Control Techniques

CNT_MODS_11

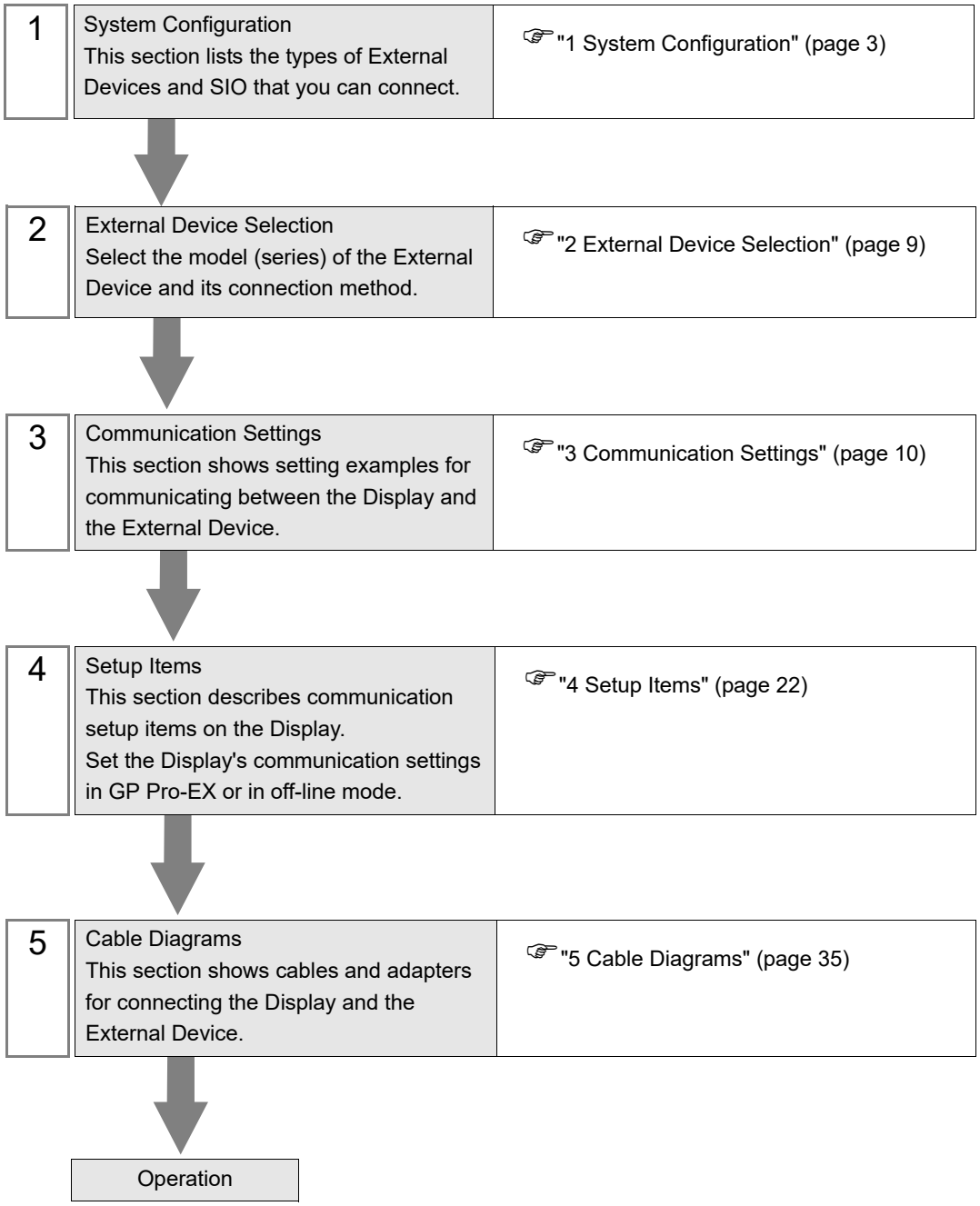
3/2024

MODBUS SIO Master Driver

Introduction

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

In this manual, the connection procedure is described in the sections identified below:



1 System Configuration

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

■ General Modbus

Driver	CPU	Link I/F	SIO Type	Setting Example	Cable Diagrams
MODBUSSlave Device			RS-232C	Setting Example 1 (page 10)	Cable Diagram 1 (page 35)
			RS-422/485 (4 wire)	Setting Example 2 (page 12)	Cable Diagram 2 (page 39)
			RS-422/485 (2 wire)	Setting Example 3 (page 14)	Cable Diagram 3 (page 50)

■ Control Techniques (Modbus)

Driver	CPU	Link I/F	SIO Type	Setting Example	Cable Diagrams
Unidrive SP	All	Built-in RJ45 port	RS-422/485 (2 wire)	Setting Example 4 (page 16)	Cable Diagram 4 (page 63)
		SM-Applications Plus	RS-422/485 (2 wire)	Setting Example 5 (page 18)	Cable Diagram 5 (page 72)

■ Control Techniques (Routing)

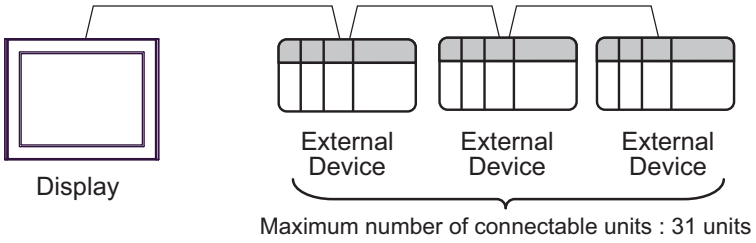
Driver	CPU	Link I/F	SIO Type	Setting Example	Cable Diagrams
Unidrive SP	All	Built-in RJ45 port	RS-422/485 (2-wire)	Setting Example 6 (page 20)	Cable Diagram 6 (page 81)

■ Connection Configuration

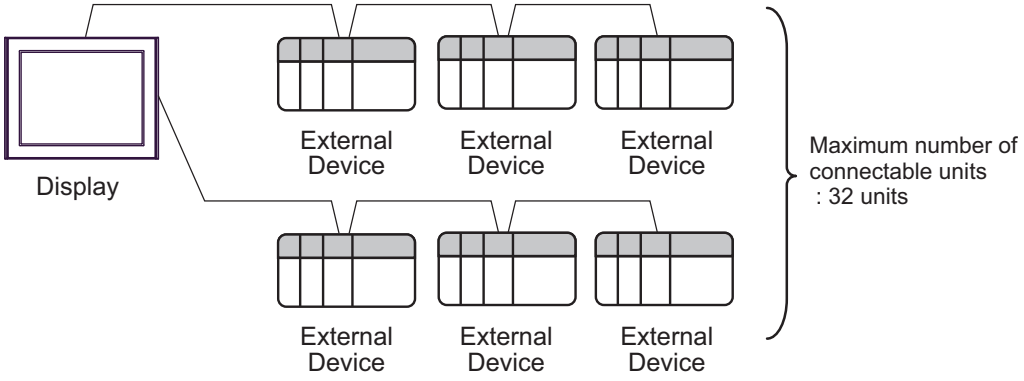
◆ 1:1 Connection

◆ 1:n Connection (General Modbus, Control Techniques (Modbus))

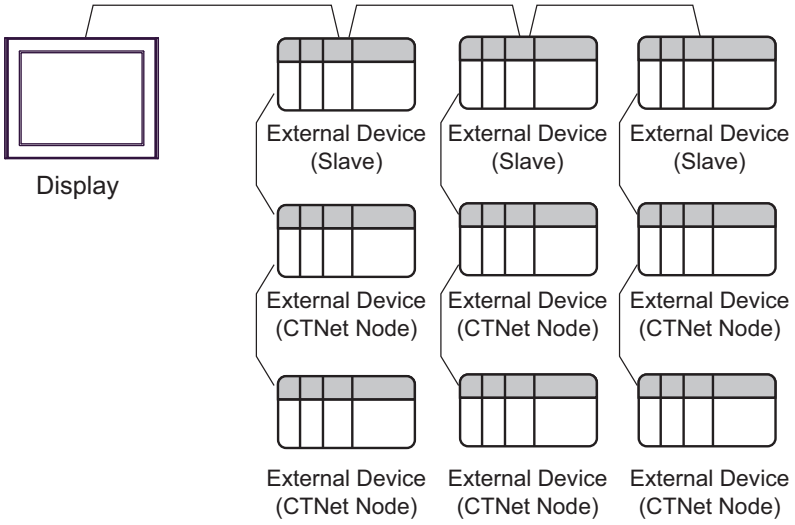
- Using 1 port



- Using multiple ports



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



NOTE

- The number of connectable Displays depends on the External Device.
  Please refer to the manual of External Device for more details.

■ 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 (T41 model), PS-3651A (T41 model)	COM1*1	-	-
PS-3650A (T42 model), PS-3651A (T42 model)	COM1*1*2, COM2	COM1*1*2	COM1*1*2
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
PS4000*3	COM1, COM2	-	-
PL3000	COM1*1*2, COM2*1, COM3, COM4	COM1*1*2	COM1*1*2
PE-4000B Atom N270	COM1, COM2	-	-
PE-4000B Atom N2600	COM1, COM2	COM3*4 , COM4*4, COM5*4, COM6*4	COM3*4, COM4*4, COM5*4, COM6*4
PS5000 (Slim Panel Type Core i3 Model) *5 *6	COM1, COM2*4	COM2*4	COM2*4
PS5000 (Slim Panel Type Atom Model) *5 *6	COM1, COM2*7	COM2*7	COM2*7
PS5000 (Enclosed Panel Type)*8	COM1	-	-
PS5000 (Modular Type PFXPU/PFXPP)*5 *6 PS5000 (Modular Type PFXPL2B5-6)	COM1*7	COM1*7	COM1*7
PS5000 (Modular Type PFXPL2B1-4)	COM1, COM2*7	COM2*7	COM2*7
PS6000 (Advanced Box) PS6000 (Standard Box)	COM1*9	*10	*10
PS6000 (Basic Box)	COM1*9	COM1*9	COM1*9

*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.

*3 When making communication between an External Device and COM port on the Expansion slot, only RS-232C is supported. However, ER (DTR/CTS) control cannot be executed because of the specification of COM port.
For connection with External Device, use user-created cables and disable Pin Nos. 1, 4, 6 and 9.
Please refer to the IPC manual for details of pin layout.

*4 Set up the SIO type with the BIOS. Please refer to the IPC manual for details of BIOS.

*5 When setting up communication between an External Device and the RS-232C/422/485 interface module, use the IPC (RS-232C) or PS5000 (RS-422/485) cable diagrams. However, when using PFXZPBMPR42P2 in a RS-422/485 (4-wire) configuration with no flow control, connect 7.RTS+ and 8.CTS+, and connect 6.RTS- and 9.CTS-.
When using RS-422/485 communication with External Devices, you may need to reduce the transmission speed and increase the TX Wait time.

*6 To use RS-422/485 communication on the RS-232C/422/485 interface module, the DIP Switch setting is required. Please refer to "Knowledge Base" (FAQs) on the support site. (http://www.pro-face.com/trans/en/manual/1001.html)

Settings	FAQ ID
PFXZPBMPR42P2, RS422/485 change method	FA263858
PFXZPBMPR42P2 termination resistor setting	FA263974
PFXZPBMPR44P2, RS422/485 change method	FA264087
PFXZPBMPR44P2 termination resistor setting	FA264088

*7 Set up the SIO type with the DIP Switch. Please refer to the IPC manual for details of DIP Switch. The BOX Atom has not a switch to set the RS-232C, RS-422/485 mode. Use the BIOS for the setting.

*8 For the connection with the External Device, on the user-created cable read as if the connector on the Display-side is a M12 A-coding 8 pin socket. The pin assignment is the same as described in the cable diagram. For the M12 A-coding connector, use PFXZPSCNM122.

*9 In addition to COM1, you can also use the COM port on the optional interface.

*10 Install the optional interface in the expansion slot.

DIP Switch settings (PL3000 / PS3000 Series)

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.

RS-422/485 (4 wire)

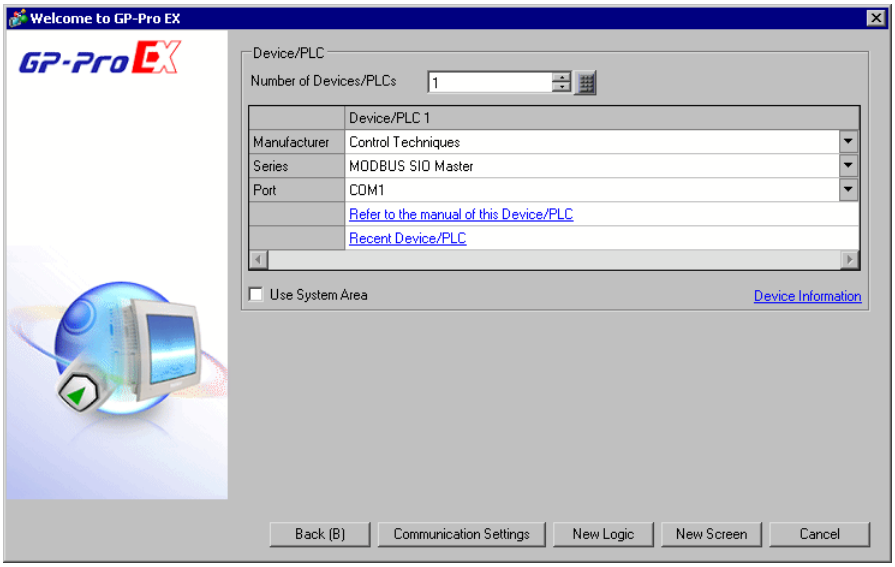
DIP Switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA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

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	

2 External Device Selection

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Number of Devices/ PLCs	Use an integer from 1 to 4 to enter the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to be connected. Select "Control Techniques".
Series	Select the model (series) of the External Device and its connection method. Select "MODBUS SIO Master". In System configuration, check to make sure the External Device to which you are connecting is supported in "MODBUS SIO Master". ☞"1 System Configuration" (page 3)
Port	Select the Display port to be connected to the External Device.
Use System Area	Check this option to synchronize the system data area of the Display and the device (memory) of the External Device. When synchronized, you can use the External Device's ladder program to switch the display or display the window on the Display. Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This feature can also be set in GP-Pro EX or in the Display's offline mode. Cf. GP-Pro EX Reference Manual "System Settings [Display Unit] - [System Area] Settings Guide" Cf. Maintenance/Troubleshooting Guide "Main Unit - System Area Settings"

3 Communication Settings

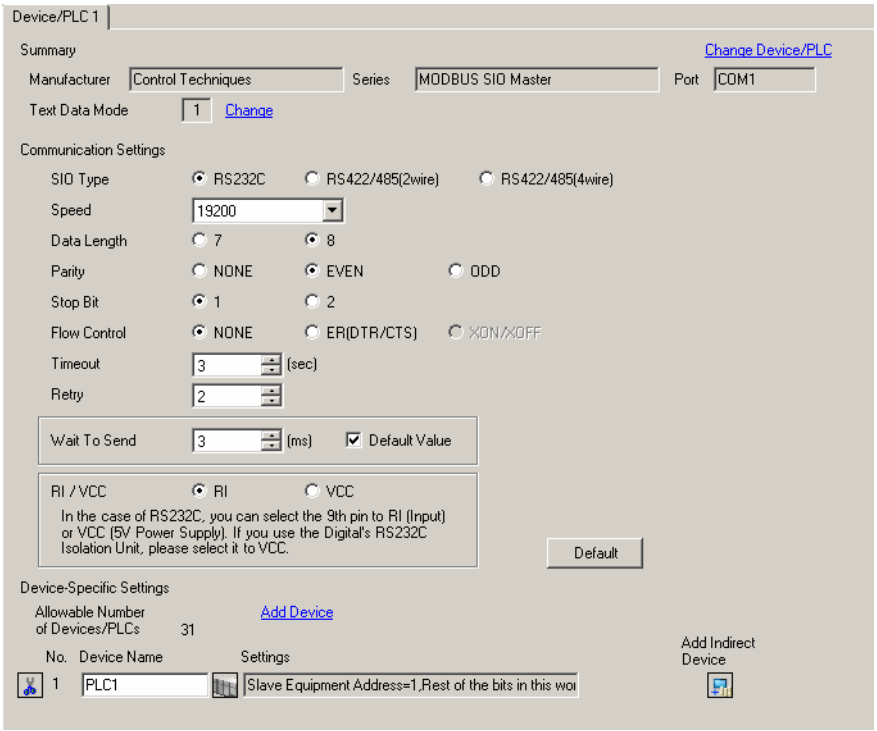
This section provides examples of communication settings recommended by Pro-face for the Display and the External Device.

3.1 Setting Example 1

■ GP-Pro EX Settings

◆ Communication Settings

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



NOTE

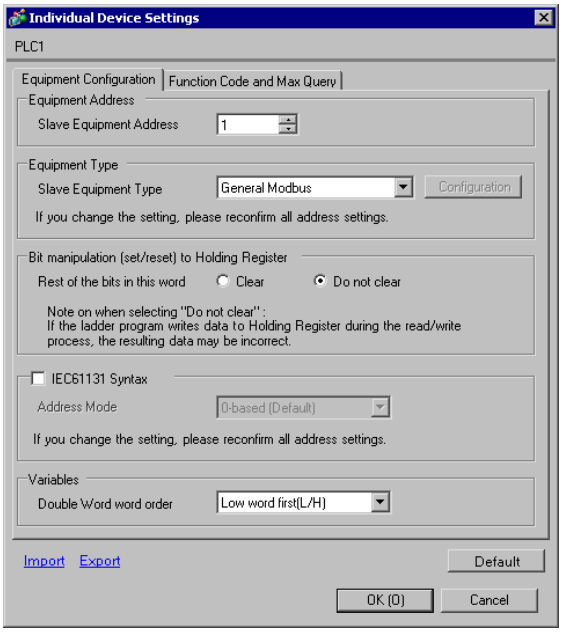
- For Flow Control, select "NONE" or "ER(DTR/CTS)" depending on the cable used.

◆ Device Setting

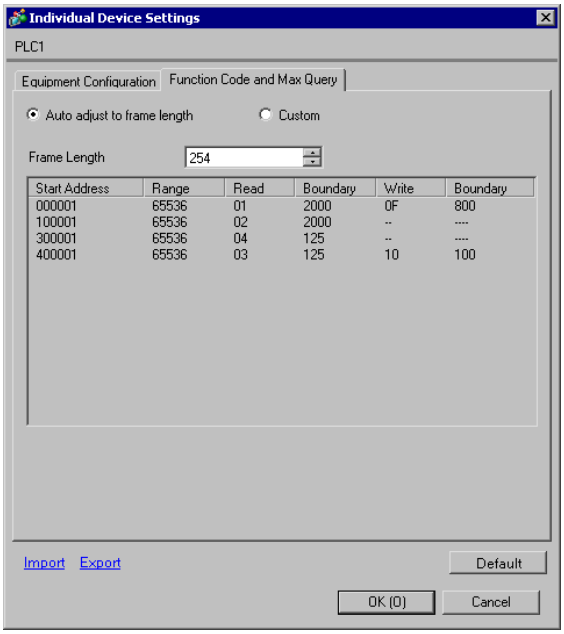
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Function Code and Max Query] tab



■ External Device Settings

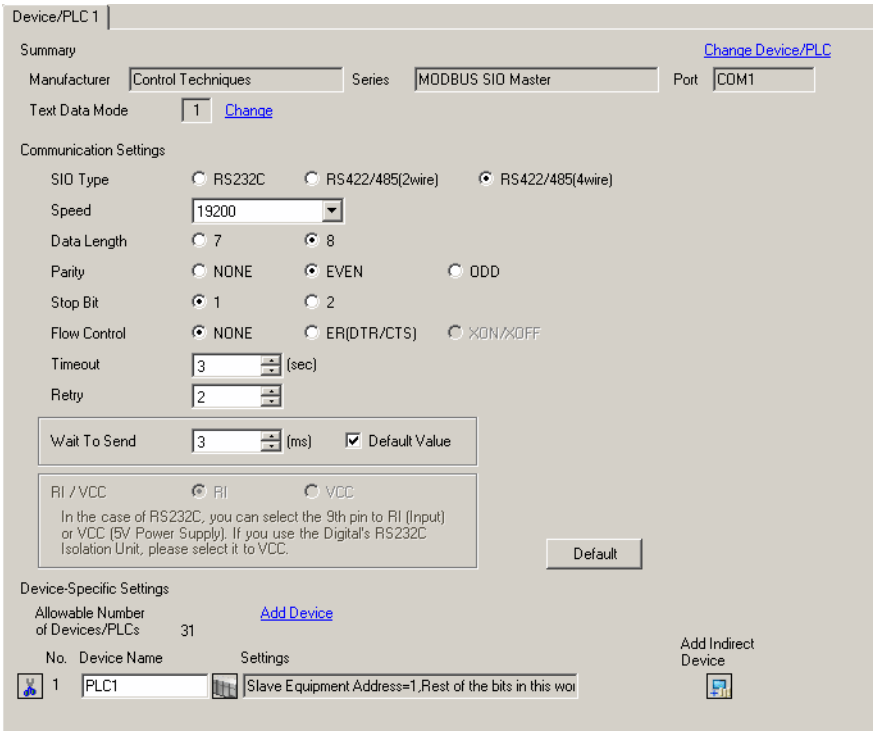
External Device settings vary depending on the device used. Refer to your External Device manual for details.

3.2 Setting Example 2

■ GP-Pro EX Settings

◆ Communication Settings

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

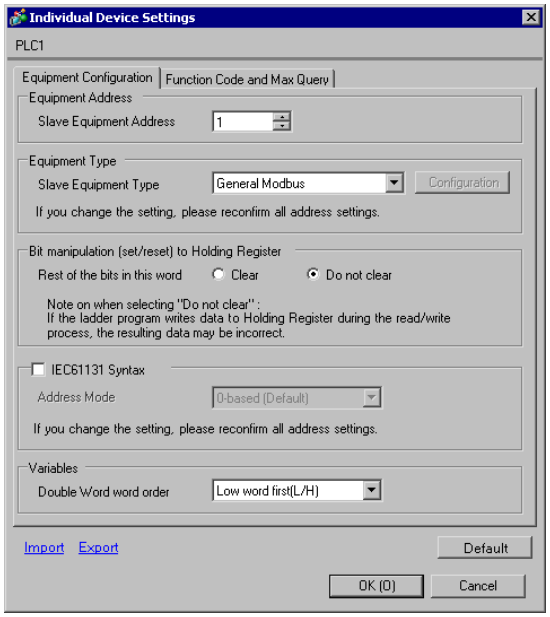


◆ Device Setting

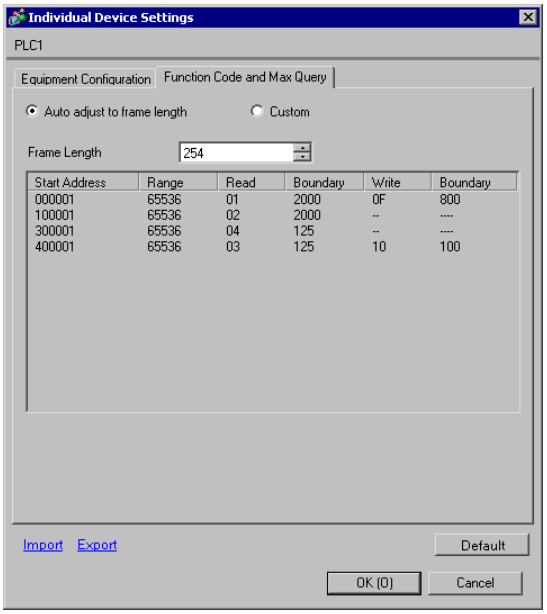
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Function Code and Max Query] tab



■ External Device Settings

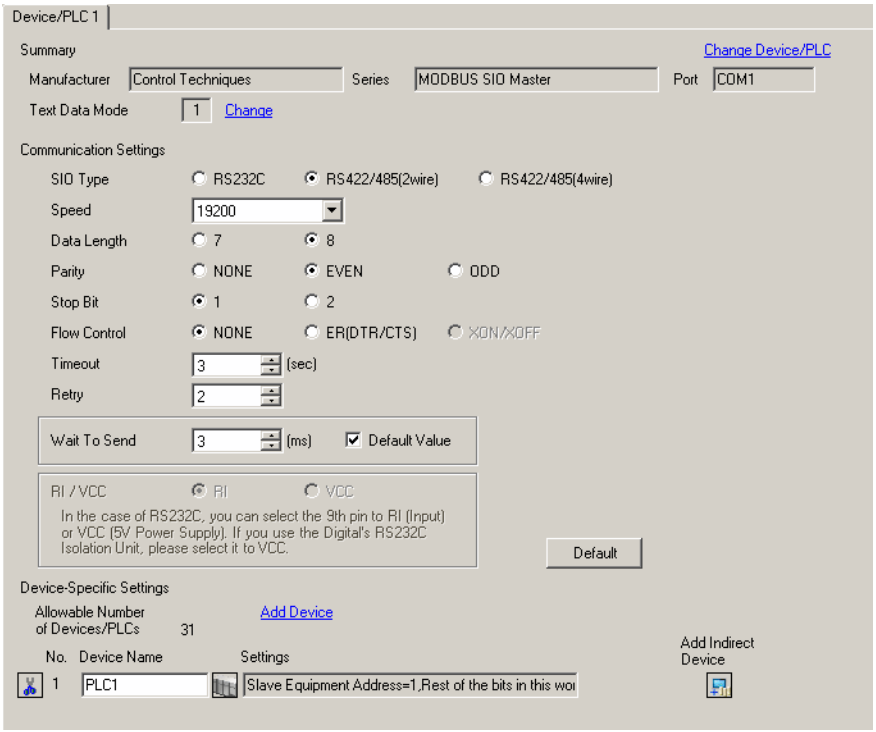
External Device settings vary depending on the device used. Refer to your External Device manual for details.

