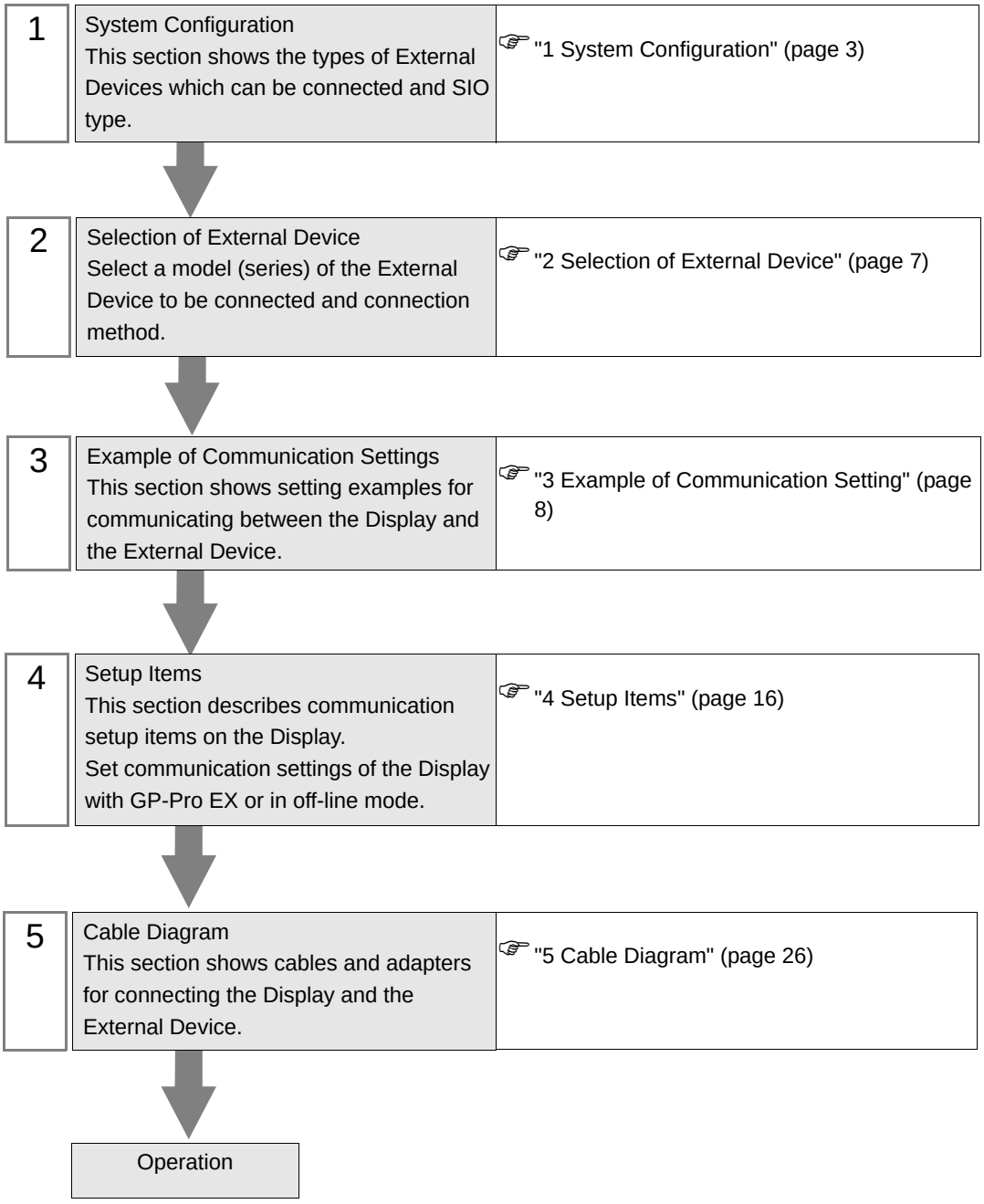
MODBUS SLAVE Driver

Introduction

This manual describes how to connect the Display and the External Device.

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



1 System Configuration

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

■ Serial

Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
MODBUS Series	MODBUS Master Type	Serial Port	RS422/485 (2wire)	"3.1 Setting Example 1" (page 8)	" Cable Diagram 1" (page 26)
			RS232C	"3.2 Setting Example 2" (page 10)	" Cable Diagram 2" (page 31)
			RS422/485 (4wire)	"3.3 Setting Example 3" (page 12)	" Cable Diagram 3" (page 32)

■ Ethernet (TCP)

Series	CPU	Link I/F	SIO Type	Setting Example
MODBUS Series	MODBUS Master Type	Ethernet Port	Ethernet (TCP)	"3.4 Setting Example 4" (page 14)

■ Connection Configuration

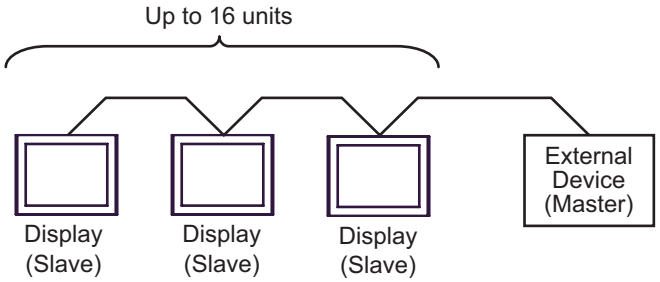
NOTE

- When using more than one driver in a Display, you cannot use the DH-485 driver of Rockwell Automation, Inc and the SIMANTIC S7 MPI Direct of Siemens AG simultaneously. In addition, you cannot use MODBUS SLAVE Driver in both COM1 and COM2.

- Serial

[Connection example 1:1]

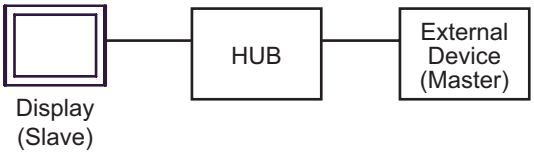
[Connection example n:1]



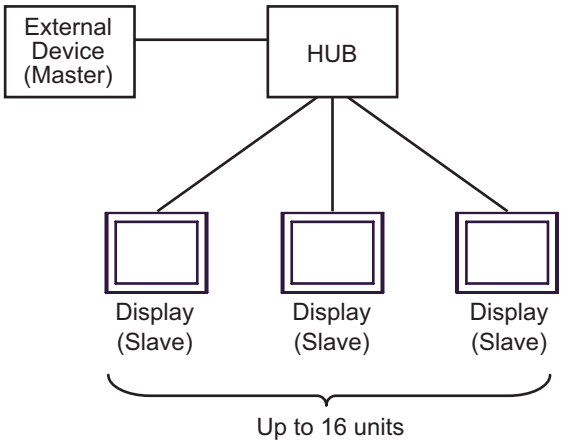
You can connect maximum 16 units of Display (Slave).

- Ethernet (TCP)

[Connection example 1:1]

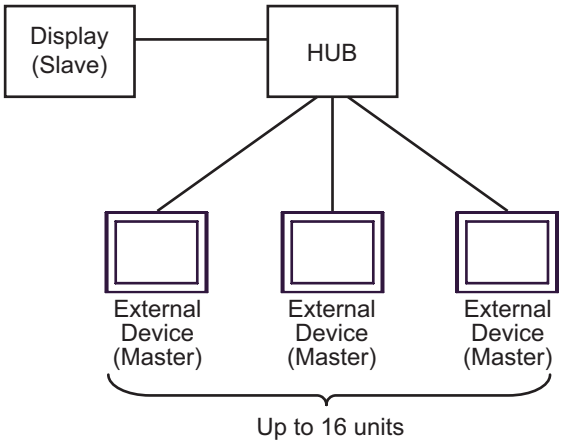


[Connection example n:1]



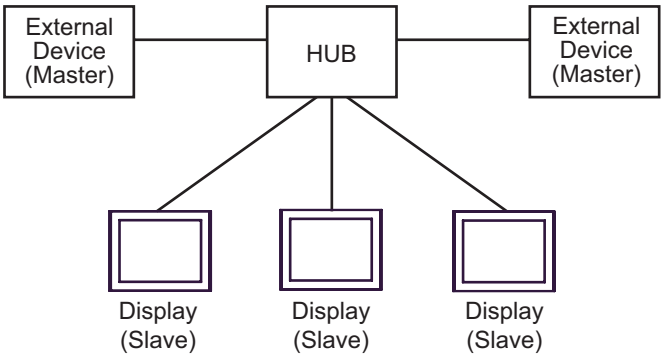
You can connect maximum 16 units of Display (Slave).

[Connection example 1:m]



You can connect maximum 16 units of External Device (Master).

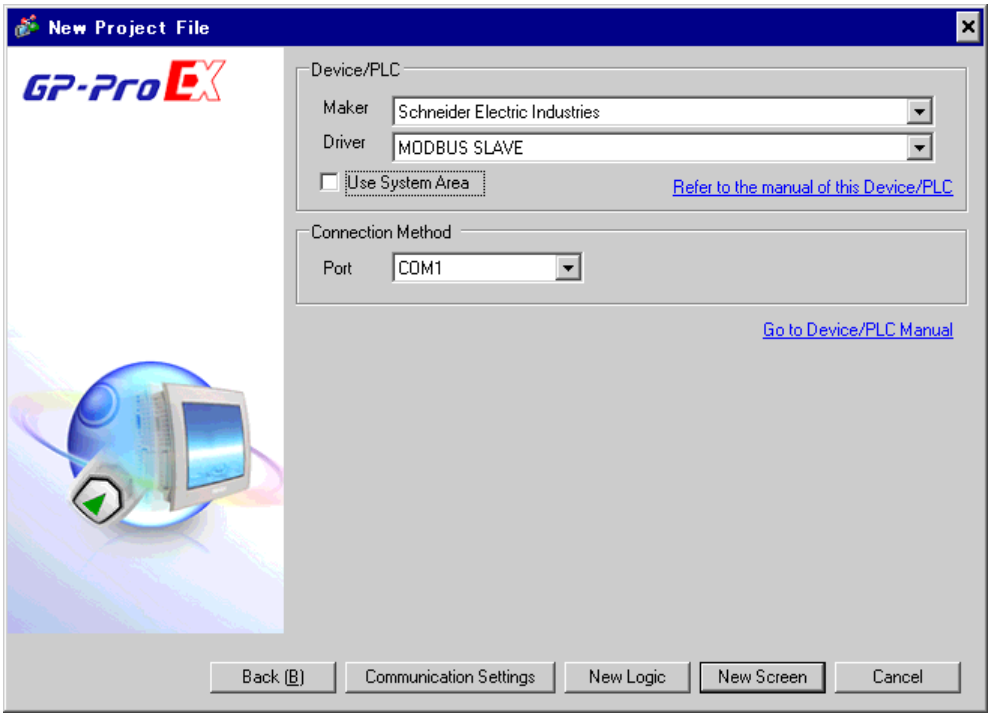
[Connection example n:m]



You can connect maximum 16 units of External Device (Master). Note that there is no communication between the Displays (Slaves).

