Hyundai Heavy Industries

HHI_HI5S_14

3/2024

Hi5 Robot Driver

Introduction

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

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

1	System Configuration This section shows the types of External Devices which can be connected and SIO type.	☞ "1 System Configuration" (page 3)
2	Selection of External Device Select a model (series) of the External Device to be connected and connection method.	☞ "2 Selection of External Device" (page 7)
3	Example of Communication Settings This section shows setting examples for communicating between the Display and the External Device.	☞ "3 Example of Communication Setting" (page 8)
4	Setup Items This section describes communication setup items on the Display. Set communication settings of the Display with GP-Pro EX or in offline mode.	☞ "4 Setup Items" (page 16)
5	Cable Diagram This section shows cables and adapters for connecting the Display and the External Device.	☞ "5 Cable Diagram" (page 21)

Operation

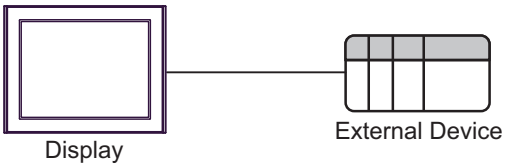
1 System Configuration

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

Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
Hi5 Robot	BD5□□ board	CNSIO port on CPU	RS-232C	"Setting Example 1" (page 8)	"Cable Diagram 1" (page 21)
			RS422/485 (4 wire)	"Setting Example 2" (page 10)	"Cable Diagram 2" (page 23)
		OPSIO port on CPU	RS-232C	"Setting Example 3" (page 12)	"Cable Diagram 3" (page 28)
			RS422/485 (4 wire)	"Setting Example 4" (page 14)	"Cable Diagram 4" (page 30)

■ Connection Configuration

- 1:1 connection



■ 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)

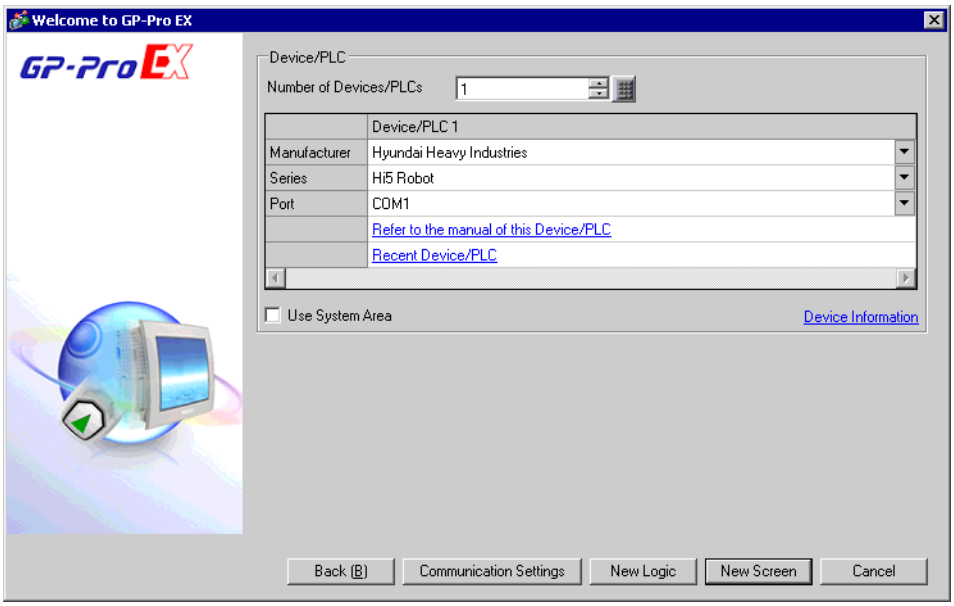
DIP Switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA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

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 "Hyundai Heavy Industries".
Series	Select a model (series) of the External Device to be connected and connection method. Select "Hi5 Robot". Check the External Device which can be connected in "Hi5 Robot" in system configuration. ☞ "1 System Configuration" (page 3)
Port	Select the Display port to be connected to the External Device.
Use System Area	Check this option when you synchronize the system data area of Display and the device (memory) of External Device. When synchronized, you can use the ladder program of External Device to switch the display or display the window on the Display. Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This can also be set in GP-Pro EX or in the Display's offline mode. Cf. GP-Pro EX Reference Manual "Display Unit (System Area) Settings Guide" Cf. Maintenance/Troubleshooting Manual "Main Unit - System Area Settings"

3 Example of Communication Setting

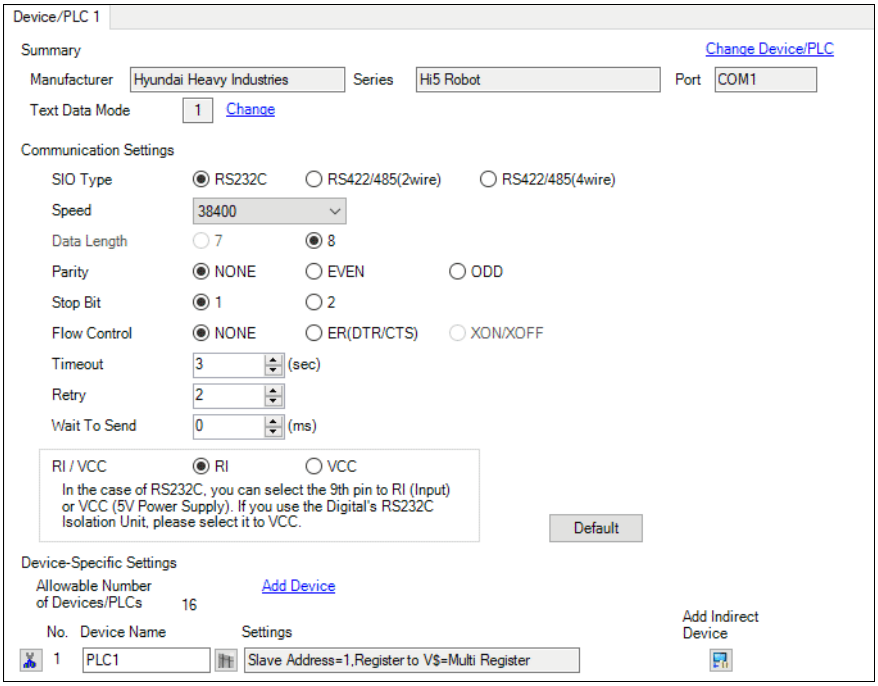
The following shows examples of communication settings of the Display and the External Device, which is recommended by Pro-face.

3.1 Setting Example 1

■ Settings of GP-Pro EX

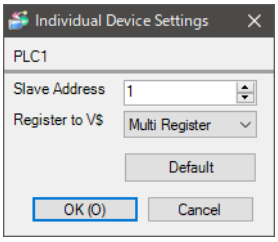
◆ Communication Settings

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



◆ Device 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.



■ Settings of External Device

For External Device communication settings, use the DIP Switches and Teach Pendant.

Please refer to the External Device manual for more details.

◆ DIP Switch Setting

Set the DIP switch for built-in PLC.

DIP Switches	Settings
SW01	OFF
SW02	OFF
SW03	OFF
SW04	OFF
SW05	ON
SW06	OFF
SW07	OFF
SW08	OFF

◆ Teach Pendant Setting

1 Press [F2].

2 From the menu, select [2: Controller parameters], [3: Serial ports] and then [1: Serial Port #1] to display the [Serial Port #1] setup items.

3 Define the setup items as follows.

Setup Items	Setting Value
Baudrate	38400
Data length	8
Stop bit	1
Parity bit	Disable
Echo	Disable
Port Usage	MODBUS
Comm. Type	RS232

4 Press [F7].

5 Press [F2].

6 Select [2: Controller parameters], [1: Control Environment Settings], and then [F5: Next Screen] to display the [Control Environment Settings].

7 Define the setup items as follows.

Setup Items	Setting Value
Transmission mode	RTU
Slave Address	1

IMPORTANT

- RTU is the only transmission mode supported. ASCII transmission mode is not supported.

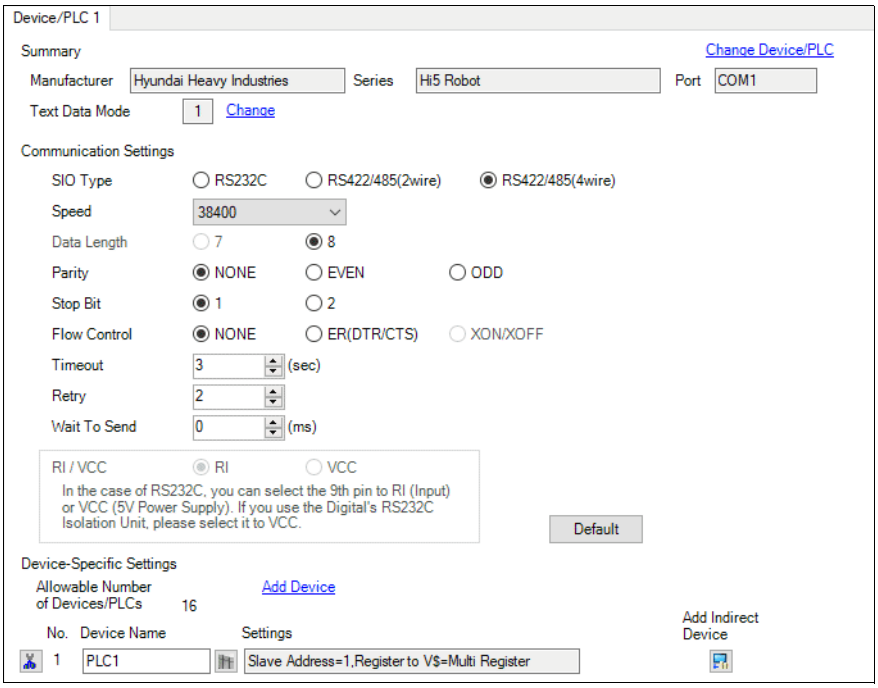
8 Press [F7].