3.3 Setting Example 3

■ GP-Pro EX Settings

◆ Communication Settings

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

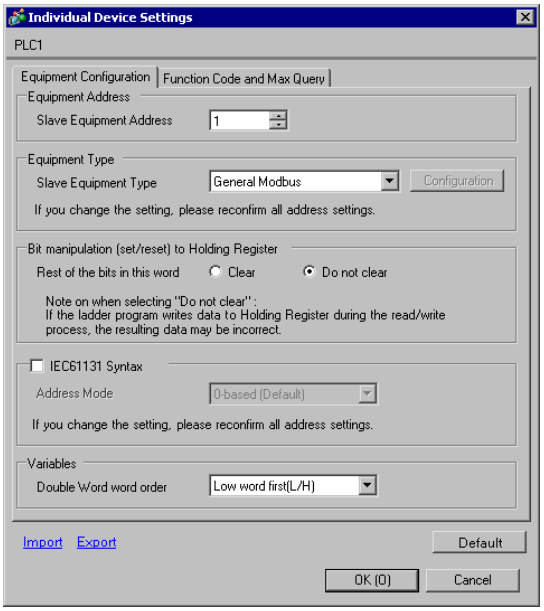


◆ Device Setting

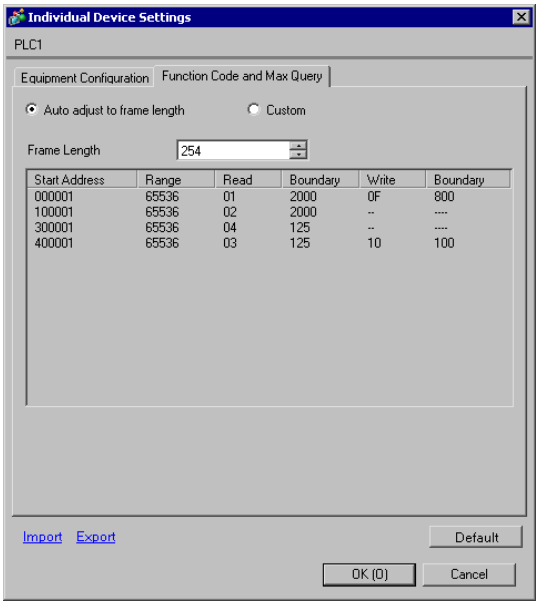
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Function Code and Max Query] tab



■ External Device Settings

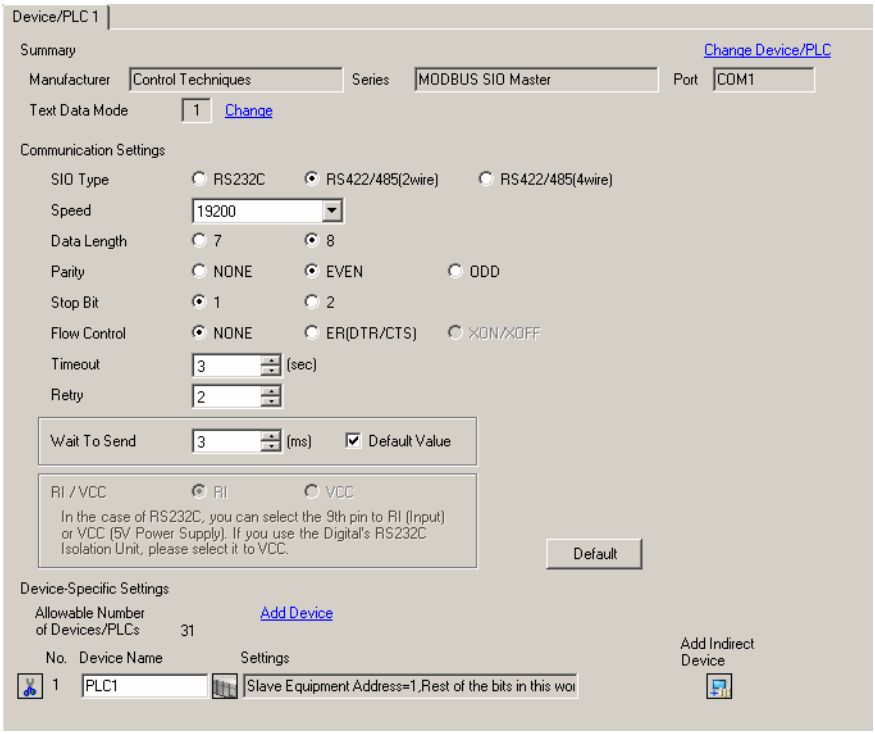
External Device settings vary depending on the device used. Refer to your External Device manual for details.

3.4 Setting Example 4

■ GP-Pro EX Settings

◆ Communication Settings

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

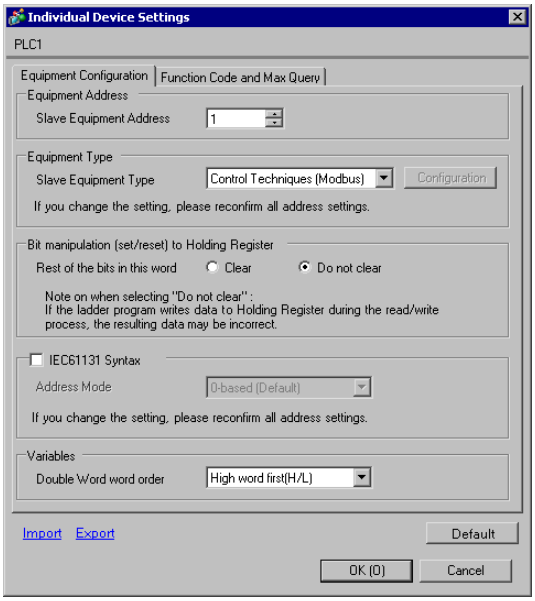


◆ Device Setting

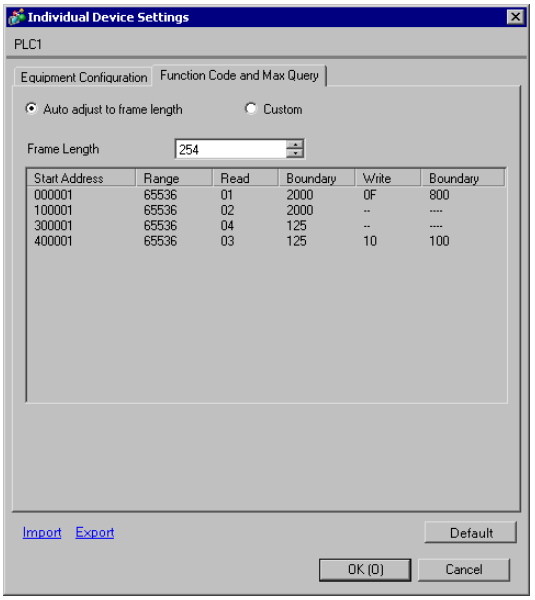
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Function Code and Max Query] tab



■ External Device Settings

Use the Control Techniques configuration tool (CTSoft Ver.01.10.02) for External Device communication settings. Refer to your External Device manual for details.

1 Start up the configuration tool.
2 Create a new project.
3 From [Parameters] select [Basic Setup] in the tree view and display the dialog box.
4 Switch to online mode.
5 Double-click a parameter you want to set and display the [Edit Parameter] dialog box.
6 Set each item as shown below and click [OK].

Parameter	Setup Items	Setting
00.35	Serial mode	1: rtu
00.36	Baud rate	6: 19200
00.37	Serial address	1

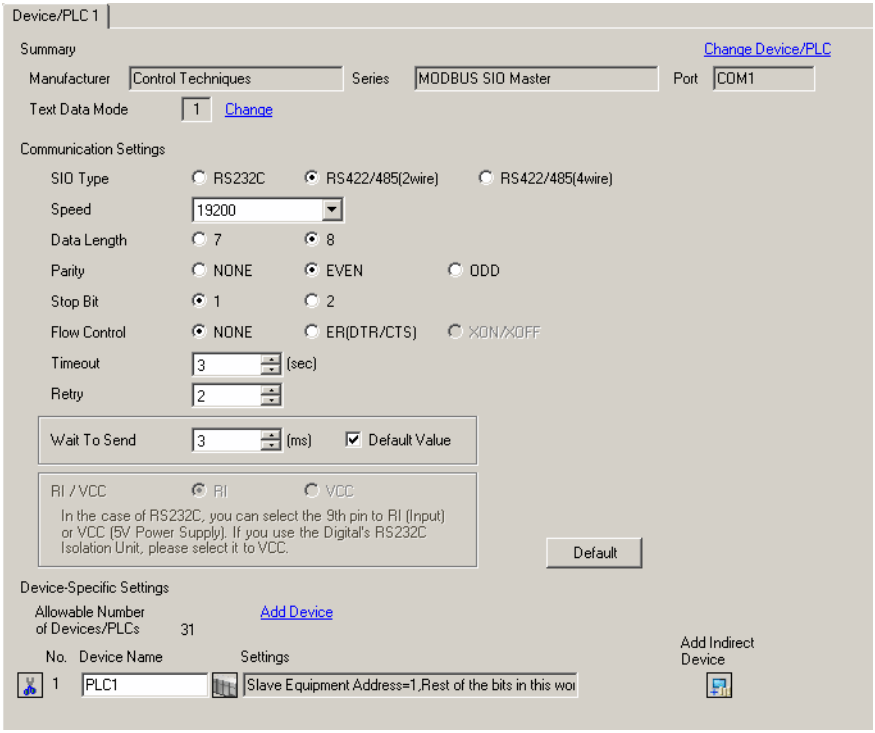
7 Save the parameter in the External Device.
8 Switch to offline mode.
9 Reboot the External Device.

3.5 Setting Example 5

■ GP-Pro EX Settings

◆ Communication Settings

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

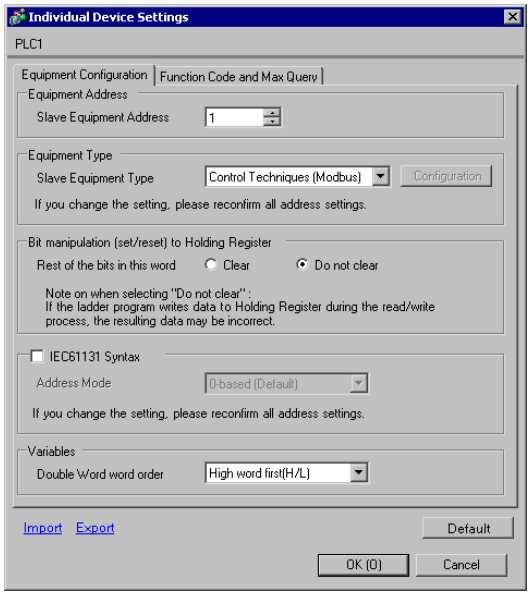


◆ Device Setting

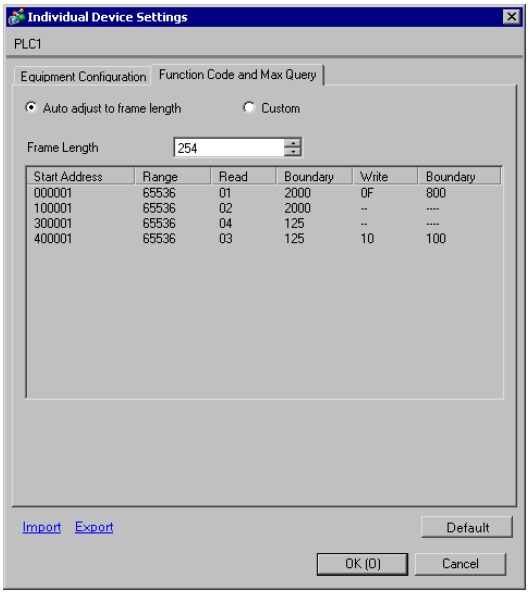
To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] .

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

[Equipment Configuration] tab



[Function Code and Max Query] tab



■ External Device Settings

Use the Control Techniques configuration tool (CTSoft Ver.01.10.02) for External Device communication settings. Refer to your External Device manual for details.

1 Start up the configuration tool.
2 Create a new project.
3 From [Parameters] select [SM-Applications Plus] for the slot number to use in the tree view and display the dialog box.
4 Double-click a parameter you want to set and display the [Edit Parameter] dialog box.
5 Set each item as shown below and click [OK].

Parameter	Setup Items	Setting
17.05	RS-485 address	1
17.06	RS-485 mode	15
17.07	RS-485 baud rate	6: 19200
17.08	RS-485 turnaround delay	2
17.09	RS-485 Tx enable delay	OFF

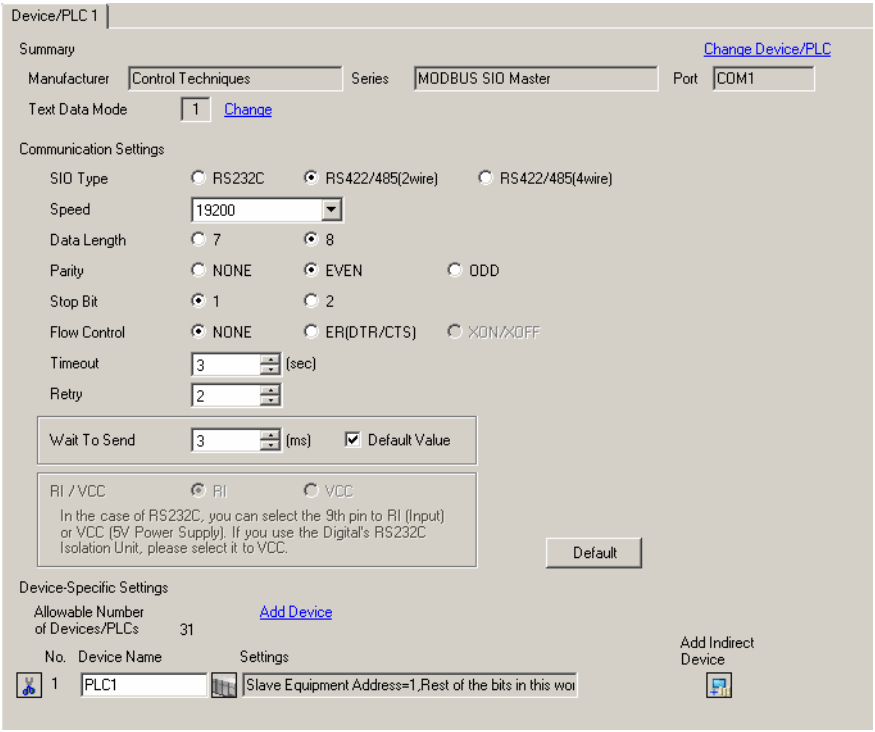
6 Download the communication settings to the External Device.
7 Reset the External Device.
8 Save the communication settings in the External Device.
9 Reboot the External Device.

3.6 Setting Example 6

■ GP-Pro EX Settings

◆ Communication Settings

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

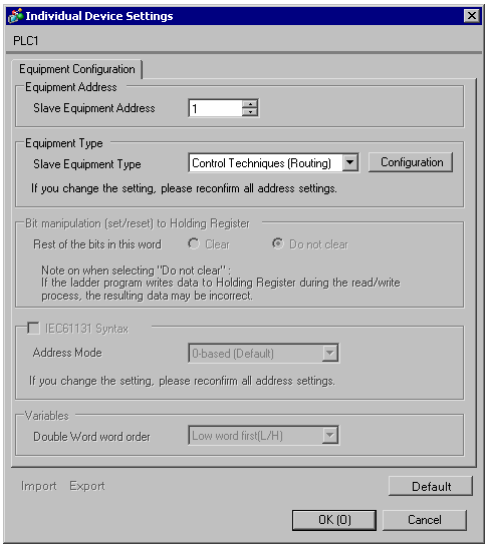


◆ Device Setting

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

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

[Equipment Configuration] tab



■ External Device Settings

Use the Control Techniques configuration tool (CTSoft Ver.01.10.02) for External Device communication settings. Refer to your External Device manual for details.

1 Start up the configuration tool.

2 Create a project and display [My Drive 1] and [My Drive 2] in the tree view.

NOTE

- When using CTNet, two or more Drives are required. In this section, the Drive is referred to as [My Drive 1] and [My Drive 2].

3 From [Parameters] select [SM-Applications Plus] for the slot number to use under [My Drive 1] and [My Drive 2] in the tree view, and display the dialog box.

4 Double-click a parameter you want to set and display the [Edit Parameter] dialog box.

5 Set each item as shown below and click [OK].

Parameter	Setup Items	Setting	
		My Drive 1	My Drive 2
22	CTNet token ring ID	0	0
23	CTNet node address	1	255
24	CTNet baud rate	2.5	2.5

NOTE

- Use parameters 25 to 35 as default.

6 Download the communication settings to the External Device.

7 Reset the External Device.

8 Save the communication settings in the External Device.

4 Setup Items

Set up the Display's communication settings in GP Pro-EX or in the Display's off-line mode.

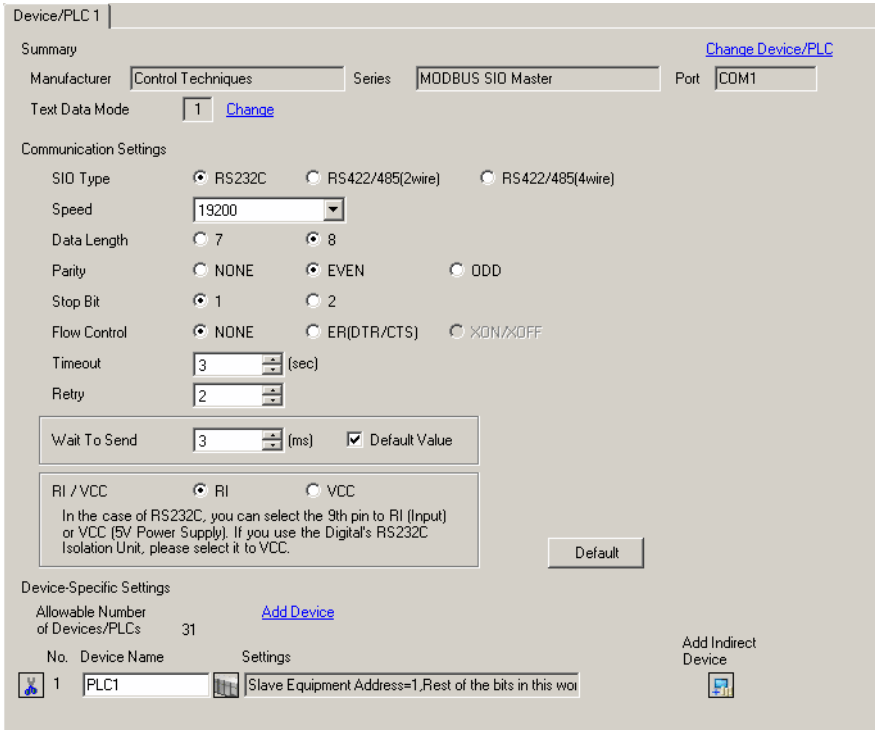
The setting of each parameter must match that of the External Device.

☞"3 Communication Settings" (page 10)

4.1 GP-Pro EX Setup Items

■ Communication Settings

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



Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device.
Speed	Select the communication speed between the External Device and the Display.
Data Length	Select the data length.
Parity	Select how to check parity.
Stop Bit	Select the 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, use an integer from 0 to 255 to enter how many times the Display retransmits the command.

Setup Items	Setup Description
Wait To Send	Use an integer from 0 to 5000 to enter standby time (ms) for the Display from receiving packets to transmitting the next commands. When the Default Value check box is selected, 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. When connecting with the IPC, it is necessary to change RI/5V using the IPC changeover switch. Refer to the IPC manual for details.

NOTE

- Refer to the GP-Pro EX Reference Manual for Indirect Device.

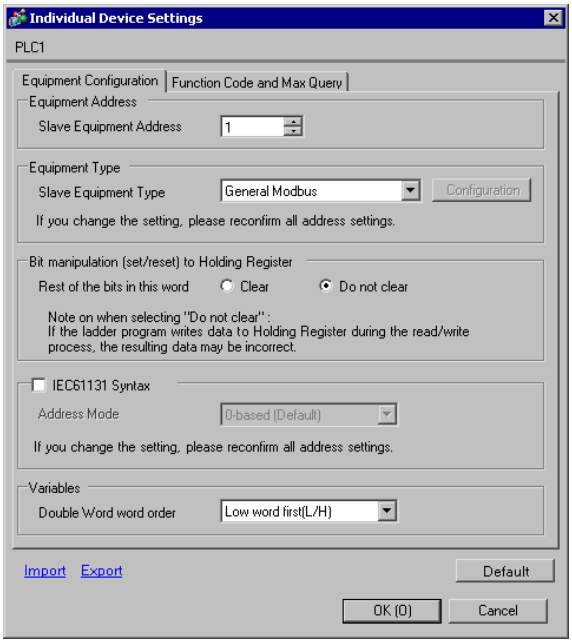
  Cf. GP-Pro EX Reference Manual "Changing the Device/PLC at Runtime (Indirect Device)"

■ Device Setting

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

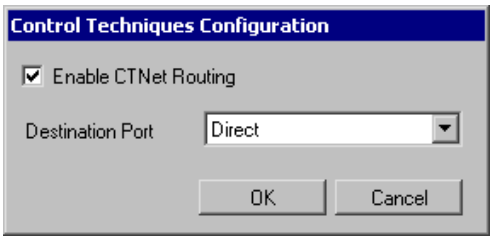
To connect multiple External Devices, from [Device-Specific Settings] in the [Device/PLC] window, click [Add Device] to add another External Device.

◆ [Equipment Configuration] tab



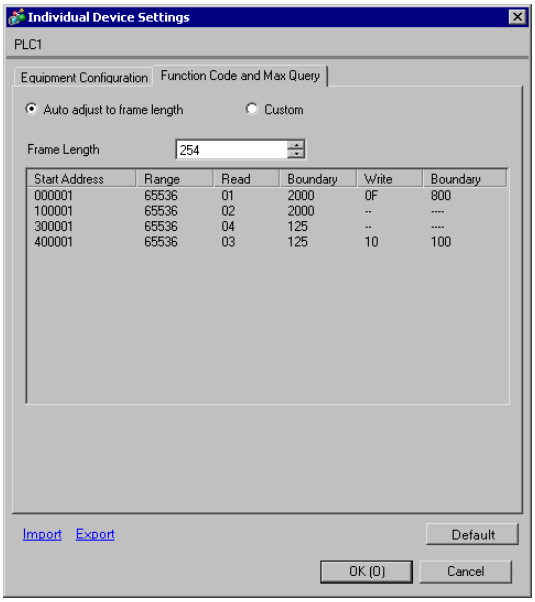
Setup Items	Setup Description
Slave Equipment Address	Use an integer from 1 to 247 to enter the slave equipment address of the External Device.
Slave Equipment Type	Select the slave type to use among "General Modbus", "Control Techniques (Modbus)", and "Control Techniques (Routing)". If you select "Control Techniques (Routing)", the [Configuration] option will be enabled to configure the CTNet settings. ☞"• [Control Techniques Configuration] dialog box" (page 25)
Bit manipulation (set/reset) to Holding Register Rest of the bits in the 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 check box when you use the IEC61131 grammar for variables. If you select this check box, select the address mode from "0-based" or "1-based".
Double Word word order	Select the order of storing double word data from "Low word first" or "High word first".
Import	Import the device setting information described in the xml file. ☞" ◆ Import Procedure in the Device Setting" (page 29)
Export	Export the device setting information described in the xml file. ☞" ◆ Export Procedure in the Device Setting" (page 29)

- [Control Techniques Configuration] dialog box



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

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



Setup Items	Setup Description
Auto adjust to frame length	Automatically set each function code and the data boundary for one communication according to the frame length. Function codes cannot be changed. To change a function code, use "Custom".
Frame Length	Set the frame length from "6 to 254". After setting, click the device list to display the boundary.
Import	Import the device setting information described in the xml file. ☞" ◆ Import Procedure in the Device Setting" (page 29)
Export	Export the device setting information described in the xml file. ☞" ◆ Export Procedure in the Device Setting" (page 29)

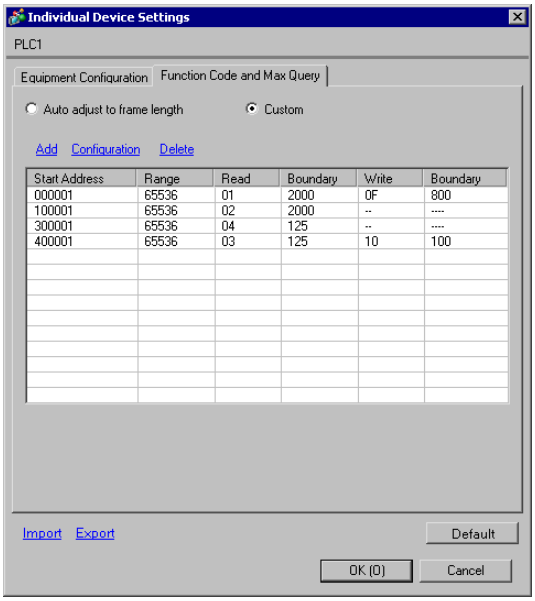
NOTE

- 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

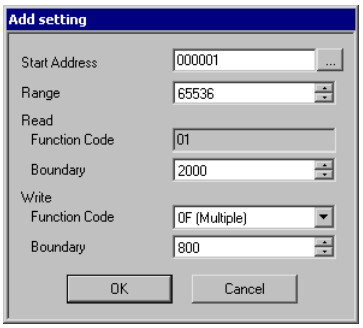
- Use "Custom" in the following cases:
  - When you use a different function code depending on an address.
  - When you use the function code "05: Force Single Coil" or "06: Preset Single Register".
  - When the read/write boundary depends on the device.