2 Selection of External Device

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Maker	Select the maker of the External Device to be connected. Select "Schneider Electric Industries".
Driver	Select a model (series) of the External Device to be connected and connection method. Select "MODBUS SLAVE". Check the External Device which can be connected in "MODBUS SLAVE" in system configuration. ☞ "1 System Configuration" (page 3)
Use System Area	Check this option when you synchronize the system data area of the Display and the device (memory) of the External Device. When synchronized, you can use the ladder program of the External Device to switch the display or display the window on the Display. Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (only for direct access method)" This can be also set with GP-Pro EX or in off-line mode of the Display. Cf. GP-Pro EX Reference Manual "5.14.6 Setting Guide of [System Setting Window]■Setting Guide of [Main Unit Settings] ■System Area Setting" Cf. Maintenance/Troubleshooting "2.14.1 Settings common to all Display models ◆System Area Settings"
Port	Select the Display port to be connected to the External Device.

3 Example of Communication Setting

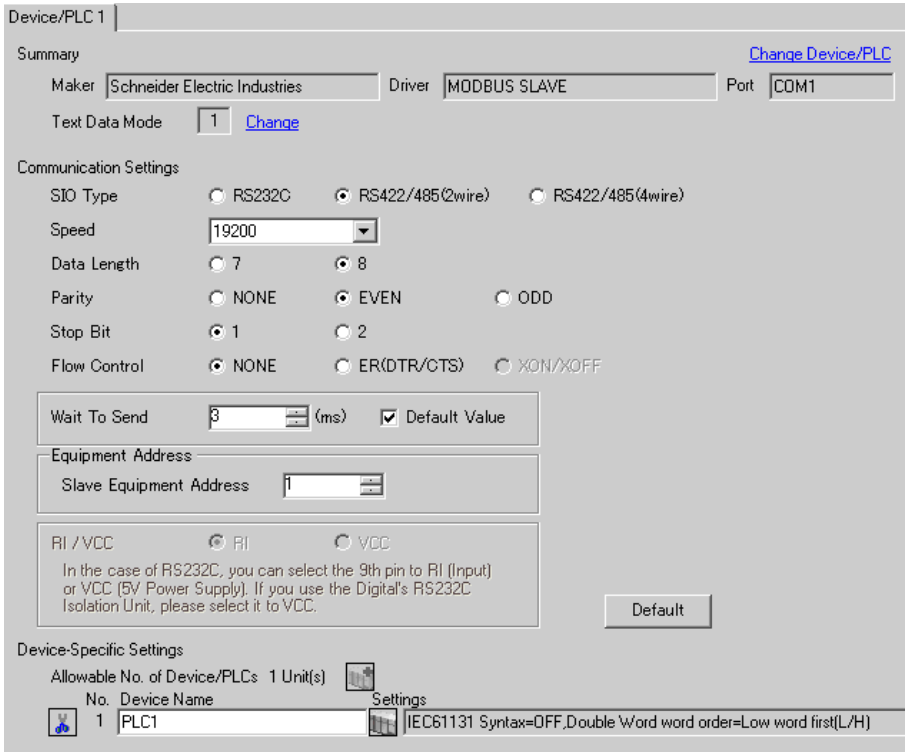
Examples of communication settings of the Display and the External Device, recommended by Digital Electronics Corp., are shown.

3.1 Setting Example 1

■ Setting of GP-Pro EX

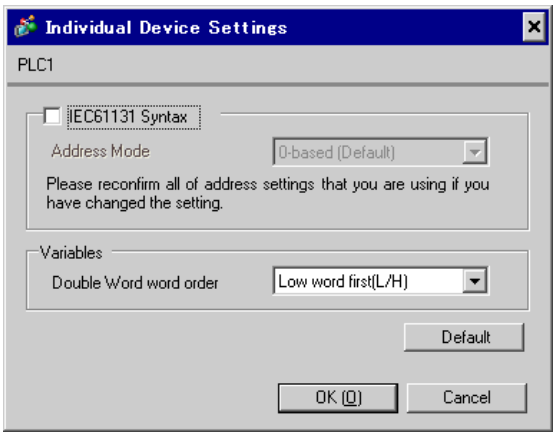
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

The communication settings depend on the External Device (Master) to be used. Please refer to the manual of the External Device for more details.

◆ Procedure

1. Set the communication settings of the External Device (Master) as follows.

Setup Items	Setup Description
Transmission Speed	19200
Data Length	8
With/Without Parity	ON
Parity Bit	EVEN
Stop Bit	1
Flow Control	NONE
Wait To Send	3 or more
Address Mode	Modicon

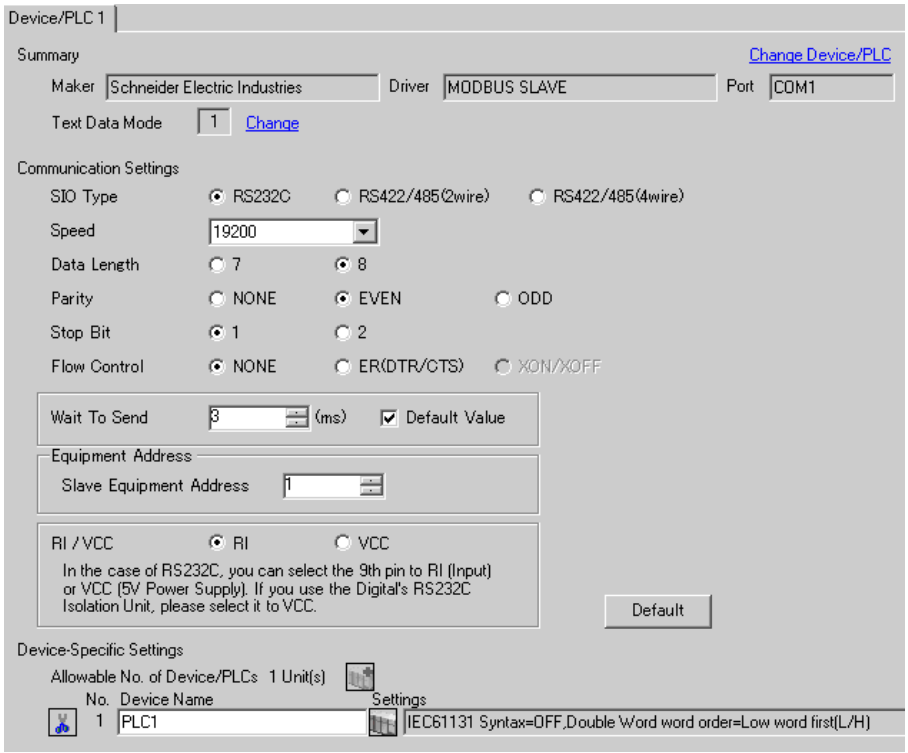
NOTE • Keep a gap of 3.5 characters or more between packets.

3.2 Setting Example 2

■ Setting of GP-Pro EX

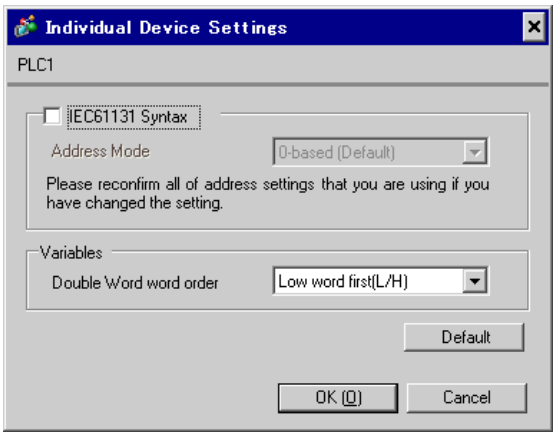
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

The communication settings depend on the External Device (Master) to be used. Please refer to the manual of the External Device for more details.

◆ Procedure

1. Set the communication settings of the External Device (Master) as follows.

Setup Items	Setup Description
Transmission Speed	19200
Data Length	8
With/Without Parity	ON
Parity Bit	EVEN
Stop Bit	1
Flow Control	NONE
Wait To Send	3 or more
Address Mode	Modicon

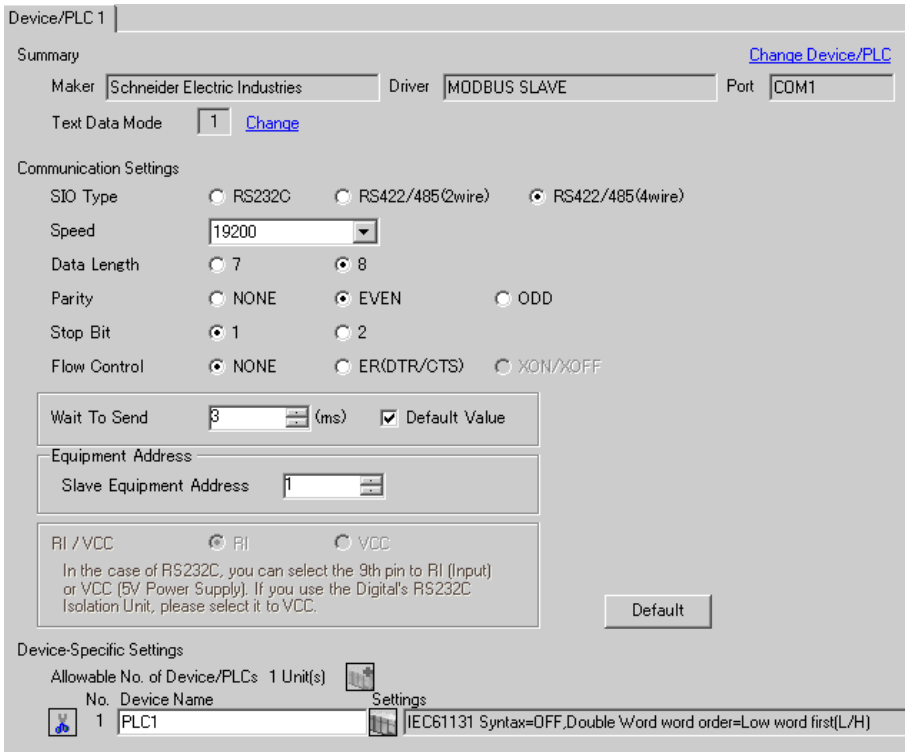
NOTE • Keep a gap of 3.5 characters or more between packets.

