# Siemens
# Simatic S5
# Manuals and Guides

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# SIMATIC S5 CPU Direct Driver


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PREFACE

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<br>This section shows the types of External Devices which can be connected and SIO type. | ☞ System Configuration (page 3) |
| 2 | Selection of External Device<br>Select a model (series) of the External Device to be connected and connection method. | ☞ Selection of External Device (page 6) |
| 3 | Example of Communication Settings<br>This section shows setting examples for communicating between the Display and the External Device. | ☞ Example of Communication Setting (page 7) |
| 4 | Setup Items<br>This section describes communication setup items on the Display.<br>Set communication settings of the Display with GP-Pro EX or in offline mode. | ☞ Setup Items (page 8) |
| 5 | Cable Diagram<br>This section shows cables and adapters for connecting the Display and the External Device. | ☞ Cable Diagram (page 13) |

Operation

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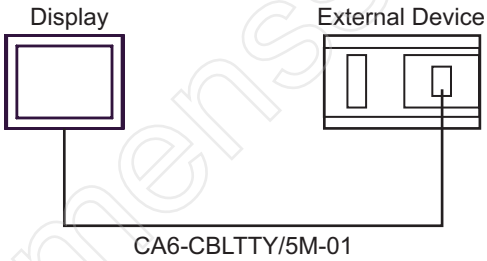
# 1 System Configuration

The system configuration in the case when the External Device of Siemens AG and the Display are connected is shown.

| Series Name | CPU | Link I/F | SIO Type | Setting Example | Cable Diagram |
|---|---|---|---|---|---|
| Series 90U-115U | CPU 90U<br>CPU 95U<br>CPU 100<br>CPU 102<br>CPU 103<br>CPU 941<br>CPU 942<br>CPU 943<br>CPU 944 | PG port on CPU | RS232C | Setting Example 1 (page 7) | Cable Diagram 1 (page 13) |
| Series 135U/155U | CPU 922<br>CPU 928<br>CPU 928B | PG port on CPU | RS232C | | |

## ■ Connection Configuration

[1:1 Connection]

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## ■ 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] |

*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.

DIP Switch setting: RS-232C

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

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



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

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

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

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

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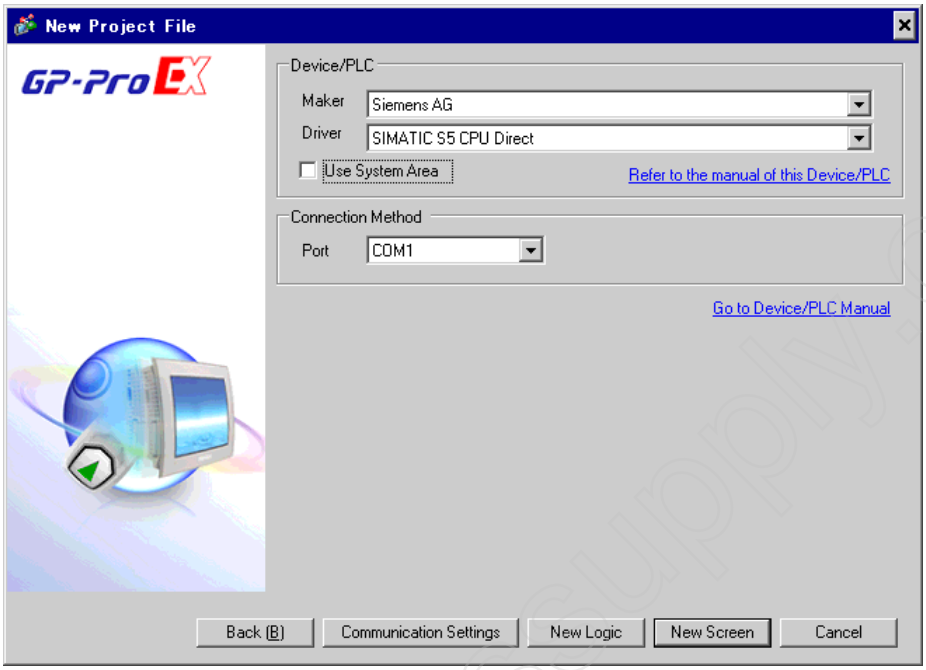
# 2 Selection of External Device

