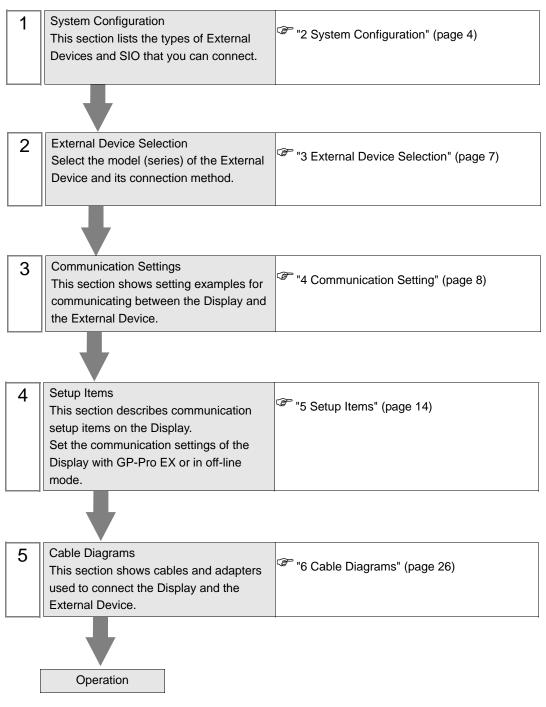
General MODBUS RTU SIO Master Driver

1	General MODBUS RTU SIO Master Driver	3
2	System Configuration	4
3	External Device Selection	7
4	Communication Setting	8
5	Setup Items	14
6	Cable Diagrams	26
7	Supported Device	42
8	Device Code and Address Code	44
9	Error Messages	

Introduction

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

In this manual, the connection procedure will be described in the sections identified below.



1 General MODBUS RTU SIO Master Driver

The general MODBUS RTU SIO Master Driver is used to connect the Display to a MODBUS-compatible External Device for general purpose.

The function code and boundary required for communication can be changed according to the External Device.

Up to 31 units of the External Device can be connected to the Display when one COM port of the Display is used.

Up to 32 units are available when two or more COM ports are used.

2 System Configuration

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

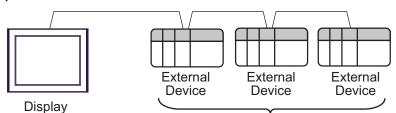
Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
			RS-232C	Setting Example 1 (page 8)	Cable Diagram 1 (page 26)
MODBUS Slave Device			RS-422/485 (4 wire)	Setting Example 2 (page 10)	Cable Diagram 2 (page 28)
			RS-422/485 (2 wire)	Setting Example 3 (page 12)	Cable Diagram 3 (page 35)

Connection Configuration

♦ 1:1 Connection

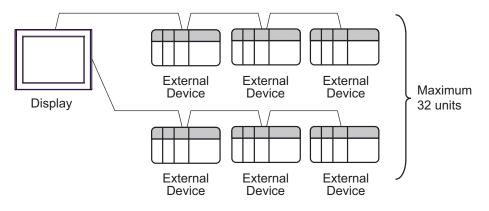


- 1: n Connection
 - Using 1 port



Maximum 31 units

• Using 2 or more ports



4

■ IPC COM Port

When connecting IPC with an External Device, the COM port used depends on the series and SIO type. Please refer to the IPC manual for details.

Usable port

Series	Usable Port			
Genes	RS-232C	RS-422/485(4 wire)	RS-422/485(2 wire)	
PS-2000B	COM1 ^{*1} , COM2, COM3 ^{*1} , COM4	-	-	
PS-3450A, PS-3451A, PS3000-BA, PS3001-BD	COM1, COM2 ^{*1*2}	COM2 ^{*1*2}	COM2 ^{*1*2}	
PS-3650A, PS-3651A	COM1 ^{*1}	-	-	
PS-3700A (Pentium®4-M) PS-3710A	COM1 ^{*1} , COM2 ^{*1} , COM3 ^{*2} , COM4	COM3 ^{*2}	COM3 ^{*2}	
PS-3711A	COM1 ^{*1} , COM2 ^{*2}	COM2 ^{*2}	COM2 ^{*2}	
PL-3000B, PL-3600T, PL-3600K, PL-3700T, PL-3700K, PL-3900T	COM1 ^{*1*2} , COM2 ^{*1} , COM3, COM4	COM1 ^{*1*2}	COM1 ^{*1*2}	

*1 The RI/5V can be switched. Use the IPC's switch to change if necessary.

*2 Set up the SIO type with the DIP switch. Please set up as follows according to SIO type to be used.

DIP switch setting: RS-232C

DIP switch	Setting	Description
1	OFF ^{*1}	Reserved (always OFF)
2	OFF	SIO type: RS-232C
3	OFF	510 type. K5-252C
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA (RXA): Not available
8	OFF	Short-circuit of SDB (TXB) and RDB (RXB): Not available
9	OFF	- RS (RTS) Auto control mode: Disabled
10	OFF	KS (K15) Auto control mode. Disabled

*1 When using PS-3450A, PS-3451A, PS3000-BA and PS3001-BD, turn ON the set value.