3.3 Setting Example 3

■ Setting of GP-Pro EX

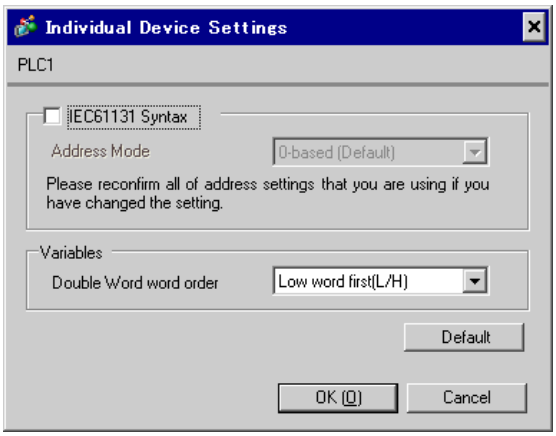
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

The communication settings depend on the External Device (Master) to be used. Please refer to the manual of the External Device for more details.

◆ Procedure

1. Set the communication settings of the External Device (Master) as follows.

Setup Items	Setup Description
Transmission Speed	19200
Data Length	8
With/Without Parity	ON
Parity Bit	EVEN
Stop Bit	1
Flow Control	NONE
Wait To Send	3 or more
Address Mode	Modicon

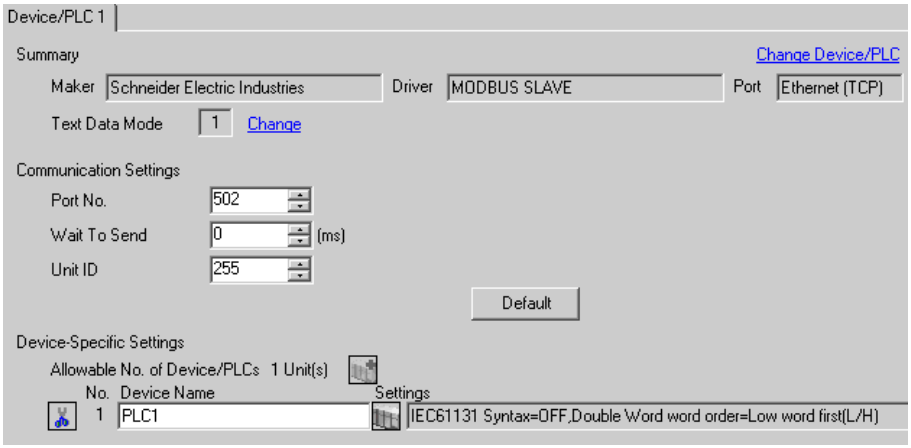
NOTE • Keep a gap of 3.5 characters or more between packets.

3.4 Setting Example 4

■ Setting of GP-Pro EX

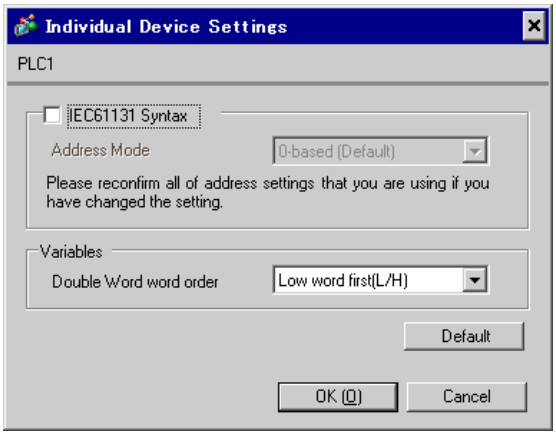
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

The communication settings depend on the External Device (Master) to be used. Please refer to the manual of the External Device for more details.

◆ Procedure

1. Set the communication settings of the External Device (Master) as follows.

Setup Items	Setup Description
Wait To Send	0
Source port number	Any number
Destination port number	502
Address Mode	Modicon

4 Setup Items

Set communication settings of the Display with GP-Pro Ex or in off-line mode of the Display.

The setting of each parameter must be identical to that of External Device.

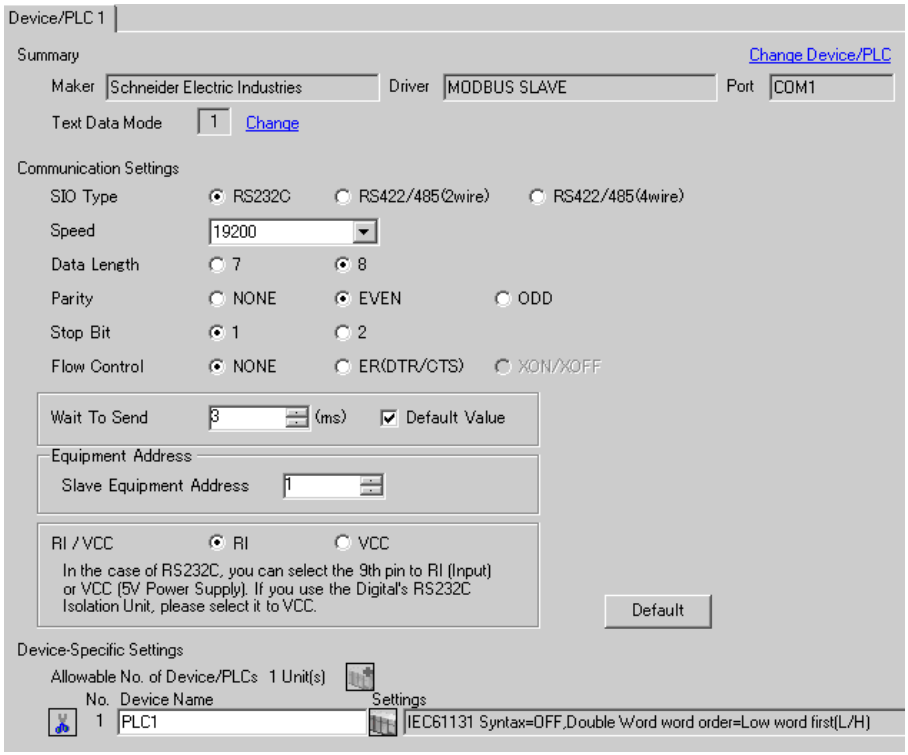
☞"3 Example of Communication Setting" (page 8)

4.1 Serial Connection

■ Setup Items in GP-Pro EX

◆ Communication Settings

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



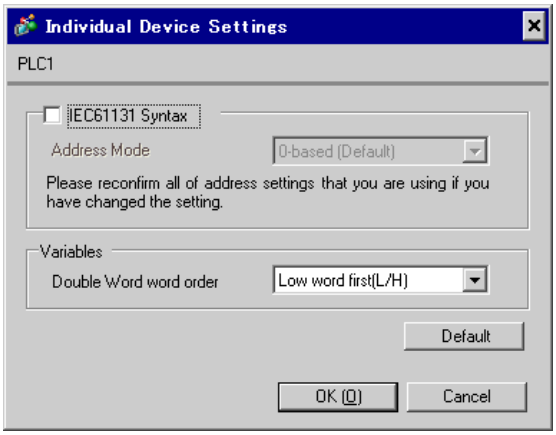
Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device.
Speed	Select speed between the External Device and the Display.
Data Length	Select data length.
Parity	Select how to check parity.
Stop Bit	Select stop bit length.
Flow Control	Display the communication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

Setup Items	Setup Description
Wait To Send	Use an integer from "1 to 255" to enter standby time (ms) for the Display from receiving packets to transmitting next commands. When the check box of the default value is checked, the Wait To Send value automatically changes in the formula below by changing each value for Speed/Data Length/Parity/Stop Bit. $\text{Wait To Send (ms)} = \frac{3500 \times (1 + \text{Data Length} + \text{Stop Bit} + \text{Parity})}{\text{Speed (bps)}}$ Value for the parity setting is shown below. No Parity = 0 Parity Even = 1 Parity Odd = 1
Slave Equipment Address	Use an integer from "1 to 247" to enter the slave address of the External Device.
RI/VCC	You can switch RI/VCC of the 9th pin when you select RS232C for SIO type.

◆ Device Setting

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

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



Setup Items	Setup Description
IEC61131 Syntax	Check this item when you use the IEC61131 grammar for variables.
Address Mode	If you check the IEC61131 Syntax 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".