3.2 Setting Example 2

■ Settings of GP-Pro EX

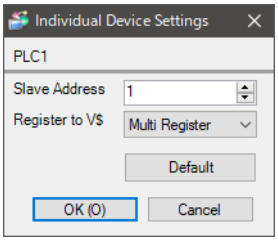
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

For External Device communication settings, use the DIP Switches and Teach Pendant.

Please refer to the External Device manual for more details.

◆ DIP Switch Setting

Set the DIP switch for built-in PLC.

DIP Switches	Settings
SW01	OFF
SW02	OFF
SW03	OFF
SW04	OFF
SW05	ON
SW06	OFF
SW07	OFF
SW08	OFF

◆ Teach Pendant Setting

1 Press [F2].

2 From the menu, select [2: Controller parameters], [3: Serial ports] and then [1: Serial Port #1] to display the [Serial Port #1] setup items.

3 Define the setup items as follows.

Setup Items	Setting Value
Baudrate	38400
Data length	8
Stop bit	1
Parity bit	Disable
Echo	Disable
Port Usage	MODBUS
Comm. Type	RS422/RS485

4 Press [F7].

5 Press [F2].

6 Select [2: Controller parameters], [1: Control Environment Settings], and then [F5: Next Screen] to display the [Control Environment Settings].

7 Define the setup items as follows.

Setup Items	Setting Value
Transmission mode	RTU
Slave Address	1

IMPORTANT

- RTU is the only transmission mode supported. ASCII transmission mode is not supported.

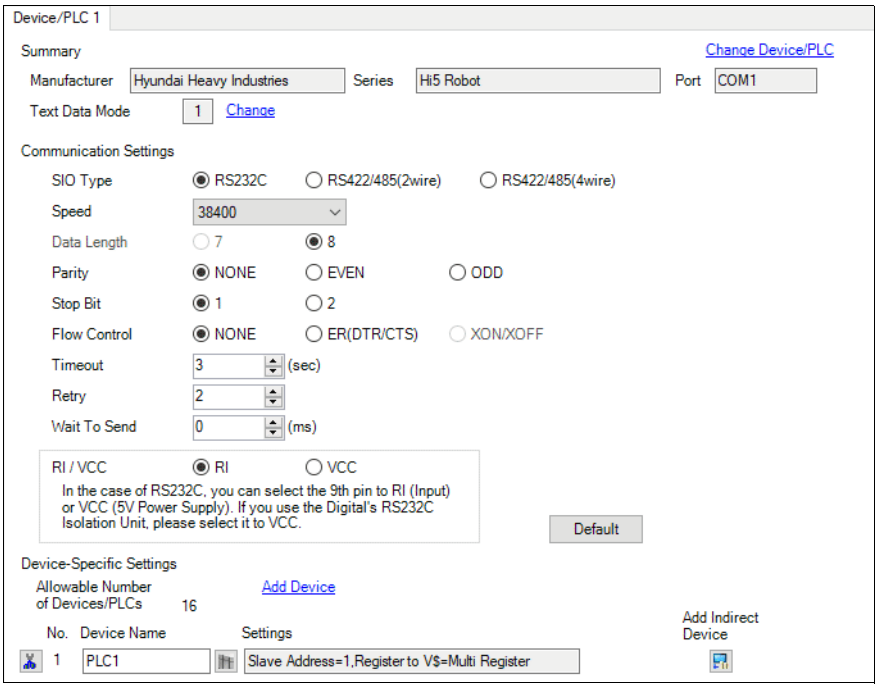
8 Press [F7].

3.3 Setting Example 3

■ Settings of GP-Pro EX

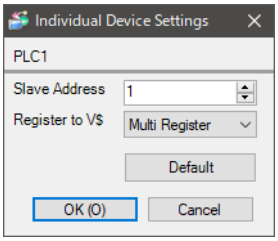
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

For External Device communication settings, use the DIP Switches and Teach Pendant.

Please refer to the External Device manual for more details.

◆ DIP Switch Setting

Set the DIP switch for built-in PLC.

DIP Switches	Settings
SW01	OFF
SW02	OFF
SW03	OFF
SW04	OFF
SW05	ON
SW06	OFF
SW07	OFF
SW08	OFF

◆ Teach Pendant Setting

1 Press [F2].

2 From the menu, select [2: Controller parameters], [3: Serial ports] and then [2: Serial Port #2] to display the [Serial Port #2] setup items.

3 Define the setup items as follows.

Setup Items	Setting Value
Baudrate	38400
Data length	8
Stop bit	1
Parity bit	Disable
Echo	Disable
Port Usage	MODBUS
Comm. Type	RS232

IMPORTANT
- When using serial port #2 (OPSIO), do not set the serial port #1(CNSIO) [Port Usage] property to MODBUS.

4 Press [F7].

5 Press [F2].

6 Select [2: Controller parameters], [1: Control Environment Settings], and then [F5: Next Screen] to display the [Control Environment Settings].

7 Define the setup items as follows.

Setup Items	Setting Value
Transmission mode	RTU
Slave Address	1

IMPORTANT
- RTU is the only transmission mode supported. ASCII transmission mode is not supported.

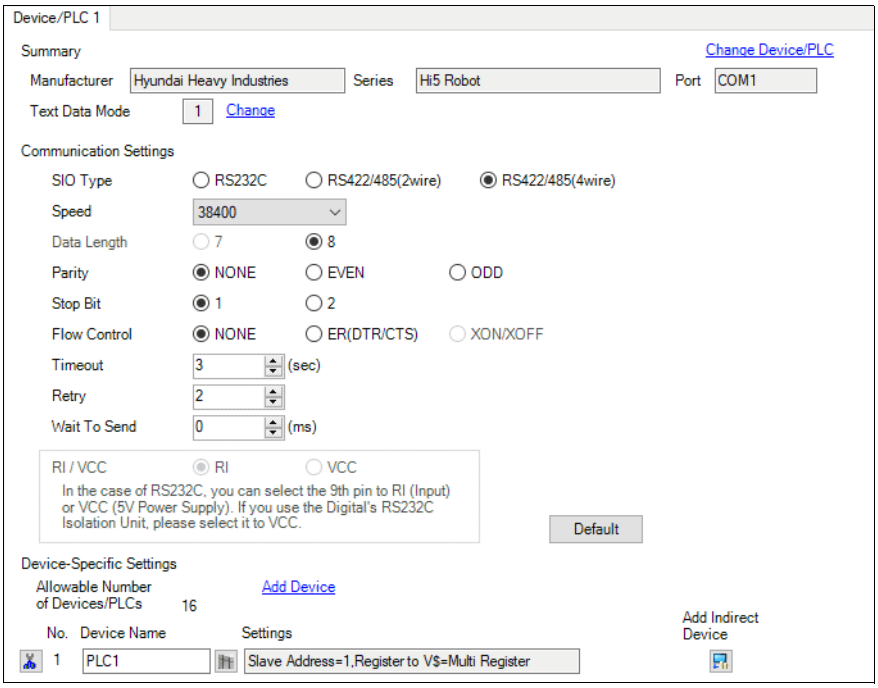
8 Press [F7].

3.4 Setting Example 4

■ Settings of GP-Pro EX

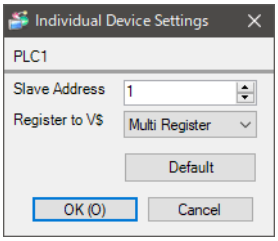
◆ Communication Settings

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



◆ Device Setting

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



■ Settings of External Device

For External Device communication settings, use the DIP Switches and Teach Pendant.

Please refer to the External Device manual for more details.

◆ DIP Switch Setting

Set the DIP switch for built-in PLC.

DIP Switches	Settings
SW01	OFF
SW02	OFF
SW03	OFF
SW04	OFF
SW05	ON
SW06	OFF
SW07	OFF
SW08	OFF

◆ Teach Pendant Setting

1 Press [F2].

2 From the menu, select [2: Controller parameters], [3: Serial ports] and then [2: Serial Port #2] to display the [Serial Port #2] setup items.

