Q Series CPU Direct Driver

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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:

System Configuration 1 "1 System Configuration" (page 3) This section shows the types of External Device which can be connected and SIO type. Selection of External Device "2 Selection of External Device" (page 7) Select a model (series) of the External Device to be connected and connection method. **Example of Communication Settings** 3 "3 Example of Communication Setting" This section shows setting examples for (page 8) communicating between the Display and the External Device. 4 Setup Items "4 Setup Items" (page 9) This section describes communication setup items on the display. Set communication settings of the Display with GP-Pro Ex or in off-line mode. Cable Diagram 5 "5 Cable Diagram" (page 13) This section shows cables and adapters for connecting the Display and the External Device. Operation

1 System Configuration

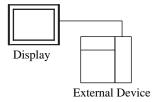
The system configuration in the case when the External Device of Mitsubishi Electric Corp. and the Display are connected is shown.

Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
MELSEC Q Series	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	CPU Direct RS232C port on High Performance Model Q CPU*1	RS232C	Setting Example 1 (page 8)	Cable Diagram 1 (page 13)
	Q02UCPU Q03UDCPU Q04UDHCPU Q06UDHCPU Q13UDHCPU Q26UDHCPU				
	Q172HCPU				

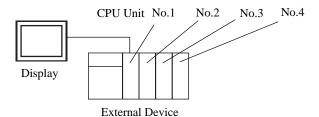
^{*1} Since the motion CPU (Q172HCPU) cannot be directly connected to the Display, use it with a Multi CPU System.

■ Connection Configuration

• Single CPU System



• Multi CPU System



NOTE

- For CPU's Unit No., No.1 is allocated to the CPU slot and No.2, 3, and 4 are allocated to the other slots from No.1 to right.
- With Multi CPU System, it's possible to access a CPU unit that is not directly connected.
 Regarding the external devices that can be used for Multi CPU System, please refer to the manual of the External Device.
- Use the motion CPU within the No. 2 to No. 4 range. The motion CPU cannot be used as No. 1.

■ 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			
Selles	RS-232C	RS-422/485(4 wire)	RS-422/485(2 wire)	
PS-2000B	COM1 ^{*1} , COM2, COM3 ^{*1} , COM4	-	-	
PS-3450A, PS-3451A	COM1, COM2*1*2	COM2*1*2	COM2*1*2	
PS-3650A, PS-3651A	COM1*1	-	-	
PS-3700A (Pentium®4-M) PS-3710A	COM1*1, COM2*1, COM3*2, COM4	COM3*2	COM3*2	
PS-3711A	COM1*1, COM2*2	COM2*2	COM2*2	
PL-3000B, PL-3600T, PL-3600K, PL-3700T, PL-3700K, PL-3900T	COM1 ^{*1*2} , COM2 ^{*1} , COM3, COM4	COM1*1*2	COM1*1*2	

^{*1} The RI/5V can be switched. Use the IPC's switch to change if necessary.

DIP switch setting: RS-232C

DIP switch	Setting	Description	
1	OFF*1	Reserved (always OFF)	
2	OFF	SIO type: RS-232C	
3	OFF	510 type. R5-232c	
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} It is necessary to turn ON the set value, only when using PS-3450A and PS-3451A.

^{*2} It is necessary to set up the SIO type with the DIP switch. Please set up as follows according to SIO type to be used.

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

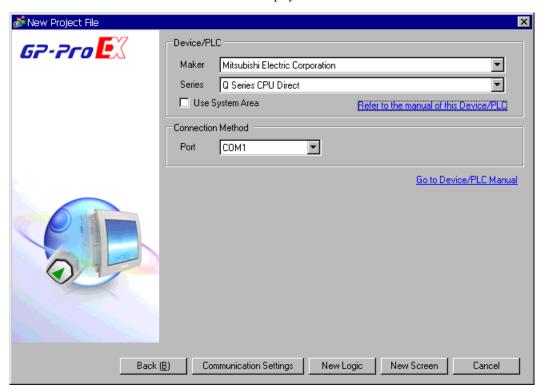
DIP switch	Setting	Description	
1	OFF	Reserved (always OFF)	
2	ON	SIO type: RS-422/485	
3	ON	310 type. R3-422/463	
4	OFF	Output mode of SD (TXD) data: Always output	
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None	
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None	
7	OFF	Short-circuit 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	NS (K13) Auto control mode. Disabled	