■ Settings in Off-Line Mode

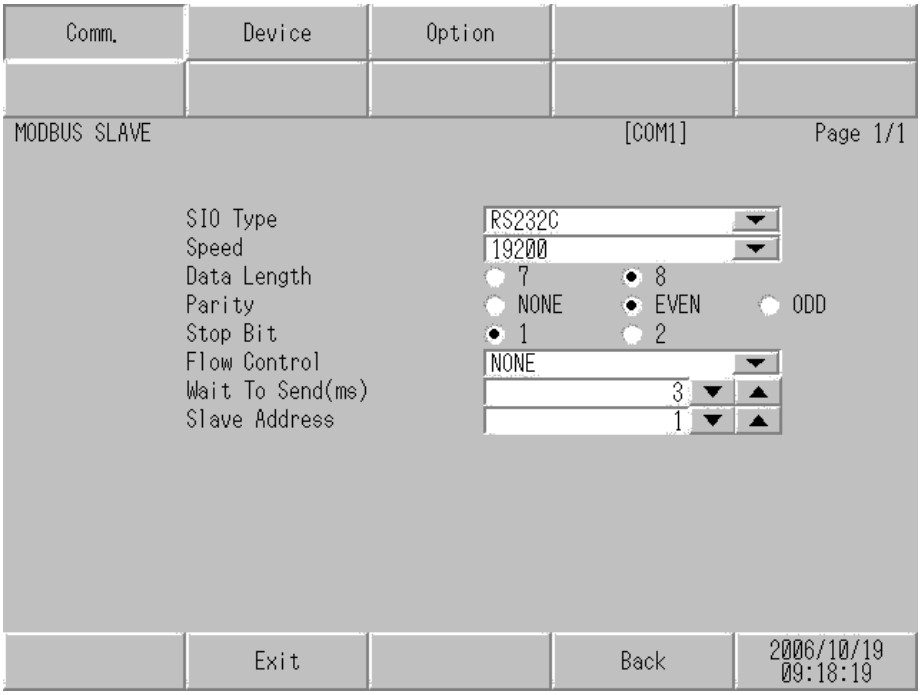
NOTE

- Please refer to Maintenance/Troubleshooting for more information on how to enter off-line mode or about operation.

  Cf. Maintenance/Troubleshooting "2.2 Offline Mode"

◆ Communication Settings

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

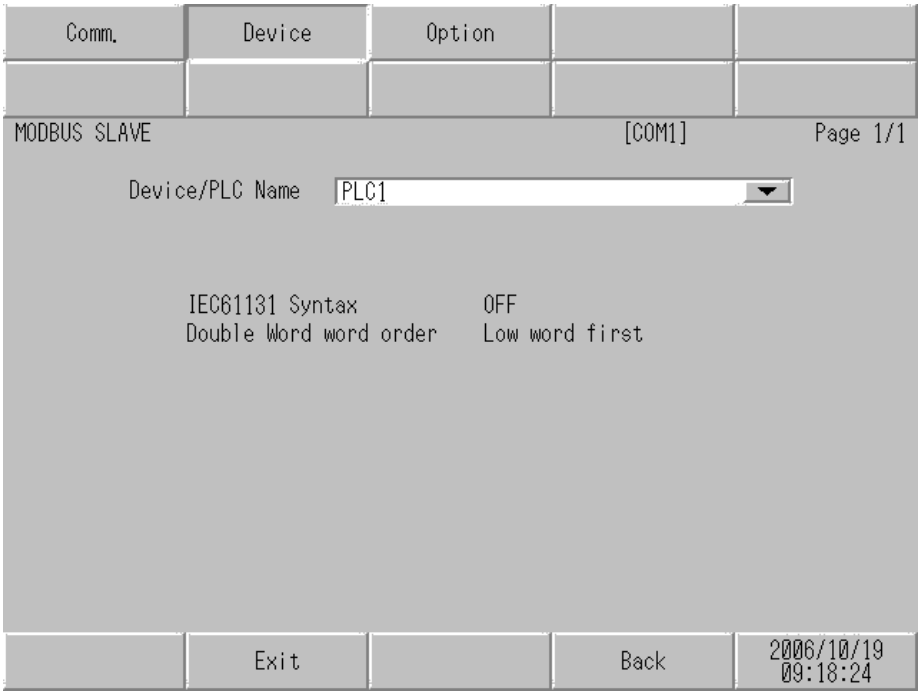


Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device. IMPORTANT To make the communication settings correctly, confirm the serial interface specifications of Display unit for [SIO Type]. We cannot guarantee the operation if a communication type that the serial interface does not support is specified. For details concerning the serial interface specifications, refer to the manual for Display unit.
Speed	Select speed between the External Device and the Display.
Data Length	Select data length.
Parity	Select how to check parity.
Stop Bit	Select stop bit length.
Flow Control	Display the communication control method to prevent overflow of transmission and reception data.

Setup Items	Setup Description
Wait To Send	Use an integer from "1 to 255" to enter standby time (ms) for the Display from receiving packets to transmitting 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
Slave Address	Use an integer from "1 to 247" to enter the slave address of the External Device.

■ Device Setting

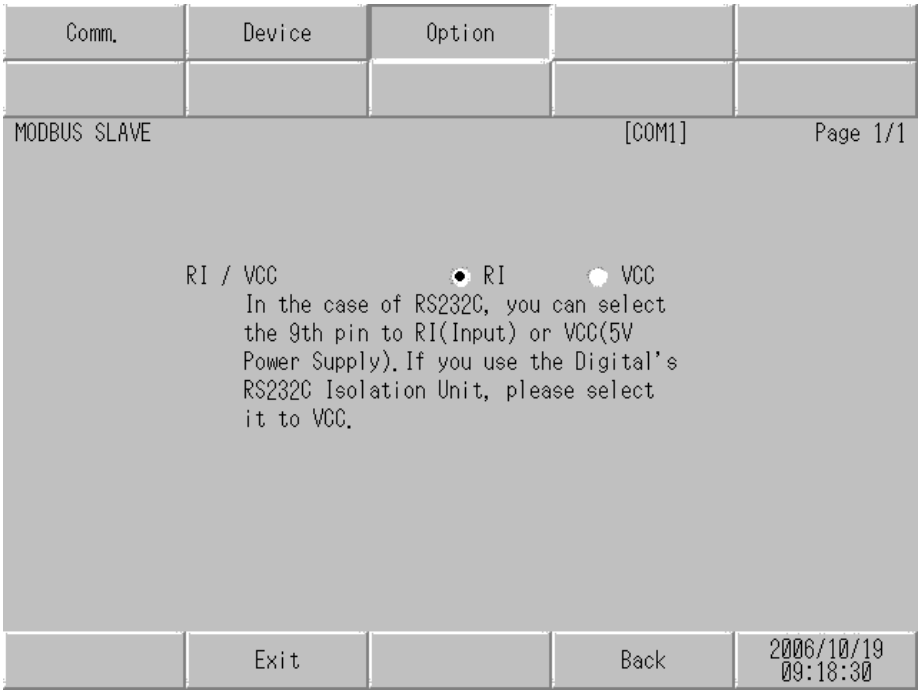
To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings]. Touch the External Device you want to set from the displayed list, and touch [Device Settings].



Setup Items	Setup Description
Device/PLC name	Select the External Device to set. Device name is a title of the External Device set with GP-Pro EX. (Initial value [PLC])
IEC61131 Syntax	Displays whether IEC61131 syntax is used or not.
DWord Word Order	Displays the order in which double word data is stored.

■ Option

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



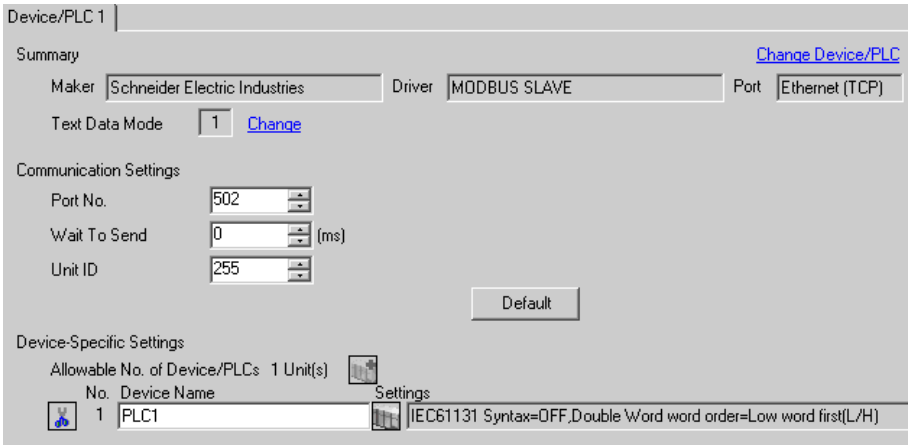
Setup Items	Setup Description
RI/VCC	Switches RI/VCC of the 9th pin.

4.2 Ethernet (TCP) Connection

■ Setup Items in GP-Pro EX

◆ Communication Settings

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

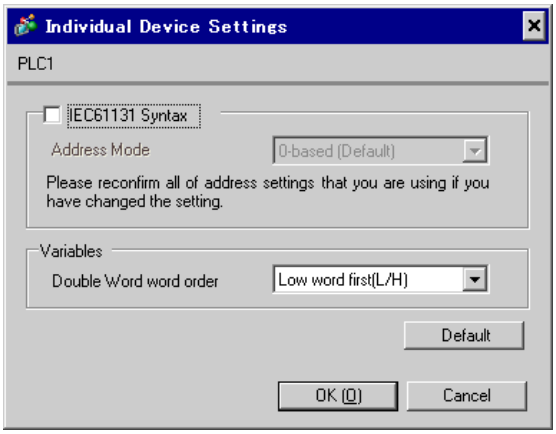


Setup Items	Setup Description
Port No.	Use an integer "502" or from "1024 to 65535" to enter the port No. of the Display.
Wait To Send	Use an integer from "0 to 255" to enter standby time (ms) for the Display from receiving packets to transmitting next commands.
Unit ID	Use an integer from "1 to 247" or "255" to enter the slave address.

◆ Device Setting

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

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



Setup Items	Setup Description
IEC61131 Syntax	Check this item when you use the IEC61131 grammar for variables.
Address Mode	If you check the IEC61131 Syntax 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".