3 Define the setup items as follows.

Setup Items	Setting Value
Baudrate	38400
Data length	8
Stop bit	1
Parity bit	Disable
Echo	Disable
Port Usage	MODBUS
Comm. Type	RS422/RS485

IMPORTANT
- When using serial port #2 (OPSIO), do not set the serial port #1(CNSIO) [Port Usage] property to MODBUS.

4 Press [F7].

5 Press [F2].

6 Select [2: Controller parameters], [1: Control Environment Settings], and then [F5: Next Screen] to display the [Control Environment Settings].

7 Define the setup items as follows.

Setup Items	Setting Value
Transmission mode	RTU
Slave Address	1

IMPORTANT
- RTU is the only transmission mode supported. ASCII transmission mode is not supported.

8 Press [F7].

4 Setup Items

Set communication settings of the Display with GP-Pro EX or in offline mode of the Display.

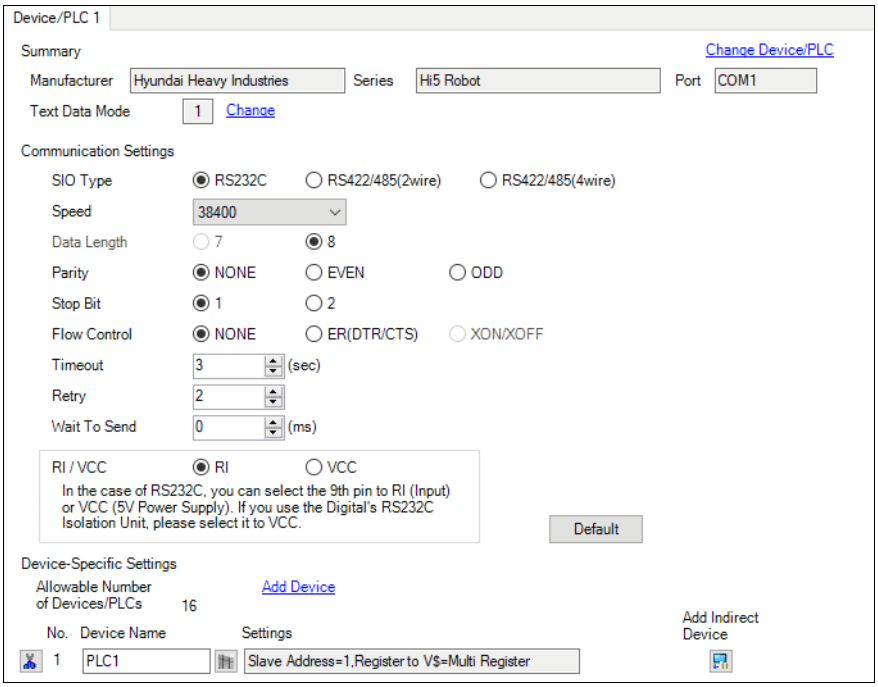
The setting of each parameter must be identical to that of External Device.

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

4.1 Setup Items in GP-Pro EX

■ Communication Settings

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



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	Display data length.
Parity	Select how to check parity.
Stop Bit	Select 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.
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.

Setup Items	Setup Description
RI/VCC	You can switch RI/VCC of the 9th pin when you select RS232C for SIO type. It is necessary to change RI/5V by changeover switch of IPC when connect with IPC. Please refer to the manual of the IPC for more detail.

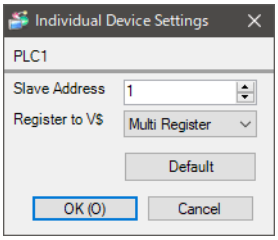
NOTE

- 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.



Setup Items	Setup Description
Slave Address	Use an integer from 1 to 247 to enter the address of the External Device.
Register to V$	Select a command for registering V$ devices. Multi Register: To register multiple V$ devices. Single Register: To register only one V$ device. **NOTE** • [Multi Register] is recommended. However, if an error occurs when writing to the V$ device, use [Single Register].

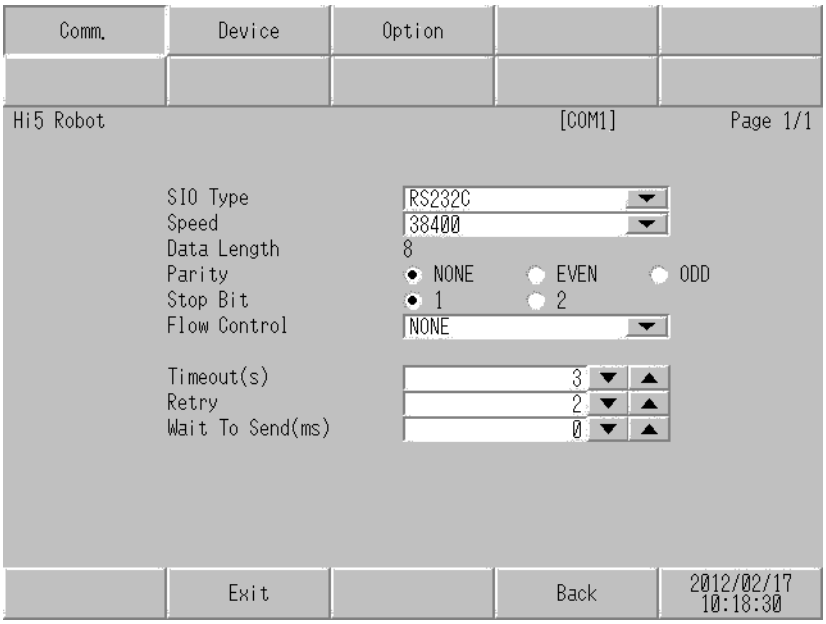
4.2 Setup Items in Offline Mode

NOTE

- Please refer to Maintenance/Troubleshooting Guide for more information on how to enter offline mode or about operation.
  Cf. Maintenance/Troubleshooting Guide "Offline Mode"
- The number of the setup items to be displayed for 1 page in the offline mode depends on the Display in use. Please refer to the Reference manual for details.

■ Communication Settings

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

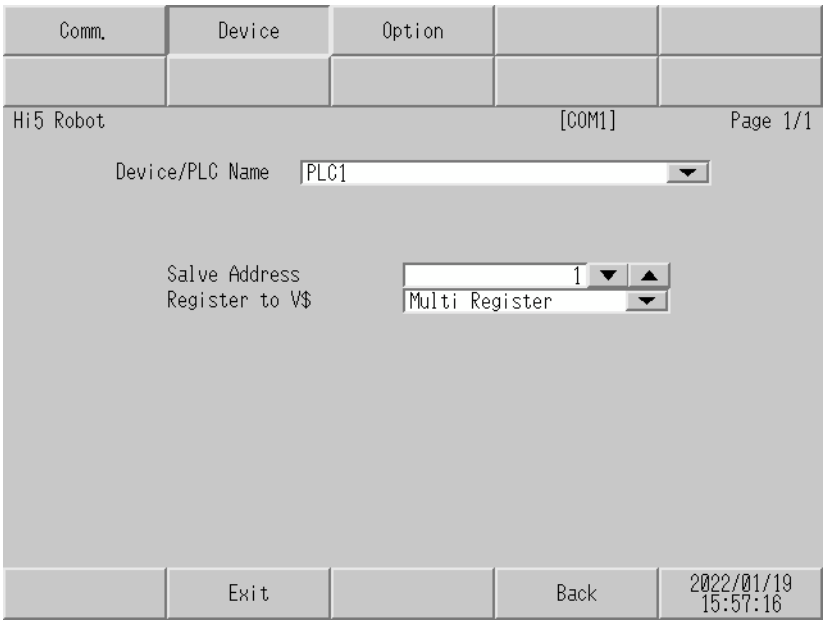


Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device. **IMPORTANT** To make the communication settings correctly, confirm the serial interface specifications of Display unit for [SIO Type]. We cannot guarantee the operation if a communication type that the 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	Display data length.
Parity	Select how to check parity.
Stop Bit	Select stop bit length.
Flow Control	Select the communication control method to prevent overflow of transmission and reception data.
Timeout (s)	Use an integer from 1 to 127 to enter the time (s) for which the Display waits for the response from the External Device.

Setup Items	Setup Description
Retry	In case of no response from the External Device, use an integer from 0 to 255 to enter how many times the Display retransmits the command.
Wait To Send (ms)	Use an integer from 0 to 255 to enter standby time (ms) for the Display from receiving packets to transmitting next commands.

