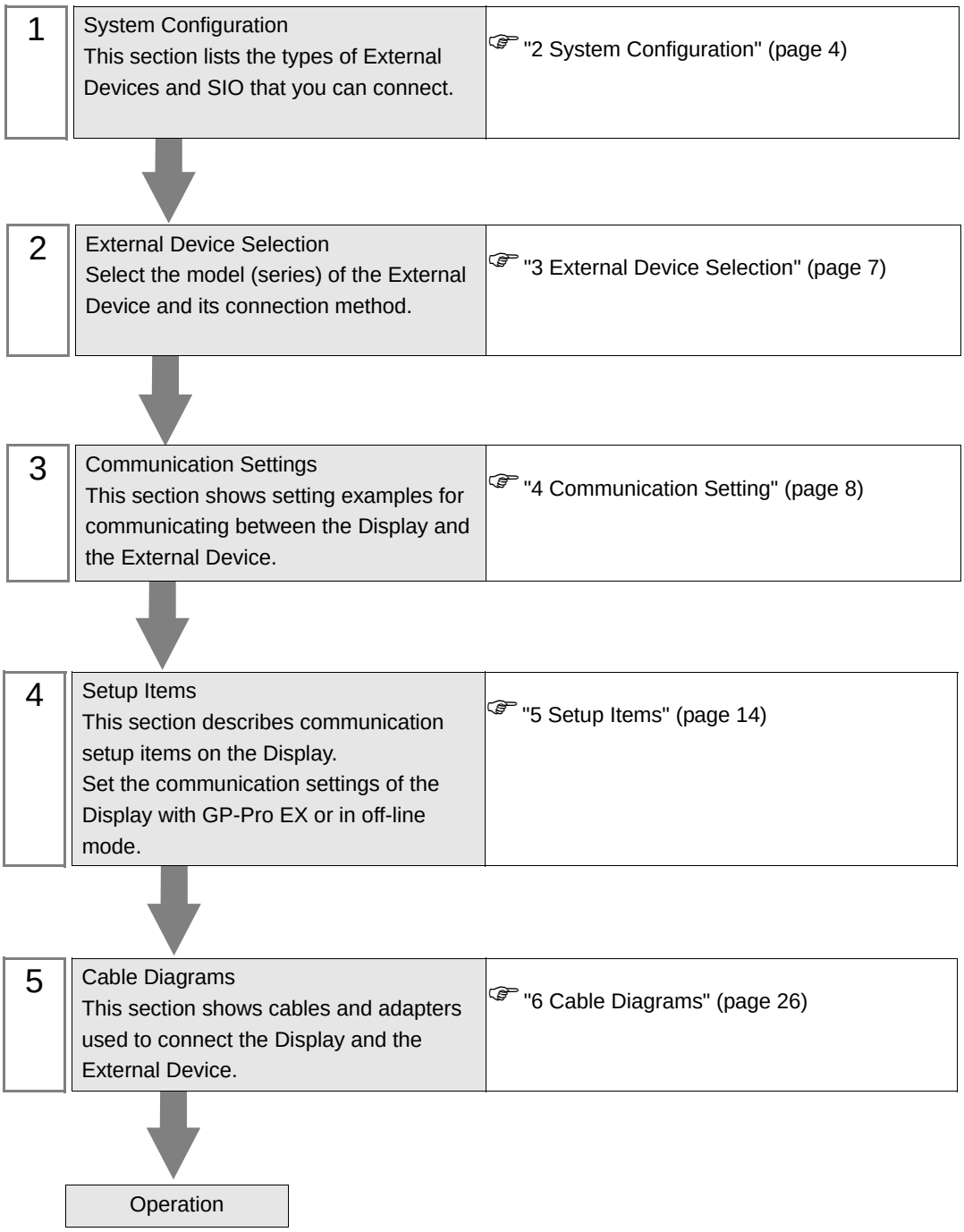
General MODBUS RTU SIO Master Driver

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.

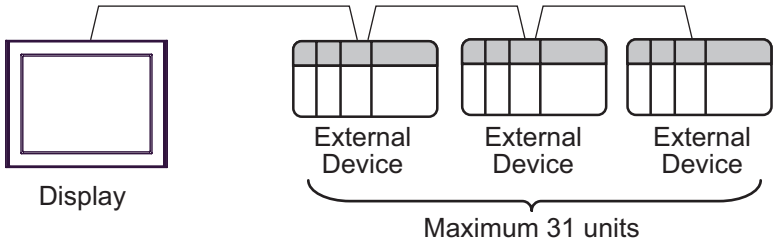
Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
MODBUS Slave Device			RS-232C	Setting Example 1 (page 8)	Cable Diagram 1 (page 26)
			RS-422/485 (4 wire)	Setting Example 2 (page 10)	Cable Diagram 2 (page 28)
			RS-422/485 (2 wire)	Setting Example 3 (page 12)	Cable Diagram 3 (page 35)

■ Connection Configuration

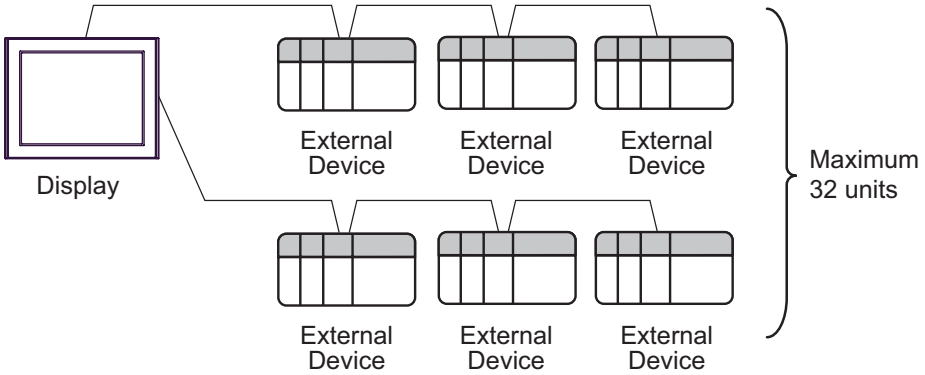
◆ 1:1 Connection

◆ 1: n Connection

- Using 1 port



- Using 2 or more ports



■ 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		
	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	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) 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	

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

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

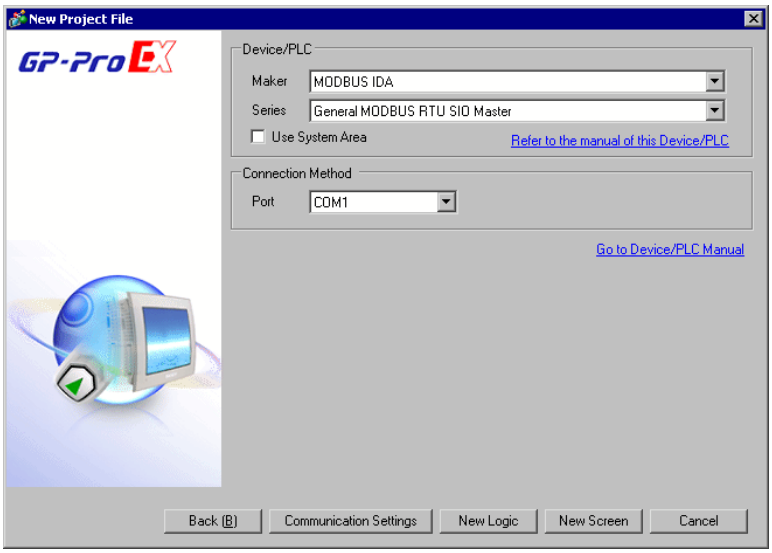
DIP switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA (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	

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	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) 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	

3 External Device Selection

Select the External Device to be connected to the Display.



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". ☞ "2 System Configuration" (page 4)
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)" 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.

4 Communication Setting

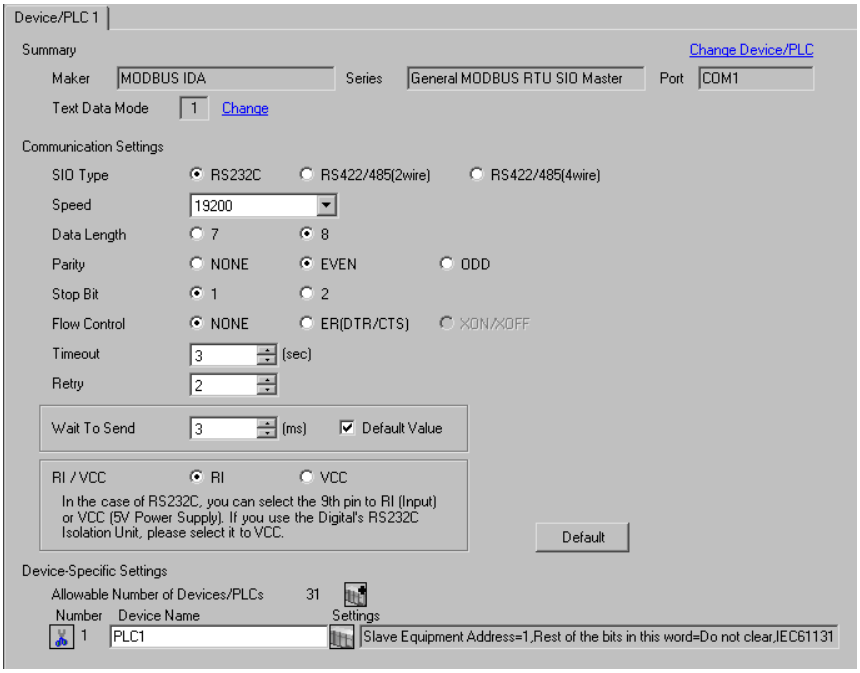
This section provides examples of communication settings for the Display and the External Device, which are recommended by Pro-face.