■ Settings in Off-Line Mode

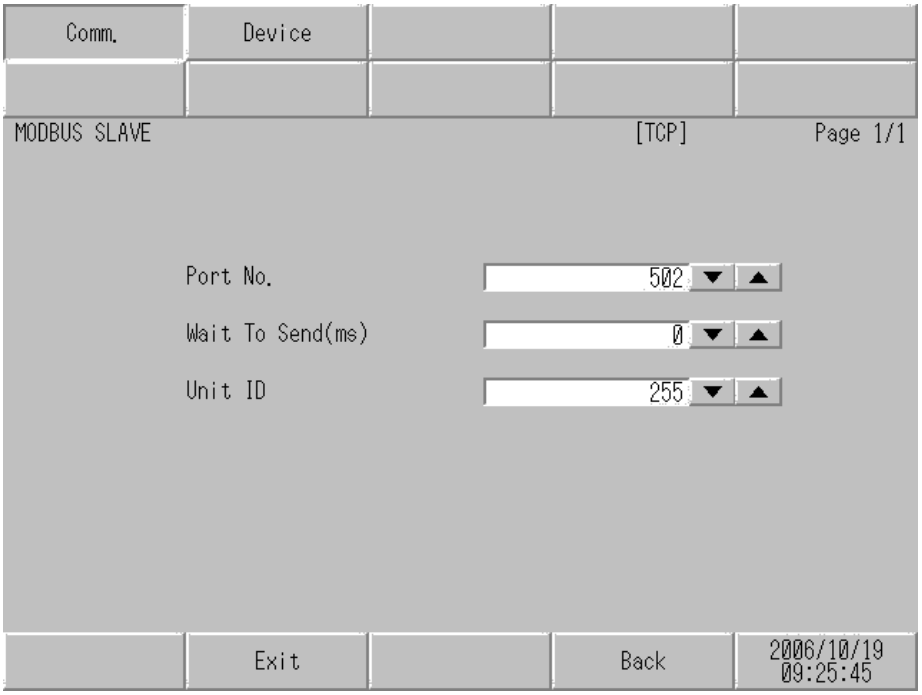
NOTE

- Please refer to Maintenance/Troubleshooting for more information on how to enter off-line mode or about operation.

Cf. Maintenance/Troubleshooting "2.2 Offline Mode"

◆ Communication Settings

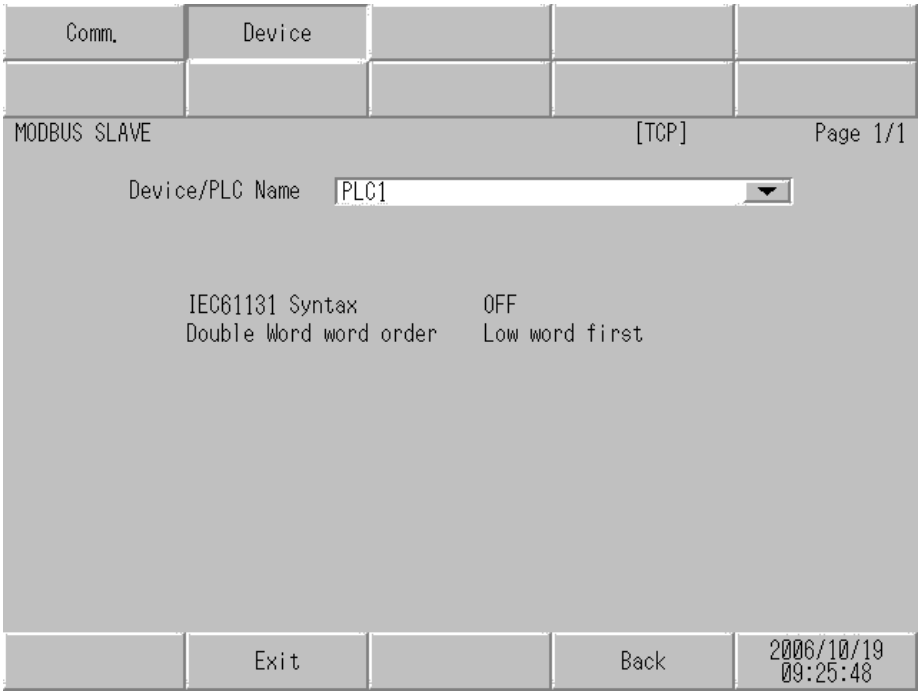
To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings] in the off-line mode. Touch the External Device you want to set from the displayed list.



Setup Items	Setup Description
Port No.	Use an integer "502" or from "1024 to 65535" to enter the port No. of the Display.
Wait To Send	Use an integer from "0 to 255" to enter standby time (ms) for the Display from receiving packets to transmitting next commands.
Unit ID	Use an integer from "1 to 247" or "255" to enter the slave address.

■ Device Setting

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



Setup Items	Setup Description
Device/PLC name	Select the External Device to set. Device name is a title of the External Device set with GP-Pro EX. (Initial value [PLC])
IEC61131 Syntax	Displays whether IEC61131 syntax is used or not.
DWord Word Order	Displays the order in which double word data is stored.

5 Cable Diagram

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

- The FG pin of the main body of the External Device must be D-class grounded. Please refer to the manual of the External Device for more details.
- SG and FG are connected inside the Display. When connecting SG to the External Device, design the system not to form short-circuit loop.
- Connect the isolation unit, when communication is not stabilized under the influence of a noise etc..

Cable Diagram 1

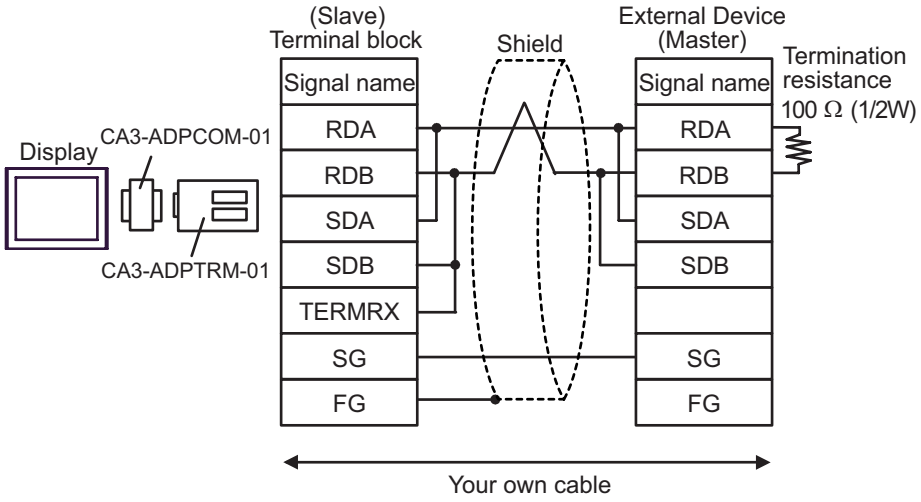
Display (Connection Port)	Cable		Remarks
GP*1 (COM1) AGP-3302B (COM2)	A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + Your own cable	Cable length: 1,000m or less (Depends on master's capacity)
	B	Your own cable	
GP*2 (COM2)	C	Online adapter by Pro-face CA4-ADPONL-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + Your own cable	
	D	Online adapter by Pro-face CA4-ADPONL-01 + Your own cable	

*1 All GP models except AGP-3302B

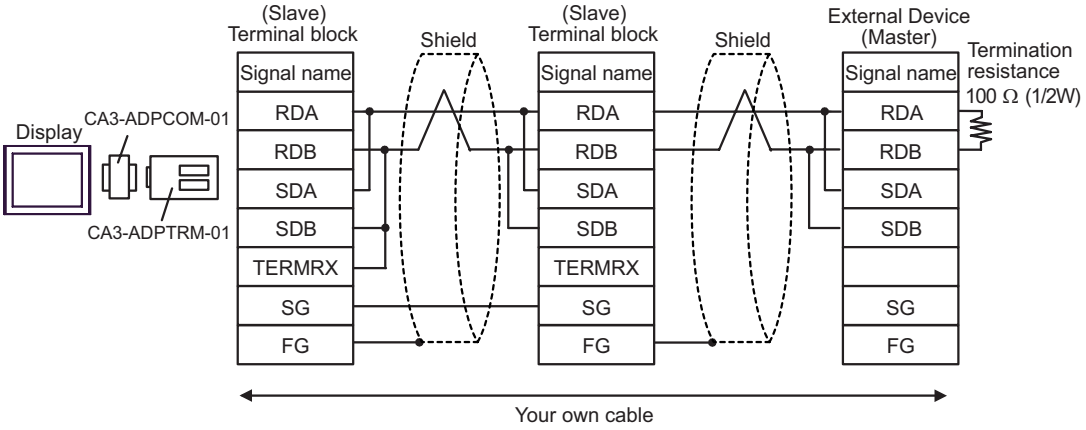
*2 All GP models except GP-3200 series and AGP-3302B

A. When using the COM port conversion adapter (CA3-ADPCOM-01), the terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and your own cable