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 "Siemens AG". |
| Driver | Select a model (series) of the External Device to be connected and connection method. Select "SIMATIC S5 CPU Direct".<br>Check the External Device which can be connected in "SIMATIC S5 CPU Direct" in system configuration.<br>☞ System Configuration (page 3) |
| 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.<br>Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"<br>This feature can also be set in GP-Pro EX or in the Display's offline mode.<br>Cf. GP-Pro EX Reference Manual "Display Unit (System Area) Settings Guide"<br>Cf. Maintenance/Troubleshooting Guide "Main Unit - System Area Settings" |
| Port | Select the Display port to be connected to the External Device. |

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# 3 Example of Communication Setting

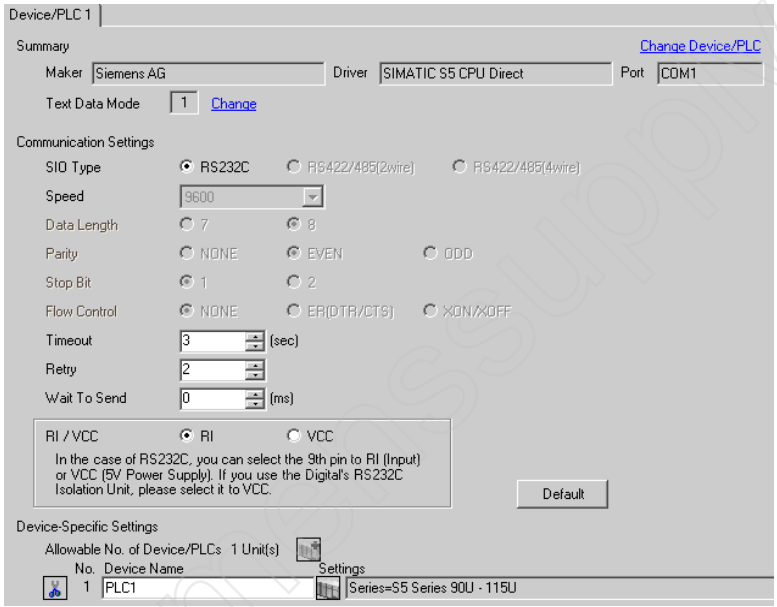
Examples of communication settings of the Display and the External Device, recommended by Digital Electronics Corp., are shown.

## 3.1 Setting Example 1

### ■ Settings 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 setting of the External Device is fixed.

You need not set it.

# 4 Setup Items

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

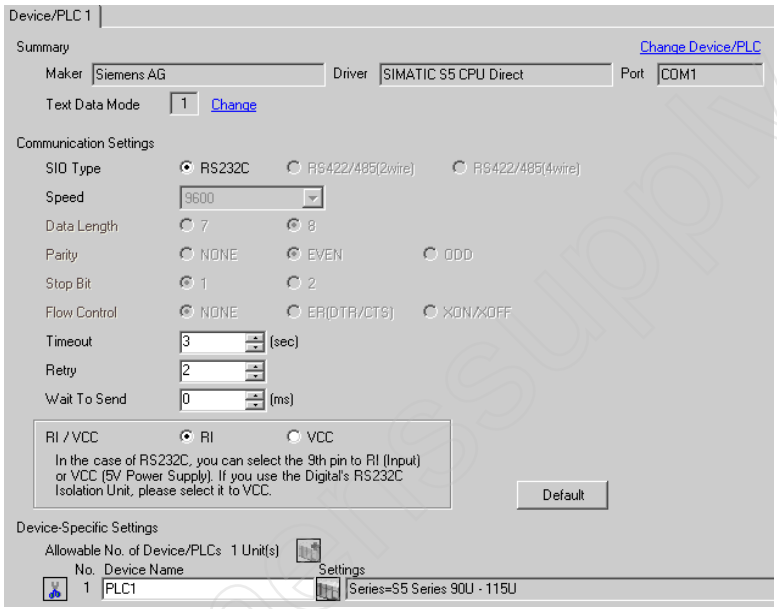
The setting of each parameter must be identical to that of External Device.