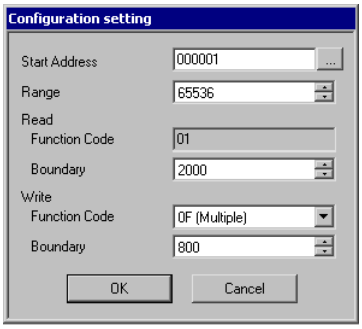
◆ [Function Code and Max Query] tab (when "Custom" is selected)



Setup Items	Setup Description
Custom	Manually set each function code and the data 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 setting information described in the xml file. ☞" ◆ Import Procedure in the Device Setting" (page 29)
Export	Export the device setting information described in the xml file. ☞" ◆ Export Procedure in the Device Setting" (page 29)

- [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].

4.2 Setup Items in Offline Mode

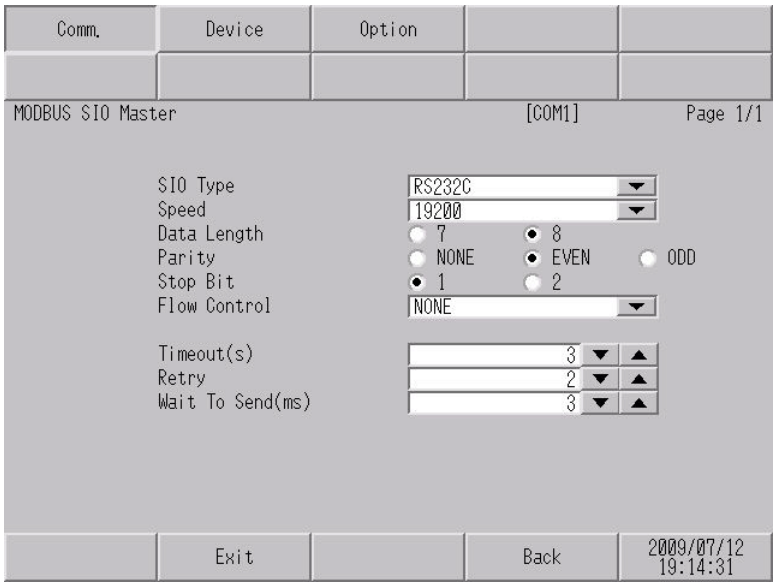
NOTE

- Refer to the Maintenance/Troubleshooting manual for information on how to enter offline mode or about the operation.

  Cf. Maintenance/Troubleshooting Manual "Offline 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 list that appears.



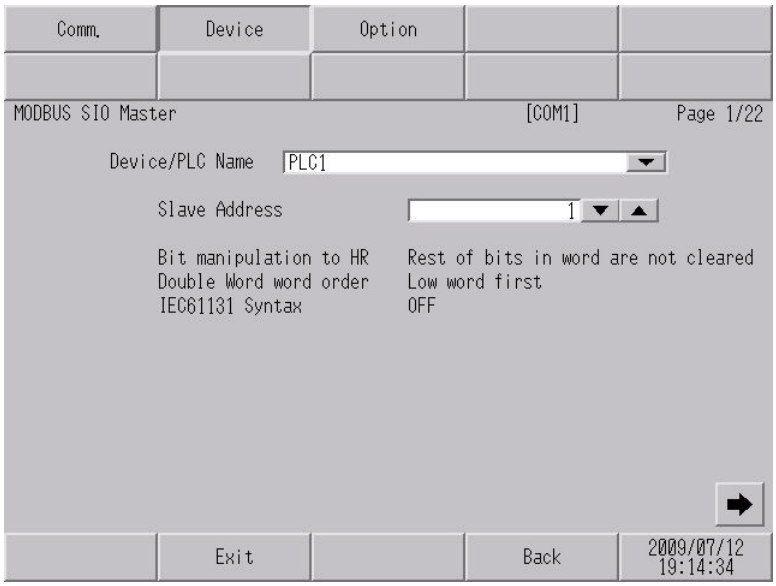
Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device. **IMPORTANT** In the communication settings, set [SIO Type] correctly according to the serial interface specifications of the Display. If you select an SIO type that the serial interface does not support, 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 the data length.
Parity	Select how to check parity.
Stop Bit	Select the 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, use an integer from 0 to 255 to enter how many times the Display retransmits the command.

Setup Items	Setup Description
Wait To Send	Use an integer from 0 to 5000 to enter standby time (ms) for the Display from receiving packets to transmitting the next commands. 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

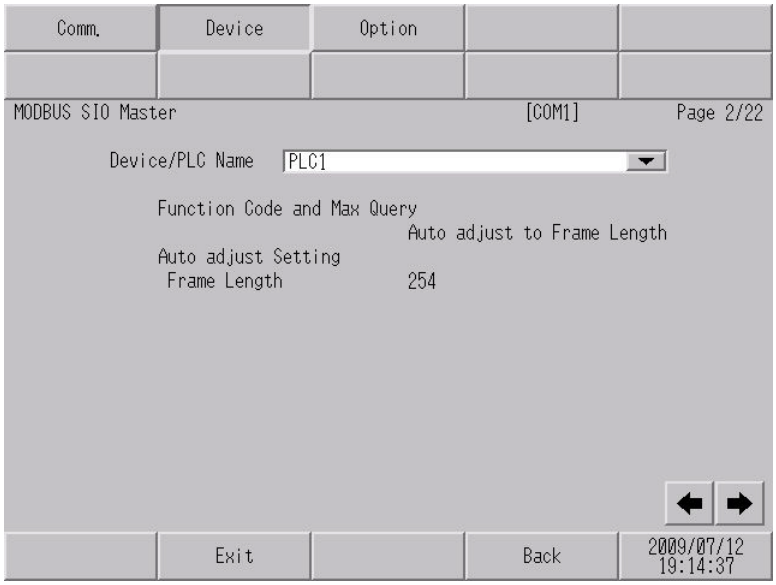
To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings]. Touch the External Device you want to set from the displayed list, and touch [Device].

(Page 1/22)



Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. Device/PLC 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 equipment 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.)
IEC61131 Syntax	Displays the usage status of the currently set IEC61131 syntax in ON/OFF. (Not available in off-line mode.)

(Page 2/22)

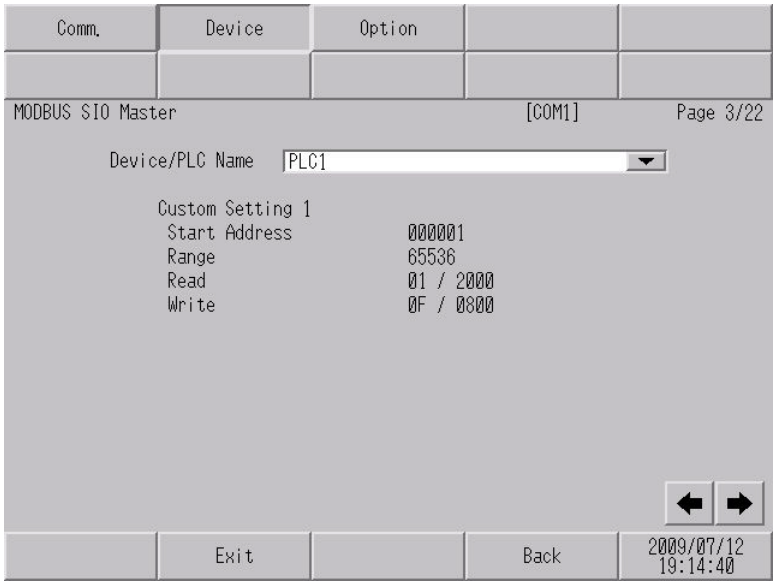


Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. Device/PLC name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Function Code and Max Query	Displays the option to set the function code and boundary. (Not available to set in off-line mode.)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

NOTE

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

(Page 3/22 to 22/22)



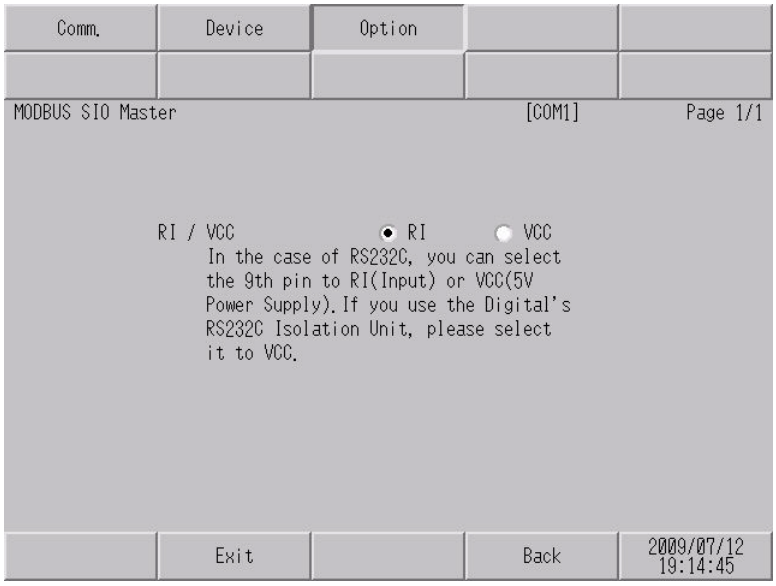
Setup Items	Setup Description
Device/PLC Name	Select the External Device to set. Device/PLC name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Start Address	Displays the start address of the device. (Not available to set in off-line mode.)
Range	Displays the range of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

◆ Options

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings]. Touch the External Device you want to set from the list that appears, 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. When connecting with the IPC, it is necessary to change RI/5V using the IPC changeover switch. Refer to the IPC manual for details.

NOTE

- GP-4100 series, GP-4*01TM, GP-Rear Module, LT-4*01TM and LT-Rear Module do not have the [Option] setting in the offline mode.

5 Cable Diagrams

The following cable diagrams may be different from cable diagrams recommended by Control Techniques. Please be assured there is no operational problem in applying the cable diagrams shown in this manual.

- Please ground the FG pin of the External Device body. Use a grounding resistance of 100Ω 2 mm^2 or thicker wire, or your country's applicable standard. Refer to your External Device manual for more details.
- The SG and FG are connected inside the Display. When connecting the External Device to the SG, design your system to avoid short-circuit loops.
- Connect an isolation unit if the communication is not stable due to noise or other factors.
- 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
GP3000 (COM1) GP4000*1 (COM1) SP5000*2 (COM1/2) SP-5B00 (COM1) ST3000 (COM1) ST6000 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000 (COM1) LT3000 (COM1) IPC*3 PC/AT	1A	User-created cable (ER (DTR/CTS) control)	The cable length must be 15m or less.
	1B	User-created cable (without control)	
GP-4105 (COM1) GP-4115T (COM1) GP-4115T3 (COM1)	1C	User-created cable (ER (DTR/CTS) control)	The cable length must be 15m or less.
	1D	User-created cable (without control)	
LT-4*01TM (COM1) LT-Rear Module (COM1)	1E	RJ45 RS-232C Cable (5m) by Pro-face PFXZLMCBRJR21	The cable length must be 5m or less.

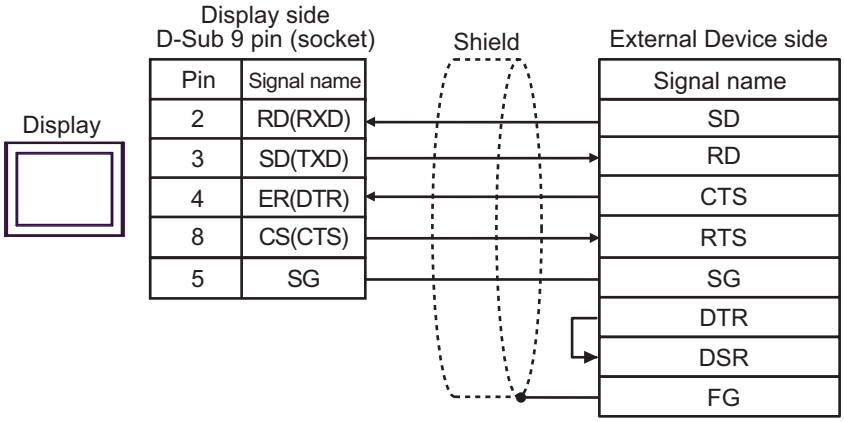
*1 All GP4000 models except GP-4100 series and GP-4203T

*2 Except SP-5B00

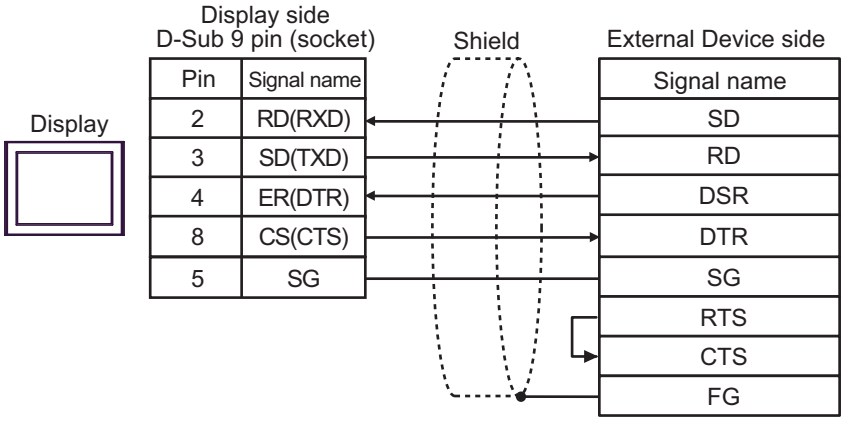
*3 Only a COM port that can communicate with RS-232C can be used.
☞■ IPC COM Port (page 6)

1A)

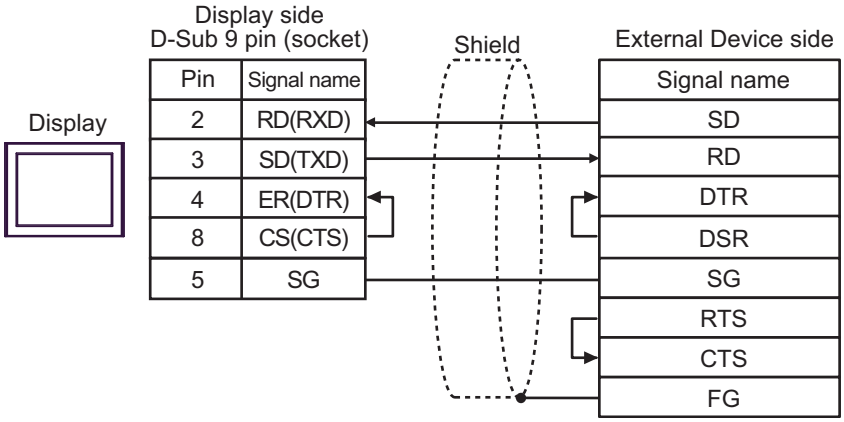
- When the External Device supports RTS/CTS control



- When the External Device supports DTR/DSR control

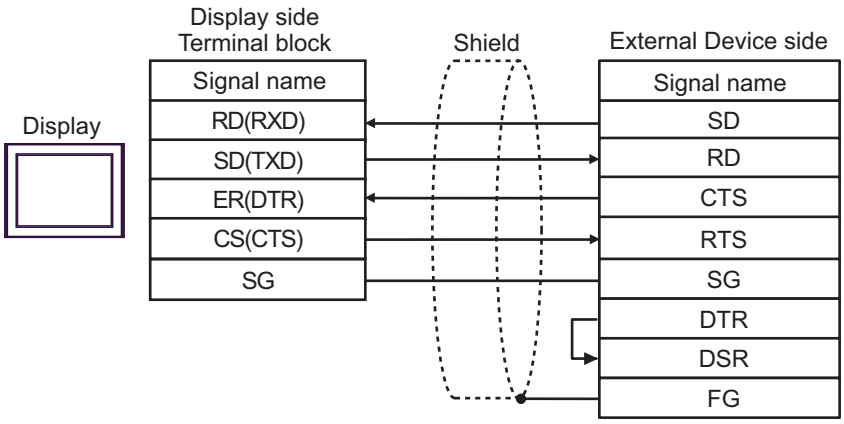


1B)

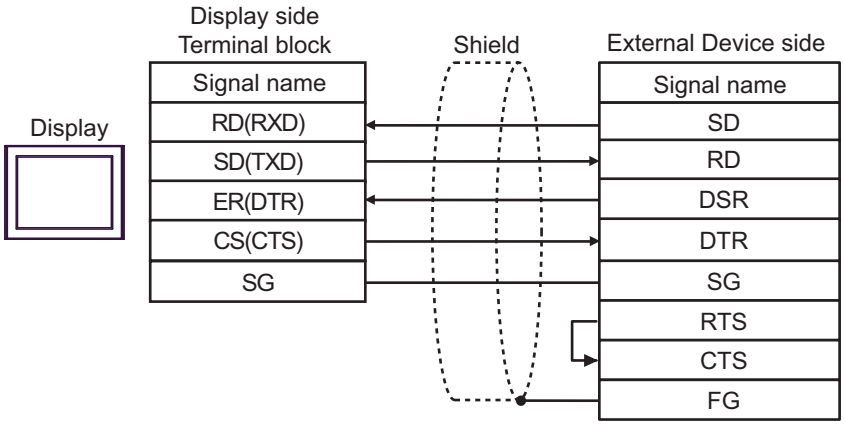


1C)

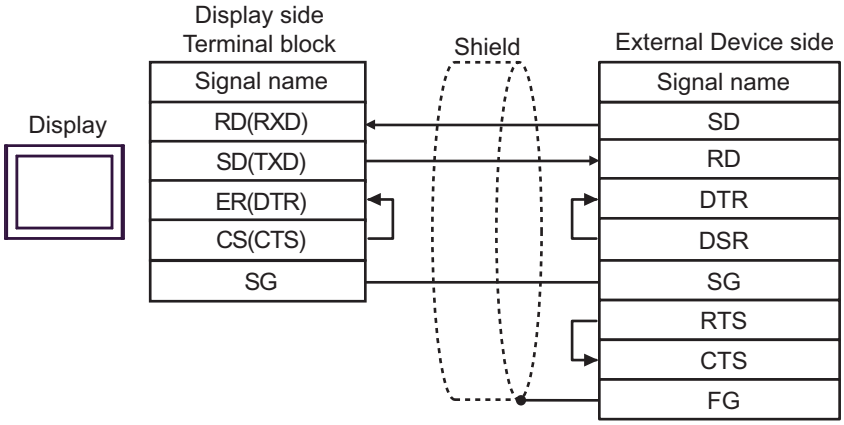
- When the External Device supports RTS/CTS control



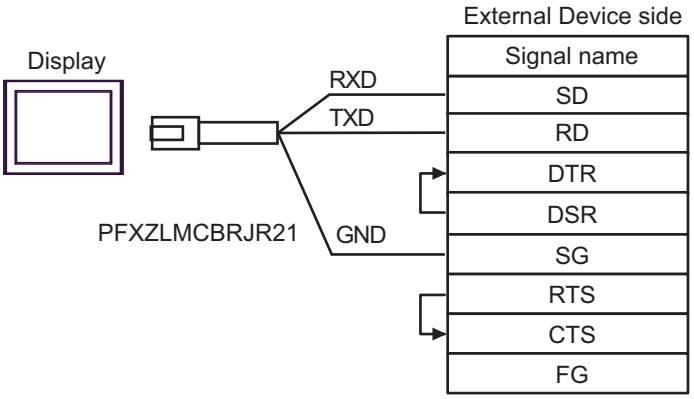
- When the External Device supports DTR/DSR control



1D)



1E)


External Device side
Display
Signal name
RXD
SD
TXD
RD
DTR
DSR
PFXZLMCBRJR21
GND
SG
RTS
CTS
FG

Cable Diagram 2

Display (Connection Port)	Cable		Remarks
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) LT3000 (COM1) IPC[*3]	2A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	The cable length must be 1000m maximum.
	2B	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	2C	User-created cable	
GP3000[*4] (COM2)	2D	Online adapter by Pro-face CA4-ADPONL-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	The cable length must be 1000m maximum.
	2E	Online adapter by Pro-face CA4-ADPONL-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	2F	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	
GP-4106 (COM1) GP-4116T (COM1)	2G	User-created cable	The cable length must be 1000m maximum.
GP4000[*5] (COM2) GP-4201T (COM1) SP5000[*6] (COM1/2) SP-5B00 (COM2) ST6000[*7] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000[*8] (COM2) PS6000 (Basic Box) (COM1/2)	2H	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1[*9] + User-created cable	The cable length must be 1000m maximum.
	2B	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + RS-422 cable by Pro-face CA3-CBL422-01	
	2C	User-created cable	
PE-4000B[*10] PS5000[*10] PS6000 (Optional Interface)[*10]	2I	User-created cable	The cable length must be 1000m maximum.

*1 All GP3000 models except AGP-3302B

*2 Except AST-3211A and AST-3302B

*3 Only the COM port which can communicate by RS-422/485 (4 wire) can be used. (Except PE-4000B, PS5000, and PS6000)
☞ ■ IPC COM Port (page 6)

*4 All GP3000 models except the GP-3200 Series and AGP-3302B

*5 All GP4000 models except GP-4100 series, GP-4*01TM, GP-Rear Module, GP-4201T and GP-4*03T

*6 Except SP-5B00

*7 Except ST-6200

*8 Due to the COM port specifications, flow control is not possible. Omit wiring the control pins on the Display side of the cable diagram.

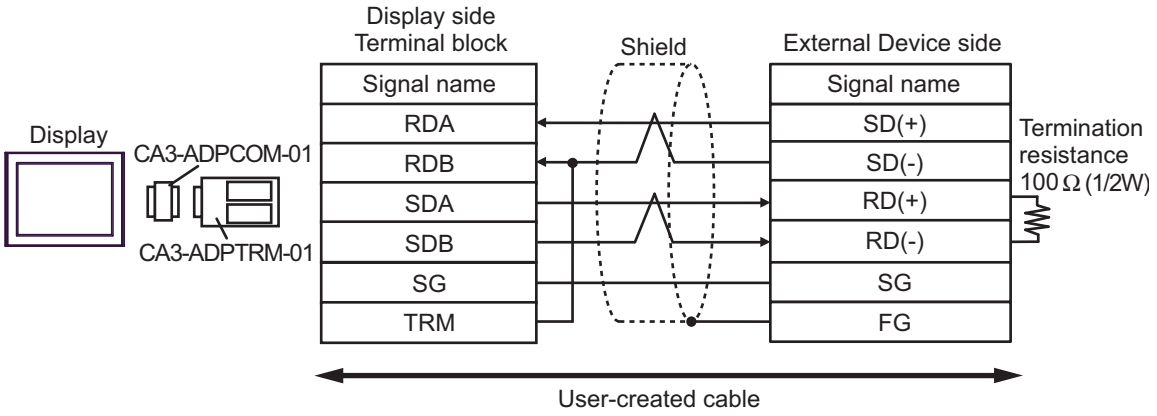
*9 When using a Terminal Block Conversion Adapter (CA3-ADPTRM-01) instead of the RS-422 Terminal Block Conversion Adapter, refer to Cable Diagram 2A.