DIP switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	510 type. K5-422/465
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA (RXA): Not available
8	OFF	Short-circuit of SDB (TXB) and RDB (RXB): Not available
9	OFF	RS (RTS) Auto control mode: Disabled
10	OFF	KS (KIS) Auto control mode. Disabled

DIP switch setting: RS-422/485 (4 wire)

DIP switch setting: RS-422/485 (2 wire)

DIP switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	510 type. R5-422/465
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	ON	Short-circuit of SDA (TXA) and RDA (RXA): Available
8	ON	Short-circuit of SDB (TXB) and RDB (RXB): Available
9	ON	- RS (RTS) Auto control mode: Enabled
10	ON	NS (NIS) Auto control mode. Endoled

3 External Device Selection

Select the External Device to be connected to the Display.

💰 New Project File			×
GP-Pro	Device/PL	C	
	Maker	MODBUS IDA	
	Series	General MODBUS RTU SIO Master	
	🗌 Use S	Use System Area Refer to the manual of this Device/PLC	
	Connection	Method	
	Port	COM1	
			Go to Device/PLC Manual
Back (<u>B)</u> Con	nmunication Settings New I	_ogic New Screen Cancel

Setup Items	Setup Description	
Maker	Select the maker of the External Device to be connected. Select "MODBUS IDA".	
Series	Select the model (series) of the External Device to be connected and connection method. Select "General MODBUS RTU SIO Master". In the System Configuration, check to make sure the External Device you are connecting is supported in "General MODBUS RTU SIO Master".	
Use System Area	 Select this option to synchronize the system data area of the Display and the device (memory) of the External Device. When they are synchronized, you can use the ladder program of the External Device to switch the display or to display a window on the Display. Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)" 	
Use Uystem Area	This can also be set with GP-Pro EX or in the Display's off-line mode.	
	Cf. GP-Pro EX Reference Manual "5.17.6 Setting Guide of [System Setting Window], Setting Guide of [Main Unit Settings], System Area Setting"	
	Cf. Maintenance/Troubleshooting Manual "2.15.1 Common to the Display", Setting Guide of [Main Unit Settings], System Area Setting"	
Port	Select the port of the Display to be connected to the External Device.	

7

4 Communication Setting

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

4.1 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
Maker MODBU:	S IDA Series General MODBUS RTU SIO Master Port COM1
Text Data Mode	1 Change
Communication Settings	
SIO Type	• RS232C C RS422/485(2wire) C RS422/485(4wire)
Speed	19200 💌
Data Length	C 7 C 8
Parity	O NONE O EVEN O ODD
Stop Bit	• 1 C 2
Flow Control	NONE C ER(DTR/CTS) C XON/XOFF
Timeout	3 (sec)
Retry	2
Wait To Send	3 📑 (ms) 🔽 Default Value
RI / VCC	© RI O VCC
	32C, you can select the 9th pin to RI (Input) Supply), If you use the Digital's RS232C se select it to VCC. Default
Device-Specific Settings	_
Allowable Number of	
1 PLC1	Tame Seturings Slave Equipment Address=1,Rest of the bits in this word=Do not clear,IEC61131
Allowable Number of Number Device N	lame Settings

NOTE

• Select "NONE" or "ER (DTR/CTS)" for the flow control according to the cable to use.

Device Setting

To display the [Individual Device Settings] dialog box, select the external device and click in [Settings] from [Device-Specific Settings] in the [Device/PLC] window. To connect multiple External Devices, click if from [Device-Specific Settings] in the [Device/PLC] window to add another External Device.

[Equipment Configuration] Tab	[Function Code and Max Query] Tab
Individual Device Settings	💰 Individual Device Settings 🛛 🗙
PLC1	PLC1
Equipment Configuration Function Code and Max Query Equipment Address	Equipment Configuration Function Code and Max Query
Bit manipulation (set/reset) to Holding Register	Frame Length 254 🛨
Rest of the bits in this word Clear Clear Do not clear	Start Address Range Read Boundary Write Boundary
Note on when selecting "Donat clear": If the ladder program writes data to Holding Register during the read/write process, the resulting data may be inconnect.	000001 65536 01 2000 0F 800 10001 65536 02 2000 300001 65536 04 125 400001 65536 03 125 10 100
EC61131 Syntax	
Address Mode O-based (Default)	
If you change the setting, please reconfirm all address settings.	
Variables	
Double Word word order Low word first(L/H)	
Import Export Default	Import Export Default
OK (0) Cancel	OK (0) Cancel

External Device Settings

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

4.2 Setting Example 2

- 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/PL	<u>c</u>		
Maker MODBUS IDA Series General MODBUS RTU SIO Master Port COM1	-		
Text Data Mode 1 Change			
Communication Settings			
SIO Type C RS232C C RS422/485(2wire) 📀 RS422/485(4wire)			
Speed 19200			
Data Length O 7 💿 8			
Parity C NONE C EVEN C ODD			
Stop Bit 1 C 2			
Flow Control O NONE O ER(DTR/CTS) O X0N/X0FF			
Timeout 3 芸 (sec)			
Retry 2			
Wait To Send 3 🔆 (ms) 🔽 Default Value			
RI/VCC © RI C VCC			
In the case of RS232C, you can select the 9th pin to RI [Input] or VCC (5V Power Supply). If you use the Digital's RS232C Isolation Unit, please select it to VCC.			
Device-Specific Settings			
Allowable Number of Devices/PLCs 31			
Number Device Name Settings Image: Slave Equipment Address=1 Rest of the bits in this word=Do not clear,IEC6 Image: Slave Equipment Address=1 Rest of the bits in this word=Do not clear,IEC6	1131		

Device Setting

To display the [Individual Device Settings] dialog box, select the external device and click in [Settings] from [Device-Specific Settings] in the [Device/PLC] window. To connect multiple External Devices, click if from [Device-Specific Settings] in the [Device/PLC] window to add another External Device.