4.1 Setting Example 1

■ GP-Pro EX Settings

◆ Communication Settings

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



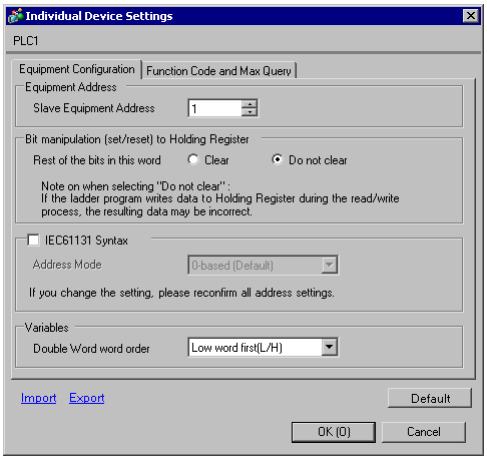
NOTE

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

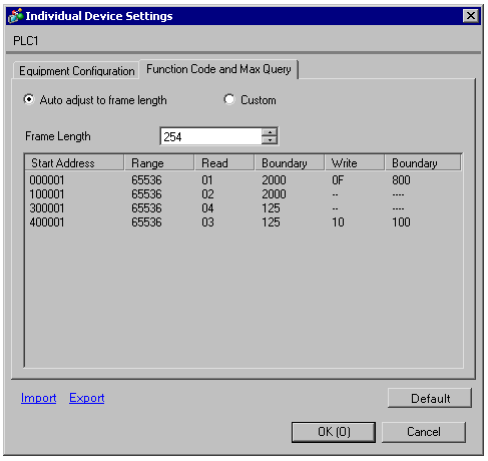
◆ Device Setting

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

[Equipment Configuration] Tab



[Function Code and Max Query] Tab



■ External Device Settings

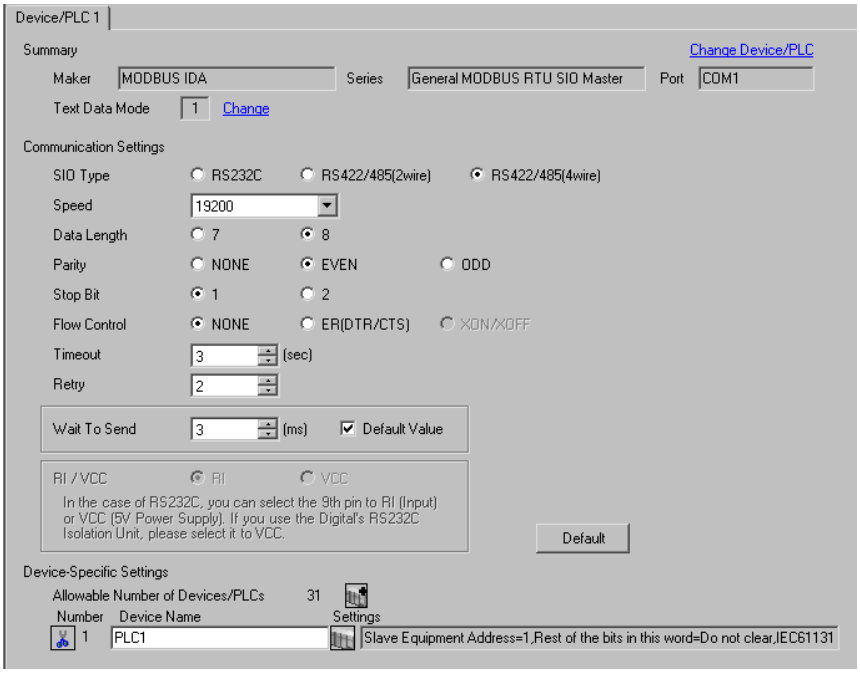
External Device settings vary depending on the device. Refer to your External Device manual for details.

4.2 Setting Example 2

■ GP-Pro EX Settings

◆ Communication Settings

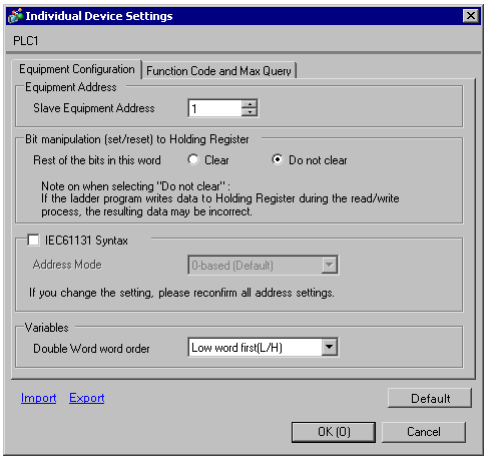
To display the setup screen, from the [System Settings] workspace, select [Device/PLC].



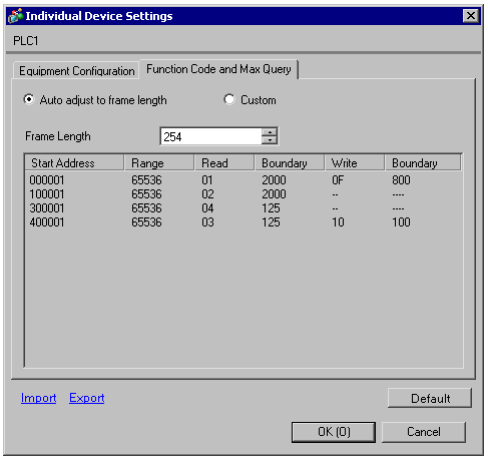
◆ Device Setting

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

[Equipment Configuration] Tab



[Function Code and Max Query] Tab



■ External Device Settings

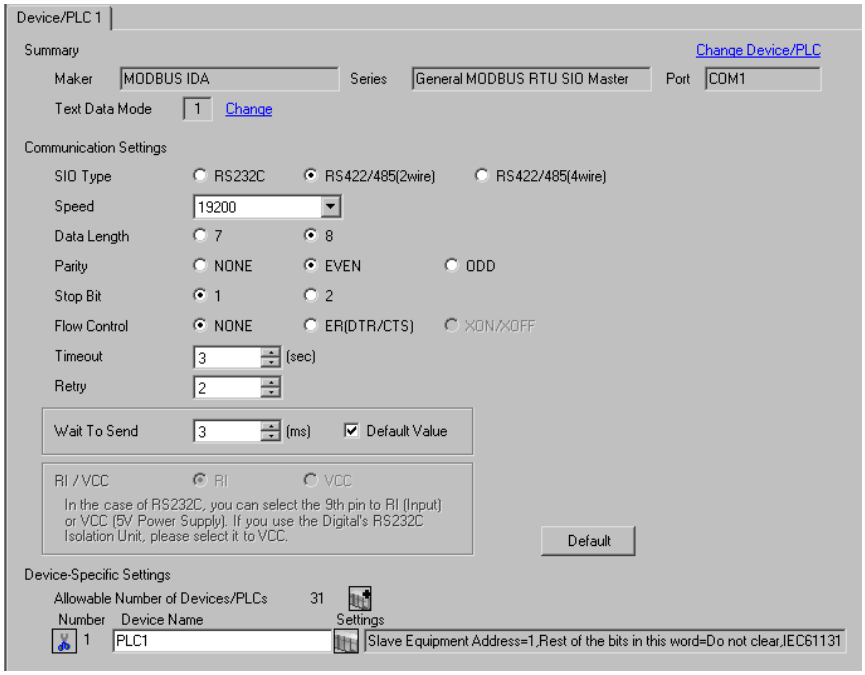
External Device settings vary depending on the device. Refer to your External Device manual for details.

4.3 Setting Example 3

■ GP-Pro EX Settings

◆ Communication Settings

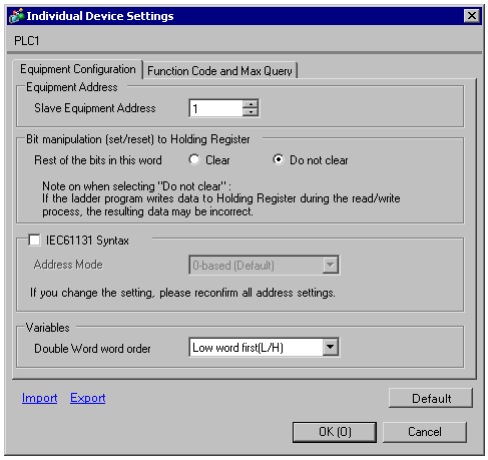
To display the setup screen, from the [System Settings] workspace, select [Device/PLC].