*10 Only the COM port which can communicate by RS-422/485 (4 wire) can be used.
☞ ■ IPC COM Port (page 6)

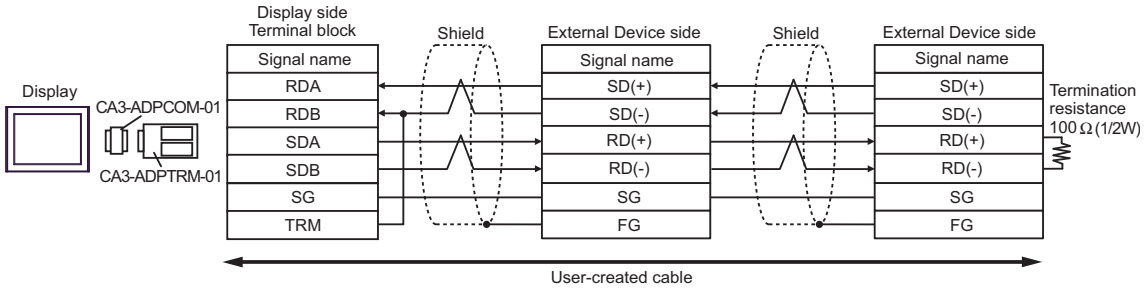
IMPORTANT
- The RS-422/485 cable length is normally 1000m or less, which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is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

2A)

- 1:1 Connection



- 1:n Connection

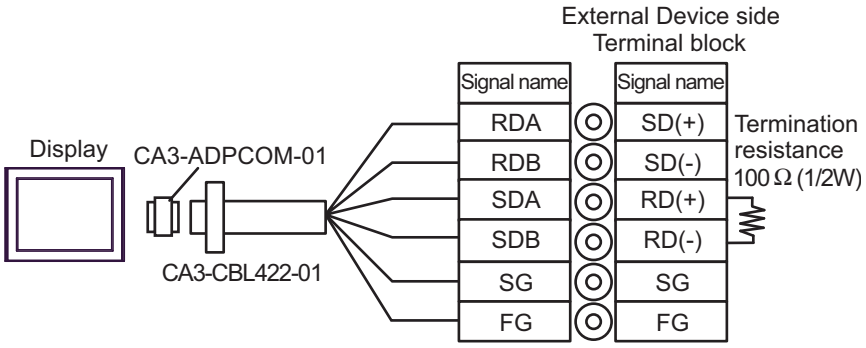


NOTE

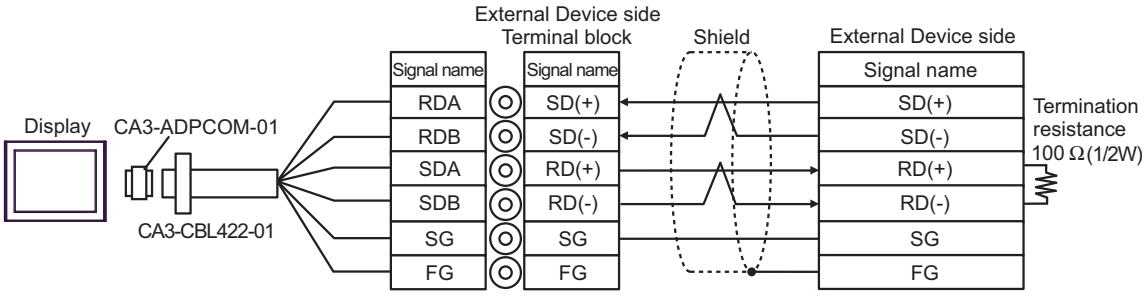
- When connecting the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

2B)

- 1:1 Connection



- 1:n Connection

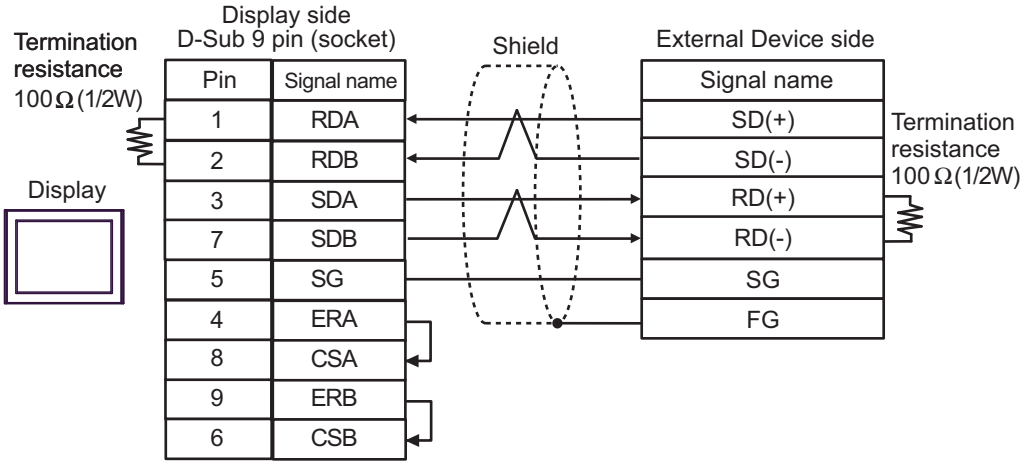


NOTE

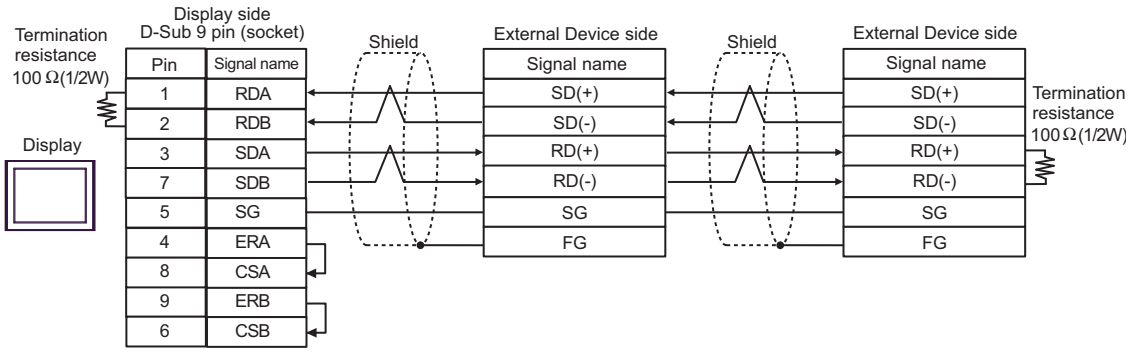
- 100Ω (1/2W) termination resistance is inserted between RDA and RDB in CA3-CBL422-01.

2C)

- 1:1 Connection

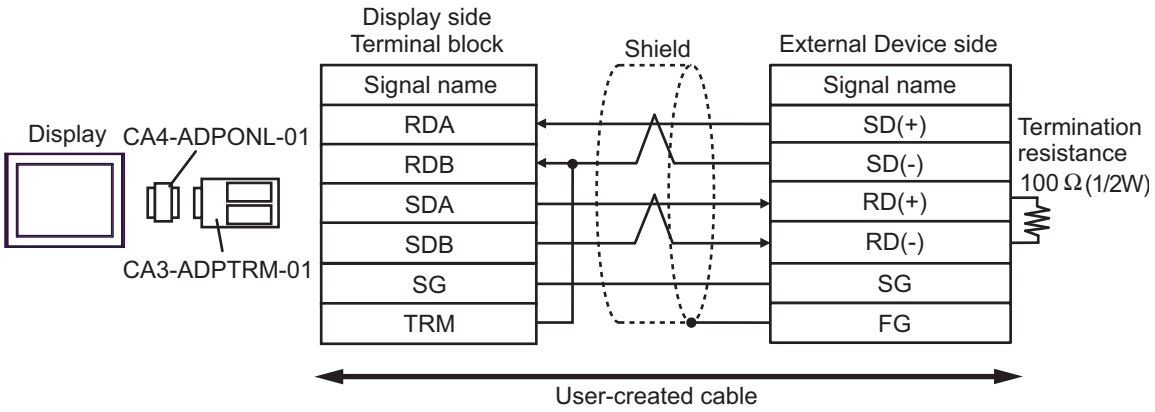


- 1:n Connection

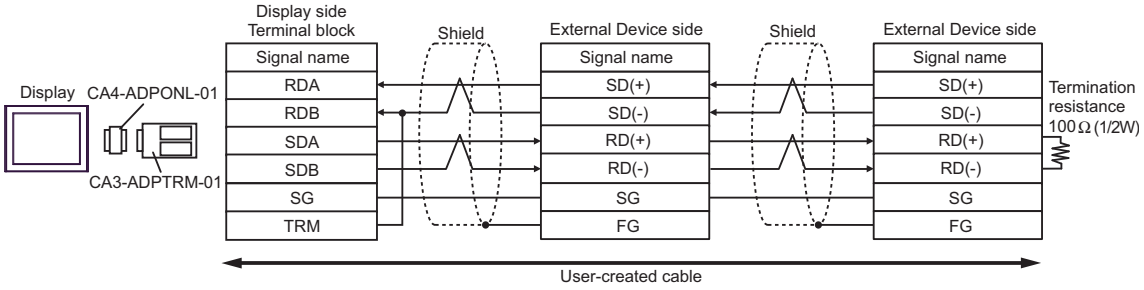


2D)

- 1:1 Connection



- 1:n Connection

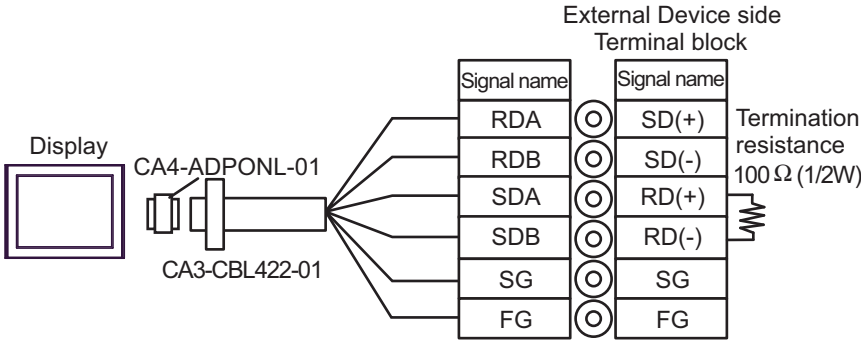


NOTE

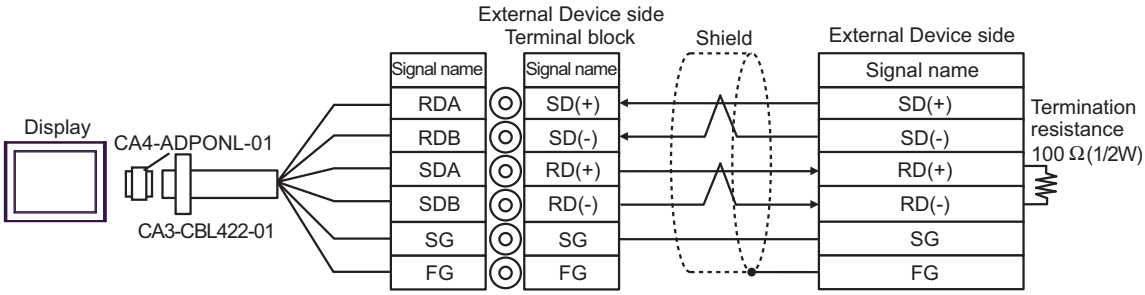
- When connecting the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

2E)

- 1:1 Connection



- 1:n Connection

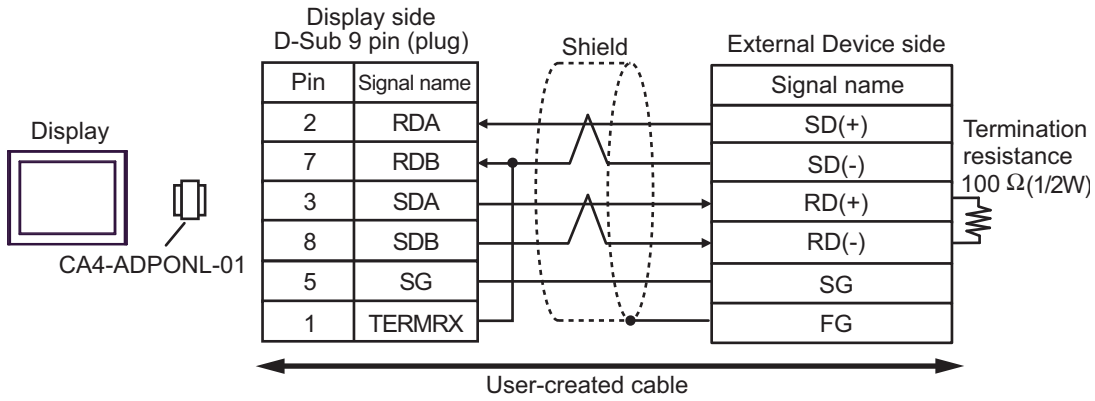


NOTE

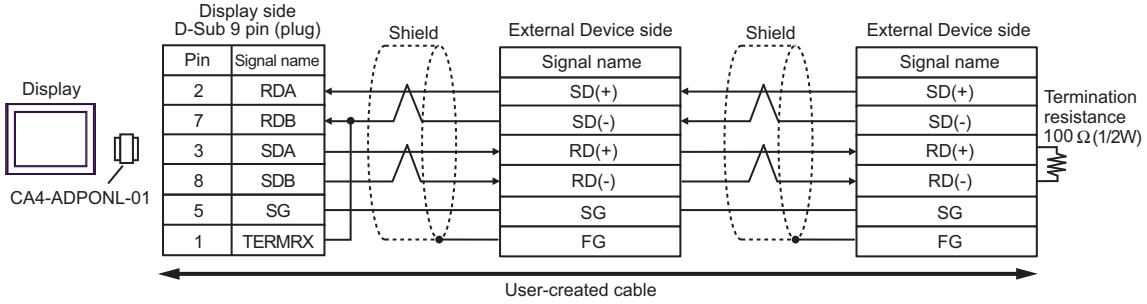
- 100Ω (1/2W) termination resistance is inserted between RDA and RDB in CA3-CBL422-01.

2F)

- 1:1 Connection



- 1:n Connection

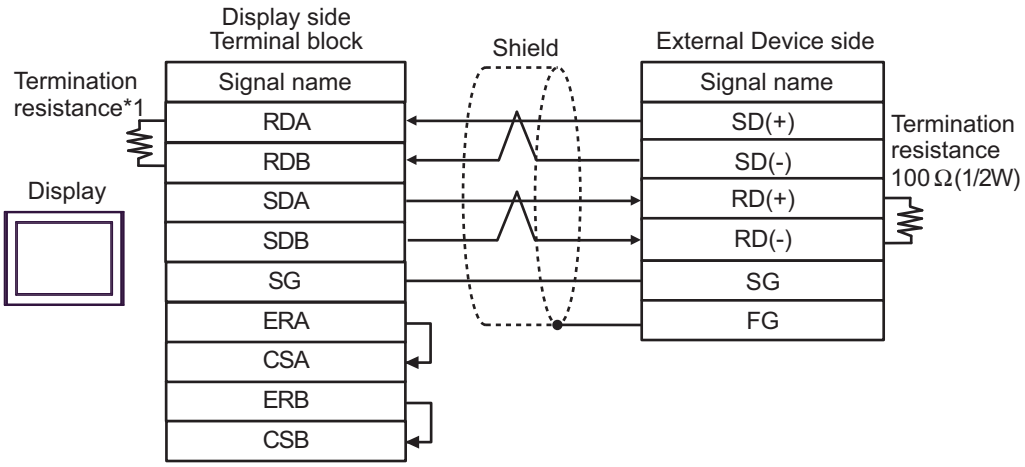


NOTE

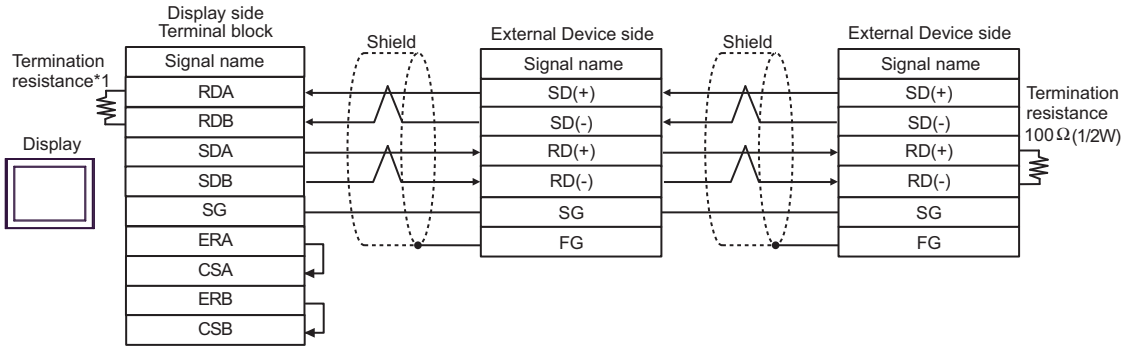
- When the RDB terminal of CA4-ADPONL-01 to the TERMRX terminal, 100Ω (1/2W) termination resistance is inserted between RDA and RDB terminals on the Display.

2G)

- 1:1 Connection



- 1:n Connection

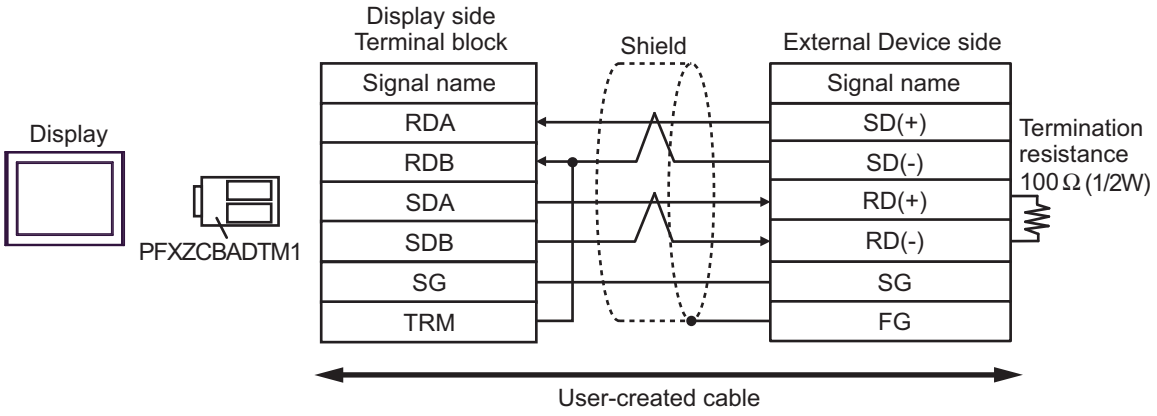


*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

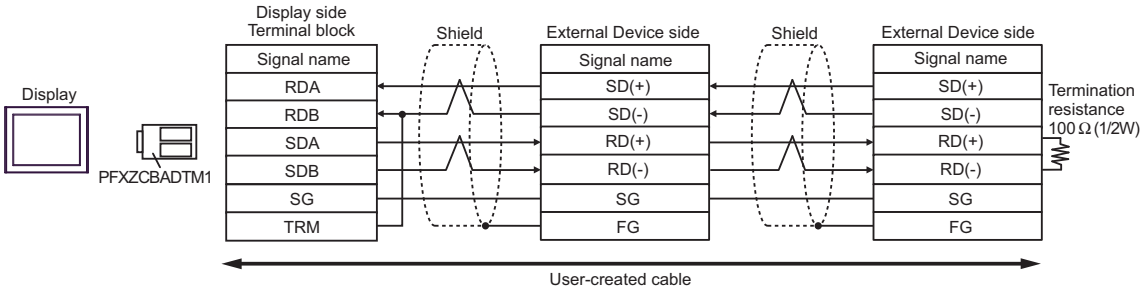
DIP Switch No.	Set Value
1	OFF
2	OFF
3	ON
4	ON

2H)

- 1:1 Connection



- 1:n Connection

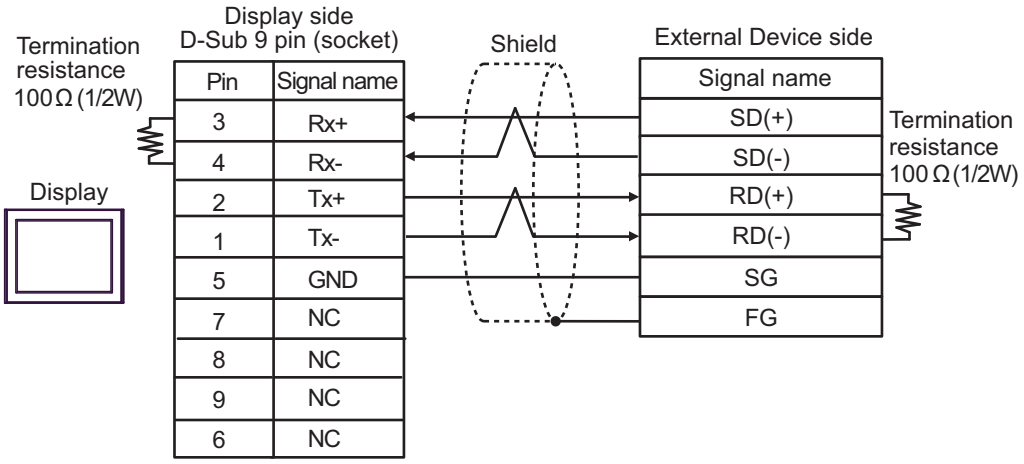


NOTE

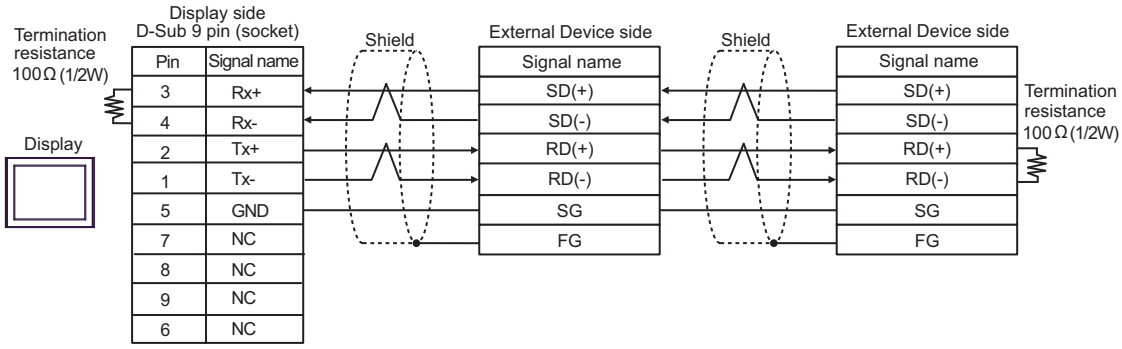
- When the RDB terminal of PFXZCBADTM1 to the TRM terminal, the termination resistance of 100W (1/2W) is inserted between RDA and RDB terminals on the Display.

2I)

- 1:1 Connection



- 1:n Connection



Cable Diagram 3

Display (Connection Port)	Cable		Remarks
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) LT3000 (COM1)	3A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	The cable length must be 1000m maximum.
	3B	User-created cable	The cable length must be 1000m maximum.
GP3000[*3] (COM2)	3C	Online adapter by Pro-face CA4-ADPONL-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	The cable length must be 1000m maximum.
	3D	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	The cable length must be 1000m maximum.
IPC[*4]	3E	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Connector terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	The cable length must be 1000m maximum.
	3F	User-created cable	The cable length must be 1000m maximum.
GP-4106 (COM1) GP-4116T (COM1)	3G	User-created cable	The cable length must be 1000m maximum.
GP-4107 (COM1) GP-4*03T[*5] (COM2) GP-4203T (COM1)	3H	User-created cable	The cable length must be 1000m maximum.
GP4000[*6] (COM2) GP-4201T (COM1) SP5000[*7] (COM1/2) SP-5B00 (COM2) ST6000[*8] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000[*9] (COM2) PS6000 (Basic Box) (COM1/2)	3I	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1[*10] + User-created cable	The cable length must be 1000m maximum.
	3B	User-created cable	The cable length must be 1000m maximum.
LT-4*01TM (COM1) LT-Rear Module (COM1)	3J	RJ45 RS-485 Cable (5m) by Pro-face PFXZLMCBRJR81	The cable length must be 200m maximum.

Display (Connection Port)	Cable		Remarks
PE-4000B*11 PS5000*11 PS6000 (Optional Interface)*11	3K	User-created cable	The cable length must be 1000m maximum.

*1 All GP3000 models except AGP-3302B

*2 Except AST-3211A and AST-3302B

*3 All GP3000 models except GP-3200 series and AGP-3302B

*4 Only the COM port which can communicate by RS-422/485 (2 wire) can be used. (Except PE-4000B, PS5000, and PS6000)
☞ ■ IPC COM Port (page 6)

*5 Except GP-4203T

*6 All GP4000 models except GP-4100 series, GP-4*01TM, GP-Rear Module, GP-4201T and GP-4*03T

*7 Except SP-5B00

*8 Except ST-6200

*9 Due to the COM port specifications, flow control is not possible. Omit wiring the control pins on the Display side of the cable diagram.