■ Device Settings

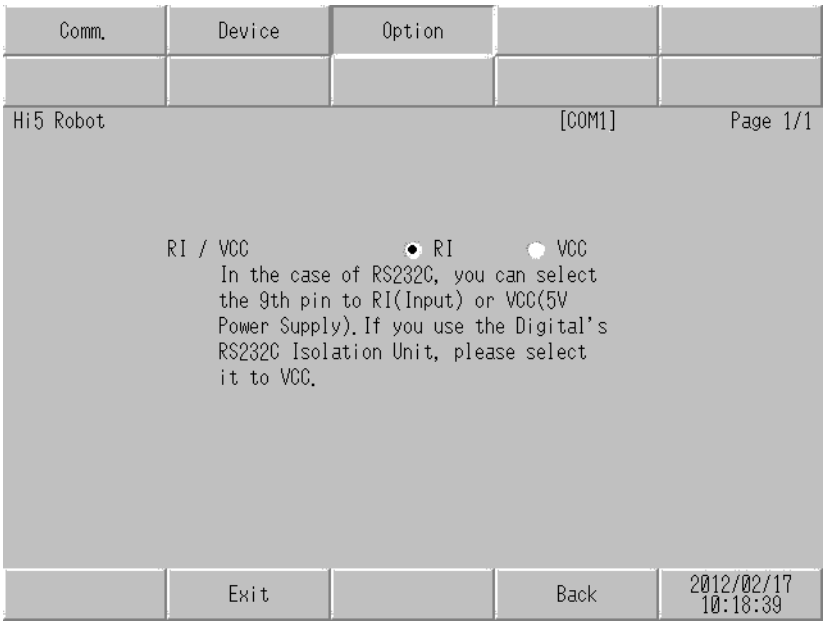
To display the setting screen, touch [Device/PLC Settings] from [Peripheral Settings]. Touch the External Device you want to set from the displayed list, and touch [Device].



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 [PLC1])
Slave Address	Use an integer from 1 to 247 to enter the address of the External Device.
Register to V$	Select a command for registering V$ devices. Multi Register: To register multiple V$ devices. Single Register: To register only one V$ device.

■ Option

To display the setting screen, touch [Device/PLC Settings] from [Peripheral 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. It is necessary to change RI/5V by changeover switch of IPC when connect with IPC. Please refer to the manual of the IPC for more detail.

NOTE

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

5 Cable Diagram

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

- The FG pin of the External Device body 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

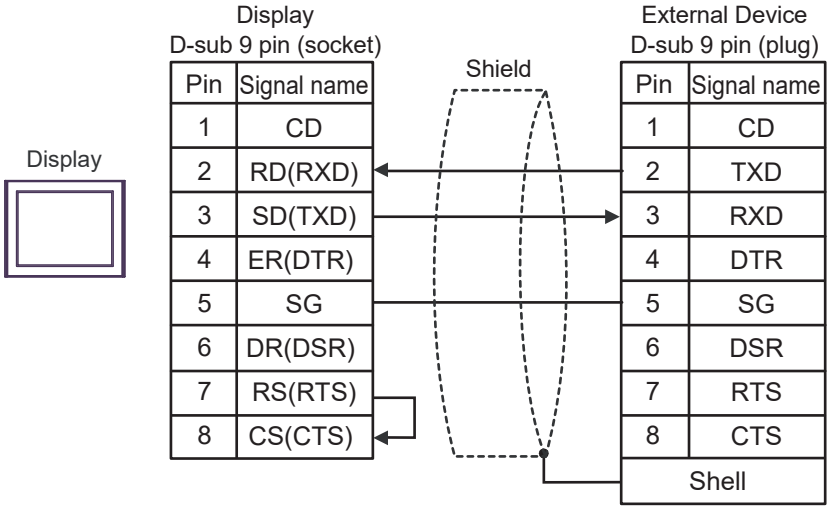
Display (Connection Port)	Cable		Notes
GP3000 (COM1) GP4000*1 (COM1) SP5000*2 (COM1/2) SP-5B00 (COM1) ST3000 (COM1) ST6000 (COM1) STM6000 (COM1) STC6000 (COM1) IPC*3 PC/AT	1A	User-created cable	Cable length: 15m or less
GP-4105 (COM1) GP-4115T (COM1) GP-4115T3 (COM1)	1B	User-created cable	Cable length: 15m or less

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

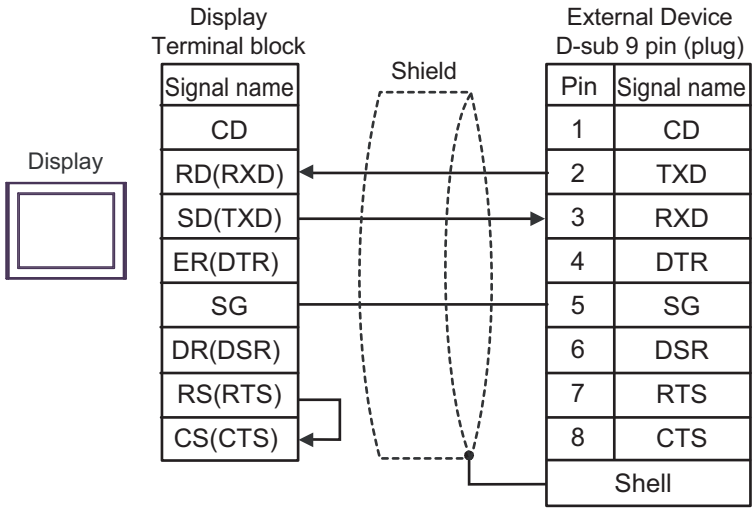
*2 Except SP-5B00

*3 Only the COM port which can communicate by RS-232C can be used.
"■ IPC COM Port" (page 4)

1A)


Display
D-sub 9 pin (socket)
Pin
Signal name
1 CD
2 RD(RXD)
3 SD(TXD)
4 ER(DTR)
5 SG
6 DR(DSR)
7 RS(RTS)
8 CS(CTS)
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
1 CD
2 TXD
3 RXD
4 DTR
5 SG
6 DSR
7 RTS
8 CTS
Shell
Display

1B)


Display
Terminal block
Signal name
CD
RD(RXD)
SD(TXD)
ER(DTR)
SG
DR(DSR)
RS(RTS)
CS(CTS)
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
1 CD
2 TXD
3 RXD
4 DTR
5 SG
6 DSR
7 RTS
8 CTS
Shell
Display

Cable Diagram 2

Display (Connection Port)	Cable		Notes
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) IPC[*3]	2A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	Cable length: 500m or less
	2B	User-created cable	
GP3000[*4] (COM2)	2C	Online adapter by Pro-face CA4-ADPONL-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	Cable length: 500m or less
	2D	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	
GP-4106 (COM1) GP-4116T (COM1)	2E	User-created cable	Cable length: 500m or less
GP4000[*5] (COM2) GP-4201T (COM1) SP5000[*6] (COM1/2) SP-5B00 (COM2) ST6000[*7] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) PS6000 (Basic Box) (COM1/2)	2F	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1[*8] + User-created cable	Cable length: 500m or less
	2B	User-created cable	
PE-4000B[*9] PS5000[*9] PS6000 (Optional Interface)[*9]	2G	User-created cable	Cable length: 500m or less

*1 All GP 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 4)

*4 All GP models except 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

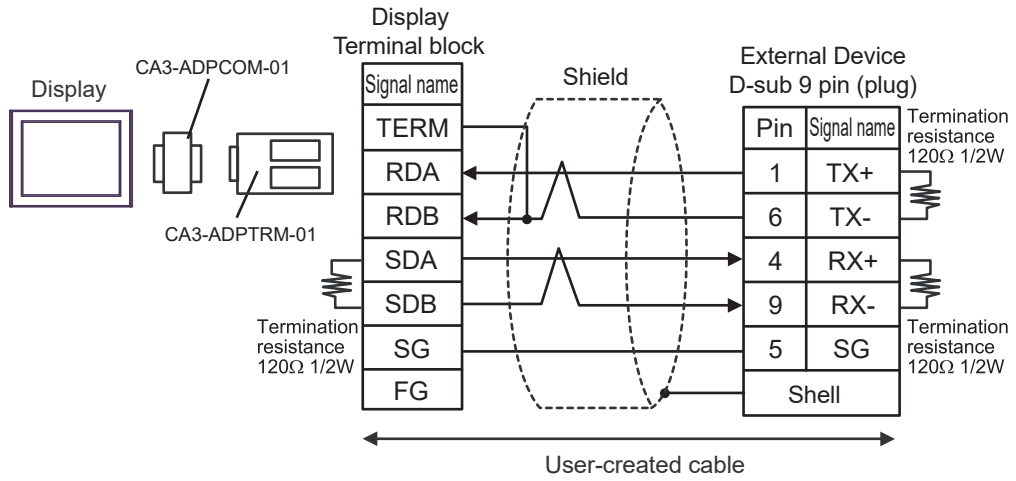
*6 Except SP-5B00

*7 Except ST-6200

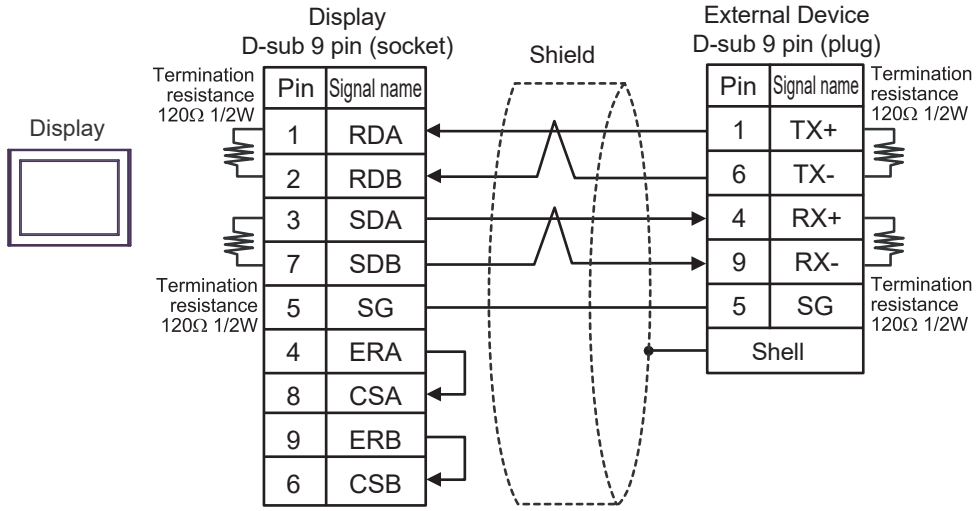
*8 When using a Terminal Block Conversion Adapter (CA3-ADPTRM-01) instead of the RS-422 Terminal Block Conversion Adapter, refer to Cable Diagram 2A.