[Equipment Configuration] Tab	[Function Code and Max Query] Tab
💰 Individual Device Settings 🛛 🗙	💰 Individual Device Settings 🛛 🗙
PLC1	PLC1
Equipment Configuration Function Code and Max Query	Equipment Configuration Function Code and Max Query
Slave Equipment Address 1	Auto adjust to frame length C Custom
Bit manipulation (set/reset) to Holding Register	Frame Length 254
Rest of the bits in this word C Clear O not clear	Start Address Range Read Boundary Write Boundary
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.	000001 65536 01 2000 0F 800 100001 65536 02 2000 300001 65536 04 125 400001 65536 03 125 10 100
Address Mode O-based (Default)	
If you change the setting, please reconfirm all address settings.	
Variables Double Word word order Low word first(L/H)	
Import Export Default	Import Export Default
OK (0) Cancel	OK (0) Cancel

External Device Settings

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

4.3 Setting Example 3

- GP-Pro EX Settings
- Communication Settings

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

Device/PLC1	
Summary Change Devi	ce/PLC
Maker MODBUS IDA Series General MODBUS RTU SIO Master Port COM1	
Text Data Mode 1 Change	
Communication Settings	
SID Type C RS232C C RS422/485(2wire) C RS422/485(4wire)	
Speed 19200 💌	
Data Length C 7 💽 8	
Parity C NONE C EVEN C ODD	
Stop Bit 💿 1 🔿 2	
Flow Control O NONE O ER(DTR/CTS) O X0N/X0FF	
Timeout 3 (sec)	
Retry 2	
Wait To Send 3 (ms) 🔽 Default Value	
RI/VCC © RI C VCC	
In the case of RS232C, you can select the 9th pin to RI [Input] or VCC (5V Power Supply). If you use the Digital's RS232C Isolation Unit, please select it to VCC.	
Device-Specific Settings	
Allowable Number of Devices/PLCs 31	
Number Device Name Settings Number Device Name Settings Image: Setting Se	UEC61131
	,,200/101

Device Setting

To display the [Individual Device Settings] dialog box, select the external device and click in [Settings] from [Device-Specific Settings] in the [Device/PLC] window. To connect multiple External Devices, click if from [Device-Specific Settings] in the [Device/PLC] window to add another External Device.

[Equipment Configuration] Tab	[Functi	on Coc	le and	d Max C	Query] Tab
🐉 Individual Device Settings 🛛 🛛 🗙	💰 Individual Devi	e Settings				×
PLC1	PLC1					
Equipment Configuration Function Code and Max Query Equipment Address Slave Equipment Address 1	Equipment Configur			1ax Query Custom		
Bit manipulation (set/reset) to Holding Register	Frame Length	254		÷		
Rest of the bits in this word C Clear Clear	Start Address	Range	Read	Boundary	Write	Boundary
Note on when selecting "Do not clear". If the leader program write data to Holding Register during the read/write process, the resulting data may be incorrect.	000001 100001 300001 400001	65536 65536 65536 65536	01 02 04 03	2000 2000 125 125	0F 10	800 100
EEC61131 Syntax						
Address Mode O-based (Default)						
If you change the setting, please reconfirm all address settings.						
Variables Double Word word order Low word first(L/H)						
Import Export Default	Import Export					Default
OK (0) Cancel					OK (O)	Cancel

External Device Settings

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

5 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.

"4 Communication Setting" (page 8)

5.1 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
Maker MODB	US IDA Series General MODBUS RTU SID Master Port COM1
Text Data Mode	1 Change
Communication Settings	8
SIO Type	
Speed	19200
Data Length	0.7 0.8
Parity	
Stop Bit	© 1 C 2
Flow Control	NONE C ER(DTR/CTS) C XON/XOFF
Timeout	3 ÷ (sec)
Retry	2
-	
Wait To Send	3 🔆 (ms) 🔽 Default Value
RI / VCC	
In the case of R!	S232C, you can select the 9th pin to RI (Input)
or VCC (5V Pow Isolation Unit, ple	er Supply). If you use the Digital's RS232C ease select it to VCC. Default
Device-Specific Setting	e
Allowable Number	
Number Device	Name Settings
👗 1 PLC1	Slave Equipment Address=1,Rest of the bits in this word=Do not clear,IEC61131

Setup Items	Setup Description	
SIO Type	Select the SIO type for communicating with the External Device.	
Speed	Select the communication speed between the External Device and the Display.	
Data Length	Select a data length.	
Parity	Select how to check parity.	
Stop Bit	Select a stop bit length.	
Flow Control	Select the communication control method to prevent overflow of transmission and reception data.	
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".	

Continued to next page.