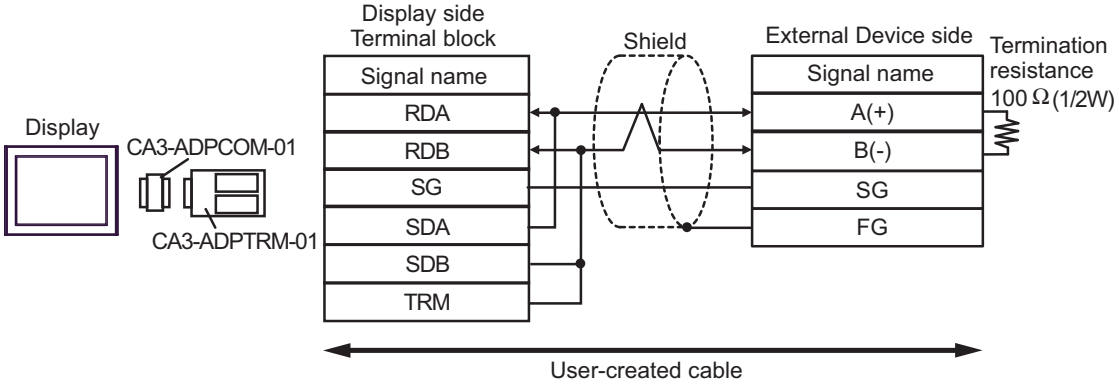
*10 When using a Terminal Block Conversion Adapter (CA3-ADPTRM-01) instead of the RS-422 Terminal Block Conversion Adapter, refer to Cable Diagram 3A.

*11 Only the COM port which can communicate by RS-422/485 (2 wire) can be used.
☞ ■ IPC COM Port (page 6)

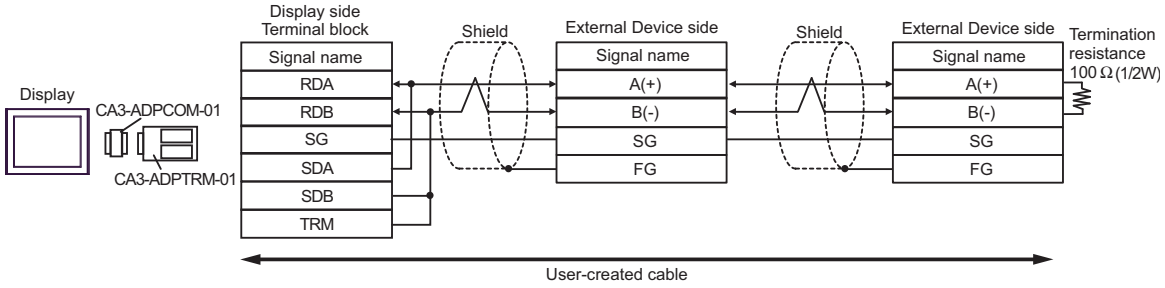
IMPORTANT
- The RS-422/485 cable length is normally 1000m or less (for LT-4*01TM and LT-Rear Module, 200m or less), which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

3A)

- 1:1 Connection



- 1: n Connection

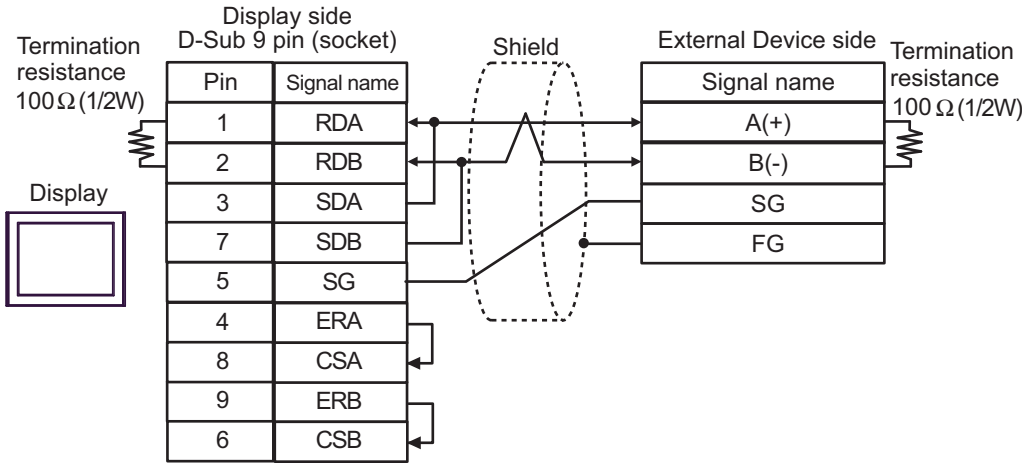


NOTE

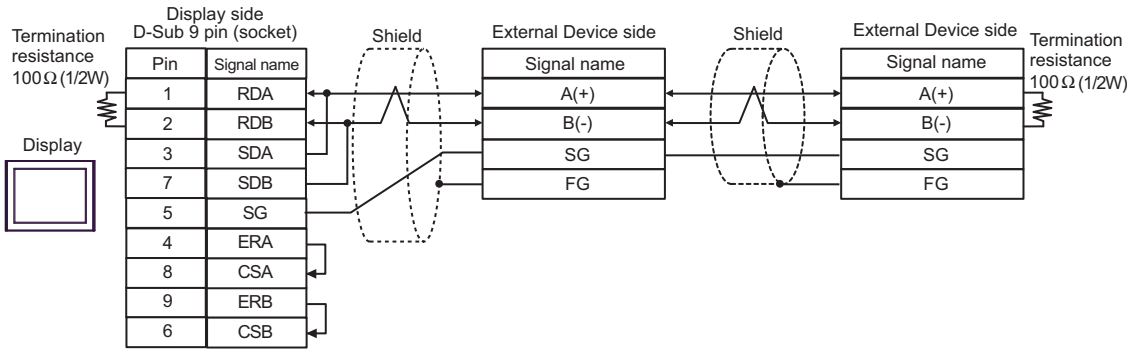
- When connecting the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

3B)

- 1:1 Connection

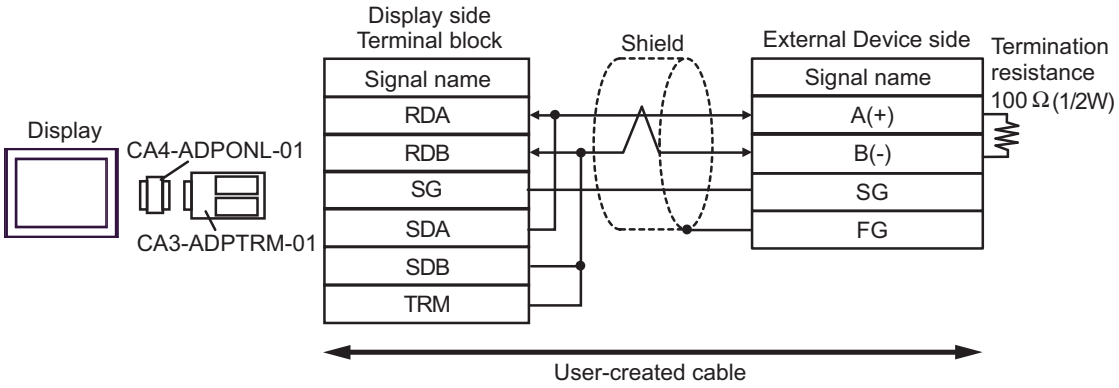


- 1: n Connection

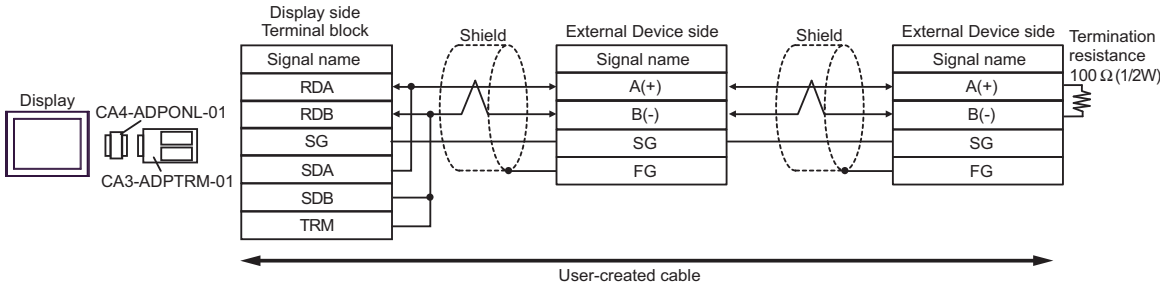


3C)

- 1:1 Connection



- 1: n Connection

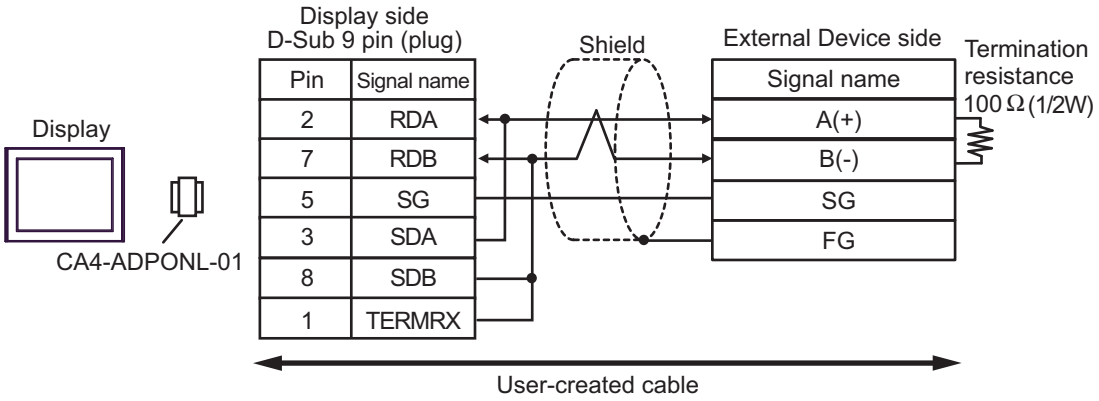


NOTE

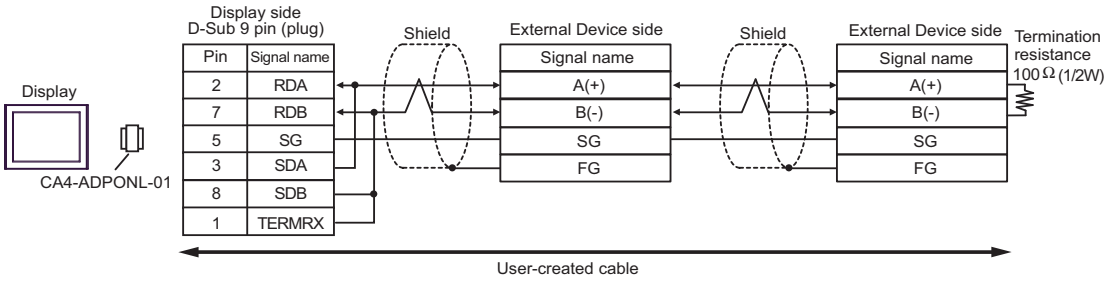
- When connecting the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

3D)

- 1:1 Connection



- 1: n Connection

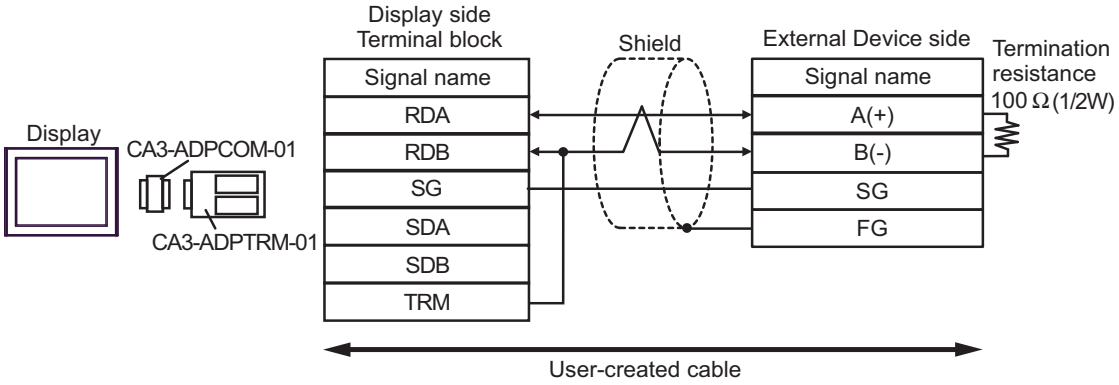


NOTE

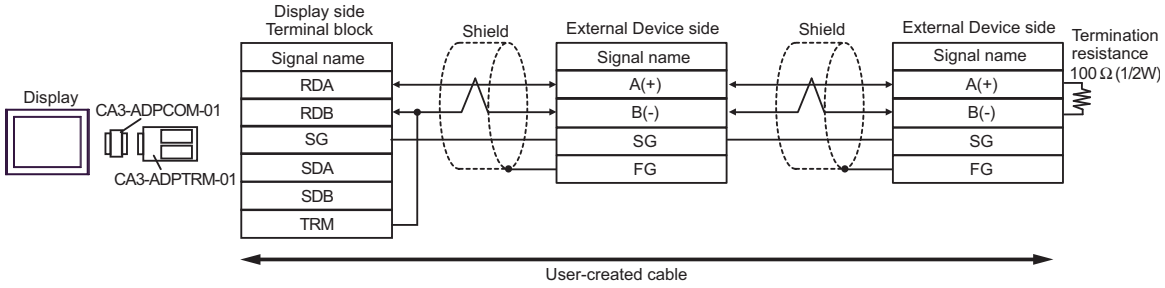
- When connecting the RDB terminal of CA4-ADPONL-01 to the TERMRX terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

3E)

- 1:1 Connection



- 1: n Connection

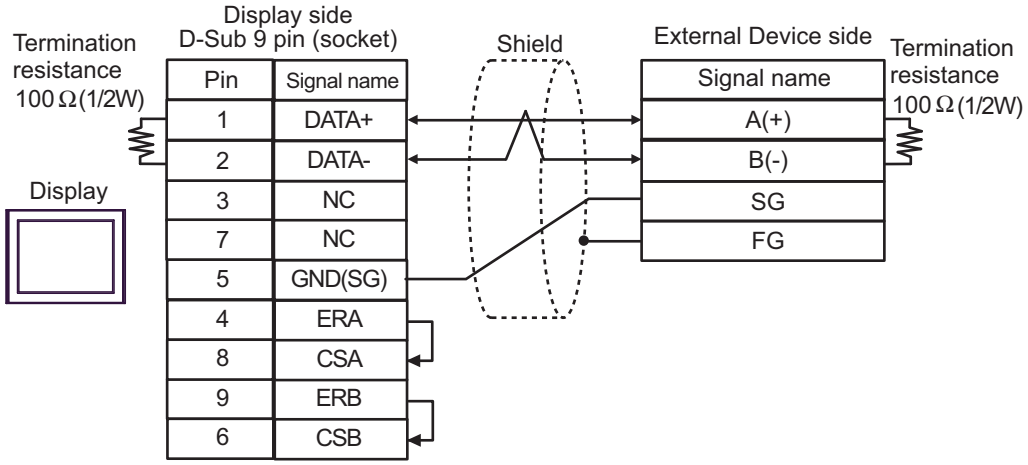


NOTE

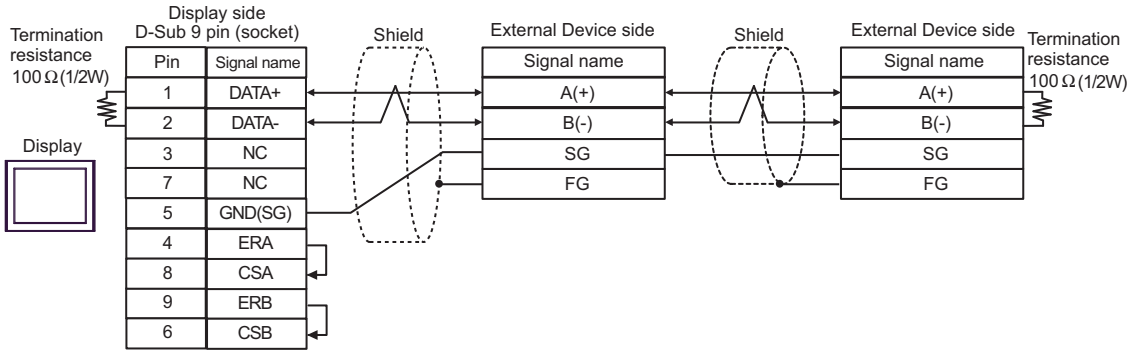
- When connecting the RDB terminal of CA3-ADPTRM-01 to the TRM terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

3F)

- 1:1 Connection

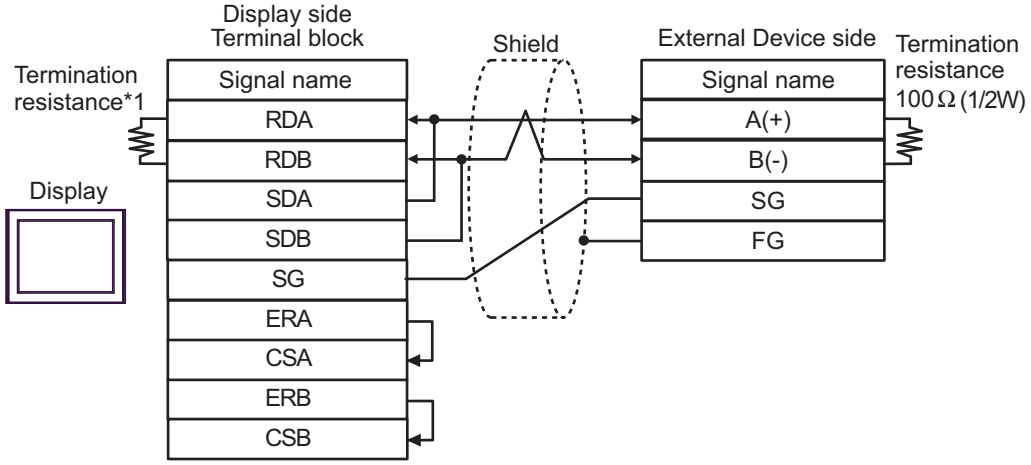


- 1: n Connection

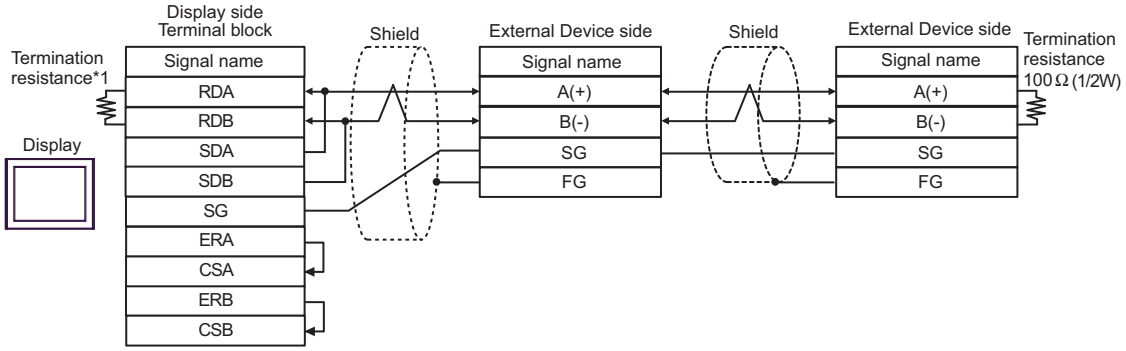


3G)

- 1:1 Connection



- 1: n Connection

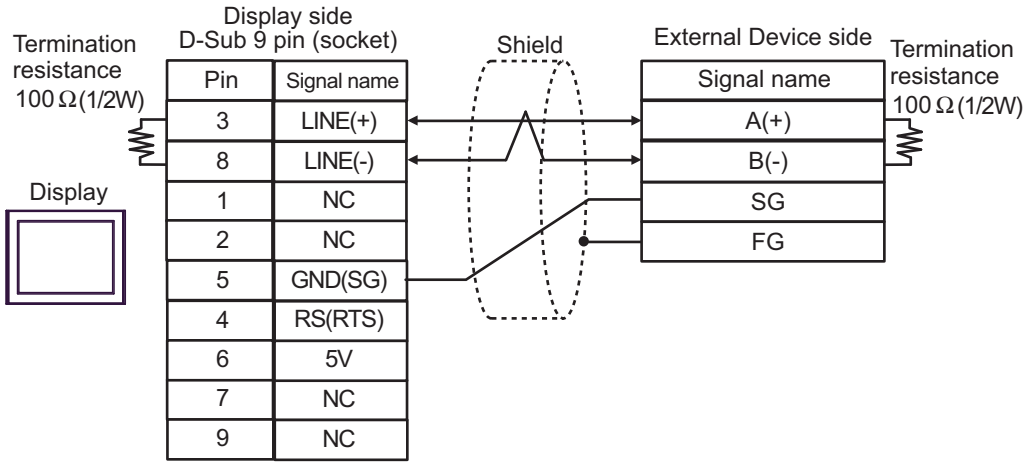


*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

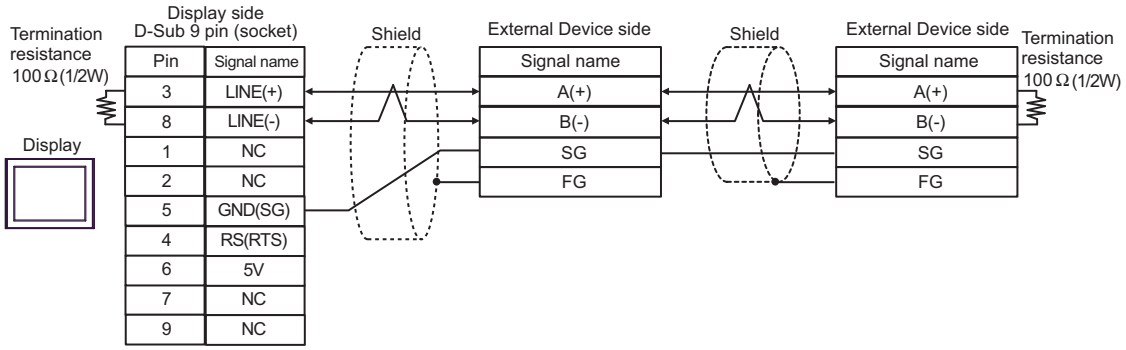
DIP Switch No.	Set Value
1	OFF
2	OFF
3	ON
4	ON

3H)

- 1:1 Connection



- 1: n Connection



IMPORTANT

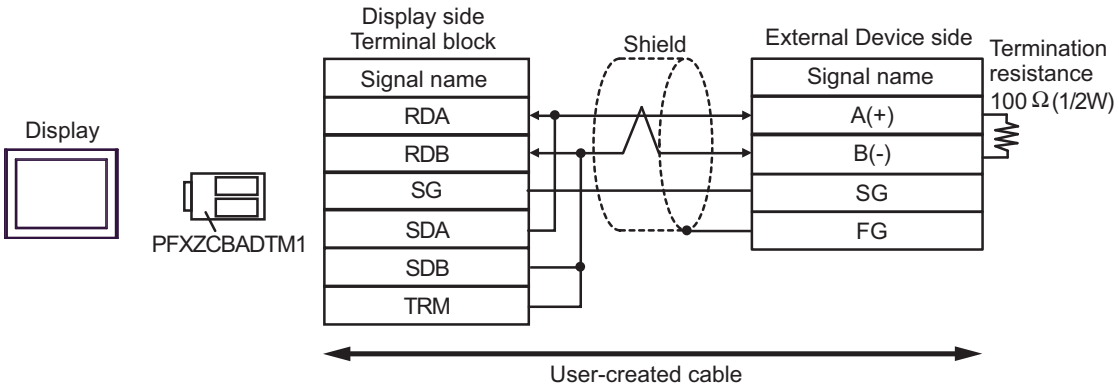
- The 5V output (Pin #6) on the Display is the power for the Siemens AG's PROFIBUS connector. Do not use it for other devices.

NOTE

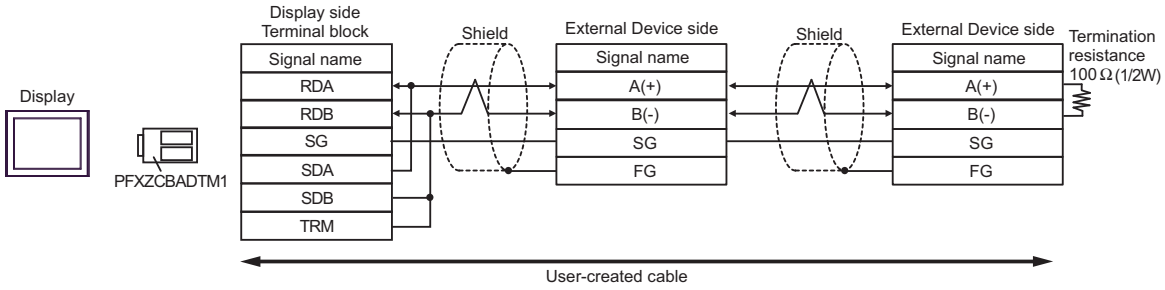
- In COM on the GP-4107, the SG and FG terminals are isolated.