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

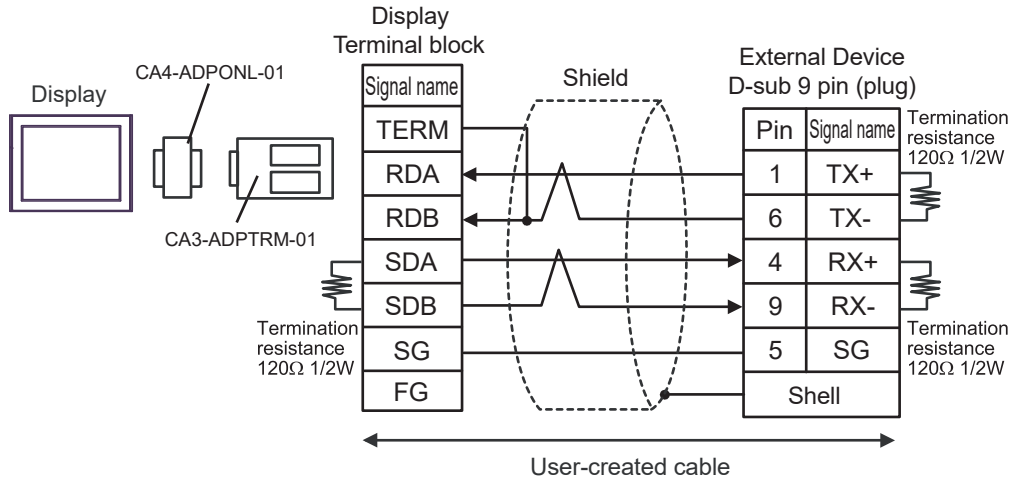
2A)


Display
Terminal block
Display
CA3-ADPCOM-01
CA3-ADPTRM-01
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
User-created cable

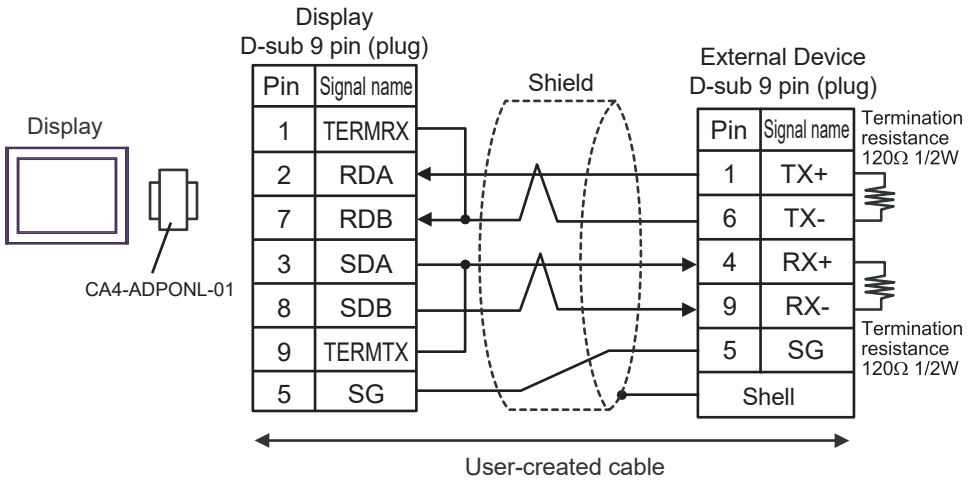
2B)


Display
Display
D-sub 9 pin (socket)
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
1
RDA
2
RDB
3
SDA
7
SDB
5
SG
4
ERA
8
CSA
9
ERB
6
CSB
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W

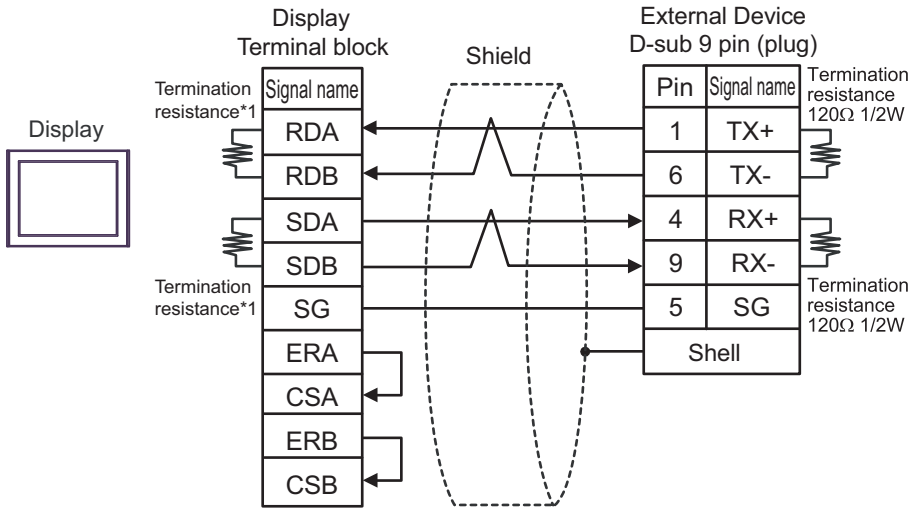
2C)


Display
Terminal block
Display
CA4-ADPONL-01
CA3-ADPTRM-01
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
User-created cable

2D)



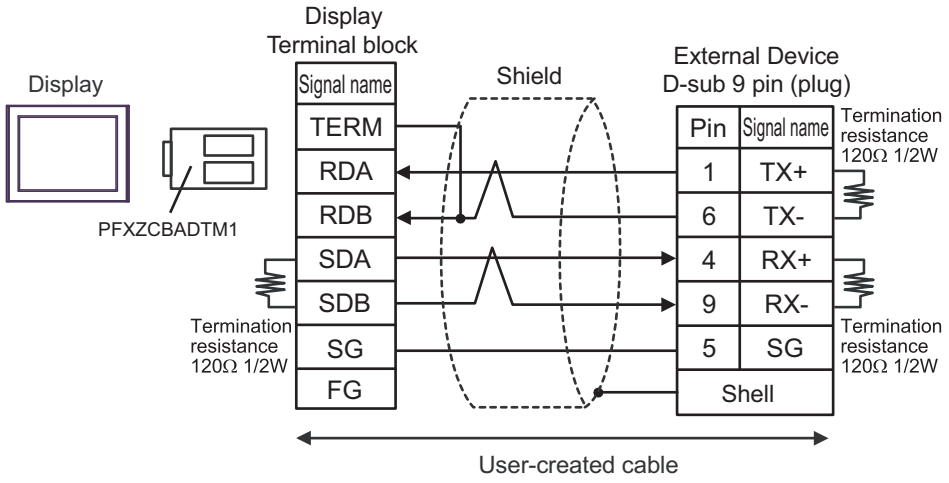
2E)



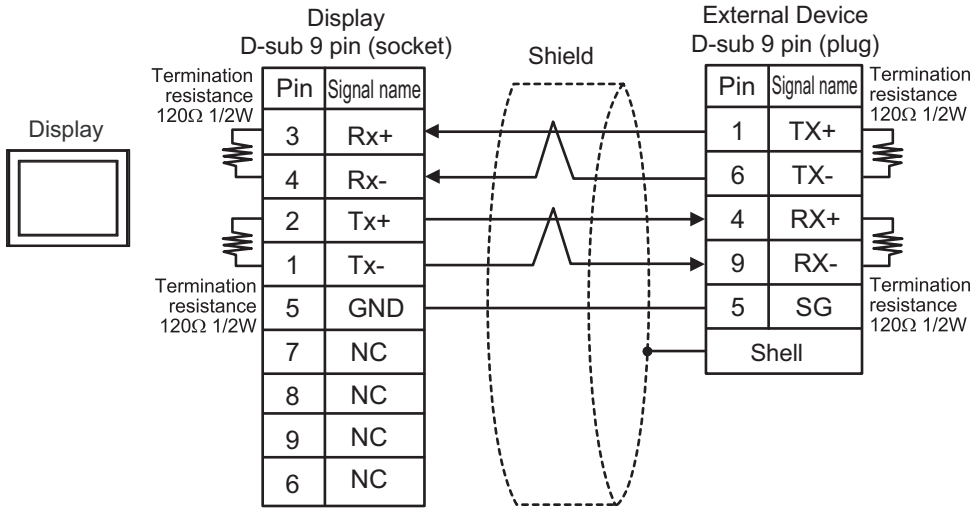
*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