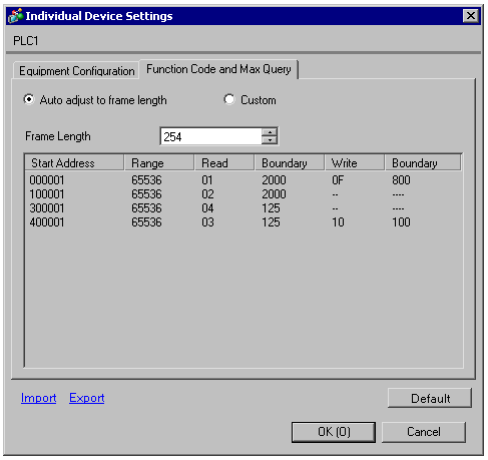
◆ Device Setting

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

[Equipment Configuration] Tab



[Function Code and Max Query] Tab



■ 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.

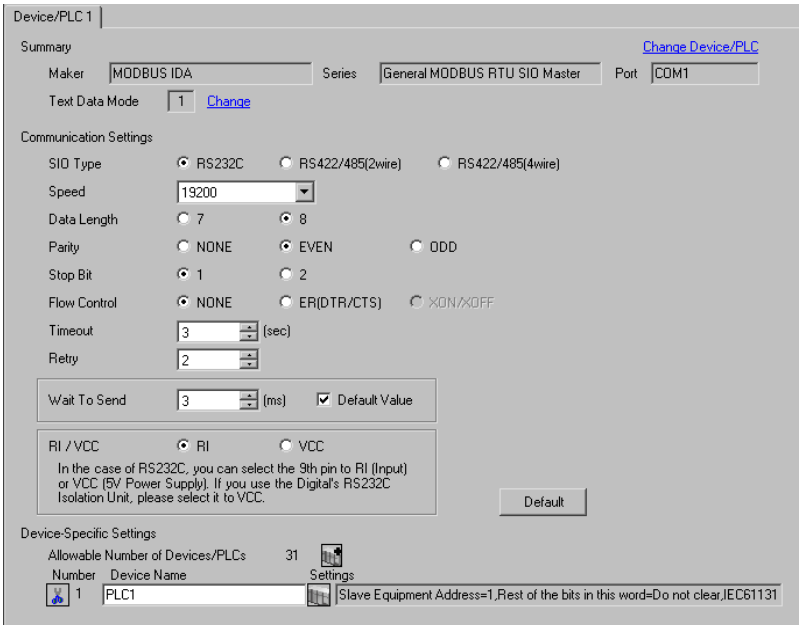
The setting of each parameter must match that of the External Device.

☞"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].



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".

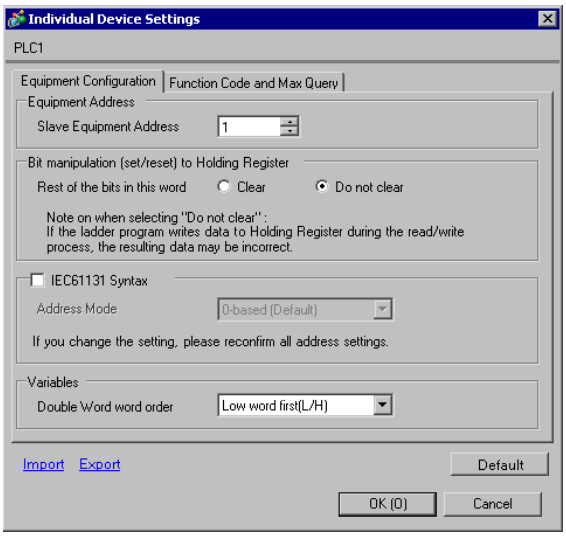
Continued to next page.

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. $\text{Wait To Send (ms)} = \frac{3500 \times (1 + \text{Data Length} + \text{Stop Bit} + \text{Parity})}{\text{Speed (bps)}}$ Value for the parity setting is shown below. No Parity = 0 Parity Even = 1 Parity Odd = 1
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

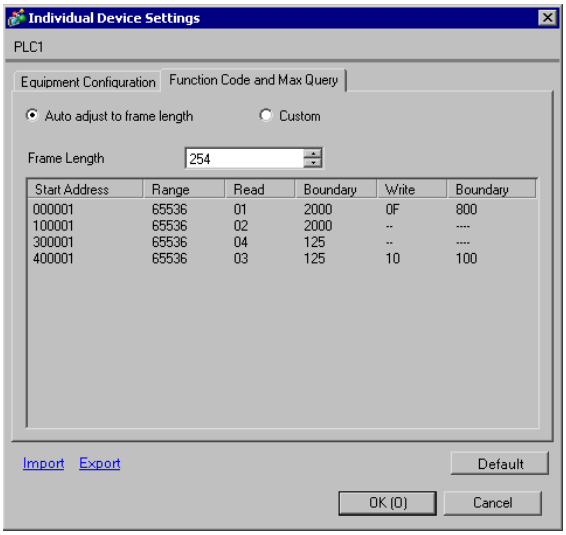
To display the [Individual Device Settings] dialog box, select the external device and click [Settings] from [Device-Specific Settings] in the [Device/PLC] window. To connect multiple External Devices, click from [Device-Specific Settings] in the [Device/PLC] window to add another External Device.

- [Equipment Configuration] Tab



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 Rest of the 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	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. ☞" ◆ 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)



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)

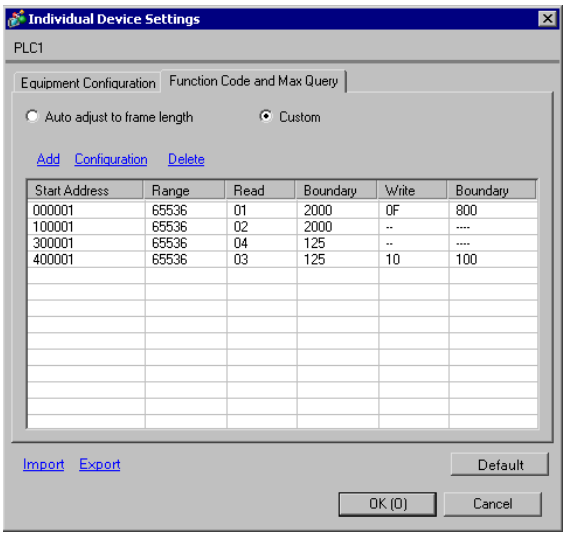
NOTE

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

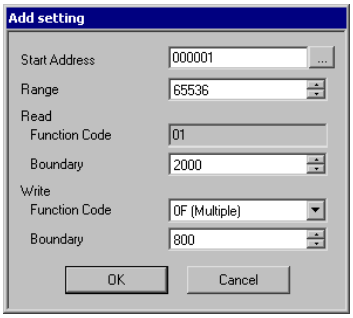
- Use "Custom" in the following cases:
  - When you use a different function code depending on an address.
  - When you use the function code "05: Force Single Coil" or "06: Preset Single Register".
  - When the read/write boundary depends on the device.

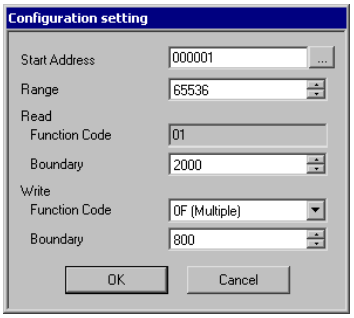
- [Function Code and Max Query] Tab (when "Custom" is selected)



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. ☞ " ◆ 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)

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





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

NOTE

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

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

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

◆ Import Procedure in the Device Setting

1 Create the xml file based on the following format sample.

- Format sample when "Auto adjust to frame length" is selected

```
<?xml version="1.0" encoding="utf-8" ?>
<ModbusConfiguration version="1">
 <ClearBits>OFF</ClearBits>                          Bit manipulation to Holding Register
 <AddressMode>ModiconSyntax</AddressMode>            Address Mode
 <DWORD>L/H</DWORD>                                  Double Word word order
 <FunctionCode>
  <Mode>AutoAdjust</Mode>                            Mode
  <FrameLength>254</FrameLength>                     Frame Length
 </FunctionCode>
</ModbusConfiguration>
```

- Format sample when "Custom" is selected

```
<?xml version="1.0" encoding="utf-8" ?>
<ModbusConfiguration version="1">
 <ClearBits>OFF</ClearBits>                          Bit manipulation to Holding Register
 <AddressMode>ModiconSyntax</AddressMode>            Address Mode
 <DWORD>L/H</DWORD>                                  Double Word word order
 <FunctionCode>
  <Mode>Custom</Mode>                                Mode
  <Setting>
   <Address>000001</Address>                         Start Address
   <Range>65535</Range>                              Range
   <Read>
    <FunctionCode>01</FunctionCode>                  Read Function Code
    <Boundary>2000</Boundary>                        Read Boundary
   </Read>
   <Write>
    <FunctionCode>0F</FunctionCode>                  Write Function Code
    <Boundary>800</Boundary>                         Write Boundary
   </Write>
  </Setting>
 </FunctionCode>
</ModbusConfiguration>
```