Setup Items	Setup Description	
Wait To Send	Enter the standby time (ms) from when the Display receives packets until it transmits the next command, from "0 to 5000". When the check box of the default value is checked, the Wait To Send value automatically changes in the formula below by changing each value for Speed/Data Length/Parity/Stop Bit. Wait To Send (ms) = $\frac{3500 \text{ x} (1 + \text{Data Length} + \text{Stop Bit} + \text{Parity})}{\text{Speed (bps)}}$ Value for the parity setting is shown below. No Parity = 0 Parity Even = 1 Parity Odd = 1	
RI/VCC	You can switch between RI/VCC on the 9th pin when you select RS-232C for SIO type. To connect to the IPC, you need to switch between RI/5V using the IPC selector switch. Refer to your IPC manual for details.	

Device Setting

To display the [Individual Device Settings] dialog box, select the external device and click if [Settings] from [Device-Specific Settings] in the [Device/PLC] window. To connect multiple External Devices, click if from [Device-Specific Settings] in the [Device/PLC] window to add another External Device.

• [Equipment Configuration] Tab

quipment Configuration Funct	ion Code and Max Query
Slave Equipment Address	1 *
Bit manipulation (set/reset) to H	lolding Register
Rest of the bits in this word	C Clear 💿 Do not clear
	data to Holding Register during the read/write
process, the resulting data r	nay be incorrect.
process, the resulting data r IEC61131 Syntax Address Mode	D-based (Default)
IEC61131 Syntax Address Mode	
☐ IEC61131 Syntax Address Mode If you change the setting, ple	0-based (Default)
☐ IEC61131 Syntax Address Mode	0-based (Default)

Setup Items		Setup Description
Slave Equipment Address		Use an integer from 1 to 247 to enter the slave address of the External Device.
Bit manipulation (set/reset) to Holding Register		Select how other bits in the same word are handled when you manipulate bits in
	Rest of the bits in this word	the holding register, from "Clear" or "Do not clear".
IEC61131 Syntax		Select this item to use the IEC61131 syntax for variables. If you check this item, 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 settings described in the xml file. ^{(GP} " ◆ Import Procedure in the Device Setting" (page 20)
Export		Export the device settings into the xml file. ☞ " ◆ Export Procedure in the Device Setting" (page 20)

• [Function Code and Max Query] Tab (when "Auto adjust to frame length" is selected)

ð	Individual Device	Settings				×
Р	LC1					
ĺ	Equipment Configurati	on Function (Code and Ma	ax Query		
	Auto adjust to frame length C Custom					
	Frame Length	254		÷		
	Start Address	Range	Read	Boundary	Write	Boundary
	000001	65536	01	2000	OF	800
	100001	65536	02	2000		
	300001	65536 65536	04 03	125 125	 10	100
]					
	Import Export					Default
)K (O)	Cancel

Setup Items	Setup Description
Auto adjust to frame length	Automatically set each function code and the 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 settings described in the xml file. ☞ " ◆ Import Procedure in the Device Setting" (page 20)
Export	Export the device settings into the xml file. ⁽ → Export Procedure in the Device Setting" (page 20)

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			
Device	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.

• [Function Code and Max Query] Tab (when "Custom" is selected)

Pl	Individual Device LC1 Equipment Configurati C Auto adjust to fran Add Configuration	on Function I me length	Code and Ma			×
	Start Address	Range	Read	Boundary	Write	Boundary
	000001	65536	01	2000	0F	800
	100001	65536	02	2000	UP	
	300001	65536	04	125		
	400001	65536	03	125	10	100
ļ	Import Export)K (O)	Default Cancel

Setup Items	Setup Description
Custom	Manually set each function code and the boundary for one communication.
Add	Add the function code and its data boundary settings. Up to 20 settings can be added. Add the settings in the [Add setting] dialog box.
Configuration	Change the selected device settings. Change the settings in the [Configuration setting] dialog box.
Delete	Delete the selected device settings.
Import	Import the device settings described in the xml file.
Export	Export the device settings into the xml file. ☞ " ◆ Export Procedure in the Device Setting" (page 20)

• [Add setting] Dialog Box / [Configuration setting] Dialog Box

Add setting	
Start Address	000001
Range	65536
Read Function Code	01
Boundary	2000 *
Write Function Code	OF (Multiple)
Boundary	800 *
OK	Cancel

Configuration setting	
Start Address	000001
Range	65536 🕂
Read Function Code	01
Boundary	2000 📫
Write Function Code	OF (Multiple)
Boundary	800 📫
ОК	Cancel

	Setup Items	Setup Description
Start Add	dress	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.		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.

	Function Code (Boundary)			
Device	Read		rite	
	Reau	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"></modbusconfiguration>	
<clearbits>OFF</clearbits>	Bit manipulation to Holding Register
<addressmode>ModiconSyntax</addressmode>	Address Mode
<dword>L/H</dword>	Double Word word order
<functioncode></functioncode>	
<mode>Custom</mode>	Mode
<setting></setting>	
<address>000001</address>	Start Address
<range>65535</range>	Range
<read></read>	
<functioncode>01</functioncode>	Read Function Code
<boundary>2000</boundary>	Read Boundary
<write></write>	
<functioncode>0F</functioncode>	Write Function Code
<boundary>800</boundary>	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].

5.2 Setup Items 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 off-line mode. Touch the External Device you want to set from the displayed list.