• 1:1 Connection

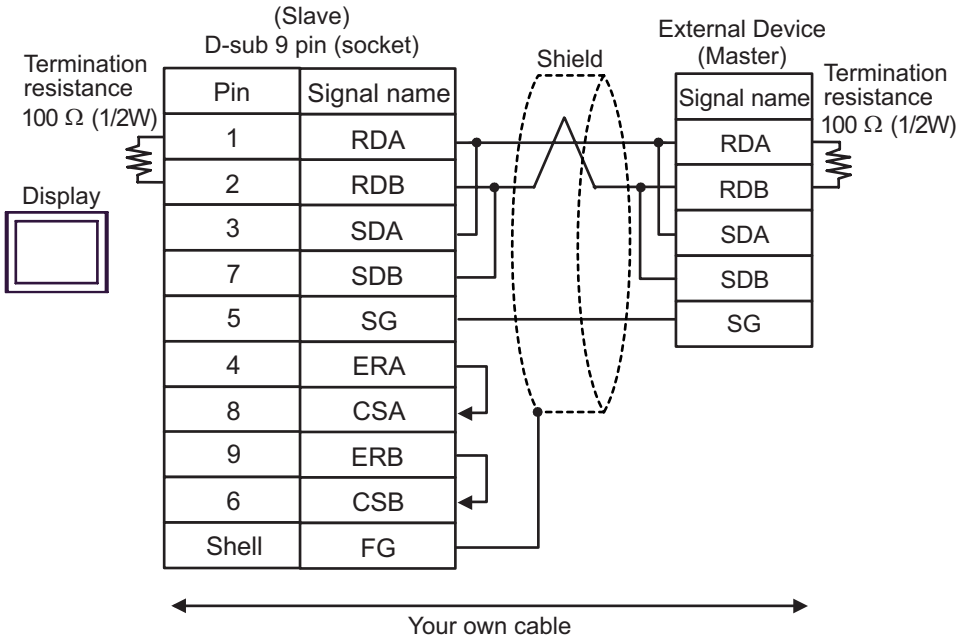


• n:1 Connection

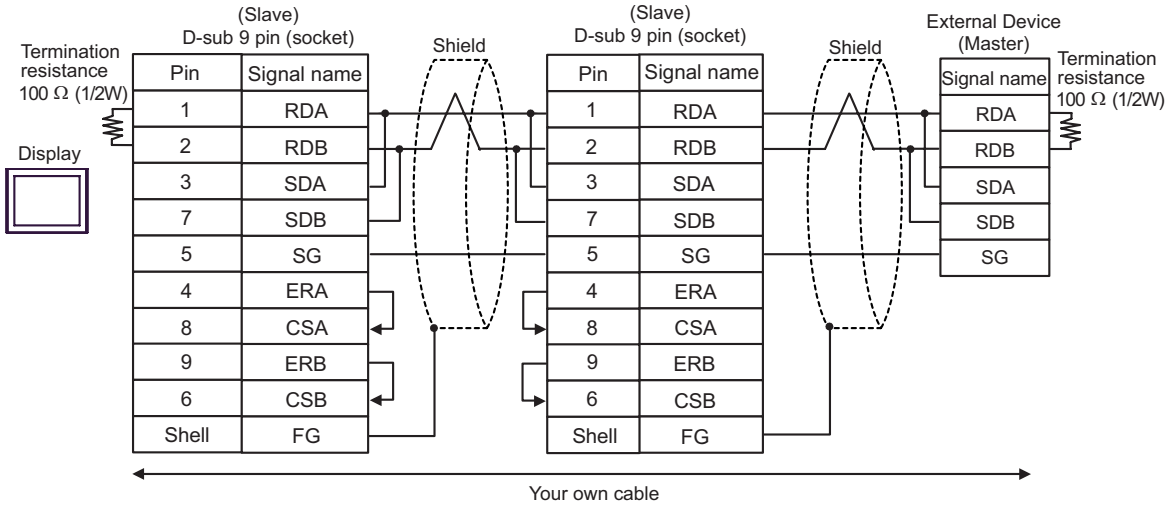


B. When your own cable is used

- 1:1 Connection

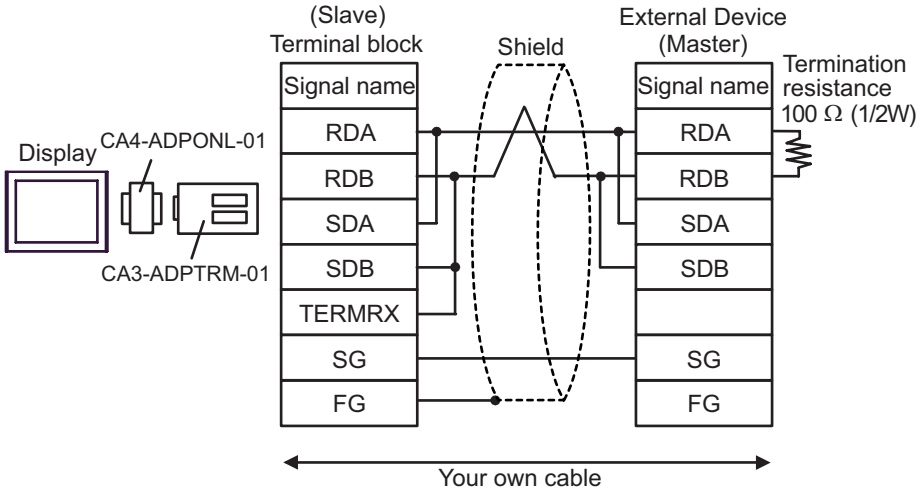


- n:1 Connection

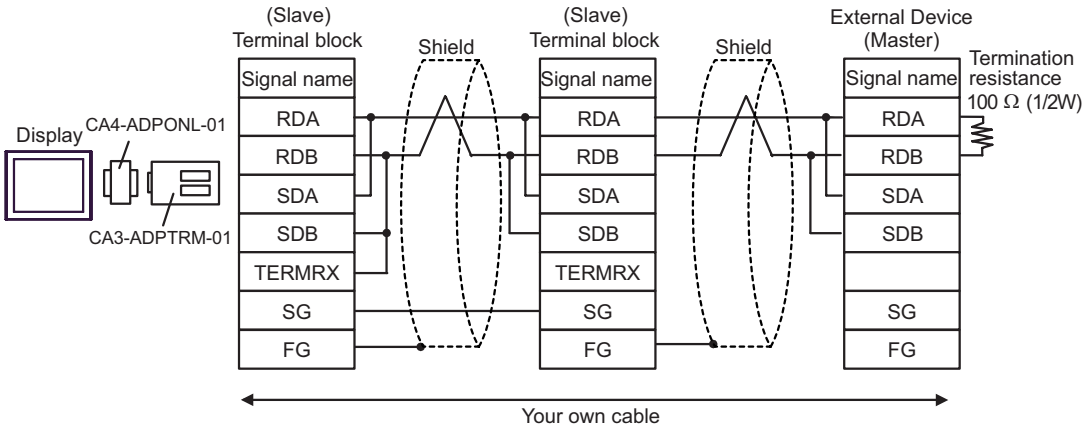


C. When using the online adapter (CA4-ADPONL-01), the terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and your own cable