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

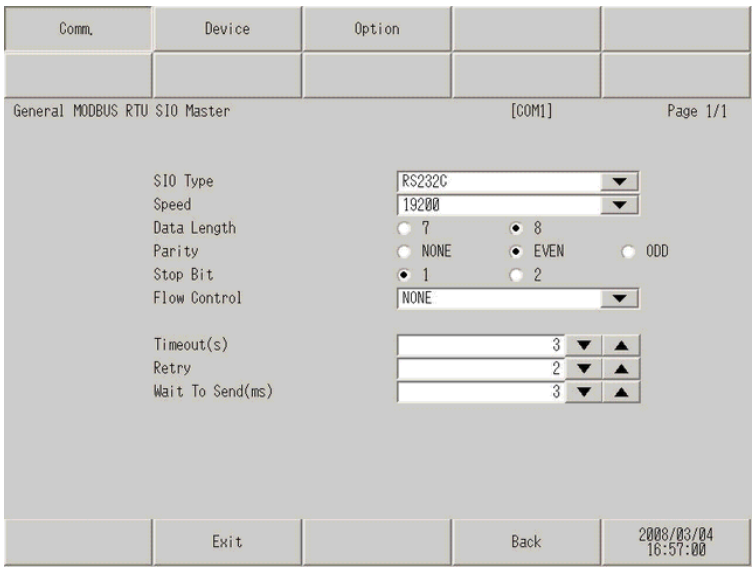
NOTE

- 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.



Setup Items	Setup Description
SIO Type	Select the SIO type for communicating with the External Device. IMPORTANT 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.

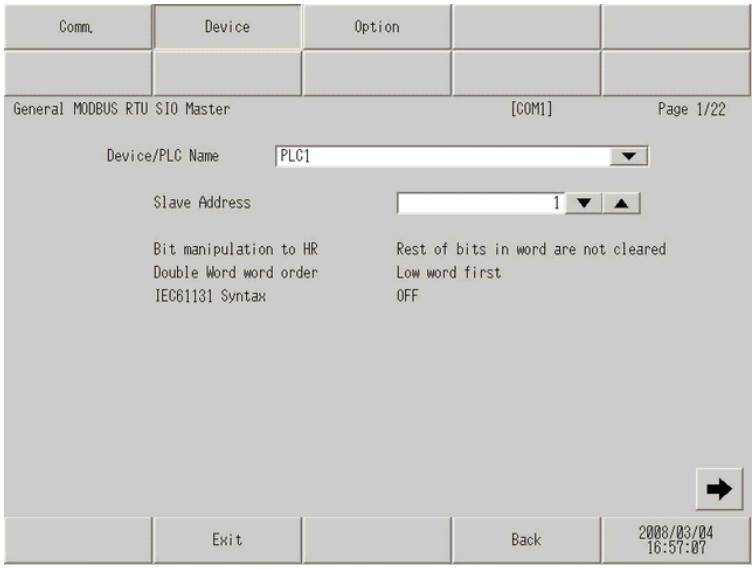
Continued to next page.

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 the 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. $\text{Wait To Send (ms)} = \frac{3500 \times (1 + \text{Data Length} + \text{Stop Bit} + \text{Parity})}{\text{Speed (bps)}}$ 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)

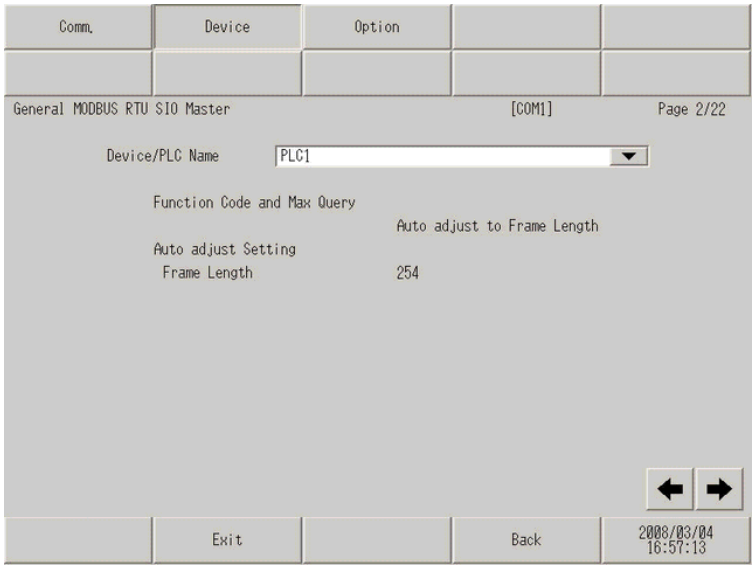


Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. The device name is the title of the External Device set with GP-Pro EX.(Initial value [PLC1])
Slave Address	Use an integer from 1 to 247 to enter the slave address of the External Device.
Bit manipulation to HR	Displays 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)

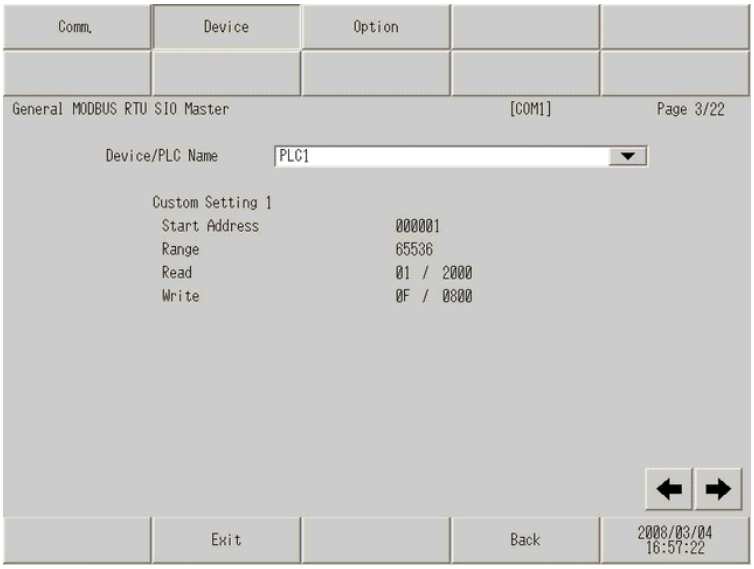


Setup Items		Setup Description
Device/PLC Name		Select the External Device to set. The device name is the title of the External Device set with GP-Pro EX.(Initial value [PLC1])
Function Code and Max Query		Displays the option to set the function code and boundary. (Not available to set in off-line mode.)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

NOTE

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

(Page 3/22 to 22/22)



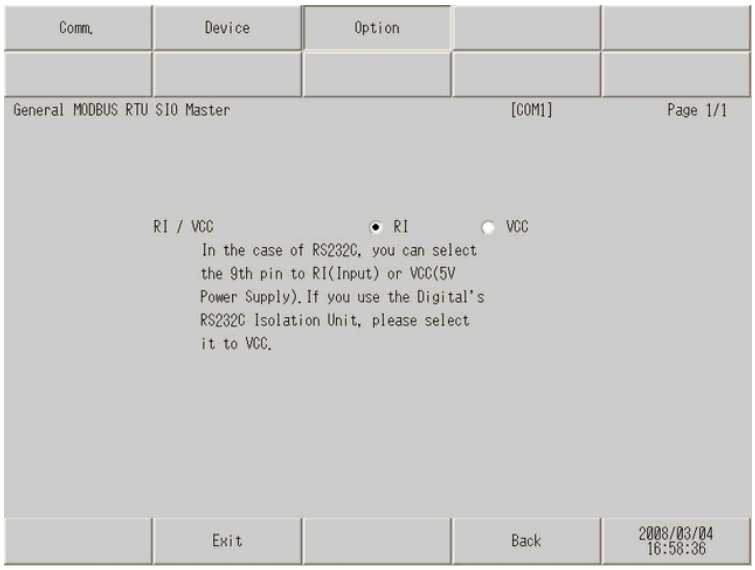
Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. The device name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Start Address	Displays the start address of the device. (Not available to set in off-line mode.)
Range	Displays the range of 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].



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.