3I)

- 1:1 Connection



- 1: n Connection

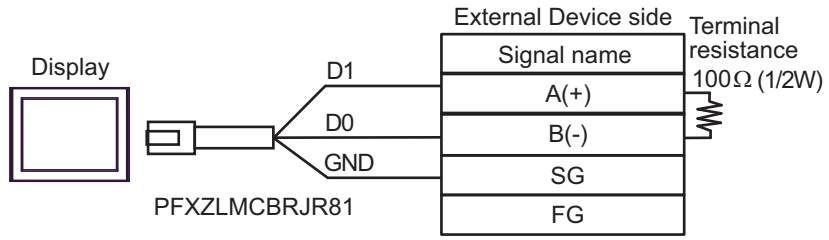


NOTE

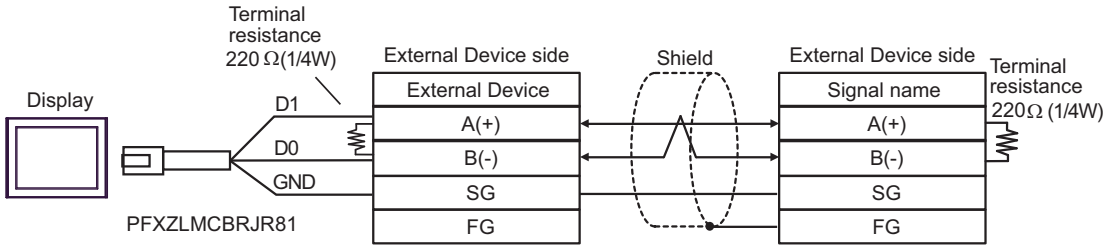
- When the RDB terminal of PFXZCBADTM1 to the TRM terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

3J)

- 1:1 Connection

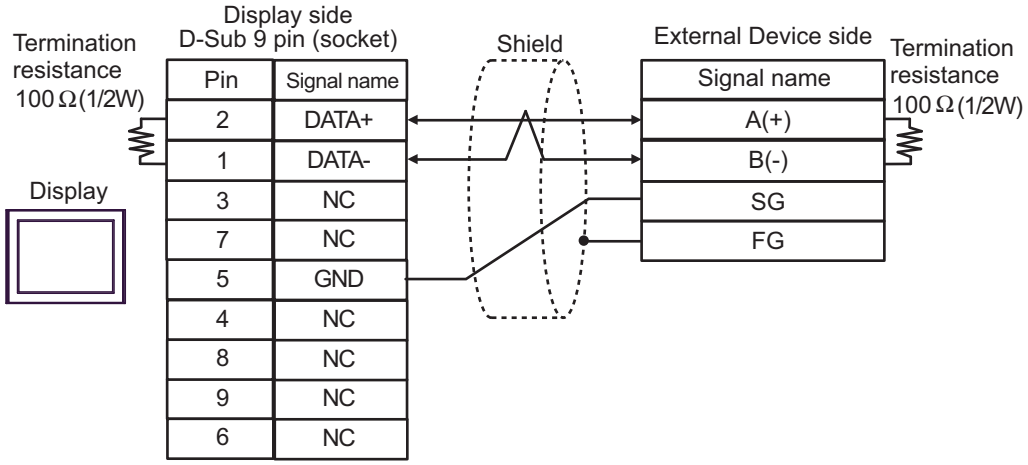


- 1: n Connection

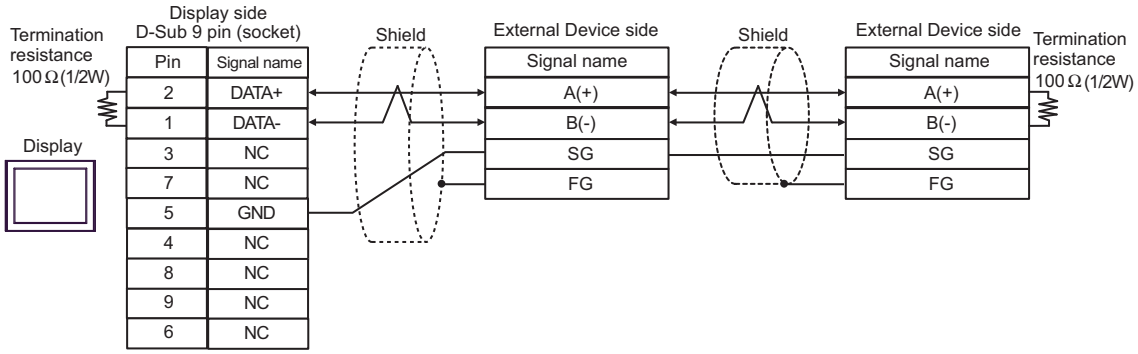


3K)

- 1:1 Connection



- 1: n Connection



Cable Diagram 4

Display (Connection Port)	Cable		Remarks
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) LT3000 (COM1)	4A	User-created cable	The cable length must be 1000m maximum.
GP3000[*3] (COM2)	4B	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	The cable length must be 1000m maximum.
IPC[*4]	4C	User-created cable	The cable length must be 1000m maximum.
GP-4106 (COM1) GP-4116T (COM1)	4D	User-created cable	The cable length must be 1000m maximum.
GP-4107 (COM1) GP-4*03T[*5] (COM2) GP-4203T (COM1)	4E	User-created cable	The cable length must be 1000m maximum.
GP4000[*6] (COM2) GP-4201T (COM1) SP5000[*7] (COM1/2) SP-5B00 (COM2) ST6000[*8] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000[*9] (COM2) PS6000 (Basic Box) (COM1/2)	4F	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1 + User-created cable	The cable length must be 1000m maximum.
	4A	User-created cable	
LT-4*01TM (COM1) LT-Rear Module (COM1)	4G	RJ45 RS-485 Cable (5m) by Pro-face PFXZLMCBRJR81	The cable length must be 200m maximum.
PE-4000B[*10] PS5000[*10] PS6000 (Optional Interface)[*10]	4H	User-created cable	The cable length must be 1000m maximum.

*1 All GP3000 models except AGP-3302B

*2 Except AST-3211A and AST-3302B

*3 All GP models except the GP-3200 Series and AGP-3302B

*4 Only the COM port which can communicate by RS-422/485 (2 wire) can be used. (Except PE-4000B, PS5000, and PS6000)

☞■ IPC COM Port (page 6)

*5 Except GP-4203T

*6 All GP4000 models except GP-4100 series, GP-4*01TM, GP-Rear Module, GP-4201T and GP-4*03T

*7 Except SP-5B00

*8 Except ST-6200

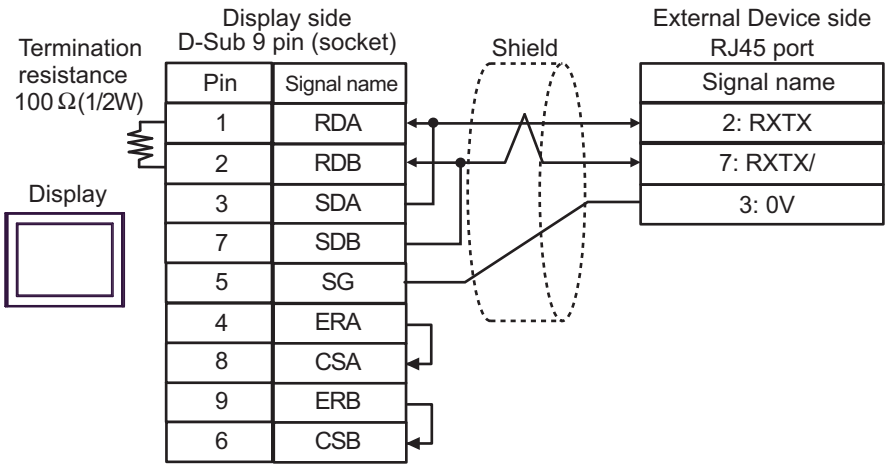
*9 Due to the COM port specifications, flow control is not possible. Omit wiring the control pins on the Display side of the cable diagram.

*10 Only the COM port which can communicate by RS-422/485 (2 wire) can be used.
☞■ IPC COM Port (page 6)

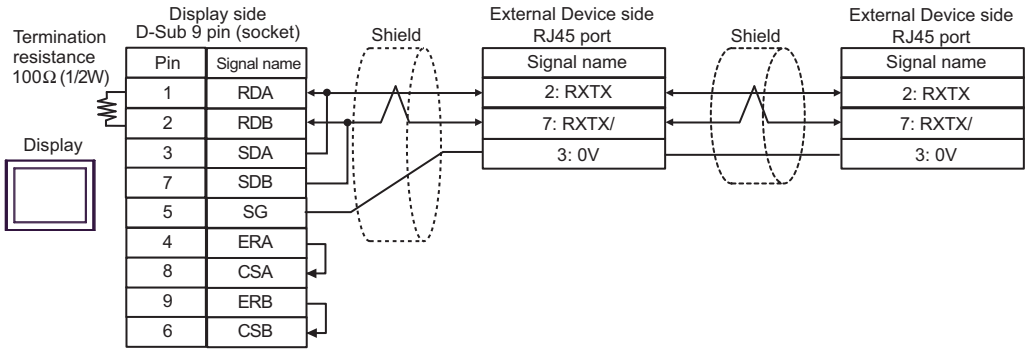
IMPORTANT
- The RS-422/485 cable length is normally 1000m or less (for LT-4*01TM and LT-Rear Module, 200m or less), which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

4A)

- 1:1 Connection

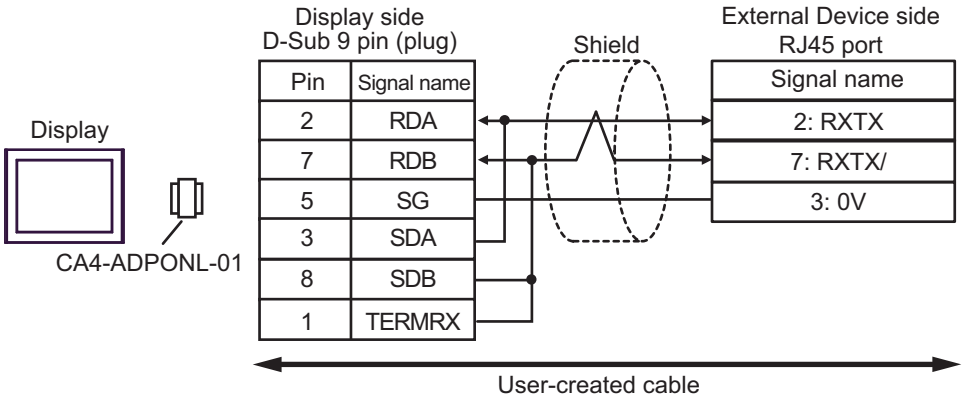


- 1: n Connection

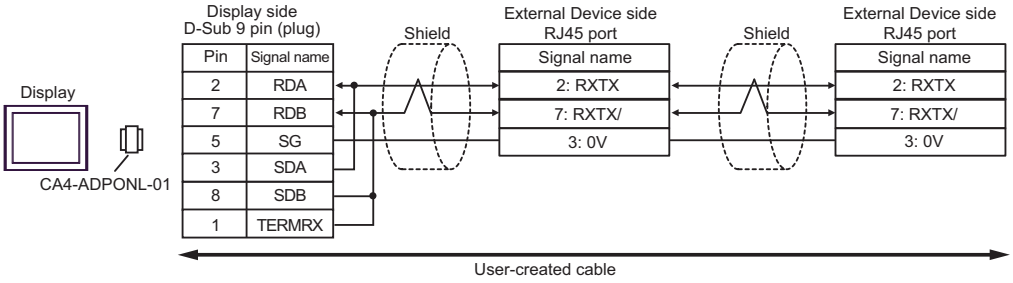


4B)

- 1:1 Connection



- 1: n Connection

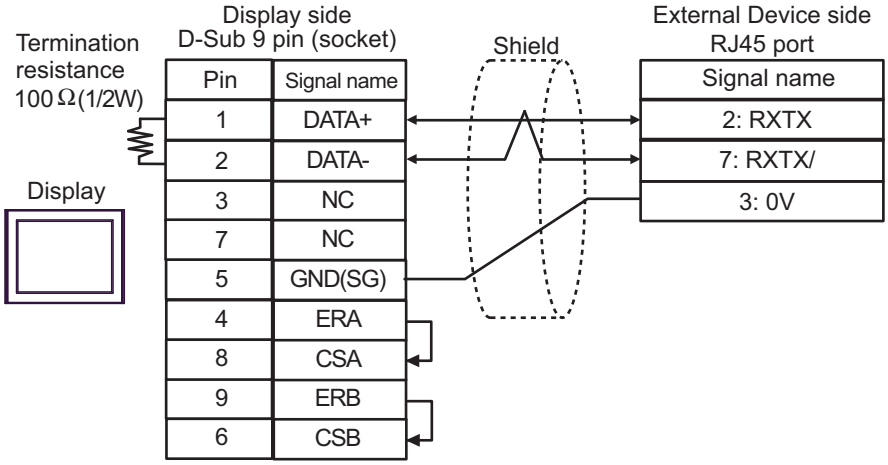


NOTE

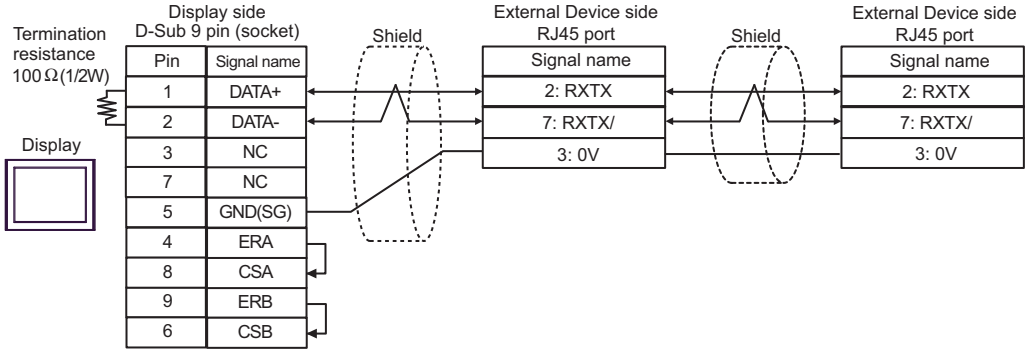
- When connecting the RDB terminal of CA4-ADPONL-01 to the TERMRX terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

4C)

- 1:1 Connection

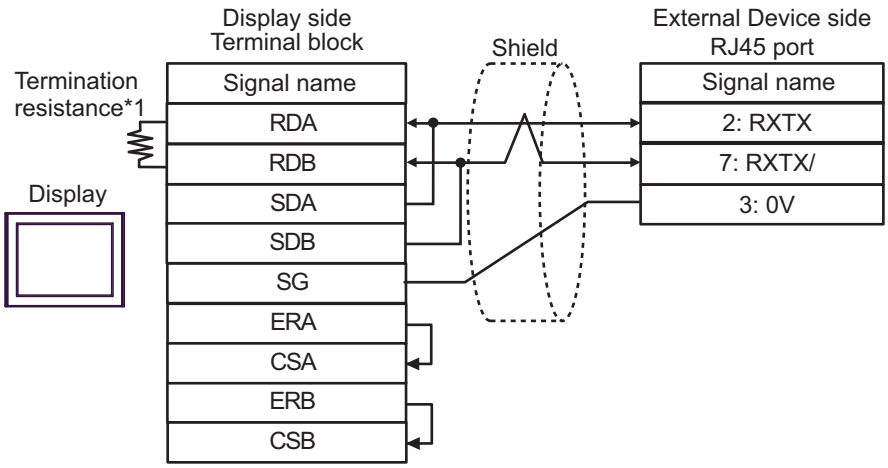


- 1: n Connection

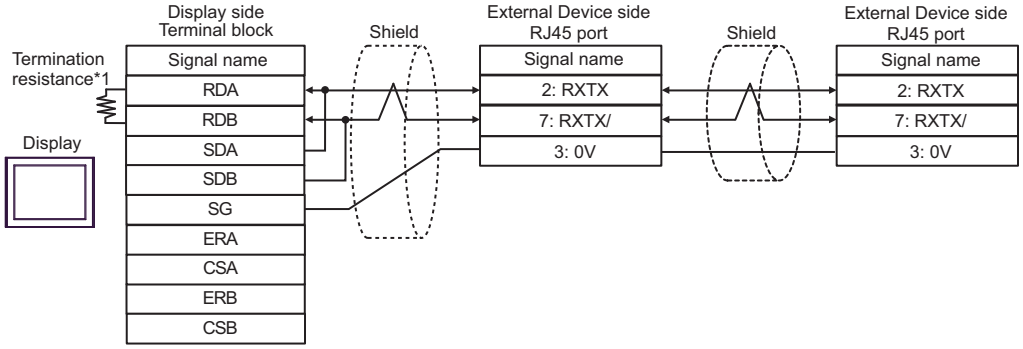


4D)

- 1:1 Connection



- 1: n Connection

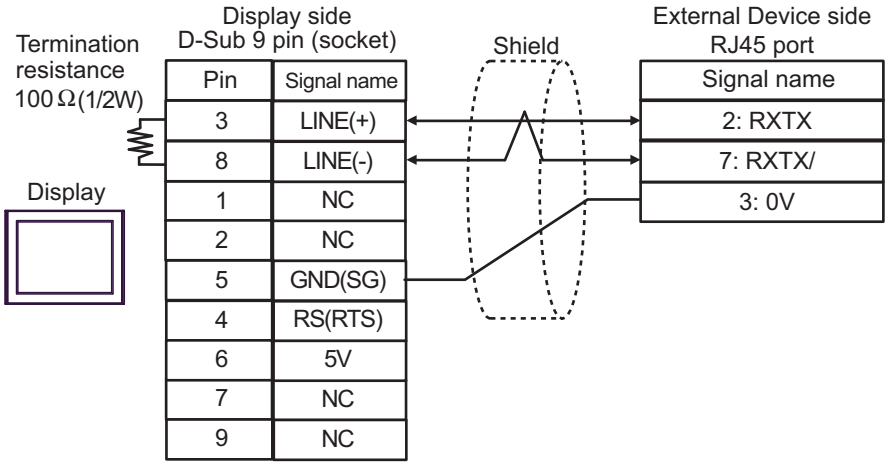


*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

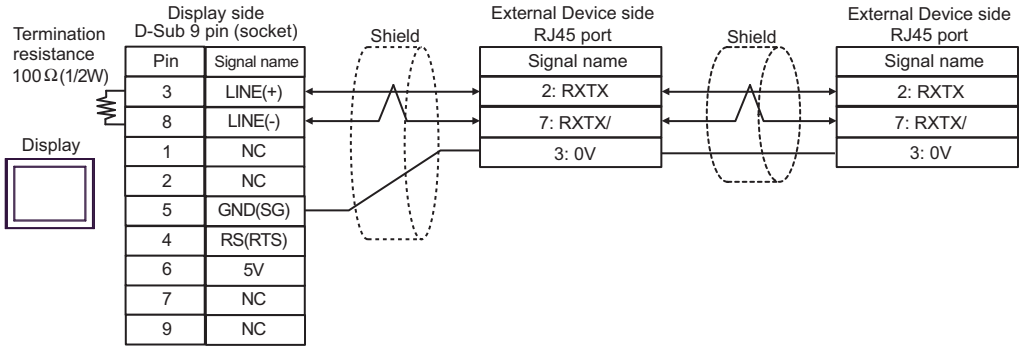
DIP Switch No.	Set Value
1	OFF
2	OFF
3	ON
4	ON

4E)

- 1:1 Connection



- 1: n Connection



IMPORTANT

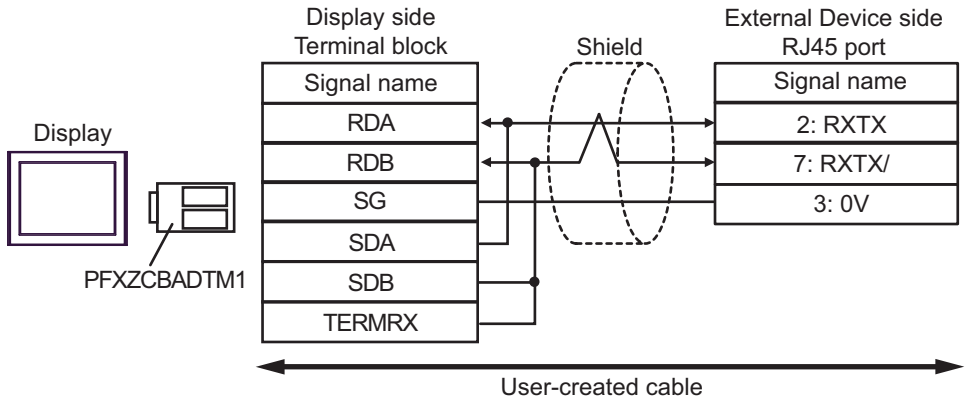
- The 5V output (Pin #6) on the Display is the power for the Siemens AG's PROFIBUS connector. Do not use it for other devices.

NOTE

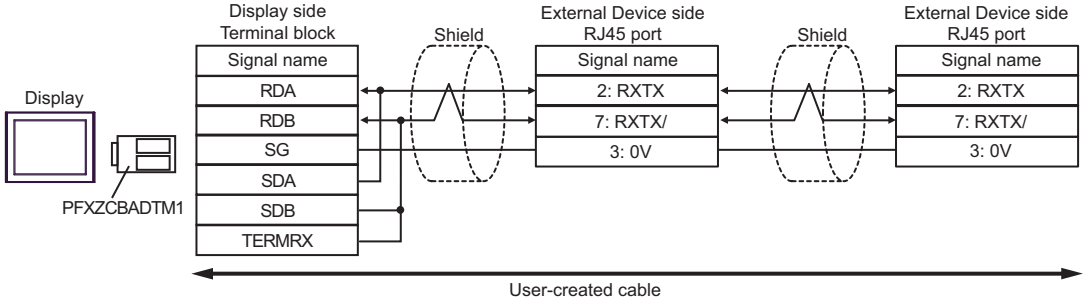
- In COM on the GP-4107, the SG and FG terminals are isolated.

4F)

- 1:1 Connection



- 1: n Connection

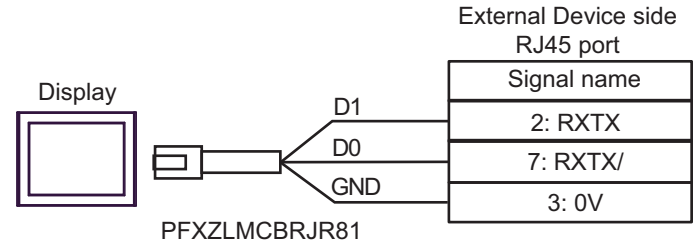


NOTE

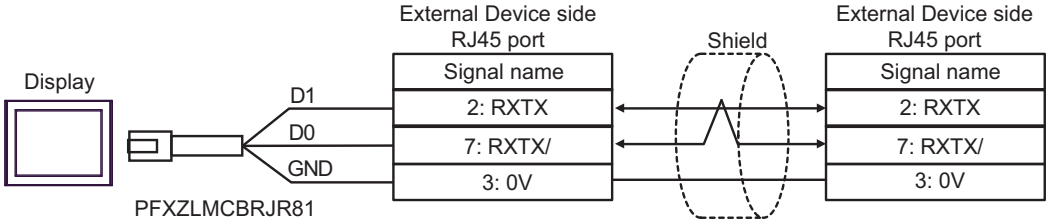
- When the RDB terminal of PFXZCBADTM1 to the TERMRX terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

4G)

- 1:1 Connection

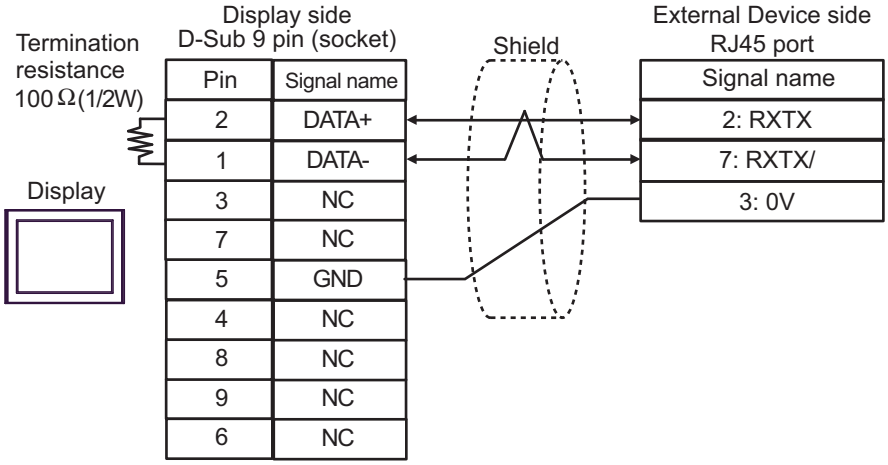


- 1: n Connection

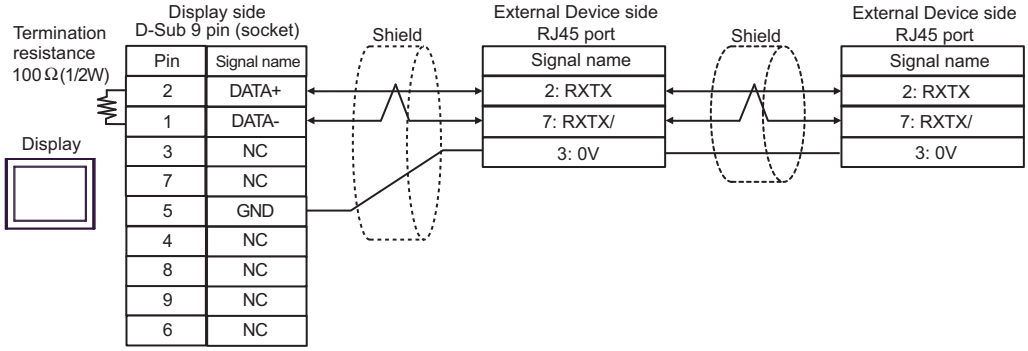


4H)

- 1:1 Connection



- 1: n Connection



Cable Diagram 5

Display (Connection Port)	Cable		Remarks
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) LT3000 (COM1)	5A	User-created cable	The cable length must be 1000m maximum.
GP3000[*3] (COM2)	5B	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	The cable length must be 1000m maximum.
IPC[*4]	5C	User-created cable	The cable length must be 1000m maximum.
GP-4106 (COM1) GP-4116T (COM1)	5D	User-created cable	The cable length must be 1000m maximum.
GP-4107 (COM1) GP-4*03T[*5] (COM2) GP-4203T (COM1)	5E	User-created cable	The cable length must be 1000m maximum.
GP4000[*6] (COM2) GP-4201T (COM1) SP5000[*7] (COM1/2) SP-5B00 (COM2) ST6000[*8] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000[*9] (COM2) PS6000 (Basic Box) (COM1/2)	5F	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1 + User-created cable	The cable length must be 1000m maximum.
	5A	User-created cable	
LT-4*01TM (COM1) LT-Rear Module (COM1)	5G	RJ45 RS-485 Cable (5m) by Pro-face PFXZLMCBRJR81	The cable length must be 200m maximum.
PE-4000B[*10] PS5000[*10] PS6000 (Optional Interface)[*10]	5H	User-created cable	The cable length must be 1000m maximum.