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

2F)


Display
Display
Terminal block
Shield
External Device
D-sub 9 pin (plug)
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
PFXZCBADTM1
User-created cable

2G)


Display
Display
D-sub 9 pin (socket)
Shield
External Device
D-sub 9 pin (plug)
Pin
Signal name
3
Rx+
4
Rx-
2
Tx+
1
Tx-
5
GND
7
NC
8
NC
9
NC
6
NC
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W

Cable Diagram 3

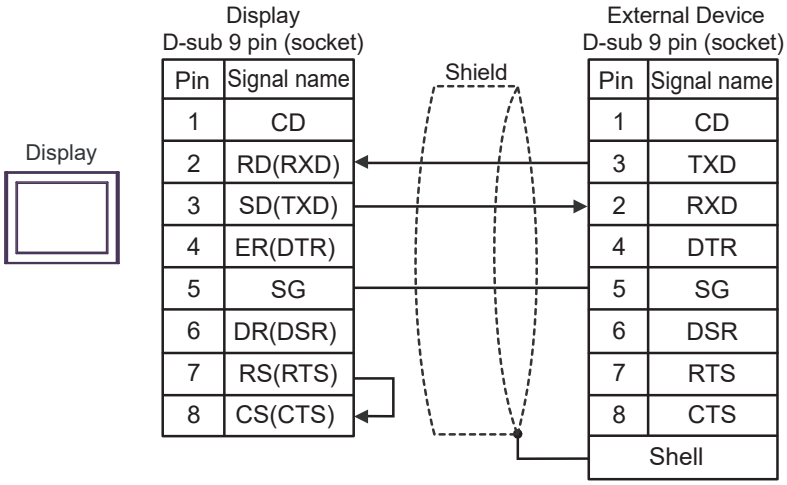
Display (Connection Port)	Cable		Notes
GP3000 (COM1) GP4000*1 (COM1) SP5000*2 (COM1/2) SP-5B00 (COM1) ST3000 (COM1) ST6000 (COM1) STM6000 (COM1) STC6000 (COM1) IPC*3 PC/AT	3A	User-created cable	Cable length: 15m or less
GP-4105 (COM1) GP-4115T (COM1) GP-4115T3 (COM1)	3B	User-created cable	Cable length: 15m or less

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

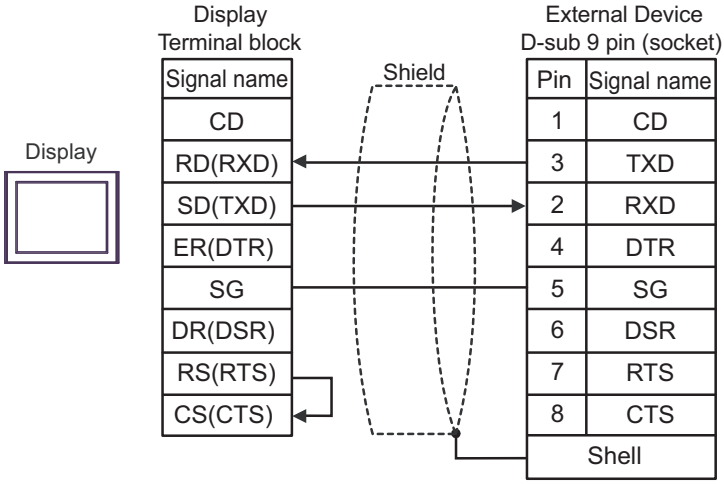
*2 Except SP-5B00

*3 Only the COM port which can communicate by RS-232C can be used.
☞"■ IPC COM Port" (page 4)

3A



3B


Display
Terminal block
Signal name
CD
RD(RXD)
SD(TXD)
ER(DTR)
SG
DR(DSR)
RS(RTS)
CS(CTS)
Shield
External Device
D-sub 9 pin (socket)
Pin
Signal name
1
CD
3
TXD
2
RXD
4
DTR
5
SG
6
DSR
7
RTS
8
CTS
Shell
Display

Cable Diagram 4

Display (Connection Port)	Cable		Notes
GP3000[*1] (COM1) AGP-3302B (COM2) GP-4*01TM (COM1) GP-Rear Module (COM1) ST3000[*2] (COM2) IPC[*3]	4A	COM port conversion adapter by Pro-face CA3-ADPCOM-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	Cable length: 500m or less
	4B	User-created cable	
GP3000[*4] (COM2)	4C	Online adapter by Pro-face CA4-ADPONL-01 + Terminal block conversion adapter by Pro-face CA3-ADPTRM-01 + User-created cable	Cable length: 500m or less
	4D	Online adapter by Pro-face CA4-ADPONL-01 + User-created cable	
GP-4106 (COM1) GP-4116T (COM1)	4E	User-created cable	Cable length: 500m or less
GP4000[*5] (COM2) GP-4201T (COM1) SP5000[*6] (COM1/2) SP-5B00 (COM2) ST6000[*7] (COM2) ST-6200 (COM1) STM6000 (COM1) STC6000 (COM1) PS6000 (Basic Box) (COM1/2)	4F	RS-422 terminal block conversion adapter by Pro-face PFXZCBADTM1[*8] + User-created cable	Cable length: 500m or less
	4B	User-created cable	
PE-4000B[*9] PS5000[*9] PS6000 (Optional Interface)[*9]	4G	User-created cable	Cable length: 500m or less

*1 All GP 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 4)

*4 All GP models except 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

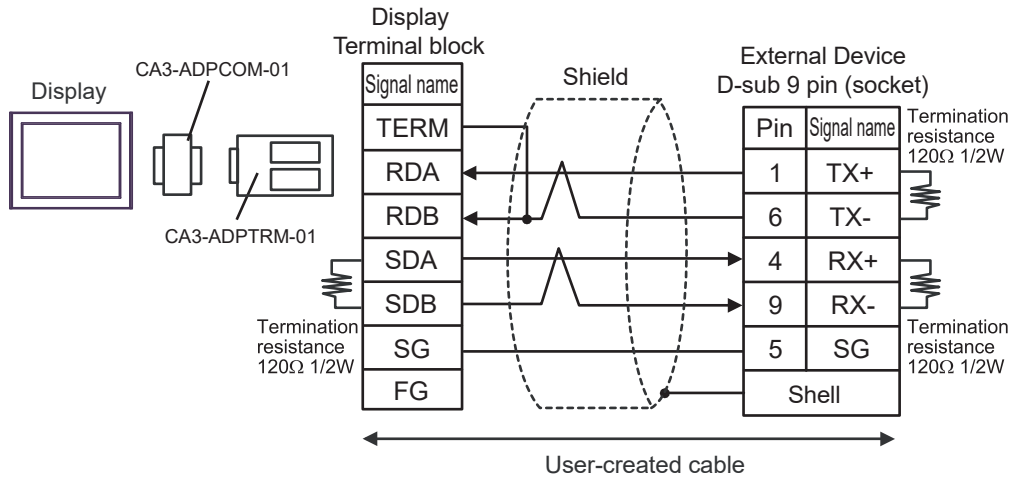
*6 Except SP-5B00

*7 Except ST-6200

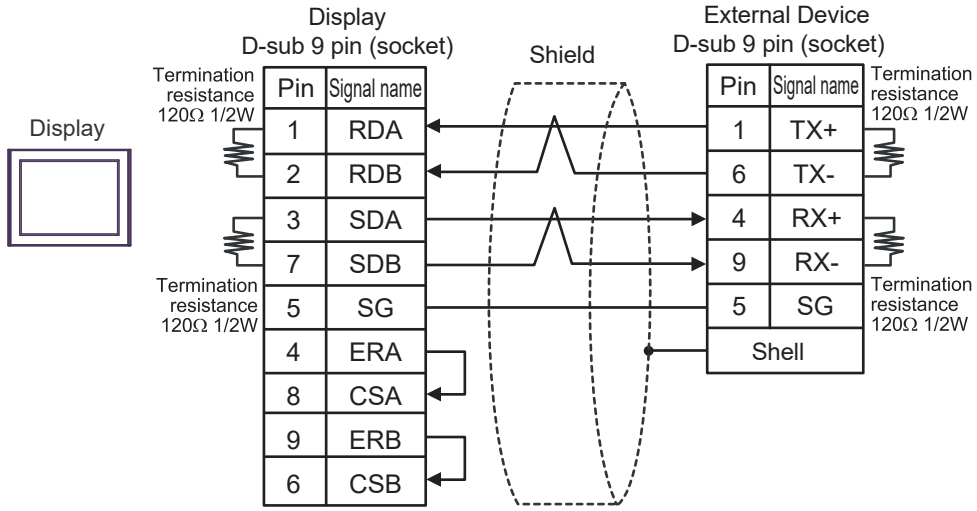
*8 When using a Terminal Block Conversion Adapter (CA3-ADPTRM-01) instead of the RS-422 Terminal Block Conversion Adapter, refer to Cable Diagram 4A.