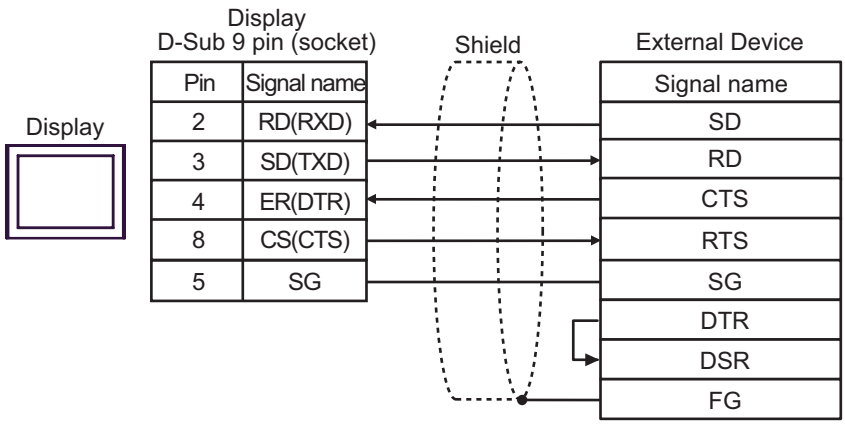
Cable Diagram 1

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

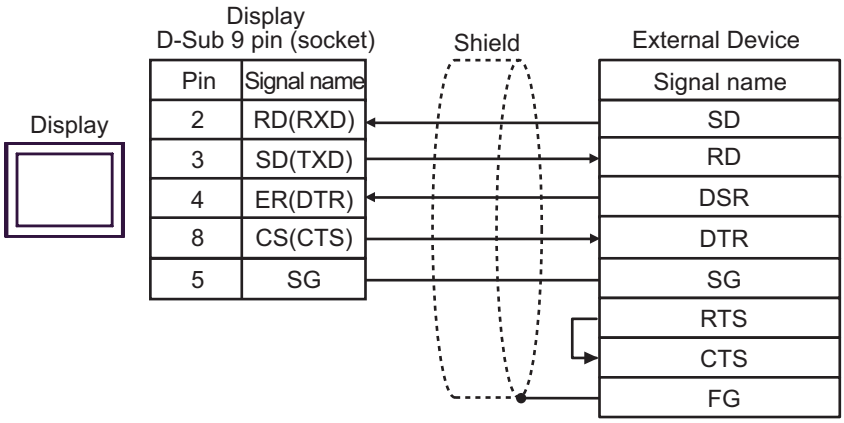
*1 Available only with the COM ports that support RS-232C.
☞■ IPC COM Port (page 5)

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

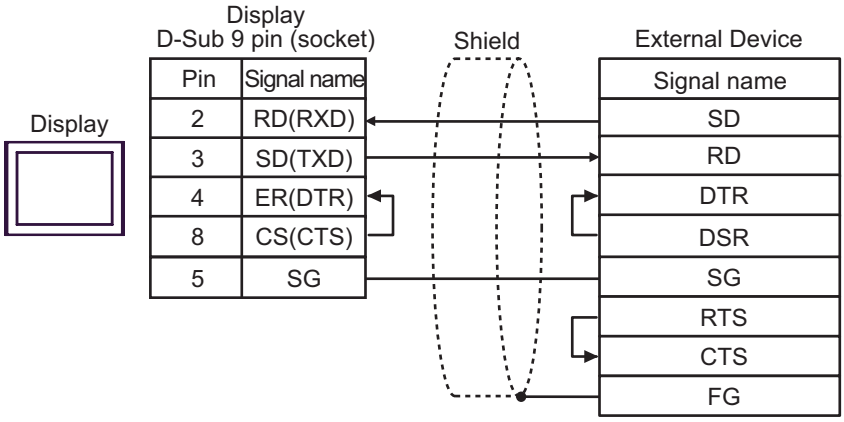
- When the External Device supports RTS/CTS control



- When the External Device supports DTR/DSR control



B) User created cable (without control)



Cable Diagram 2

Display (Connection Port)	Cable		Remarks
GP[*1] (COM1) AGP-3302B (COM2) LT (COM1) ST[*2] (COM2) IPC[*3]	A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	B	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	C	User created cable	
GP[*1](COM2)	D	Online adapter by Pro-face CA4-ADPONL-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	E	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

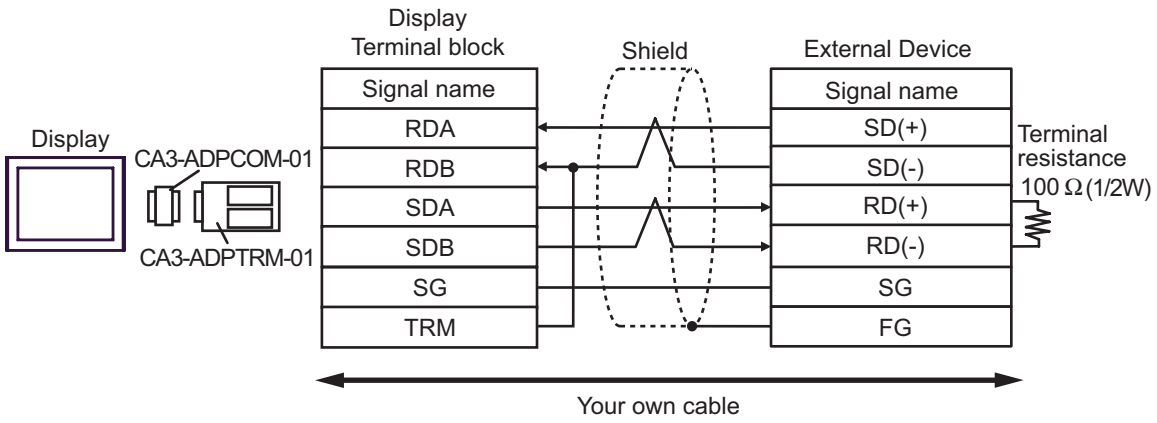
*3 Available only with the COM ports that support RS-422/485 (4 wire).
☞ ■ IPC COM Port (page 5)

IMPORTANT

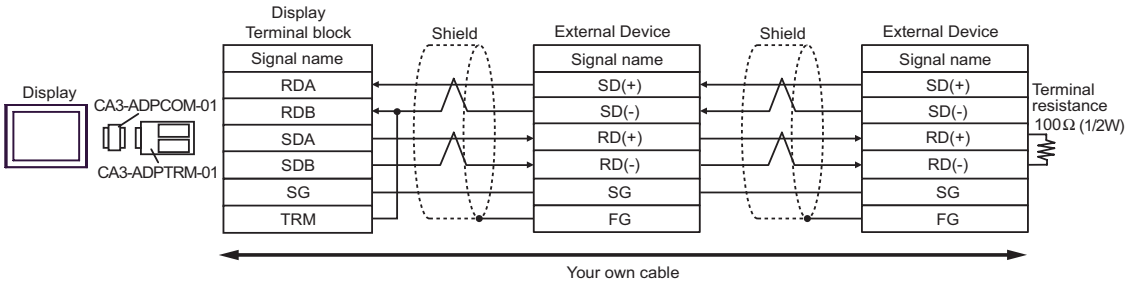
- The RS-422/485 cable length is normally 1000m or less, which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

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

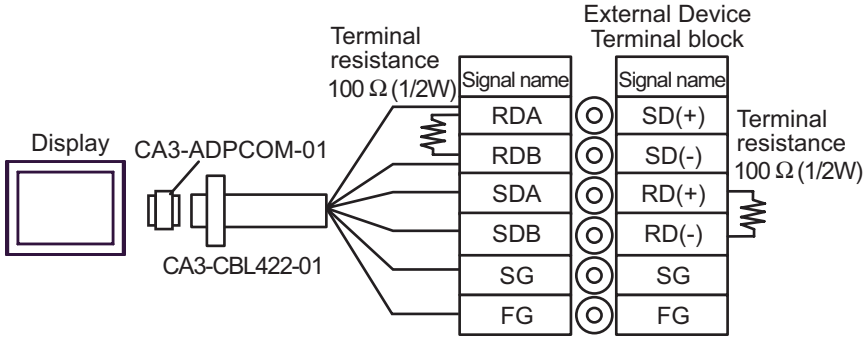


NOTE

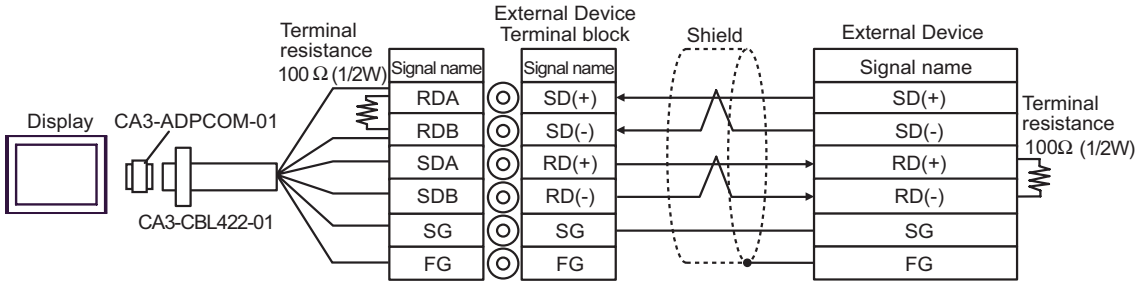
- When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