*1 All GP3000 models except AGP-3302B

*2 Except AST-3211A and AST-3302B

*3 All GP models except the GP-3200 Series and AGP-3302B

*4 Only the COM port which can communicate by RS-422/485 (2 wire) can be used. (Except PE-4000B, PS5000, and PS6000)

☞ ■ IPC COM Port (page 6)

*5 Except GP-4203T

*6 All GP4000 models except GP-4100 series, GP-4*01TM, GP-Rear Module, GP-4201T and GP-4*03T

*7 Except SP-5B00

*8 Except ST-6200

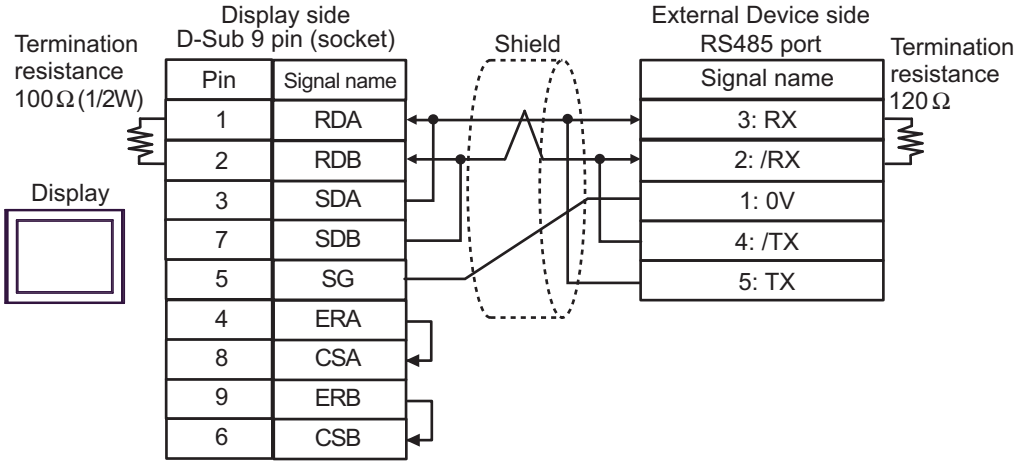
*9 Due to the COM port specifications, flow control is not possible. Omit wiring the control pins on the Display side of the cable diagram.

*10 Only the COM port which can communicate by RS-422/485 (2 wire) can be used.
☞ ■ IPC COM Port (page 6)

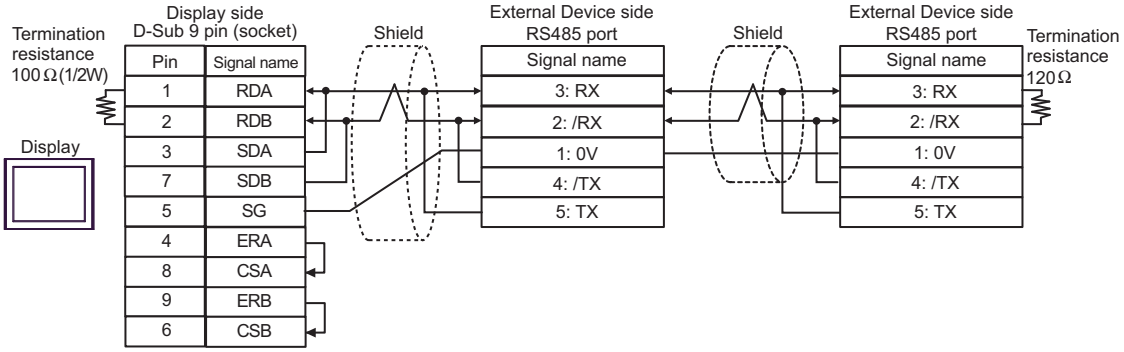
IMPORTANT
- The RS-422/485 cable length is normally 1000m or less (for LT-4*01TM and LT-Rear Module, 200m or less), which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

5A)

- 1:1 Connection

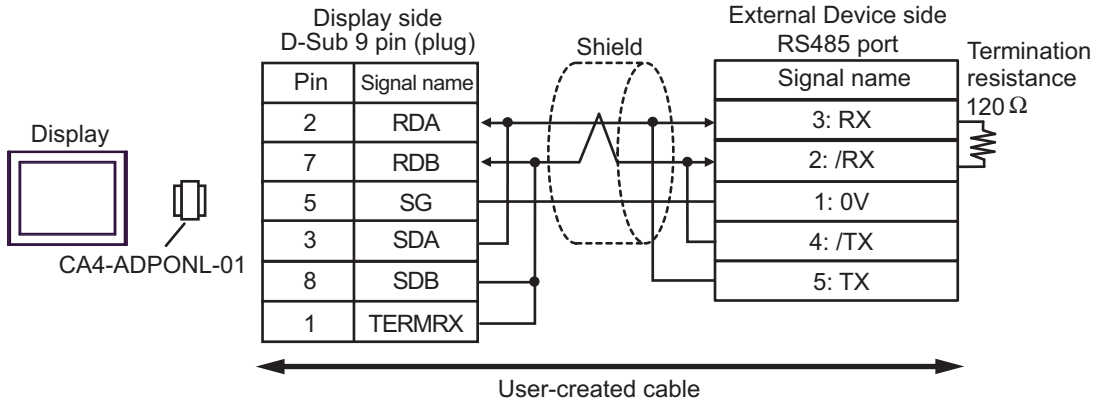


- 1: n Connection

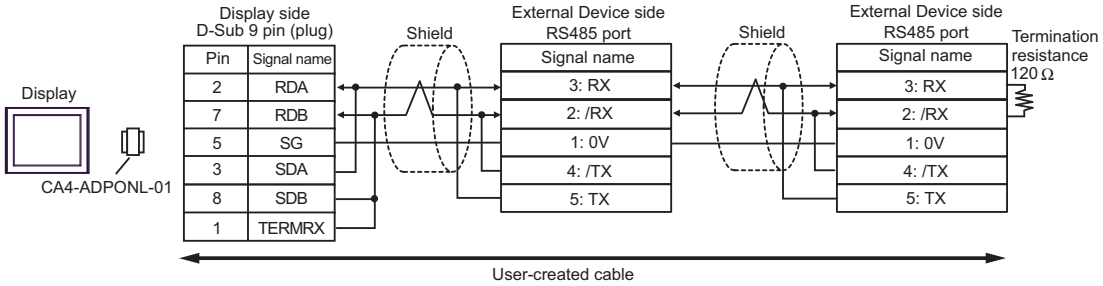


5B)

- 1:1 Connection



- 1: n Connection

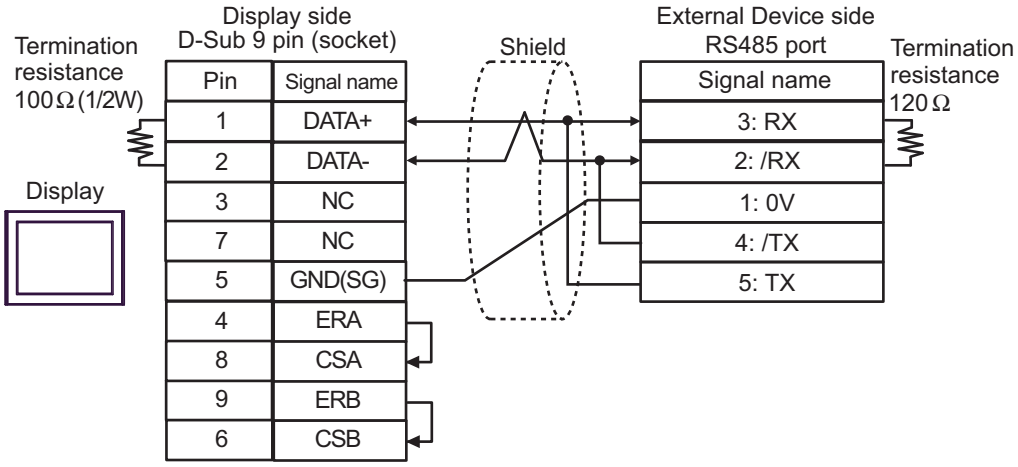


NOTE

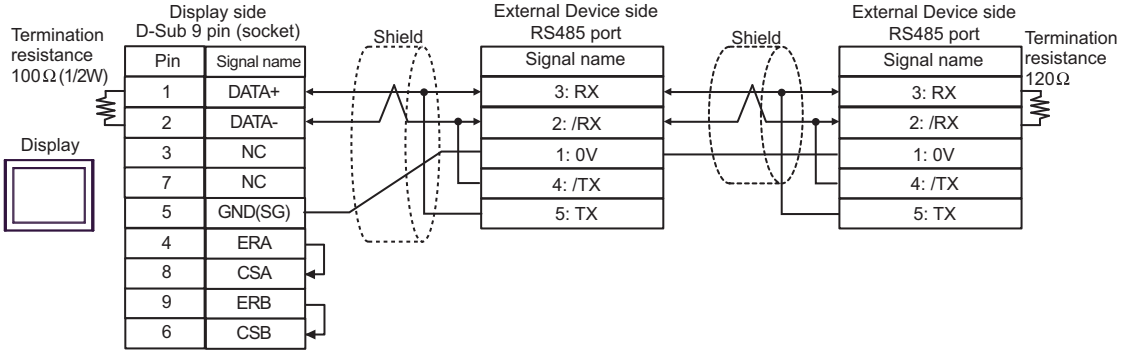
- When connecting the RDB terminal of CA4-ADPONL-01 to the TERMRX terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

5C)

- 1:1 Connection

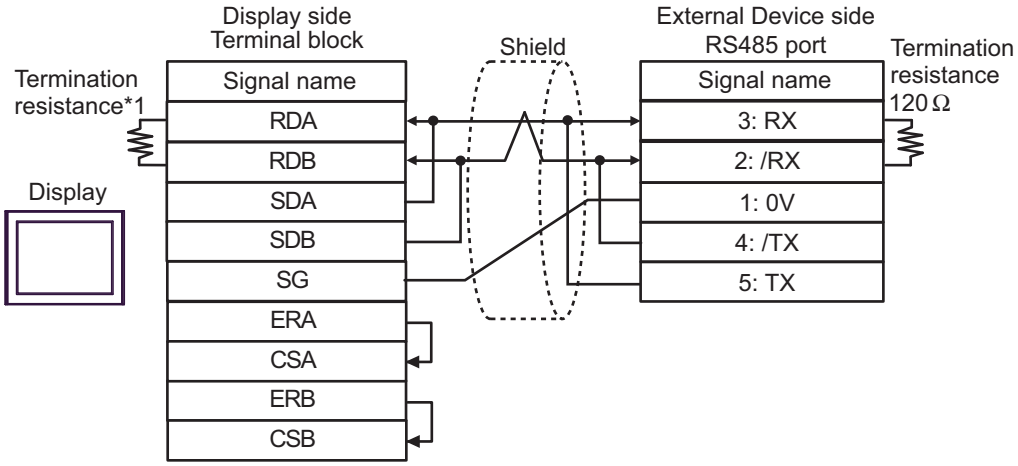


- 1: n Connection

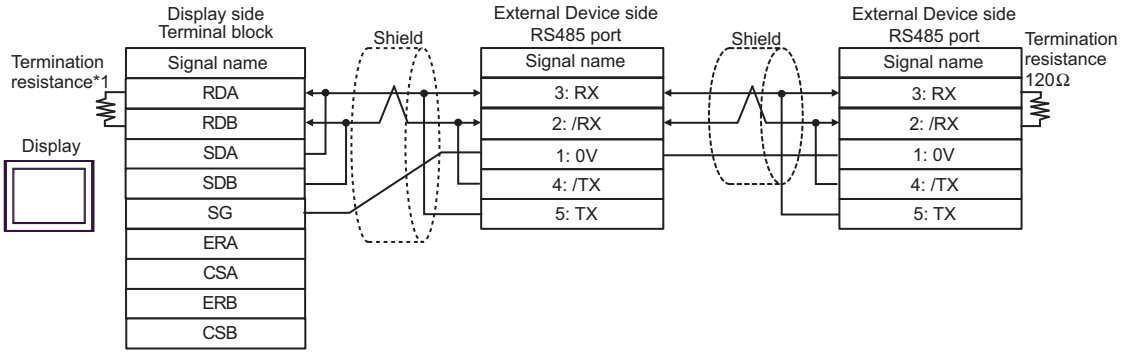


5D)

- 1:1 Connection



- 1: n Connection

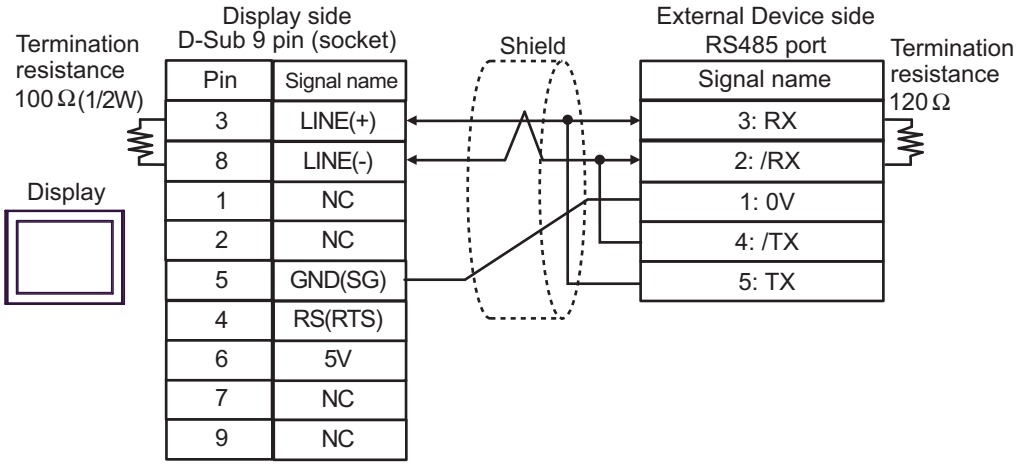


*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

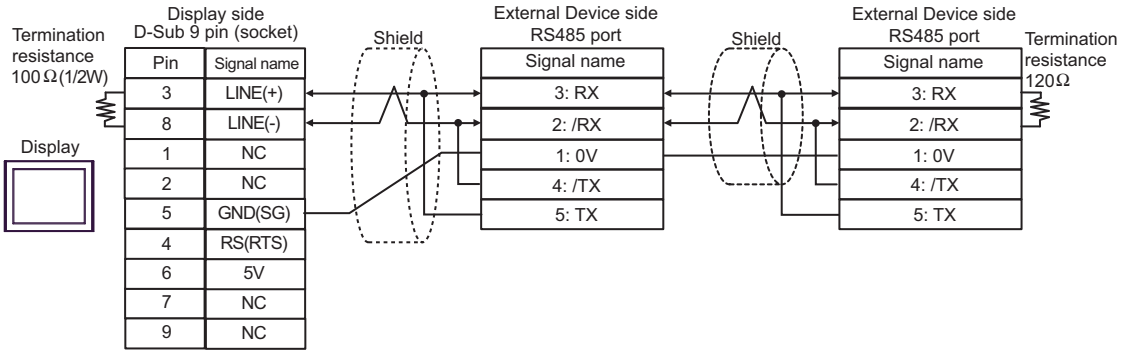
DIP Switch No.	Set Value
1	OFF
2	OFF
3	ON
4	ON

5E)

- 1:1 Connection



- 1: n Connection



IMPORTANT

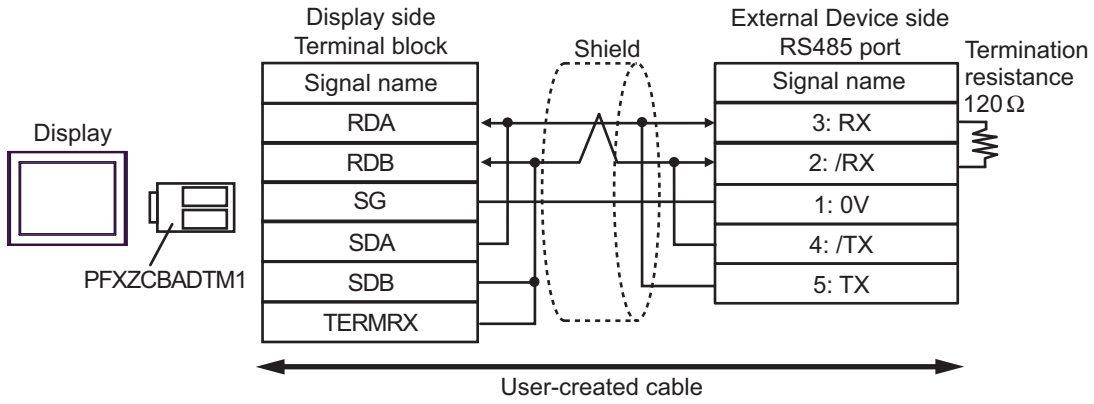
- The 5V output (Pin #6) on the Display is the power for the Siemens AG's PROFIBUS connector. Do not use it for other devices.

NOTE

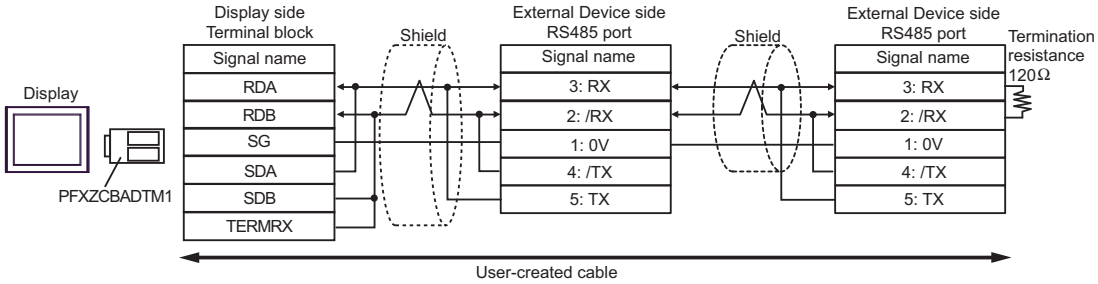
- In COM on the GP-4107, the SG and FG terminals are isolated.

5F)

- 1:1 Connection



- 1: n Connection

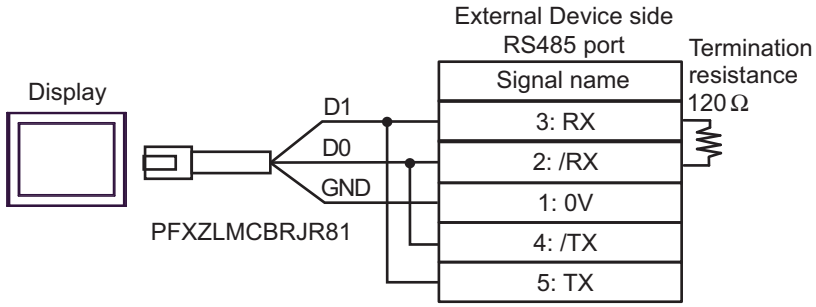


NOTE

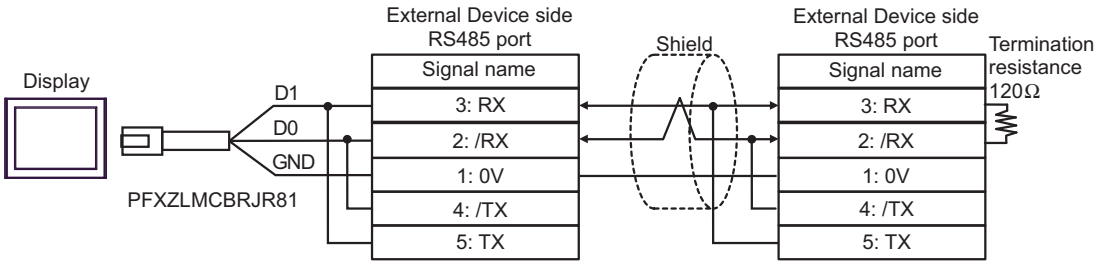
- When the RDB terminal of PFXZCBADTM1 to the TERMRX terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

5G)

- 1:1 Connection

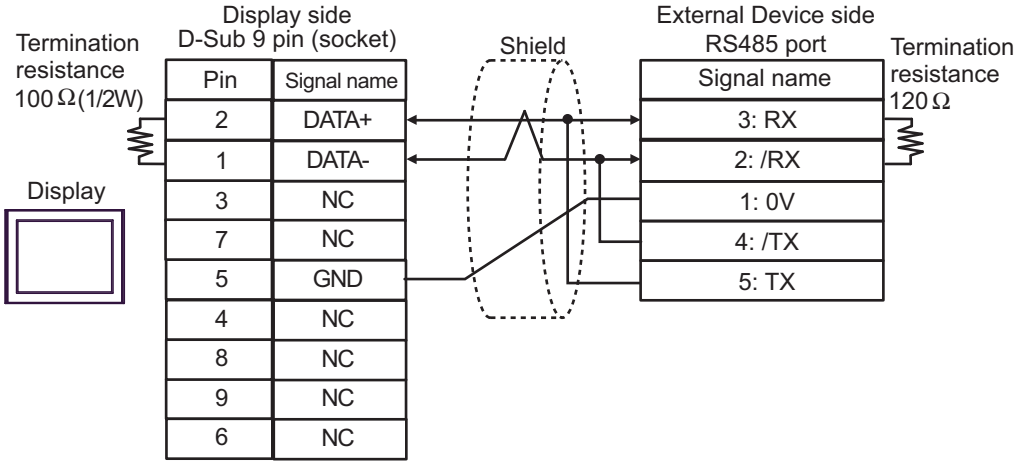


- 1: n Connection

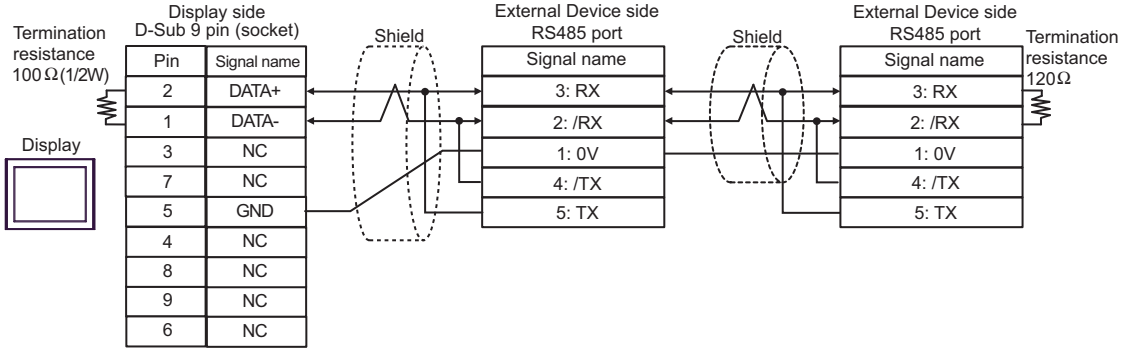


5H)

- 1:1 Connection



- 1: n Connection



Cable Diagram 6

Display (Connection Port)	Cable		Remarks
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) LT3000 (COM1)	6A	User-created cable	The cable length must be 1000m maximum.
GP3000[*3] (COM2)	6B	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	The cable length must be 1000m maximum.
IPC[*4]	6C	User-created cable	The cable length must be 1000m maximum.
GP-4106 (COM1) GP-4116T (COM1)	6D	User-created cable	The cable length must be 1000m maximum.
GP-4107 (COM1) GP-4*03T[*5] (COM2) GP-4203T (COM1)	6E	User-created cable	The cable length must be 1000m maximum.
GP4000[*6] (COM2) GP-4201T (COM1) SP5000[*7] (COM1/2) SP-5B00 (COM2) ST6000[*8] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) ET6000[*9] (COM2) PS6000 (Basic Box) (COM1/2)	6F	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1 + User-created cable	The cable length must be 1000m maximum.
	6A	User-created cable	
LT-4*01TM (COM1) LT-Rear Module (COM1)	6G	RJ45 RS-485 Cable (5m) by Pro-face PFXZLMCBRJR81	The cable length must be 200m maximum.
PE-4000B[*10] PS5000[*10] PS6000 (Optional Interface)[*10]	6H	User-created cable	The cable length must be 1000m maximum.