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

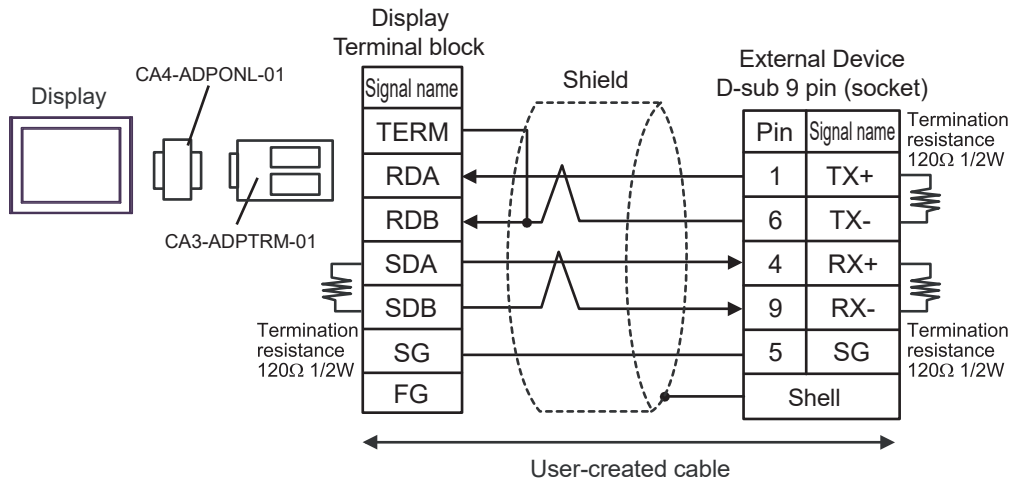
4A)


Display
Terminal block
Display
CA3-ADPCOM-01
CA3-ADPTRM-01
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Shield
External Device
D-sub 9 pin (socket)
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
User-created cable

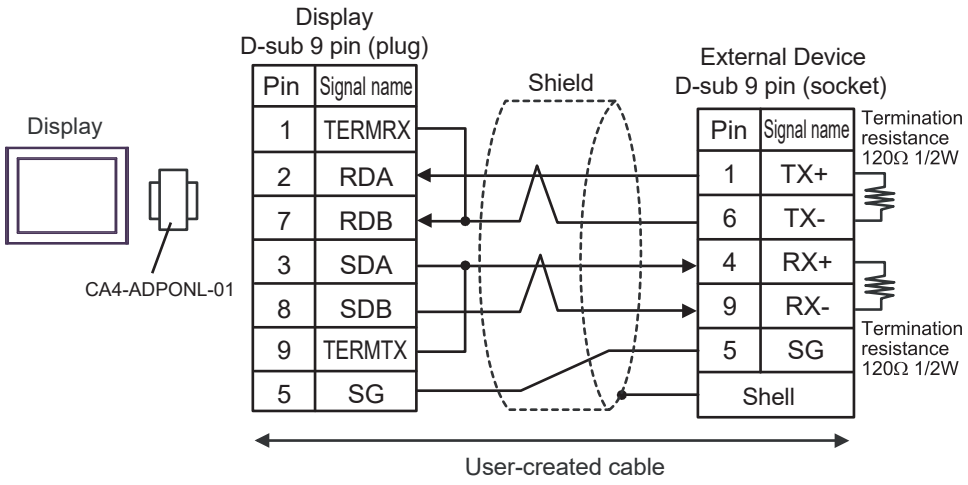
4B)


Display
Display
D-sub 9 pin (socket)
Shield
External Device
D-sub 9 pin (socket)
Pin
Signal name
1
RDA
2
RDB
3
SDA
7
SDB
5
SG
4
ERA
8
CSA
9
ERB
6
CSB
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W

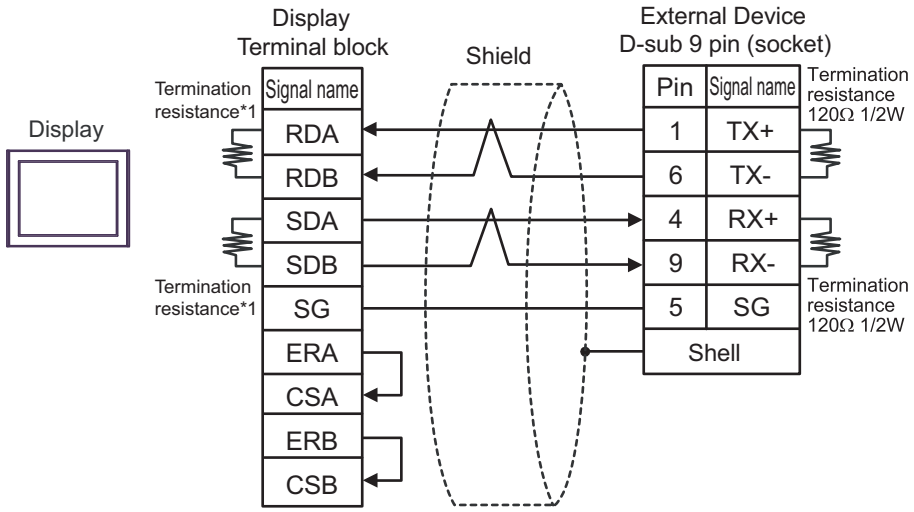
4C)


Display
Terminal block
Display
CA4-ADPONL-01
CA3-ADPTRM-01
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Shield
External Device
D-sub 9 pin (socket)
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
User-created cable

4D)



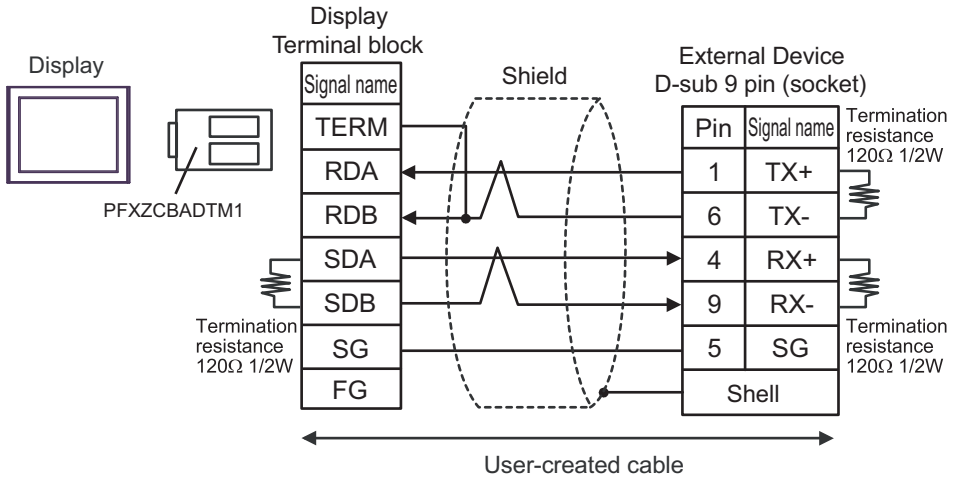
4E)



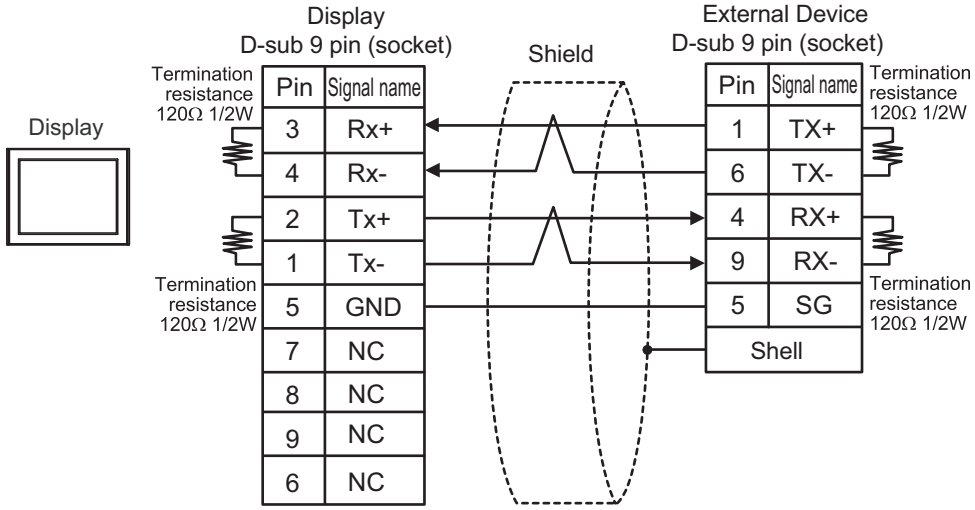
*1 The resistance in the Display is used as the termination resistance. Set the value of the DIP Switch on the rear of the Display as shown in the table below.