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

- 1:1 Connection

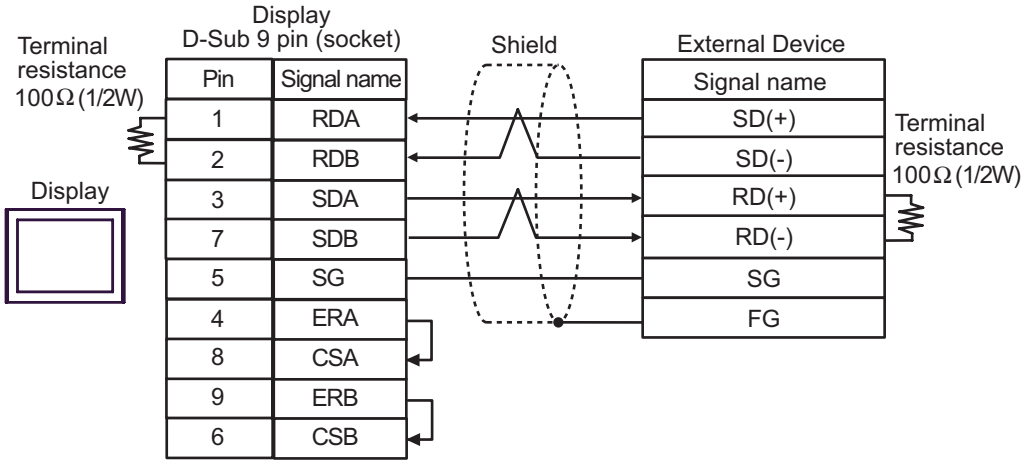


- 1:n Connection

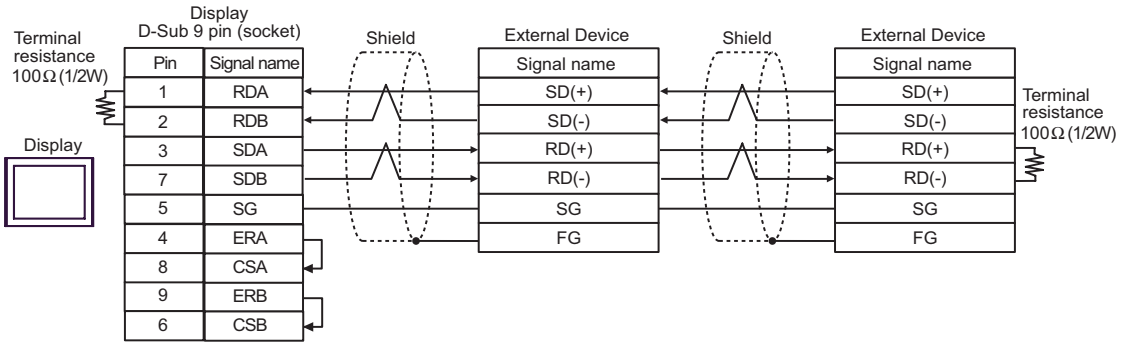


C) User created cable

- 1:1 Connection

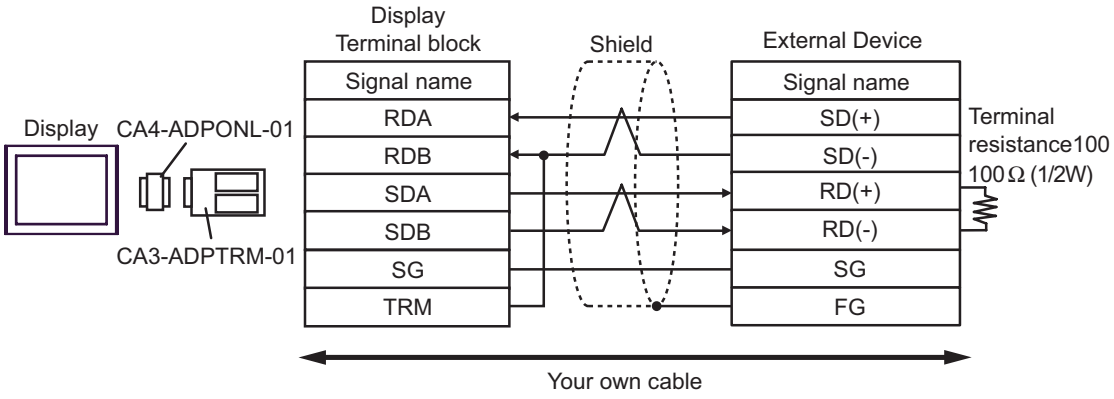


- 1:n Connection

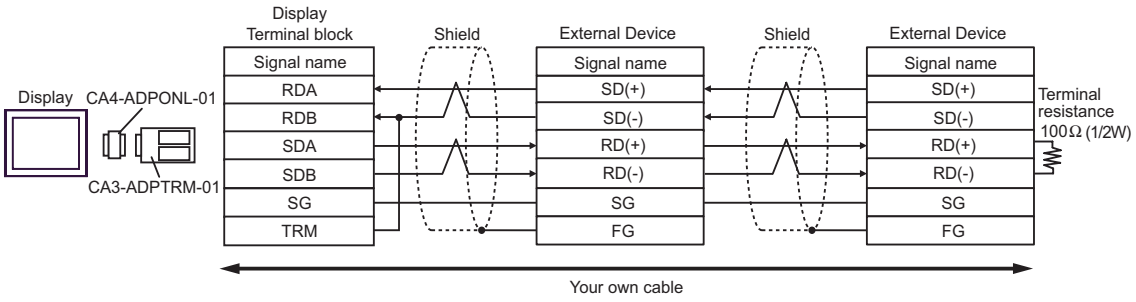


D) When using the online adapter (CA4-ADPONL-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable

- 1:1 Connection



- 1:n Connection

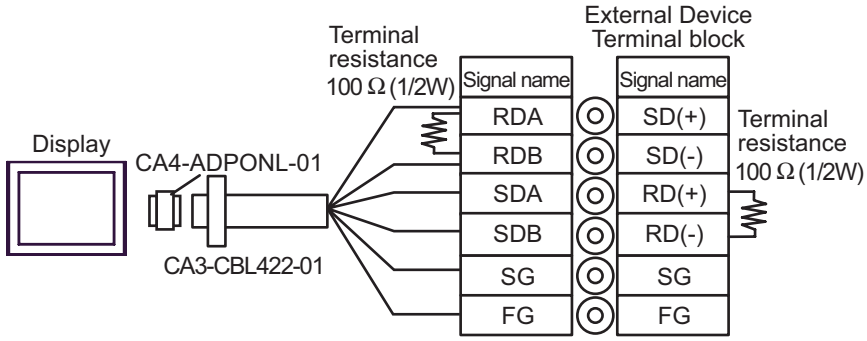


NOTE

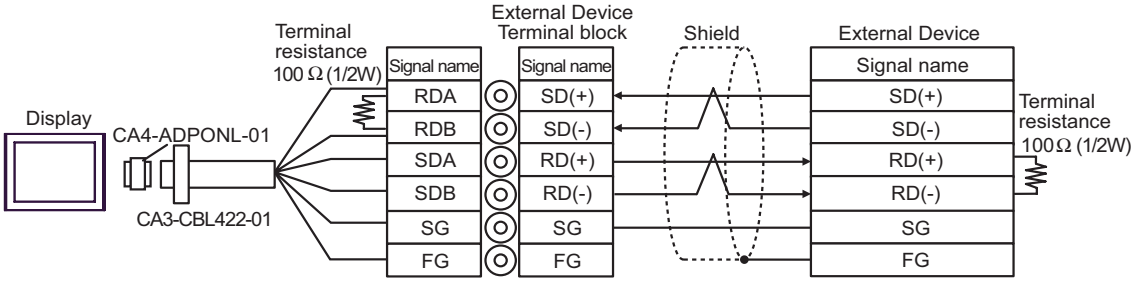
- When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

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

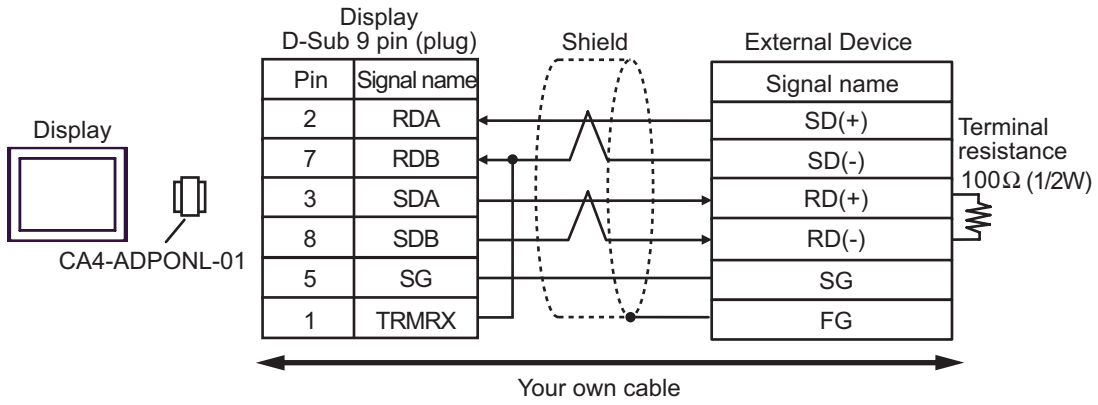


- 1:n Connection

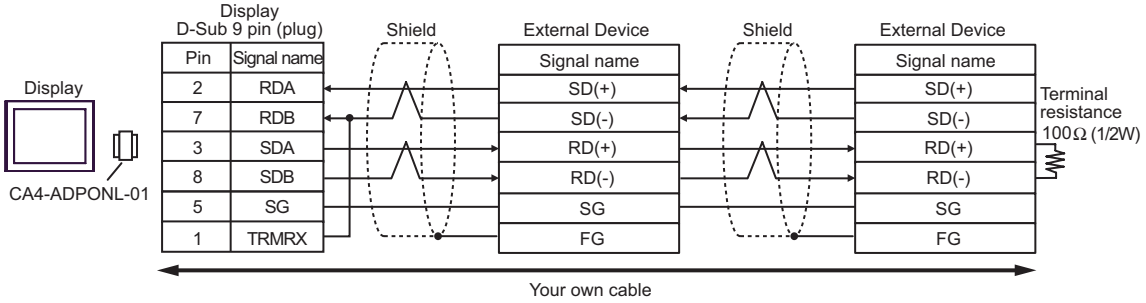


F) When using the online adapter (CA4-ADPONL-01) by Pro-face and a user created cable

- 1:1 Connection



- 1:n 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.