*1 All GP3000 models except AGP-3302B

*2 Except AST-3211A and AST-3302B

*3 All GP models except the GP-3200 Series and AGP-3302B

*4 Only the COM port which can communicate by RS-422/485 (2 wire) can be used. (Except PE-4000B, PS5000, and PS6000)

☞ ■ IPC COM Port (page 6)

*5 Except GP-4203T

*6 All GP4000 models except GP-4100 series, GP-4*01TM, GP-Rear Module, GP-4201T and GP-4*03T

*7 Except SP-5B00

*8 Except ST-6200

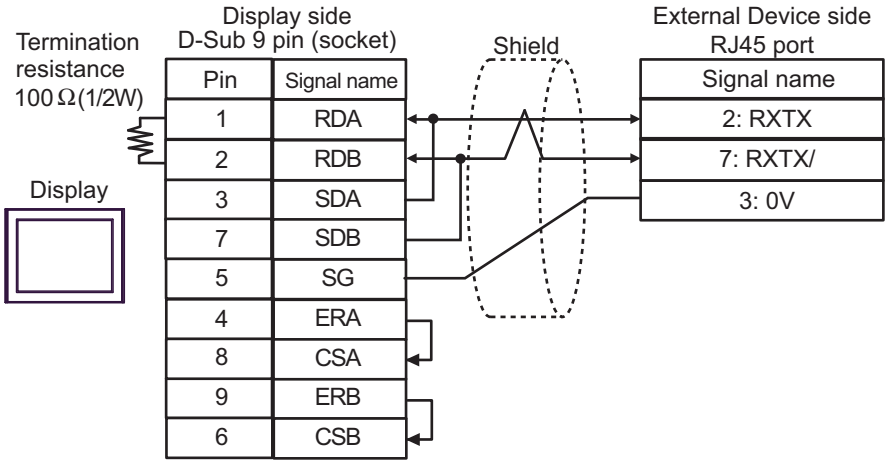
*9 Due to the COM port specifications, flow control is not possible. Omit wiring the control pins on the Display side of the cable diagram.

*10 Only the COM port which can communicate by RS-422/485 (2 wire) can be used.
☞ ■ IPC COM Port (page 6)

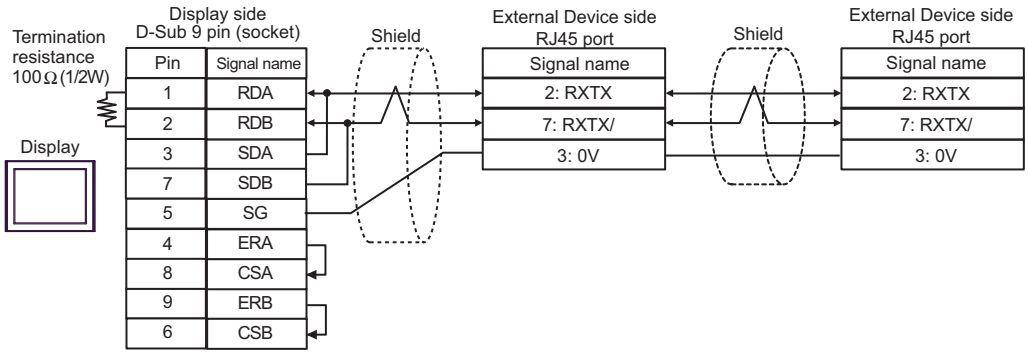
IMPORTANT
- The RS-422/485 cable length is normally 1000m or less (for LT-4*01TM and LT-Rear Module, 200m or less), which depends on the External Device. Please refer to the manual of the External Device for more details.
- The connection method and termination resistance depends on the External Device.
- The termination resistance on the Display is not isolated.

6A)

- 1:1 Connection

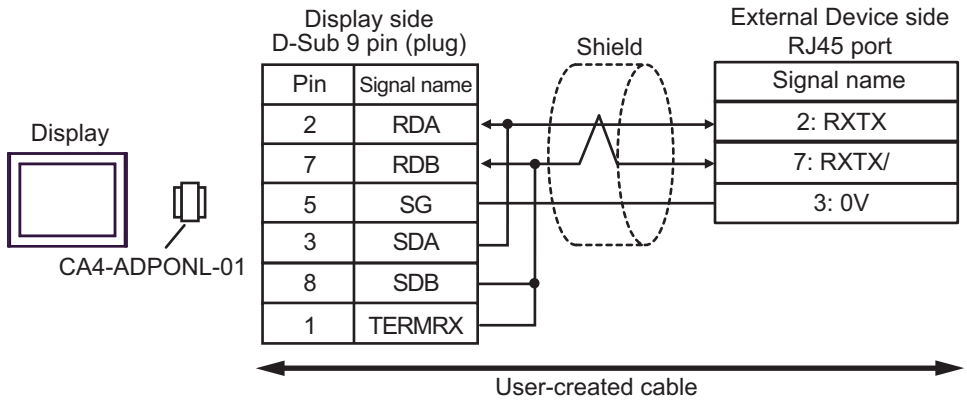


- 1: n Connection

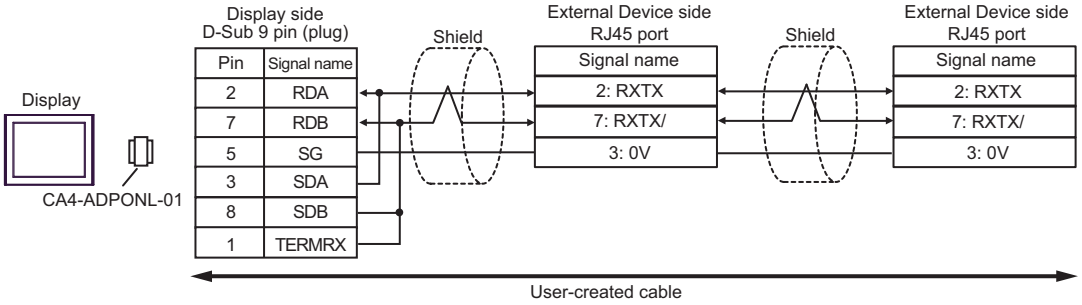


6B)

- 1:1 Connection



- 1: n Connection

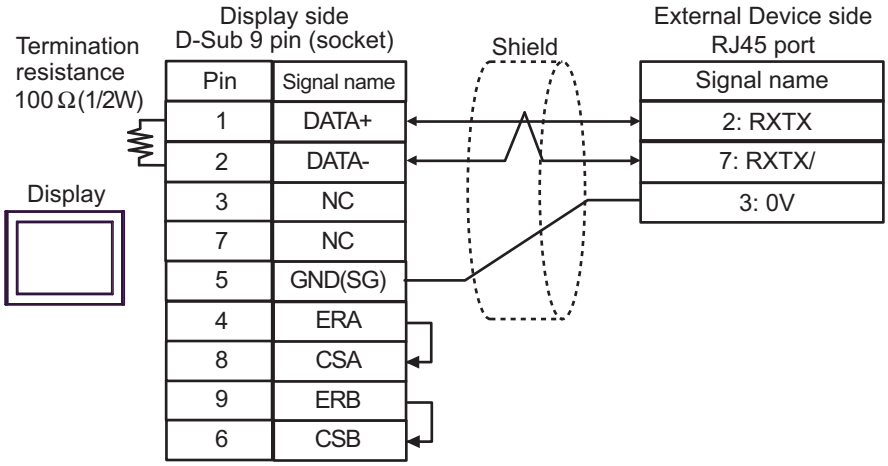


NOTE

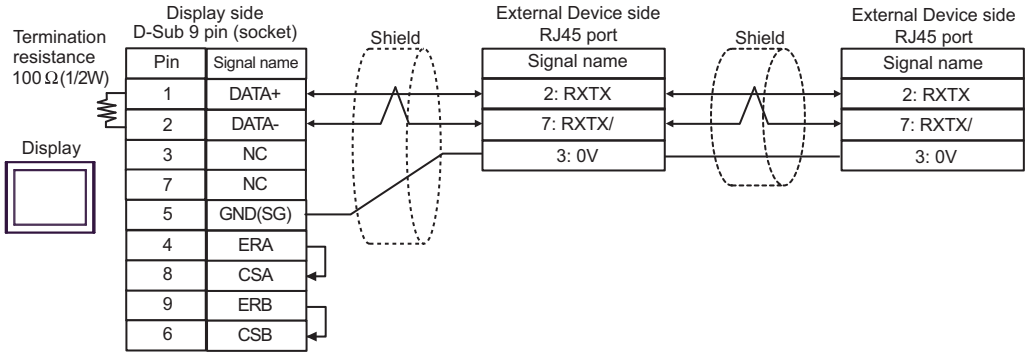
- When connecting the RDB terminal of CA4-ADPONL-01 to the TERMRX terminal, 100Ω (1/2W) termination resistance is inserted between the RDA and RDB terminals on the Display.

6C)

- 1:1 Connection

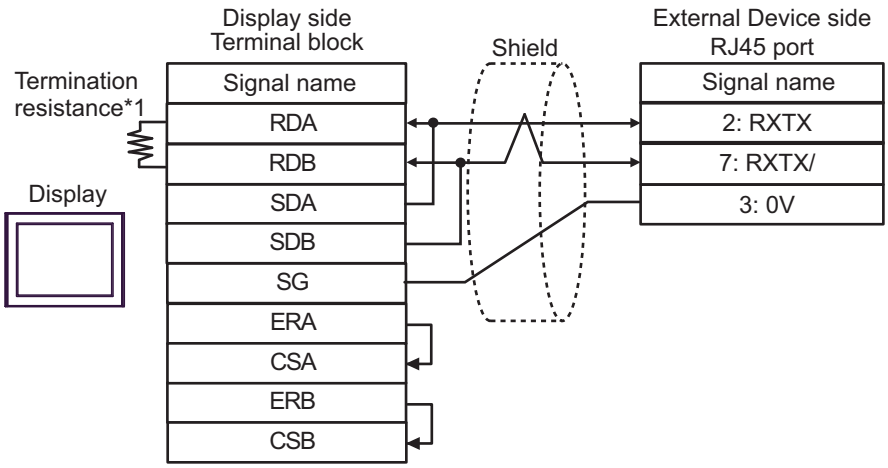


- 1: n Connection

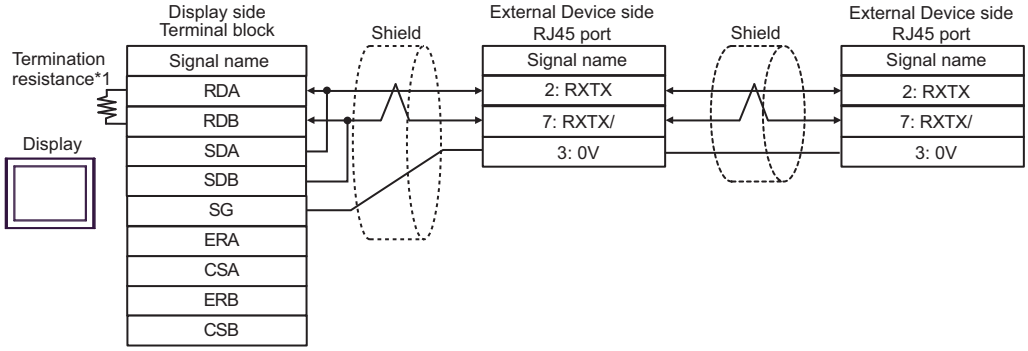


6D)

- 1:1 Connection



- 1: n Connection

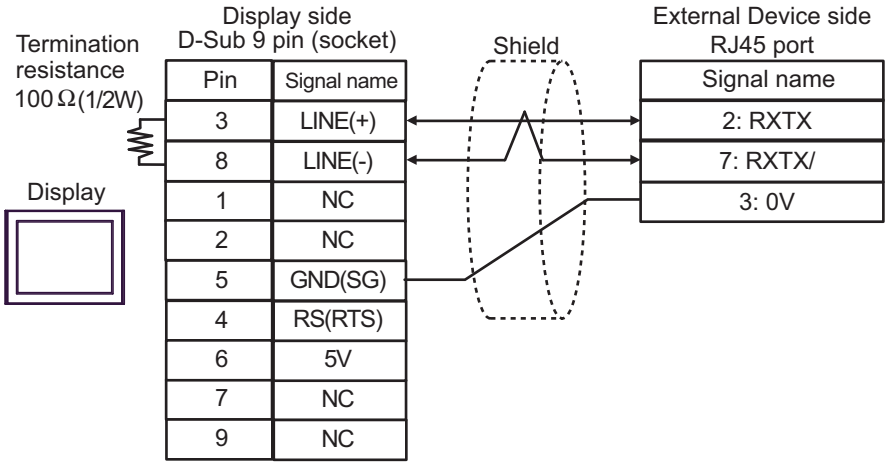


*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

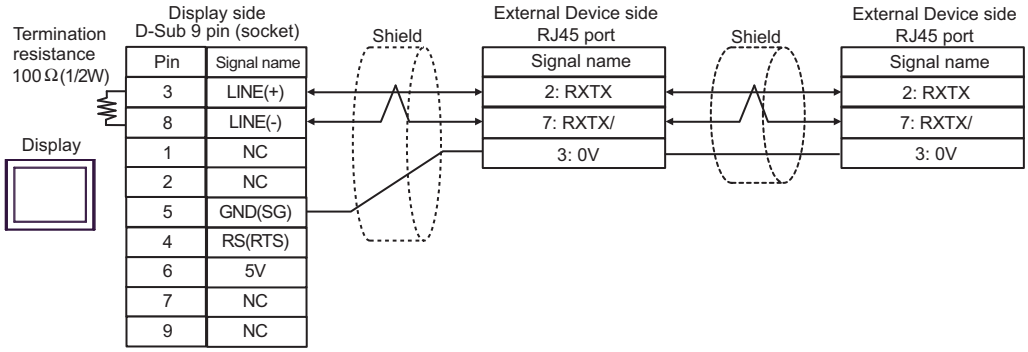
DIP Switch No.	Set Value
1	OFF
2	OFF
3	ON
4	ON

6E)

- 1:1 Connection



- 1: n Connection



IMPORTANT

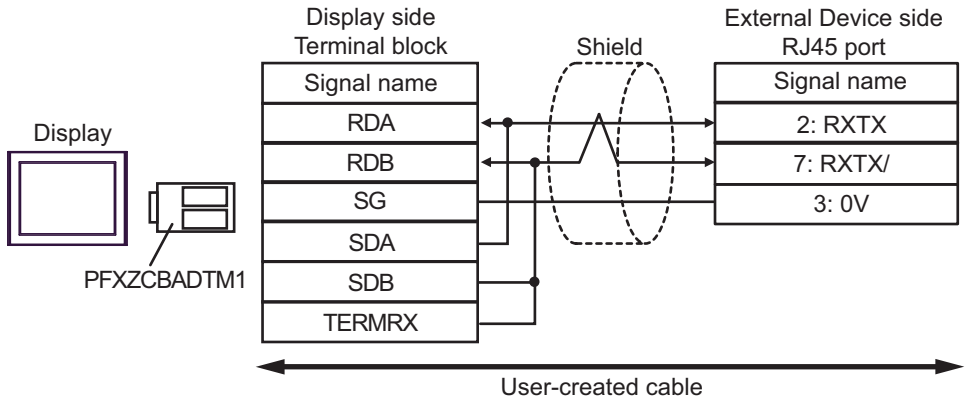
- The 5V output (Pin #6) on the Display is the power for the Siemens AG's PROFIBUS connector. Do not use it for other devices.

NOTE

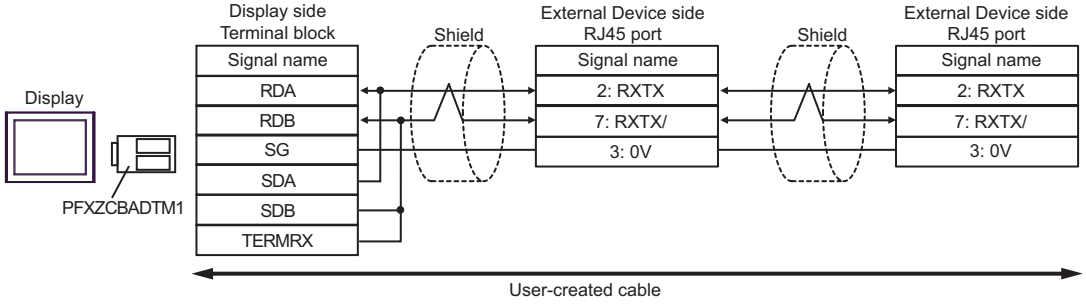
- In COM on the GP-4107, the SG and FG terminals are isolated.

6F)

- 1:1 Connection



- 1: n Connection

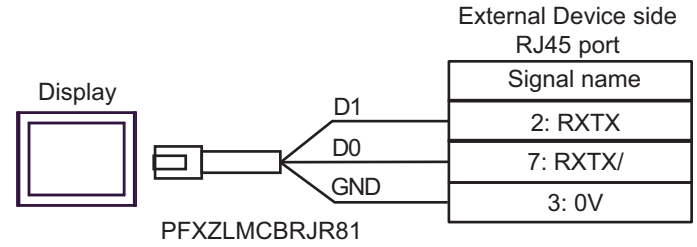


NOTE

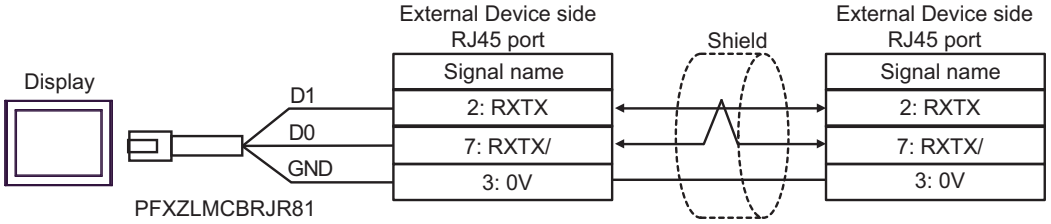
- When the RDB terminal of PFXZCBADTM1 to the TERMRX terminal, the termination resistance of 100Ω (1/2W) is inserted between RDA and RDB terminals on the Display.

6G)

- 1:1 Connection

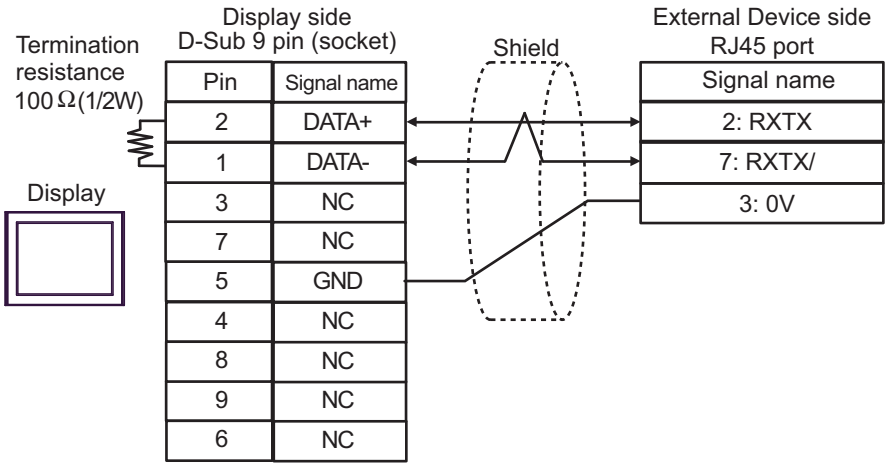


- 1: n Connection

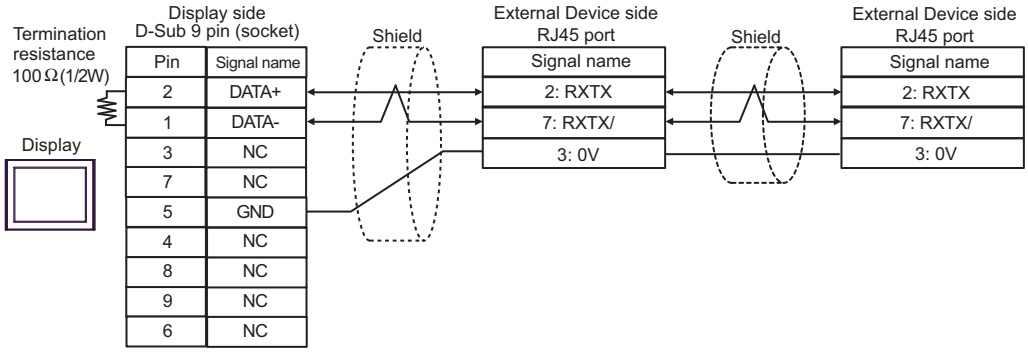


6H)

- 1:1 Connection



- 1: n Connection



6 Supported Device Addresses

The following table shows the range of supported device addresses. Please note that the actual supported range of the devices varies depending on the External Device to be used. Please check the actual range in the manual of your External Device.

6.1 General Modbus

: This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001 - 065536	000001 - 065521		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 [Individual Device Settings].
☞"4.1 GP-Pro EX Setup Items" (page 22)

*2 Write disabled.

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

"Clear"..... Bit 15

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

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

"Clear"..... Bit 31

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

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

■ IEC61131 Syntax Address Description

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

Device	MODBUS Syntax			IEC61131 Syntax				
				Format	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 invalid and display as "-Undefined-".

NOTE

- For system data area, refer to the GP-Pro EX Reference Manual.

  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

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

  ☞"Manual Symbols and Terminology"

6.2 Control Techniques (Modbus)

: This address can be specified as system data area.

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

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

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

*2 Write disabled.

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

"Clear"..... Bit 15

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

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

"Clear"..... Bit 31

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

NOTE

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

■ IEC61131 Syntax Address Description

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

Device	MODBUS Syntax			IEC61131 Syntax				
				Format	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 invalid and display as "-Undefined-".

NOTE

- For system data area, refer to the GP-Pro EX Reference Manual.

  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

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

  ☞"Manual Symbols and Terminology"

6.3 Control Techniques (Routing)

Device		Bit Address	Word Address	32 bits	Remarks
Menu.Parameter	CTNet Routing Disabled	00.00.00 - 99.99.31	00.00 - 99.99		Bit 31
	CTNet Routing Enabled	001:00.00.00 - 255:99.99.31	001:00.00 - 255:99.99		

NOTE

- For system data area, refer to the GP-Pro EX Reference Manual.

  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

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

  ☞"Manual Symbols and Terminology"

7 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.

7.1 General Modbus

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

7.2 Control Techniques (Modbus)

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

7.3 Control Techniques (Routing)

Device	Device Name	Device Code (HEX)	Address Code
Menu.Parameter	-	00A0	Word Address

8 Error Messages

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

Item	Description
No.	Error Number
Device Name	Name of the External Device where an error has occurred. Device/PLC name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Error Message	Displays messages related to an error that has occurred.
Error Occurrence Area	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 addresses are displayed as "IP address (Decimal): MAC address (Hex)". • Device addresses are displayed as "Address: Device address". • Received error codes are displayed as "Decimal [Hex]".

Example of an Error Message:

"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 Unique to External Device

Please refer to your External Device manual 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.
04	The External Device cannot be restored.
05	ACK response.
06	The External Device is busy.

■ Error Messages Specific to the External Device

Error No.	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 reading 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 writing 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 boundary is less than 16 bits, or reading the input or holding register as a double word while the boundary 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 boundary is less than 16 bits, or writing the holding register as a double word while the boundary is set to 1 word, an error will be displayed.