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	510 type. R5-422/465
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	
Maker	Select the maker of the External Device to be connected. Select "Mitsubishi Electric Corporation".	
Driver	Select a model (series) of the External Device to be connected and connection method. Select "Q Series CPU Direct". Check the External Device which can be connected in "Q Series CPU Direct" in system configuration. "I System Configuration" (page 3)	
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 "Appendix 1.4 LS Area (Direct Access Method)" This can be also set with GP-Pro EX or in off-line mode of Display. Cf. GP-Pro EX Reference Manual " 5.17.6 Setting Guide of [System Setting Window]■[Main Unit Settings] Settings Guide ◆System Area Setting" Cf. Maintenance/Troubleshooting "2.15.1 Settings common to all Display models ◆System Area Settings"	
Port	Select the Display port to be connected to the External Device.	

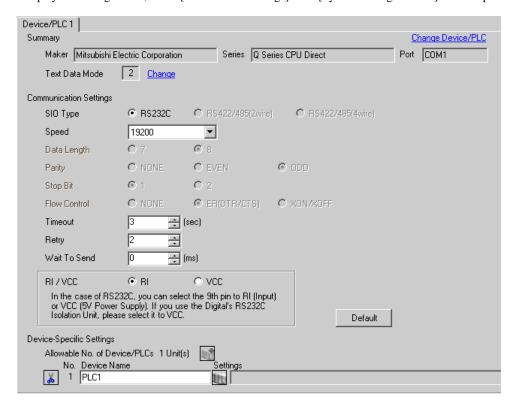
3 Example of Communication Setting

Examples of communication settings of the Display and the External Device, recommended by Pro-face, 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.



Settings of External Device

There is no setting on the External Device. The speed automatically switches according to the Display setting.

4 Setup Items

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

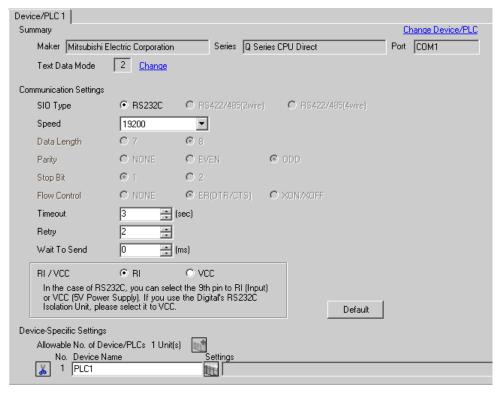
The setting of each parameter must be identical to that of External Device.

"3 Example of Communication Setting" (page 8)

4.1 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	Data length is displayed.
Parity	The parity check method is displayed.
Stop Bit	Stop bit length is displayed.
Flow Control	The communication control method to prevent overflow of transmission and reception data is displayed.
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 homany 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	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.		

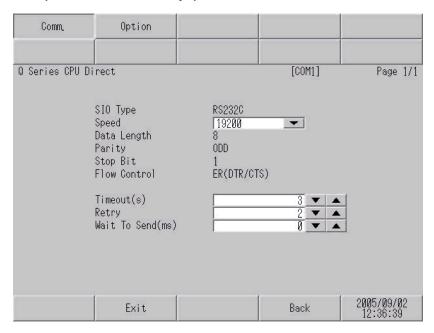
4.2 Setup Items in Off-Line Mode



- 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 Settings] in off-line mode. Touch the External Device you want to set from the displayed list.