Cable Diagram 3

Display (Connection Port)	Cable		Remarks
GP[*1] (COM1) AGP-3302B (COM2) LT (COM1) ST[*2] (COM2)	A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User created cable	
	B	User created cable	
GP[*1](COM2)	C	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	
IPC[*3]	E	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

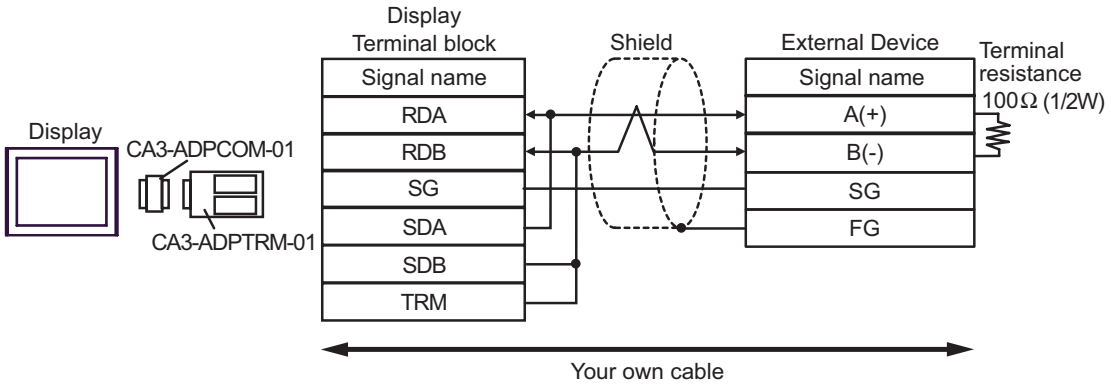
*3 Available only with the COM ports that support RS-422/485 (2 wire).
☞ ■ IPC COM Port (page 5)

IMPORTANT

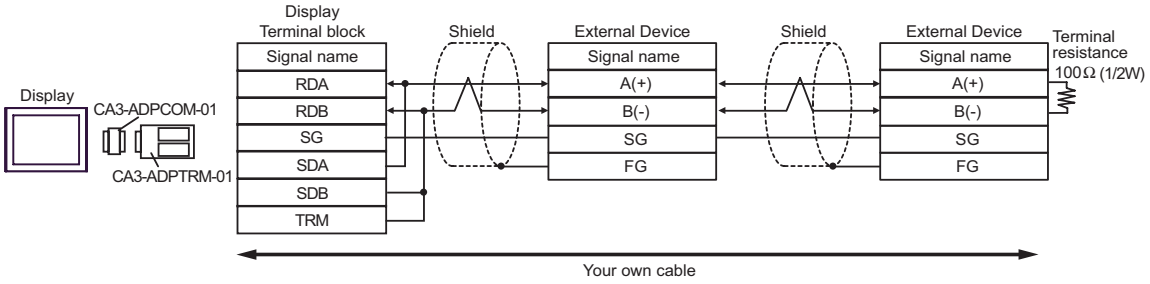
- The RS-422/485 cable length is normally 1000m or less, which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

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

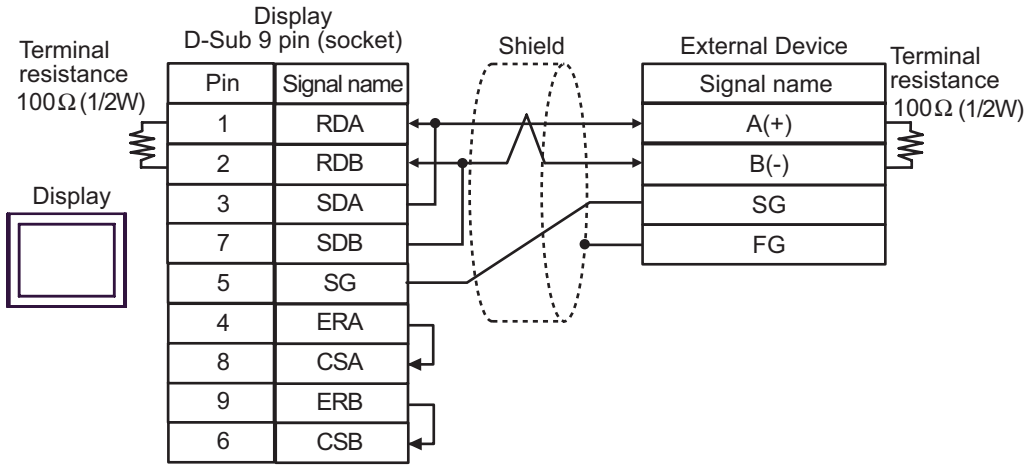


NOTE

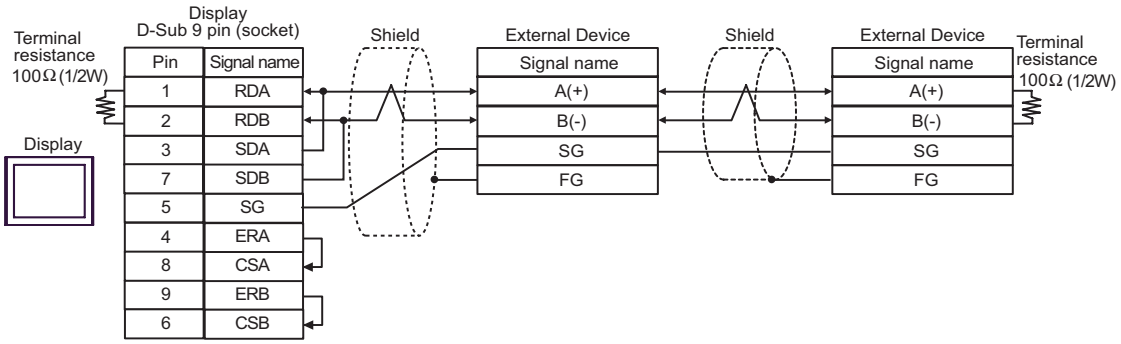
- When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

B) User created cable

- 1:1 Connection

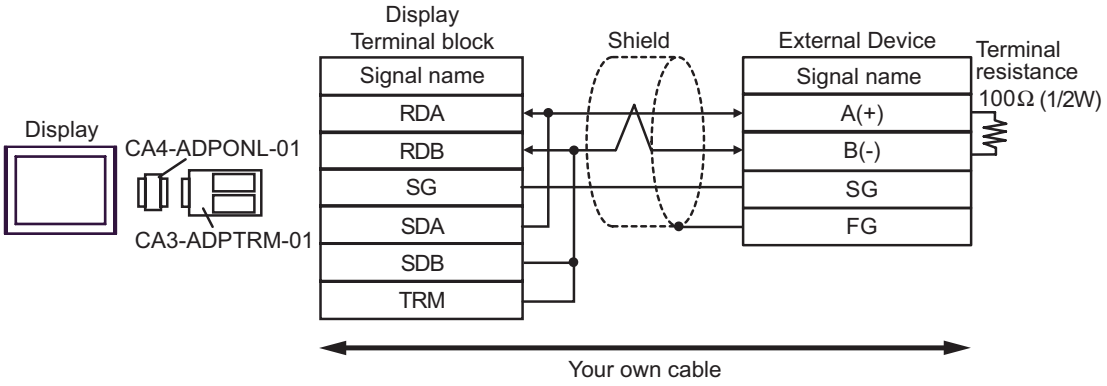


- 1: n Connection

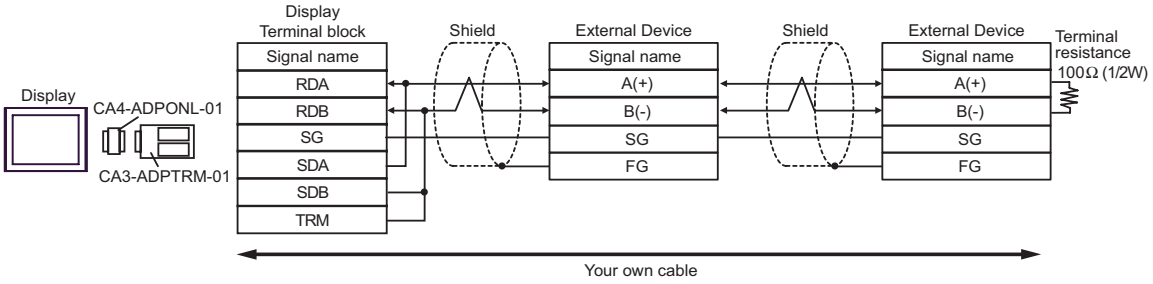


C) When using the online adapter (CA4-ADPONL-01), the connector terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and a user created cable