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

4F)


Display
Display
Terminal block
Shield
External Device
D-sub 9 pin (socket)
Signal name
TERM
RDA
RDB
SDA
SDB
SG
FG
Pin
Signal name
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
PFXZCBADTM1
User-created cable

4G)


Display
Display
D-sub 9 pin (socket)
Shield
External Device
D-sub 9 pin (socket)
Pin
Signal name
3
Rx+
4
Rx-
2
Tx+
1
Tx-
5
GND
7
NC
8
NC
9
NC
6
NC
1
TX+
6
TX-
4
RX+
9
RX-
5
SG
Shell
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W
Termination resistance 120Ω 1/2W

6 Supported Device

The following section shows the range of supported device addresses. Please note that the actual supported range of the devices vary 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	Double Word Address	32bits	Notes
External Input	X0001 - X8192	XW001 - XW512	XL001 - XL256	H / L	*1
PLC Input	DO0001 - DO4096	DOW001 - DOW256	DOL001 - DOL128		*1
Fieldbus Input #1	FB1.X001 - FB1.X960	FB1.XW01 - FB1.XW60	FB1.XL01 - FB1.XL30		*1
Fieldbus Input #2	FB2.X001 - FB2.X960	FB2.XW01 - FB2.XW60	FB2.XL01 - FB2.XL30		*1
Fieldbus Input #3	FB3.X001 - FB3.X960	FB3.XW01 - FB3.XW60	FB3.XL01 - FB3.XL30		*1
Fieldbus Input #4	FB4.X001 - FB4.X960	FB4.XW01 - FB4.XW60	FB4.XL01 - FB4.XL30		*1
CC-Link Input	FB5.X001 - FB5.X256	FB5.XW01 - FB5.XW16	FB5.XL1 - FB5.XL8		*1
Fieldbus Node Input	FN1.X001 - FN64.X128	FN1.XW01 - FN64.XW8	FN1.XL01 - FN64.XL4		*1
Timer(Contact)	T001 - T256	-	-		*1 *2
Counter(Contact)	C001 - C256	-	-		*1 *2
Analog Input	-	AI01 - AI32	-		*1
External Output	Y0001 - Y8192	YW001 - YW512	YL001 - YL256		
PLC Output	DI0001 - DI4096	DIW001 - DIW256	DIL001 - DIL128		
Fieldbus Output #1	FB1.Y001 - FB1.Y960	FB1.YW01 - FB1.YW60	FB1.YL01 - FB1.YL30		
Fieldbus Output #2	FB2.Y001 - FB2.Y960	FB2.YW01 - FB2.YW60	FB2.YL01 - FB2.YL30		
Fieldbus Output #3	FB3.Y001 - FB3.Y960	FB3.YW01 - FB3.YW60	FB3.YL01 - FB3.YL30		
Fieldbus Output #4	FB4.Y001 - FB4.Y960	FB4.YW01 - FB4.YW60	FB4.YL01 - FB4.YL30		
CC-Link Output	FB5.Y001 - FB5.Y256	FB5.YW01 - FB5.YW16	FB5.YL1 - FB5.YL8		
Fieldbus Node Output	FN1.Y001 - FN64.Y128	FN1.YW01 - FN64.YW8	FN1.YL01 - FN64.YL4		
Special	SP001 - SP128	SPW1 - SPW8	SPL1 - SPL4		
Auxiliary	R0001 - R1024	RW01 - RW64	RL01 - RL32		
Keep	K0001 - K1024	KW01 - KW64	KL01 - KL32		

Device	Bit Address	Word Address	Double Word Address	32bits	Notes
Timer(Current Value)	-	TW001 - TW512	TL001 - TL256	H / L	*2
Counter(Current Value)	-	CW001 - CW512	CL001 - CL256		*2
Analog Output	-	AO01 - AO32	-		*3
System Memory	-	SW001 -SW512	SL001 - SL256		*4
Shared Register	-	MW0001 - MW1000	ML001 - ML500		*4
HRBASIC V% Variable	-	V%001 - V%400	-		
RN Register for M-code	-	RN01 - RN16	-		*5
HRBASIC V$ Variable	-	V$01.00 - V$40.17	-		*6
HRBASIC V! Variable	-	-	V!001 - V!400		*7

*1 Write disabled.

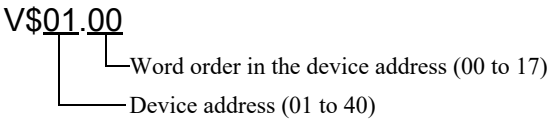
*2 T and TL devices, and C and CL devices are the same devices, respectively.

*3 AI/AO devices use the Hi5 Robot's 12 bit real numbers. The data range is between -12.0 and +12.0. The Display converts these values to -12000 and +12000.

*4 Bit setup possible. After the word address, set the bit position, from 1 to 16.

*5 The data range for RN device is 0 to 255.

*6 Since the size of the HRBASIC V$ variable is equivalent to 18 words, GP-Pro EX treats the HRBASIC V$ variable as an aggregate of 18 single-word devices. When specifying the address in GP-Pro EX, the device address data is displayed in word order from 00 to 17.



*7 HRBASIC V! are single-precision 32-bit floating point devices, with a data range of 3.4E +/-38 (7 digits). On the Display these devices have a data range of 9.9E +/-16.

NOTE

- Please refer to the GP-Pro EX Reference Manual regarding the system data area.
  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"
- Please refer to the precautions on manual notation for icons in the table.
  ☞ "Manual Symbols and Terminology"

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.

Device	Device Name	Device Code (HEX)	Address Code
External Input	X / XW	0080	Word Address
	XL	006A	Double Word Address
PLC Input	DO / DOW	0082	Word Address
	DOL	006B	Double Word Address
Fieldbus Input #1	FB1.X / FB1.XW	0183	Word Address
	FB1.XL	016C	Double Word Address
Fieldbus Input #2	FB2.X / FB2.XW	0283	Word Address
	FB2.XL	026C	Double Word Address
Fieldbus Input #3	FB3.X / FB3.XW	0383	Word Address
	FB3.XL	036C	Double Word Address
Fieldbus Input #4	FB4.X / FB4.XW	0483	Word Address
	FB4.XL	046C	Double Word Address
CC-Link Input	FB5.X / FB5.XW	0583	Word Address
	FB5.XL	056C	Double Word Address
Fieldbus Node Input	FN1 to 64.X / FN1 to 64.XW	0190 4090	Word Address
	FN1 to 64.XL	016D 406D	Double Word Address
Analog Input	AI	0066	Word Address
External Output	Y / YW	0081	Word Address
	YL	006E	Double Word Address
PLC Output	DI / DIW	0087	Word Address
	DIL	006F	Double Word Address
Fieldbus Output #1	FB1.Y / FB1.YW	0188	Word Address
	FB1.YL	0170	Double Word Address
Fieldbus Output #2	FB2.Y / FB2.YW	0288	Word Address
	FB2.YL	0270	Double Word Address
Fieldbus Output #3	FB3.Y / FB3.YW	0388	Word Address
	FB3.YL	0370	Double Word Address
Fieldbus Output #4	FB4.Y / FB4.YW	0488	Word Address
	FB4.YL	0470	Double Word Address
CC-Link Output	FB5.Y / FB5.YW	0588	Word Address
	FB5.YL	0570	Double Word Address

Device	Device Name	Device Code (HEX)	Address Code
Fieldbus Node Output	FN1 to 64.Y / FN1 to 64.YW	0191 4091	Word Address
	FN1 to 64.YL	0171 4071	Double Word Address
Special	SP / SPW	008C	Word Address
	SPL	0072	Double Word Address
Auxiliary	R / RW	008D	Word Address
	RL	0073	Double Word Address
Keep	K / KW	008E	Word Address
	KL	0074	Double Word Address
Timer (Current Value)	TW	0060	Word Address
	TL	0075	Double Word Address
Counter (Current Value)	CW	0061	Word Address
	CL	0076	Double Word Address
Analog Output	AO	0067	Word Address
System Memory	SW	0001	Word Address
	SL	0077	Double Word Address
Shared Register	MW	0000	Word Address
	ML	0078	Double Word Address
HRBASIC V% Variable	V%	0062	Word Address
RN Register for M-code	RN	0063	Word Address
HRBASIC V$ Variable	V$	0064	Word Address
HRBASIC V! Variable	V!	0065	Float Address

8 Error Messages

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

Item	Description
No.	Error No.
Device Name	Name of External Device where error occurs. Device name is a title of 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 External Device where error occurs, or error codes received from 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

- Refer to your External Device manual for details on received error codes.
- Refer to "Display-related errors" in "Maintenance/Troubleshooting Guide" for details on the error messages common to the driver.

■ Error Codes Unique to External Device

Error codes unique to External Device are shown below.

Error Code	Description
H01	Illegal function.
H02	Illegal data address.
H03	Illegal data value.
H04	Slave device failure.