☞Example of Communication Setting (page 7)

## 4.1 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 | Displays the SIO type to communicate with the External Device. |
| Speed | Displays the communication speed between the External Device and the Display. |
| Data Length | Displays data length. |
| Parity | Displays how to check parity. |
| Stop Bit | Displays stop bit length. |
| Flow Control | Displays 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. |
| RI/VCC | You can switch RI/VCC of the 9th pin if you select RS232C for SIO type.<br>It is necessary to change RI/5V by changeover switch of IPC when connect with IPC.<br>Please refer to the manual of the IPC for more detail. |

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## ■ 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 ].

| Setup Items | Setup Description |
|---|---|
| Series | Select a model of the External Device. |

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## 4.2 Settings in Offline Mode

**NOTE**

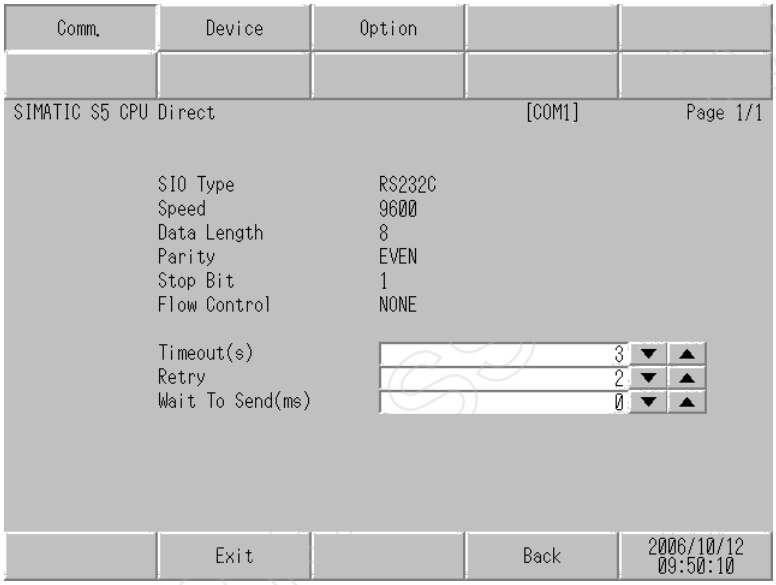
- Refer to the Maintenance/Troubleshooting guide for information on how to enter offline mode or about the operation.

  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 Equipment Settings] in the offline mode. Touch the External Device you want to set from the displayed list.

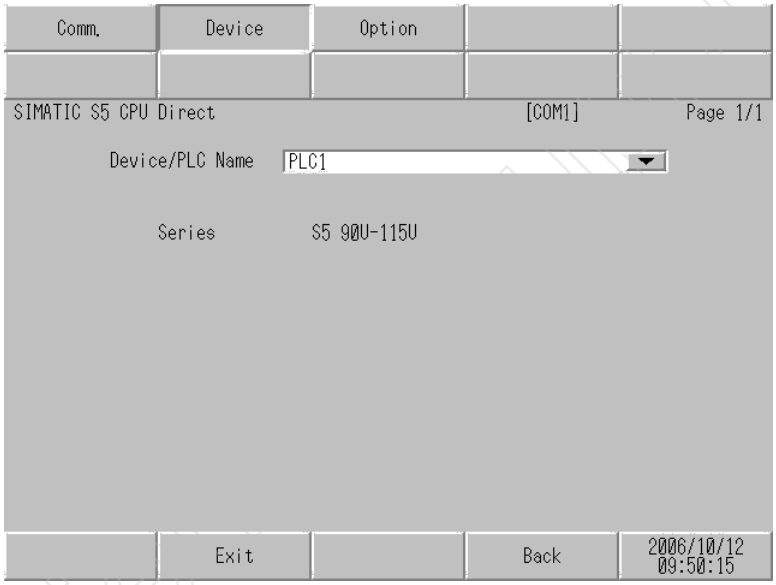



| Setup Items | Setup Description |
|---|---|
| SIO Type | Select the SIO type to communicate with the External Device.<br>**IMPORTANT**<br>To make the communication settings correctly, confirm the serial interface specifications of Display unit for [SIO Type].<br>We cannot guarantee the operation if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

| 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 | Use an integer from "0 to 255" to enter standby time (ms) for the Display from receiving packets to transmitting next commands. |