• 1:1 Connection

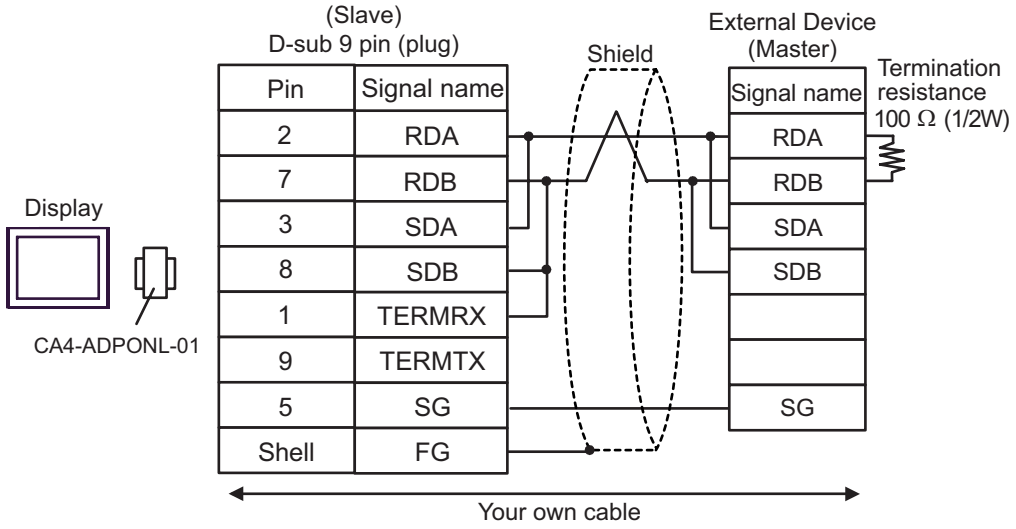


• n:1 Connection

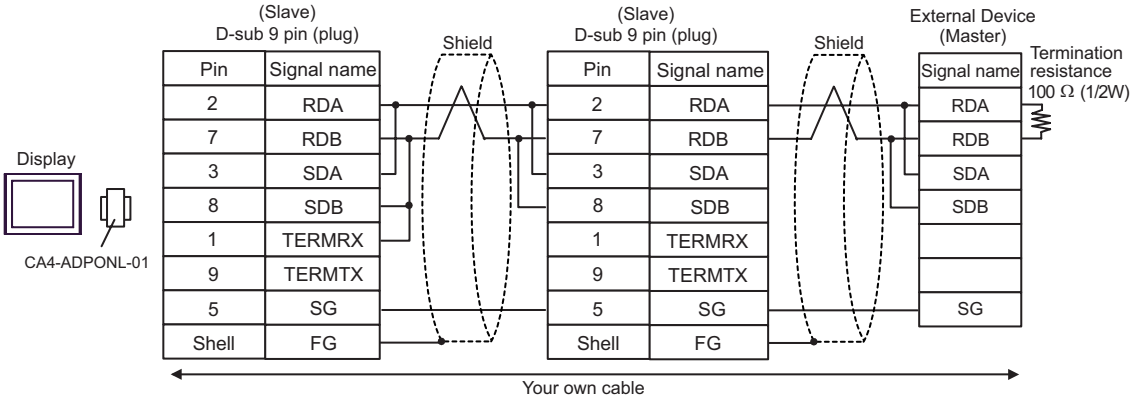


D. When using the online adapter (CA4-ADPONL-01) by Pro-face and your own cable

- 1:1 Connection



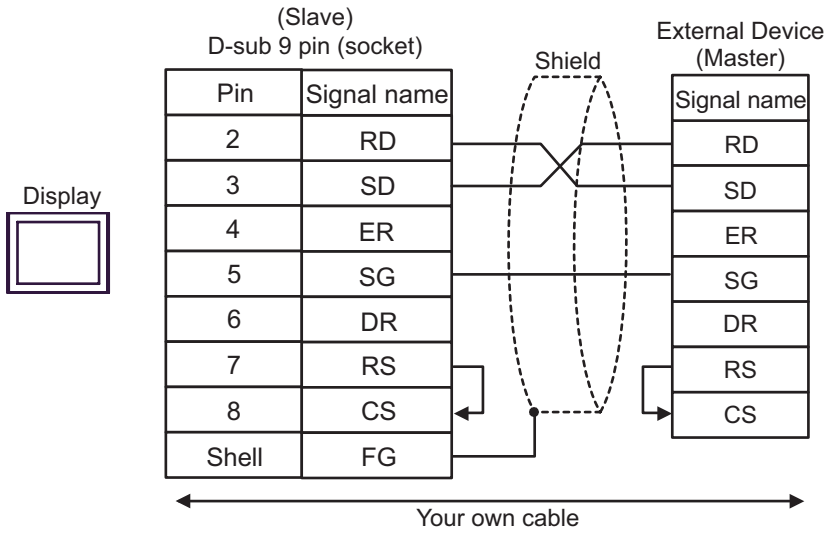
- n:1 Connection



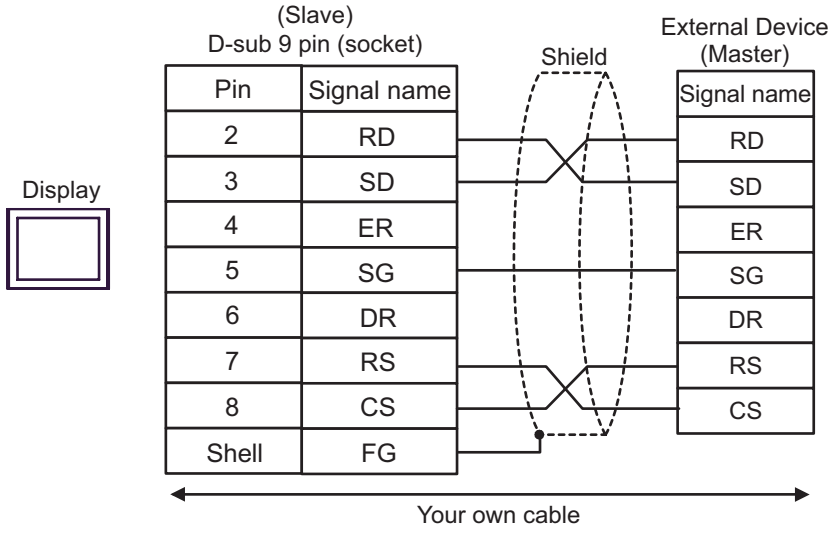
Cable Diagram 2

Display (Connection Port)	Cable		Remarks
GP (COM1) PC/AT	A	Your own cable	Cable length: 15m or less
	B	Your own cable	

A.When using your own cable (flow control: none)



B.When using your own cable (flow control: DTR/CTS)



Cable Diagram 3

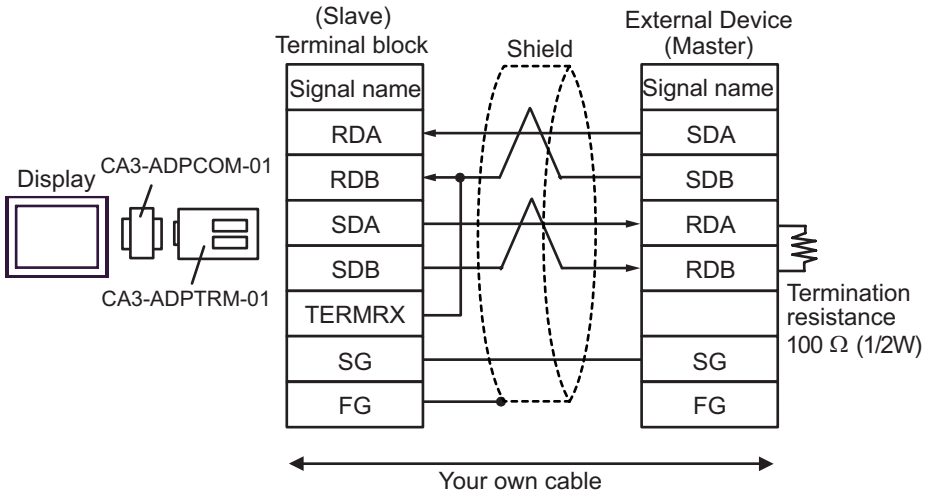
Display (Connection Port)	Cable		Remarks
GP[*1] (COM1) AGP-3302B (COM2)	A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + Your own cable	Cable length: 1,000m or less (Depends on master's capacity)
	B	Your own cable	
GP[*2] (COM2)	C	Online adapter by Pro-face CA4-ADPONL-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + Your own cable	
	D	Online adapter by Pro-face CA4-ADPONL-01 + Your own cable	

*1 All GP models except AGP-3302B

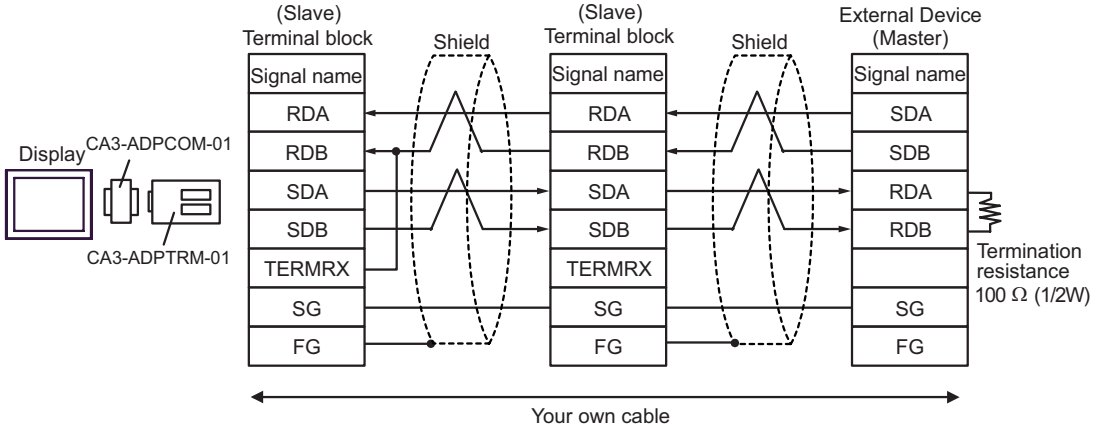
*2 All GP models except GP-3200 series and AGP-3302B

A. When using the COM port conversion adapter (CA3-ADPCOM-01), the terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and your own cable