Comm.	Device	Option		
General MODBUS RTU	SIO Master		[COM1]	Page 1/1
	SIO Type Speed Data Length Parity Stop Bit Flow Control	RS232C 19200 7 NONE • 1 NONE	• 8 • EVEN • 2	ODD
	Timeout(s) Retry Wait To Send(ms)		3 2 3	
	Exit		Back	2008/03/04 16:57:00

Setup Items	Setup Description		
SIO Type	Select the SIO type for communicating with the External Device. MPORTANT In the communication settings, set [SIO Type] correctly according to the serial interface specifications of the Display. If you select an SIO type that the serial interface does not support, proper operation cannot be guaranteed. Refer to your Display manual for details on the serial interface specifications.		
Speed	Select the communication speed between the External Device and the Display.		
Data Length	Select a data length.		
Parity	Select how to check parity.		
Stop Bit	Select a stop bit length.		
Flow Control	Select the communication control method to prevent overflow of transmission and reception data.		
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.		

Continued to next page.

Setup Items	Setup Description		
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 next command, from "0 to 5000". After changing the values of Speed/Data Length/Parity/Stop Bit, set the Wait To Send value using the following formula. Wait To Send (ms) = $\frac{3500 \times (1 + \text{Data Length} + \text{Stop Bit} + \text{Parity})}{\text{Speed (bps)}}$ Value for the parity setting is shown below.		
	No Parity = 0 Parity Even = 1 Parity Odd = 1		

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].

(Page 1/22)

Comm,	Device	Option		
General MODBUS RTU	SIO Master		[COM1]	Page 1/22
	Slave Address		1_	
	Bit manipulation to HM Double Word word order IEC61131 Syntax		bits in word are no d first	t cleared
	Eui+		Prok	2008/03/04
	Exit		Back	2008/03/ 16:57:0

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])
Slave Address	Use an integer from 1 to 247 to enter the slave address 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.)

Continued to next page.

Setup Items	Setup Description
IEC61131 Syntax	Displays the usage status of the currently set IEC61131 syntax in ON/OFF. (Not available in off-line mode.)

(Page 2/22)

Comm,	Device	Option		
General MODBUS RTU	SIO Master		[COM1]	Page 2/22
Device	/PLC Name PLC	1		•
	Function Code and Ma	ax Query		
			just to Frame Length	
	Auto adjust Setting Frame Length	254		
				+ +
	Exit		Back	2008/03/04 16:57:13

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		
Frame Length	in the online mode. (Not available to set in off-line mode.)		

NOTE

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

(Page 3/22 to 22/22)

Comm,	Device	Option		
General MODBUS RTU	SIO Master		[COM1]	Page 3/22
Device	/PLC Name	01		T
	Custom Setting 1			
	Start Address	000001		
	Range	65536		
	Read	01 / 2000		
	Write	0F / 0800	l.	
				← →
	Exit		Back	2008/03/04 16:57:22

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.

Option

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 [Option].

Device	Option		
SIO Master	<u>,</u>	[COM1]	Page 1/1
the 9th pin to Power Supply).	RI(Input) or VCC(5) If you use the Digit	/ al's	0000 /00 /04
Exit		Back	2008/03/04 16:58:36
	SIO Master RI / VCC In the case of the 9th pin to Power Supply). RS232C Isolati it to VCC.	SIO Master RI / VCC • RI In the case of RS232C, you can sel the 9th pin to RI(Input) or VCC(5V Power Supply). If you use the Digit RS232C Isolation Unit, please sele it to VCC,	S10 Master [COM1] RI / VCC • RI • VCC In the case of RS232C, you can select the 9th pin to R1(Input) or VCC(5V Power Supply). If you use the Digital's RS232C Isolation Unit, please select it to VCC,

Setup Items	Setup Description		
RI/VCC	You can switch between RI/VCC on the 9th pin when you select RS-232C for SIO type. To connect to the IPC, you need to switch between RI/5V using the IPC selector switch. Refer to your IPC manual for details.		

6 Cable Diagrams

The cable diagram shown below may be different from the cable diagram recommended by MODBUS IDA. Please be assured there is no operational problem in applying the cable diagram shown in this manual.

- The FG pin on the External Device must be D-class grounded. Refer to your External Device manual for details.
- The SG and FG are connected inside the Display. If you connect the External Device to the SG, do not form any short-circuit loop in the system design.
- If the communication is not stable because of noise or other factors, connect an isolation unit.
- The connector type or signal name may vary depending on the External Device. Connect correctly corresponding to the External Device interface specifications.

Cable Diagram 1

Display (Connection Port)		Cable	Remarks
GP (COM1)	А	User created cable (ER (DTR/CTS) control)	
ST (COM1) LT (COM1) IPC ^{*1} PC/AT	В	User created cable (without control)	The cable length must be 15m maximum.

*1 Available only with the COM ports that support RS-232C.