- 1:1 Connection



- 1: n Connection

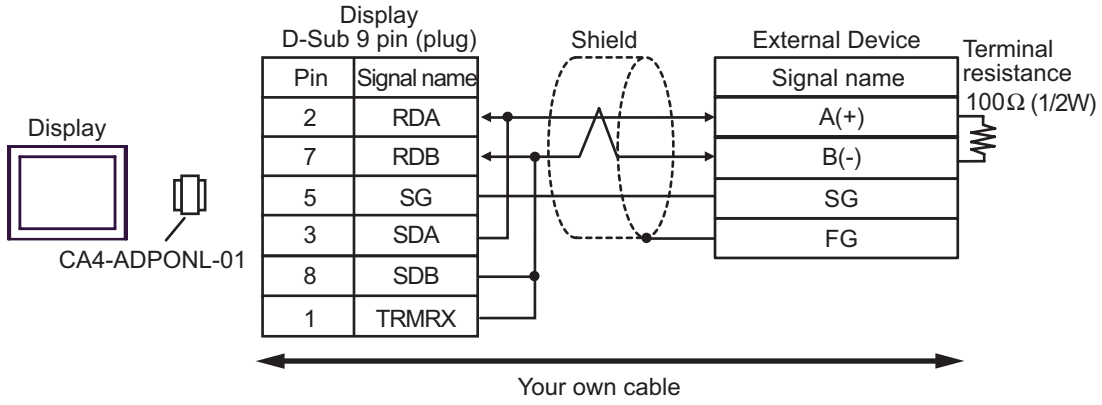


NOTE

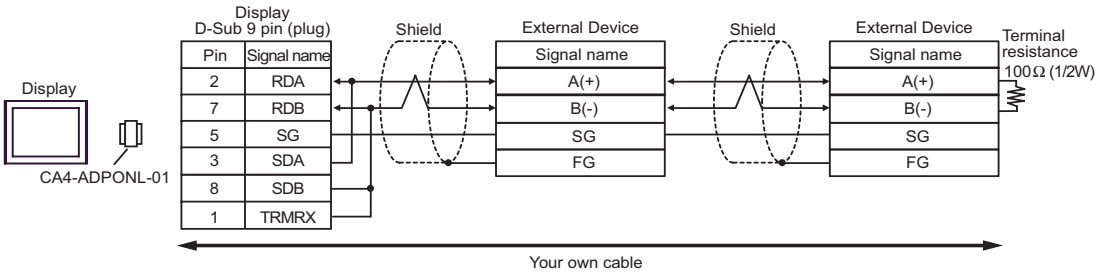
- When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

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

- 1:1 Connection



- 1: n Connection

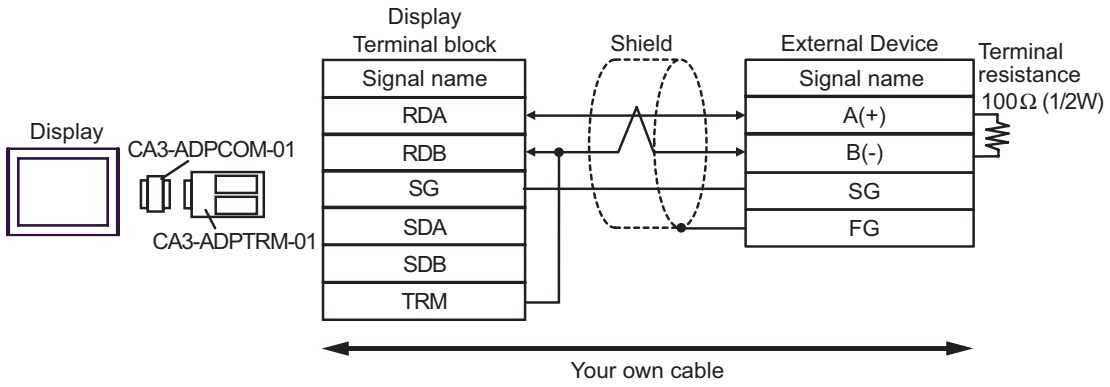


NOTE

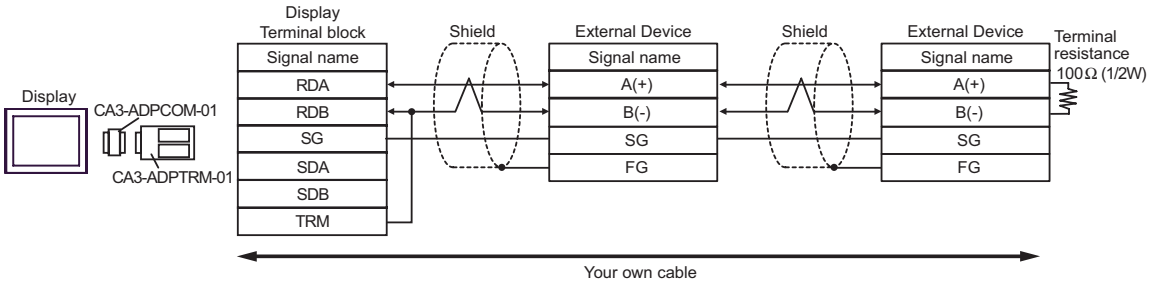
- When the RDB terminal of CA4-ADPONL-01 to the TRMRX terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

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



- 1: n Connection

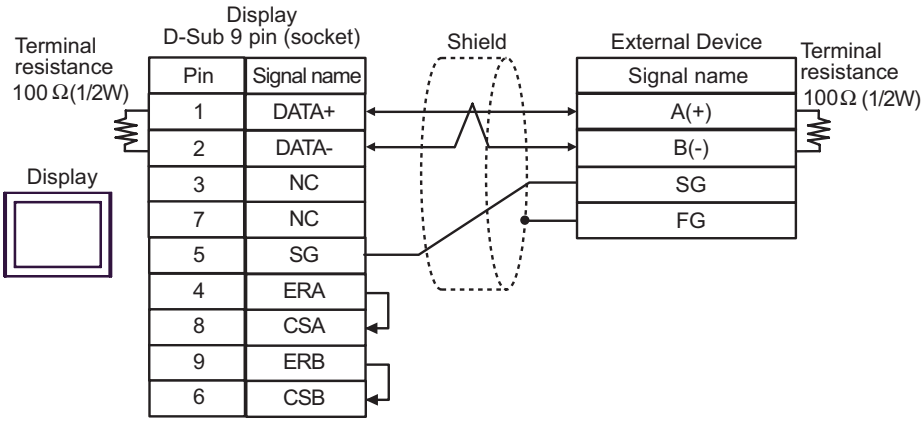


NOTE

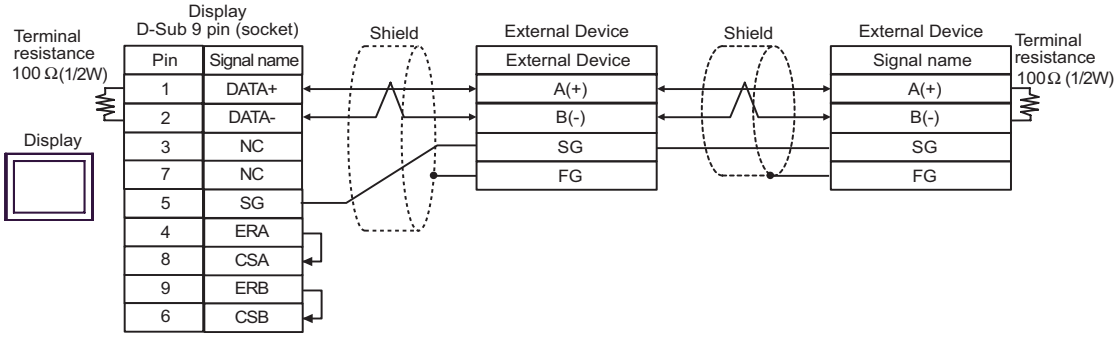
- When the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

F) User created cable

- 1:1 Connection



- 1: n Connection



7 Supported Device

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.

: This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521		16 1
Discrete Input	100001 - 165536	100001 - 165521	L / H	16 1 *2
Input Register	-----	300001 - 365536	or	Bit 15 *2
Holding Register	400001,00 - 465536,15	400001 - 465536	H / L	Bit 15 *3
Input Register	-----	D300001 - D365535	*1	Bit 31 *2
Holding Register	D400001,00 - D465535,31	D400001 - D465535		Bit 31 *4

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

"Clear"..... Bit 15

"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].

"Clear"..... Bit 31

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

■ IEC61131 Syntax Address Description

The following table compares IEC61131 and MODBUS syntax address descriptions.

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

NOTE

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

NOTE

- 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)"

- 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.
Error Occurrence Area	Displays the IP address or device address of the External Device where an error has occurred, or error codes received from the External Device. NOTE • 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])"

NOTE

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

■ Error Codes Specific to the External Device

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

General MODBUS error codes are shown below.

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

■ Error Messages Specific to the External Device

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.