• 1:1 Connection

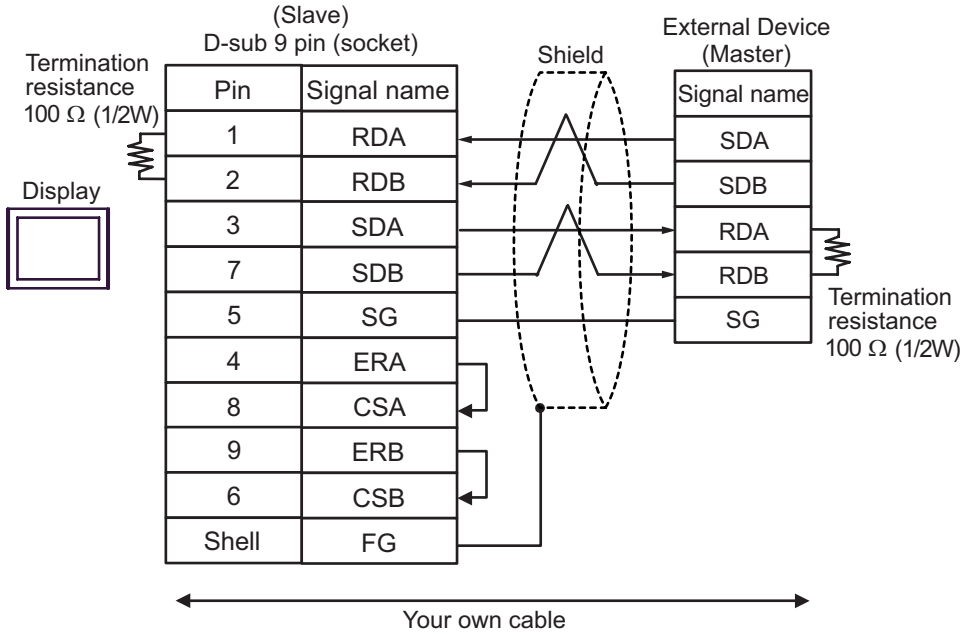


• n:1 Connection

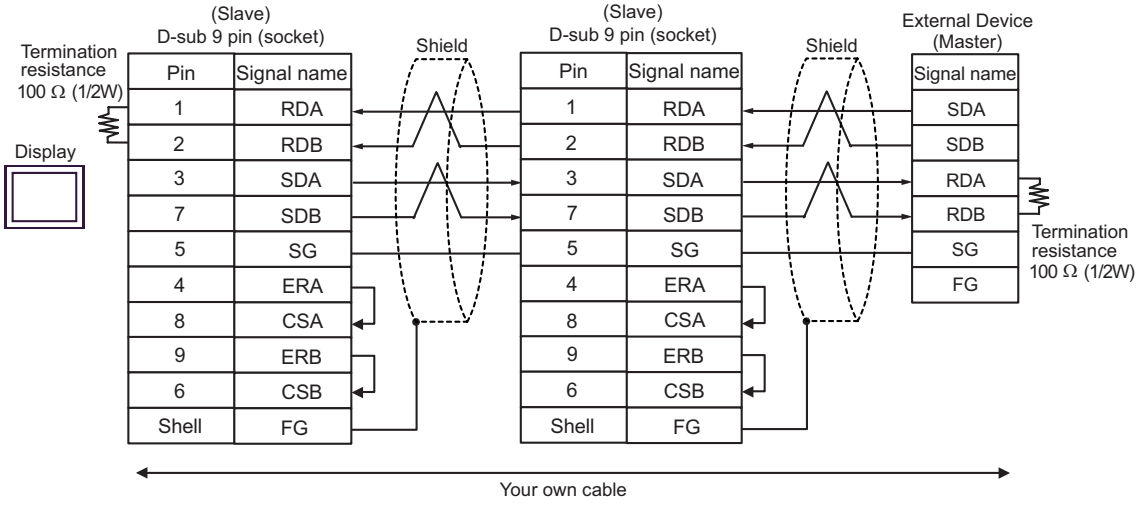


B.When your own cable is used

- 1:1 Connection

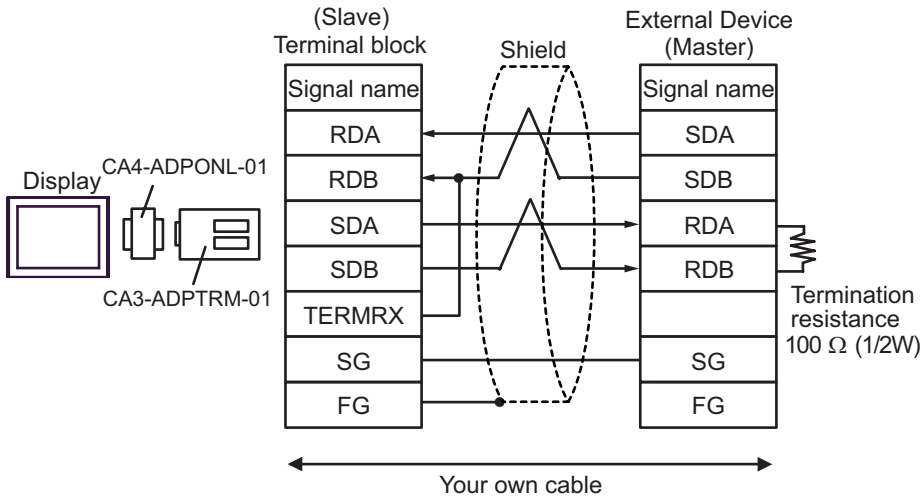


- n:1 Connection

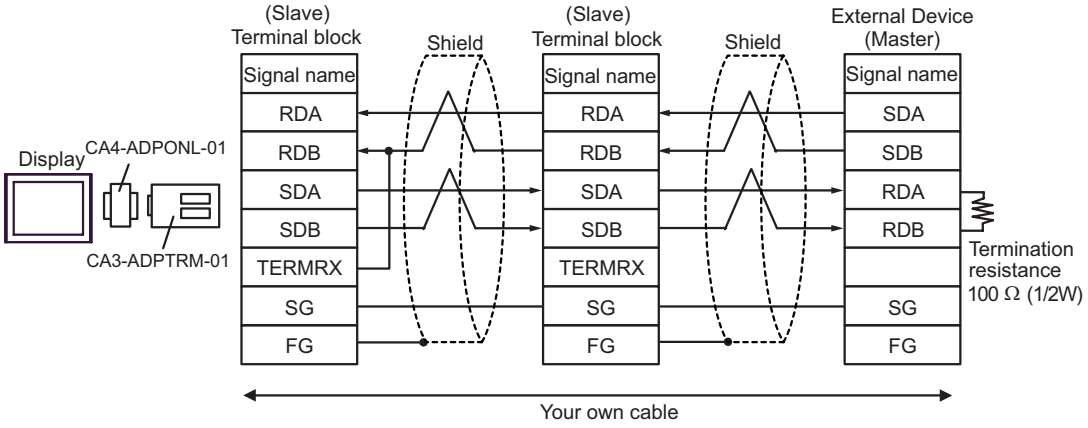


C.When using the online adapter (CA4-ADPONL-01), the terminal block conversion adapter (CA3-ADPTRM-01) by Pro-face and your own cable

- 1:1 Connection

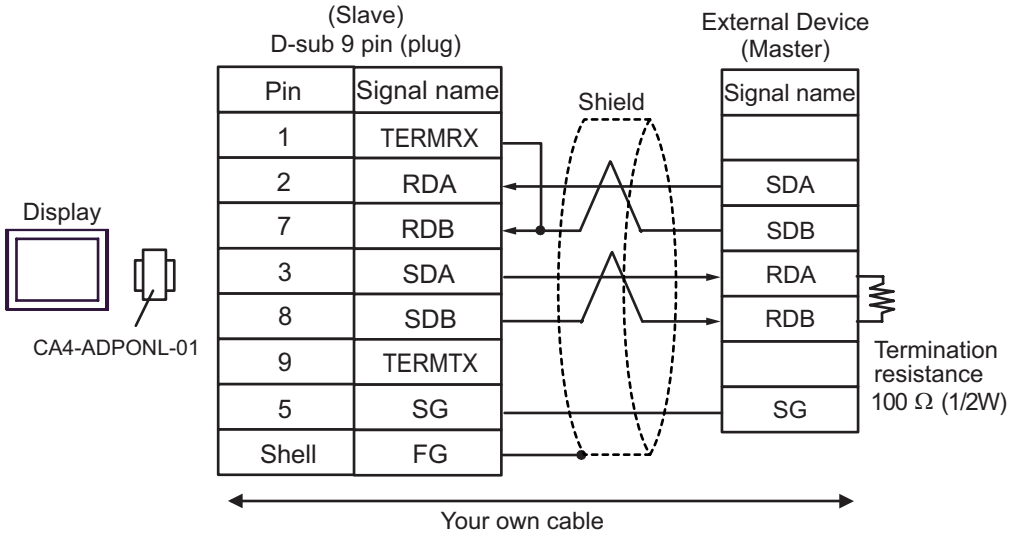


- n:1 Connection

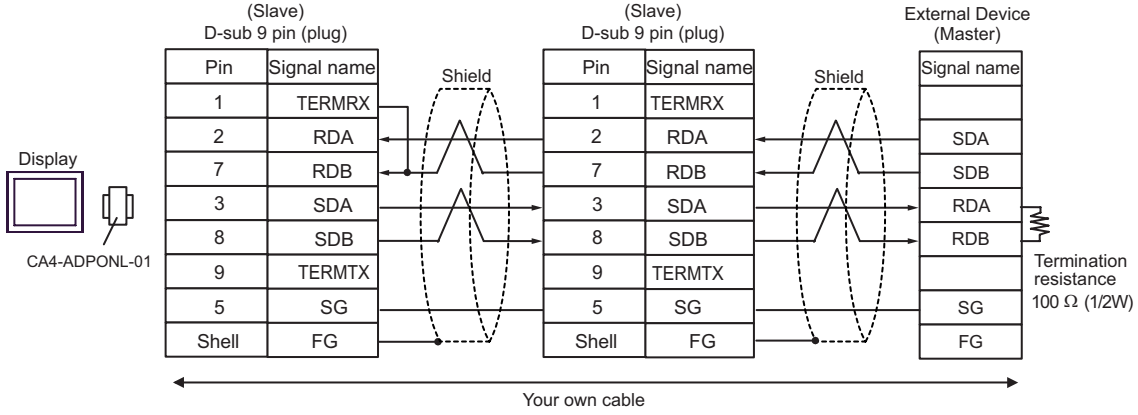


D.When using the online adapter (CA4-ADPONL-01) by Pro-face and your own cable

- 1:1 Connection



- n:1 Connection



6 Supported Device

Range of supported device address is shown in the table below. Please note that the actually supported range of the devices varies depending on the External Device to be used. Please check the actual range in the manual of your External Device.

This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Coil	000001-008192	000001-008177	L/H or H/L *1	16+1
Discrete Input	100001-108192	100001-108177		16+1 *2
Input Register	300001,00-310000.15	300001-310000		Bit 15 *2
Holding Register	400001,00-410000,15	400001-410000		Bit 15

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

*2 Write disable

IEC61131 Syntax Address Description

The following is a corresponding table for IEC61131 syntax and MODBUS syntax address descriptions.

Device	MODBUS Syntax			IEC61131 Syntax				
					0-based		1-based	
	Format	Range	First element	Format	Range	First element	Range	First element
Coil	000001+i	i = 0 to 8191	000001	%Mi	i = 0 to 8191	%M00000	i = 1 to 8192	%M00001
Discrete Input	100001+i	i = 0 to 8191	100001	-	-	-	-	-
Input Register (Word)	300001+i	i = 0 to 9999	300001	-	-	-	-	-
Input Register (Word bit)	300001+i, j	i = 0 to 9999 j = 0 to 15	300001,00	-	-	-	-	-
Holding Register (Word)	400001+i	i = 0 to 9999	400001	%MWi	i = 0 to 9999	%MW00000	i = 1 to 10000	%MW00001
Holding Register (Word bit)	400001+i, j	i = 0 to 9999 j = 0 to 15	400001,00	%MWi:Xj	i = 0 to 9999 j = 0 to 15	%MW00000:X00	i = 1 to 10000 j = 0 to 15	%MW00001:X00

NOTE

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

NOTE

- Please refer to the GP-Pro EX Reference Manual for system data area.

  Cf. GP-Pro EXReference Manual "Appendix 1.4 LS Area (only for direct access method)"

- Please 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 select "Device Type & Address" for the address type in data displays.

7.1 Modicon Syntax

Device	Device Name	Device Code (HEX)	Address Code
Coil	0	0080	(Word Address - 1) /16
Discrete Input	1	0081	(Word Address - 1) /16
Input Register	3	0001	Word Address - 1
Holding Register	4	0000	Word Address - 1

7.2 IEC61131 Syntax

- Address Mode: 0-based

Device	Device Name	Device Code (HEX)	Address Code
Coil	%M	0080	Word Address /16
Holding Register	%MW	0000	Word Address

- Address Mode: 1-based

Device	Device Name	Device Code (HEX)	Address Code
Coil	%M	0080	(Word Address - 1) /16
Holding Register	%MW	0000	Word Address - 1

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 No.
Device Name	Name of the External Device where error occurs. Device name is a title of the External Device set with GP-Pro EX.((Initial value[PLC1])
Error Message	Displays messages related to the error which occurs.
Error Occurrence Area	Displays IP address or device address of the External Device where error occurs, or error codes received from the External Device. **NOTE** • IP address is displayed such as "IP address(Decimal): MAC address(Hex)". • Device address is displayed such as "Address: Device address". • Received error codes are displayed such as "Decimal[Hex]".

Display Examples of Error Messages

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

NOTE
- Please refer to the manual of the External Device for more detail of received error codes.
- Please refer to "When an error message is displayed (Error Code List)" of "Maintenance/ Troubleshooting manual" for cross-driver error message.

■ Error Codes Specific to the External Device

Error codes specific to the External Device are shown below.

Error Code	Description
RHxx128	Checksum does not match the packet actually received.
RHxx129	The MODBUS slave driver cannot be shared between COM1 and COM2.
RHxx130	The MODBUS slave driver cannot be used with the driver for COM%d.