^C ■ IPC COM Port (page 5)

A)User created cable (ER (DTR/CTS) control)

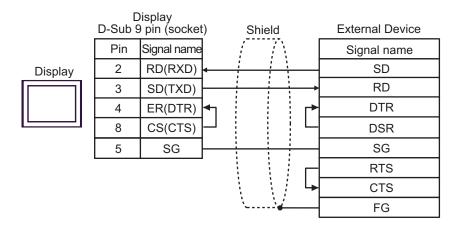
• When the External Device supports RTS/CTS control

	D-Sub 9	Display 9 pin (socket	t)	Shield		External Device
	Pin	Signal name		17		Signal name
Display	2	RD(RXD)		+ +	:	SD
	3	SD(TXD)			+	RD
	4	ER(DTR)	┝───			CTS
	8	CS(CTS)			; ;	RTS
	5	SG			:	SG
						DTR
					<u> </u> •	DSR
				<u> </u>	<u>. </u>	FG

• When the External Device supports DTR/DSR control

	D-Sub §)isplay 9 pin (socke	t)	Shiel	d	External Device
	Pin	Signal name				Signal name
Display	2	RD(RXD)		+ +		SD
	3	SD(TXD)	┣──			RD
	4	ER(DTR)	┣━━━			DSR
	8	CS(CTS)				DTR
	5	SG	┣───			SG
			-			RTS
					- j - 🖌	CTS
				`	4	FG

B) User created cable (without control)



Cable Diagram 2

Display (Connection Port)		Cable	Remarks
GP ^{*1} (COM1) AGP-3302B (COM2) LT (COM1)	А	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
ST ^{*2} (COM2) IPC ^{*3}	В	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	С	User created cable	
	D	Online adapter by Pro-face CA4-ADPONL-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
GP ^{*1} (COM2)	Е	Online adapter by Pro-face CA4-ADPONL-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	F	Online adapter by Pro-face CA4-ADPONL-01 + User created cable	

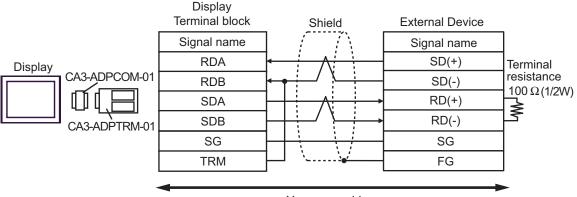
*1 All GP models except AGP-3302B

*2 All ST models except AST-3211A

The RS-422/485 cable length is normally 1000m or less, which depends on the External Device. Please refer to the manual of the External Device for more details.
 The connection method and termination resistance depends on the External Device.

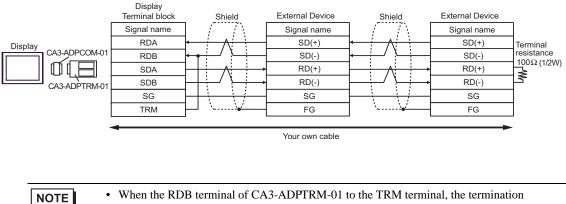
• The termination resistance on the Display is not isolated.

- A) When using the COM port conversion adapter (CA3-ADPCOM-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable.
- 1:1 Connection



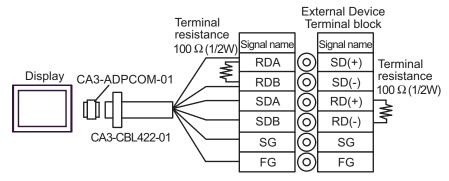
Your own cable

• 1:n Connection

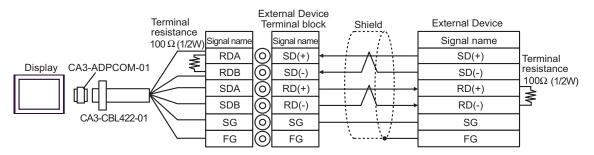


resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

- B) When using the COM port conversion adapter (CA3-ADPCOM-01), and RS-422 cable (CA3-CBL422-01) by Pro-face
- 1:1 Connection

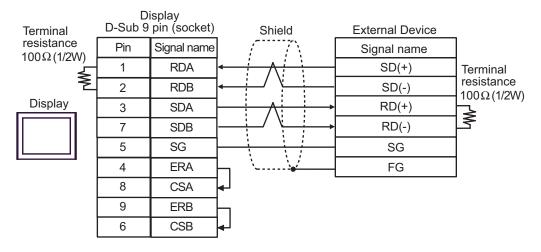


• 1:n Connection

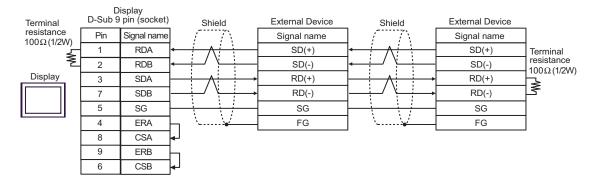


C) User created cable

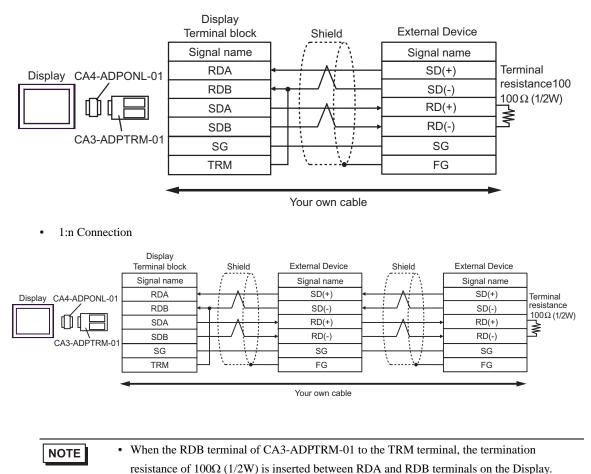
• 1:1 Connection



• 1:n Connection

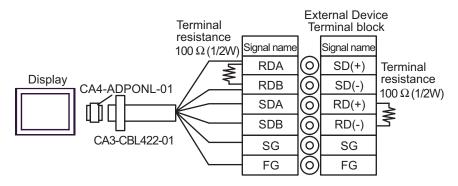


- D) When using the online adapter (CA4-ADPONL-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable
- 1:1 Connection



