address (Decimal): MAC address (Hex)". • Device addresses are displayed as "Address: Device address". • Received error codes are displayed as "Decimal [Hex]".

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 "Display-related errors" in "Maintenance/Troubleshooting Guide" for details on the error messages common to the driver.