## ■ 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].

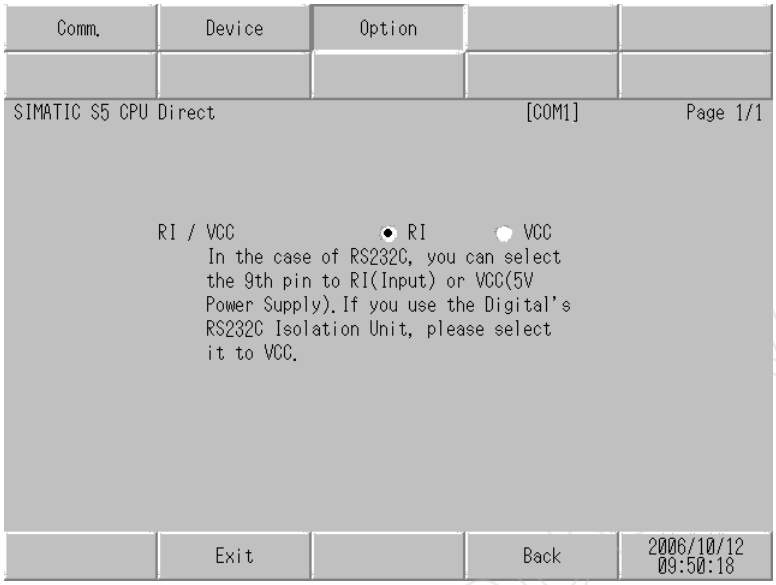



| Setup Items | Setup Description |
|---|---|
| Device/PLC Name | Select the External Device to set. Device name is a title of the External Device set with GP-Pro EX.<br>(Initial value [PLC1]) |
| Series | Display a model of the External Device. |

## ■ Option

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings].

Touch the External Device you want to set from the displayed list, and touch [Option].




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

**NOTE**

- GP-4100 series do not have the [Option] setting in the offline mode.

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# 5 Cable Diagram

The cable diagram shown below may be different from the cable diagram recommended by Siemens AG. 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..

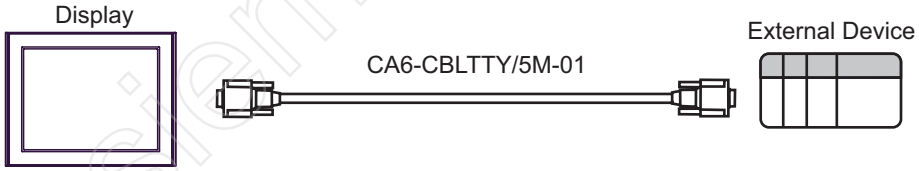
Cable Diagram 1

| Display (Connection Port) | Cable | | Remarks |
|---|---|---|---|
| GP3000 (COM1)<br>ST (COM1)<br>IPC*1<br>PC/AT | 1A | SIEMENS TTY converter cable by Pro-face<br>CA6-CBLTTY/5M-01 (5m) | |
| GP-4105 (COM1) | 1B | User-created cable<br>+<br>SIEMENS TTY converter cable by Pro-face<br>CA6-CBLTTY/5M-01 (5m) | |