GP-Pro EX Device/PLC Connection Manual

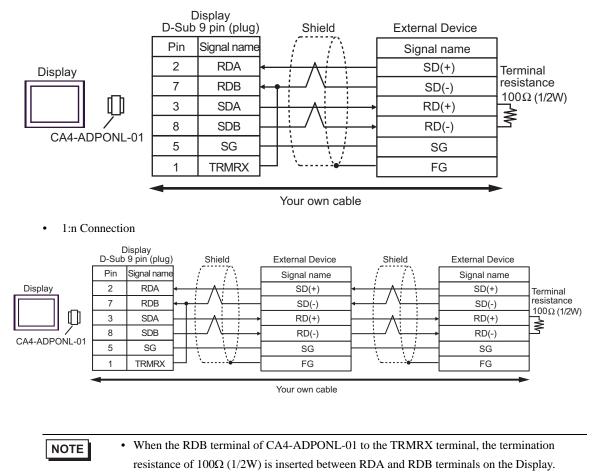
- E) When using the online adapter (CA4-ADPONL-01), the RS-422 cable (CA3-CBL422-01) by Pro-face and a user created cable
- 1:1 Connection



• 1:n Connection

Terminal		External Device Terminal block		External Device	_
resistance 100 Ω (1/2W) Signal name	Signal name	$- \int $	Signal name	
5		O SD(+) +		SD(+)	Terminal
Display CA4-ADPONL-01	RDB	O SD(-) ←	/ \	SD(-)	resistance 100Ω (1/2W)
	SDA	RD(+)		RD(+)	-
	SDB	RD(-)		RD(-)	3
CA3-CBL422-01	SG	O sg -		SG	
	FG	● FG	·	FG	

F) When using the online adapter (CA4-ADPONL-01) by Pro-face and a user created cable



1:1 Connection

Cable Diagram 3

Display (Connection Port)		Cable	Remarks
GP ^{*1} (COM1) AGP-3302B (COM2) LT (COM1) ST ^{*2} (COM2)	А	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	В	User created cable	
GP ^{*1} (COM2)	С	Online adapter by Pro-face CA4-ADPONL-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	D	Online adapter by Pro-face CA4-ADPONL-01 + User created cable	
		COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	F	User created cable	

*1 All GP models except AGP-3302B

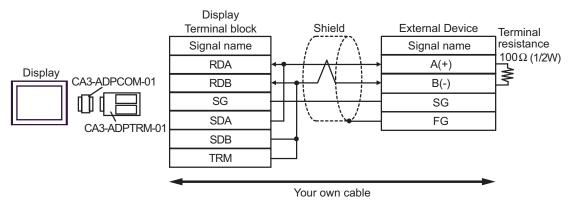
*2 All ST models except AST-3211A

IMPORTANT

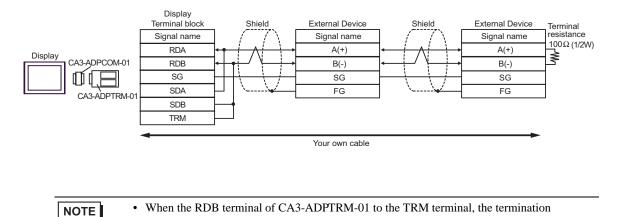
• The RS-422/485 cable length is normally 1000m or less, which depends on the External Device. Please refer to the manual of the External Device for more details.

- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

- A) When using the COM port conversion adapter (CA3-ADPCOM-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable
- 1:1 Connection



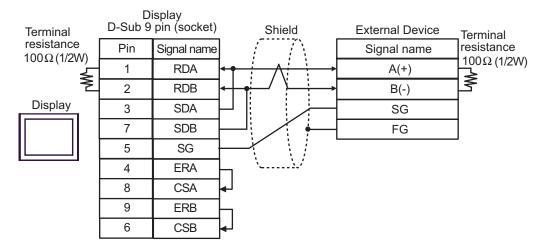
• 1: n Connection



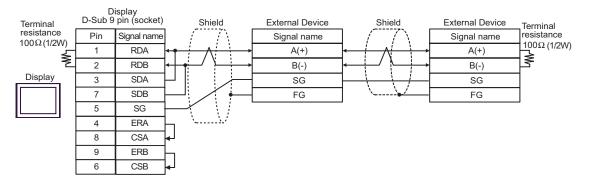
resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

B) User created cable

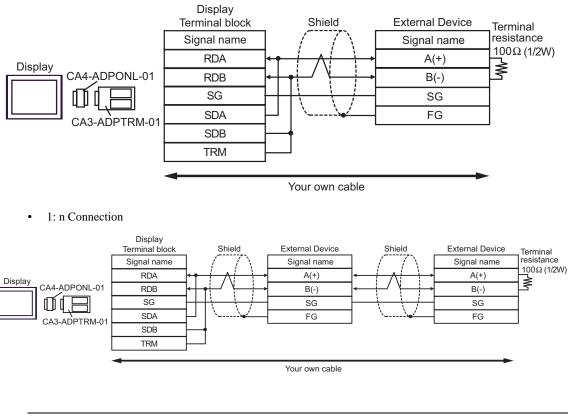
• 1:1 Connection



• 1: n Connection



- C) When using the online adapter (CA4-ADPONL-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable
- 1:1 Connection



NOTE

• When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

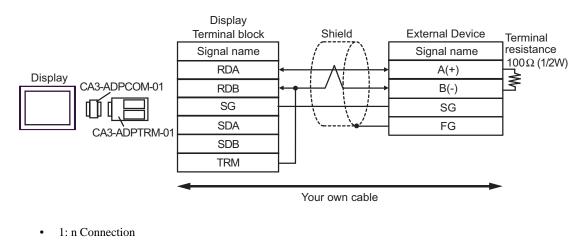
D) When using the online adapter (CA4-ADPONL-01) by Pro-face and a user created cable

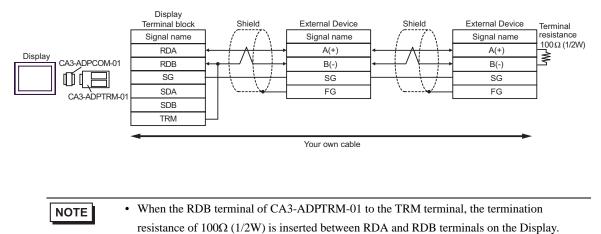
- Display D-Sub 9 pin (plug) Shield **External Device** Terminal resistance Pin Signal name Signal name 100Ω (1/2W) 2 RDA A(+) Display ≹ 7 RDB B(-) 5 SG SG 3 SDA FG CA4-ADPONL-01 8 SDB 1 TRMRX Your own cable 1: n Connection ٠ Display D-Sub 9 pin (plug) External Device External Device Shield Shield Terminal resistance Signal name Signal name Signal name Pin 100Ω (1/2W) 2 RDA A(+) A(+) Display ₹ 7 RDB B(-) B(-) 0 5 SG SG SG 3 SDA FG FG CA4-ADPONL-01 8 SDB 1 TRMRX Your own cable
- 1:1 Connection

NOTE

• When the RDB terminal of CA4-ADPONL-01 to the TRMRX terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

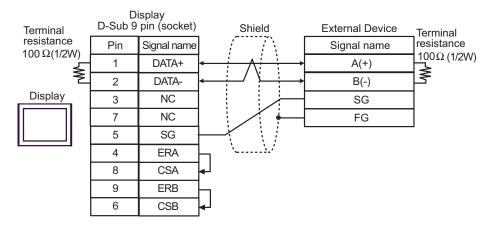
- E) When using the COM port conversion adapter (CA3-ADPCOM-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable
- 1:1 Connection



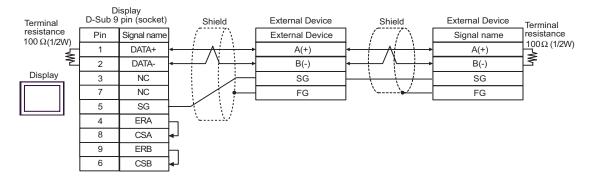


GP-Pro EX Device/PLC Connection Manual

- F) User created cable
- 1:1 Connection



• 1: n Connection



Supported Device 7

The range of supported device addresses is shown in the table below. Please note that the actual supported range for devices varies depending on the external device that is used. Please check the actual range in the external device manual.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521		<u>+1B+</u>
Discrete Input	100001 - 165536	100001 - 165521	[L / H]	+1B+ 1 *2
Input Register		300001 - 365536	or	<u>Bit</u> 15 *2
Holding Register	400001,00 - 465536,15	400001 - 465536	<u>[H/L]</u>	<u>₿ i t</u> 15] *3
Input Register		D300001 - D365535	*1	<mark>ві 131</mark> *2
Holding Register	D400001,00 - D465535,31	D400001 - D465535		<u>,∎,,</u> 31) *4

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

"5.1 Setup Items in GP-Pro EX" (page 14)

- *2 Write disable.
- *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].

<u>ві 1</u>51 "Clear".....

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

*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]. ~ 4

"Clear"	_{ві} ,31
---------	-------------------

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

IEC61131 Syntax Address Description

The following table compares IEC61131 and MODBUS syntax address descriptions.

	MODBUS Syntax		IEC61131 Syntax					
Device			0-based		1-based			
Device	Format	Range	First element	Format	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
 • 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-" and invalid. 								
• Refer to the GP-Pro EX Reference Manual for system data area. Cf. GP-Pro EXReference Manual "Appendix 1.4 LS Area (Direct Access Method)"					ss Method)"			

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

"Manual Symbols and Terminology"

8 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.

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

9 Error Messages

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

Item	Description	
No.	Error Number.	
Device Name	Name of the External Device where an error has occurred. The Device 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.	
	Displays the IP address or device address of the External Device where an error has occurred, or error codes received from the External Device.	
Error Occurrence Area	 NOTE IP address is displayed as "IP address (Decimal): MAC address (Hex)". Device address is 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])"

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

Error Number	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.

Error Messages Specific to the External Device