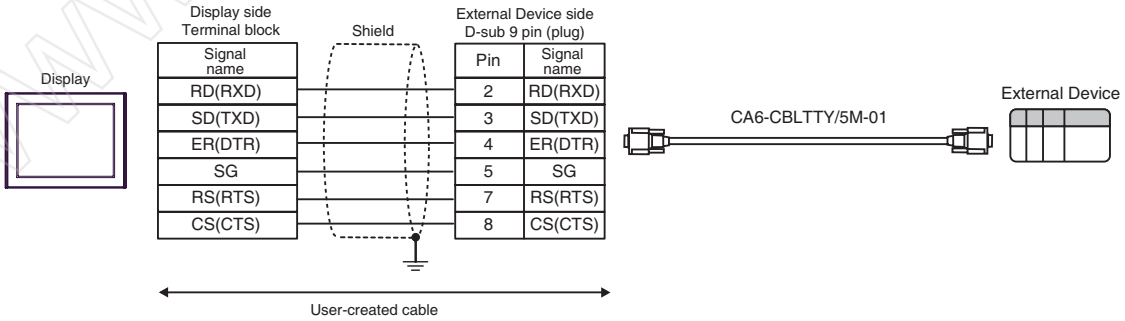
*1 Only the COM port which can communicate by RS-232C can be used.

☞ ■ IPC COM Port (page 4)

1A)




1B)

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# 6 Supported Device

Range of supported device address is shown in the table below.

## 6.1 Series 90U-115U

: This address can be specified as system data area.

| Device | Bit Address | Word Address | 32 bit | Remarks |
|---|---|---|---|---|
| Input Relay | I000.0 - I127.7 | IW000 - IW126 | H/L | ÷2 |
| Output Relay | Q000.0 - Q127.7 | QW000 - QW126 | | ÷2 |
| Internal Relay | F000.0 - F255.7 | FW000 - FW254 | | ÷2 |
| Timer | - | T000 - T255 | L/H | |
| Counter | - | C000 - C255 | | |
| Data Block | DB002.DBX000.00 - DB255.DBX255.15 | DB002.DBW000 - DB255.DBW255 | H/L | |

**NOTE**

- Please refer to the GP-Pro EX Reference Manual for 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"

## 6.2 Series 135U/155U

:This address can be specified as system data area.

| Device | Bit Address | Word Address | 32 bit | Remarks |
|---|---|---|---|---|
| Input Relay | I000.0 - I127.7 | IW000 - IW126 | H/L | ÷2 |
| Output Relay | Q000.0 - Q127.7 | QW000 - QW126 | | ÷2 |
| Internal Relay | F000.0 - F255.7 | FW000 - FW254 | | ÷2 |
| Timer | - | T000 - T255 | L/H | |
| Counter | - | C000 - C255 | | |
| Data Block | DB002.DBX000.00 - DB255.DBX255.15 | DB002.DBW000 - DB255.DBW255 | H/L | |
| Extended Data Block | X001.XBX000.00 - X255.XBX255.15 | X001.XBW000 - X255.XBW255 | | |

**NOTE**

- Please refer to the GP-Pro EX Reference Manual for 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"

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# 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 Series 90U-115U

| Device | Device Name | Device Code (HEX) | Address Code |
|---|---|---|---|
| Data Block | DB | 0000 | Value of (Data Block No. x 0x10000) + word address |
| Input | I | 0080 | Value of word address divided by 2 |
| Output | Q | 0081 | Value of word address divided by 2 |
| Internal Relay | F | 0082 | Value of word address divided by 2 |
| Timer | T | 0060 | Word Address |
| Counter | C | 0061 | Word Address |

## 7.2 Series 135U/155U

| Device | Device Name | Device Code (HEX) | Address Code |
|---|---|---|---|
| Data Block | DB | 0000 | Value of (Data Block No. x 0x10000) + word address |
| Extended Data Block | X | 0001 | Value of (Extended Data Block No. x 0x10000) + word address |
| Input | I | 0080 | Value of word address divided by 2 |
| Output | Q | 0081 | Value of word address divided by 2 |
| Internal Relay | F | 0082 | Value of word address divided by 2 |
| Timer | T | 0060 | Word Address |
| Counter | C | 0061 | Word Address |

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# 8 Error Messages

Error messages are displayed on the Display screen 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.<br>**NOTE**<br>• IP address is displayed such as "IP address (Decimal): MAC address (Hex)".<br>• Device address is displayed such as "Address: Device address".<br>• 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.

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