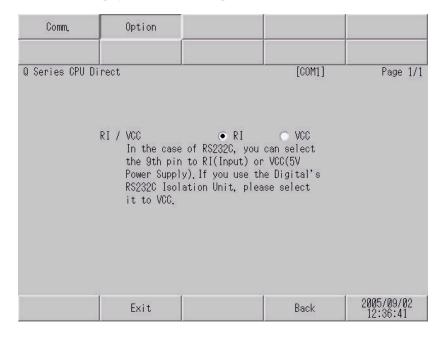


Setup Items	Setup Description
	SIO type to communicate with the External Device is displayed.
SIO Type	To make the communication settings correctly, confirm the serial interface specifications of Display unit for [SIO Type]. We cannot guarantee the operation if a communication type that the serial interface 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	Data length is displayed.
Parity	The parity check method is displayed.
Stop Bit	Stop bit length is displayed.
Flow Control	The communication control method to prevent overflow of transmission and reception data is displayed.
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.

■ 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.

5 Cable Diagram

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

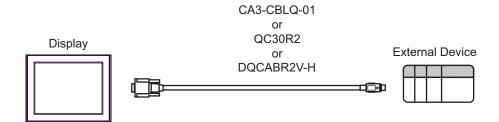
- The FG pin of the main body of the External Device must be D-class grounded. Please refer to the manual of the External Device for more details.
- SG and FG are connected inside the Display. When connecting SG to the External Device, design the system
 not to form short-circuit loop.
- · Connect the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

Cable Diagram 1

Display (Connection Port)	Cable	Notes
GP (COM1) ST (COM1) IPC*1 PC/AT	Mitsubishi Q connection cable by Pro-face CA3-CBLQ-01(5m) or RS-232C cable by Mitsubishi Electric Corp. QC30R2 (3m) or RS-232C cable for MELSEC-Q CPU connection by Diatrend Corp. DQCABR2V-H	Available to order the length of DQCABR2V-H by Diatrend Corp. up to 15m.

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

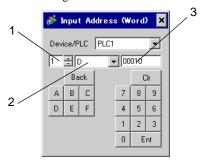
■ IPC COM Port (page 5)



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.

Input address of external device in the dialog below.



1. Unit Number Select the number of a CPU unit to communicate with from 1 to 4.

Select "0" to access a CPU unit that is directly connected like the Single CPU System.

Device Specify a device.
 Address Specify an address.

6.1 Q02CPU/Q02HCPU/Q06HCPU/Q12HCPU/Q25HCPU

This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Notes
Input Relay	X0000 - X1FFF	X0000 - X1FF0		*** 0
Output Relay	Y0000 - Y1FFF	Y0000 - Y1FF0		*** 0]
Internal Relay	M00000 - M32767	M00000 - M32752		<u>÷ 16</u>]
Special Relay	SM0000 - SM2047	SM0000 - SM2032		÷16j
Latch Relay	L00000 - L32767	L00000 - L32752		÷16j
Annunciator	F00000 - F32767	F00000 - F32752		<u>÷ 16</u>]
Edge Relay	V00000 - V32767	V00000 - V32752		÷16j
Step Relay	S0000 - S8191	S0000 - S8176	[L/H]	÷16j
Link Relay	B0000 - B7FFF	B0000 - B7FF0		*** 0]
Special Link Relay	SB000 - SB7FF	SB000 - SB7F0		*** 0]
Timer (Contact)	TS00000 - TS23087			
Timer (Coil)	TC00000 - TC23087			
Retentive Timer (Contact)	SS00000 - SS23087			
Retentive Timer (Coil)	SC00000 - SC23087			

Device	Bit Address	Word Address	32 bits	Notes
Counter (Contact)	CS00000 - CS23087			
Counter (Coil)	CC00000 - CC23087			
Timer (Current Value)		TN00000 - TN23087		
Retentive Timer (Current Value)		SN00000 - SN23087		
Counter (Current Value)		CN00000 - CN23087		
Data Register		D00000 - D25983		*1 BitF)
Special Register		SD0000 - SD2047		Bit F)
Link Register		W0000 - W657F		Bit F)
Special Link Register		SW000 - SW7FF		Bit F)
File Register (Normal)		R00000 - R32767	[L/H]	Bit F)
File Register (Block switching is not necessary)		ZR0000000 - ZR1042431		<u>B i t</u> F
		0R00000 - 0R32767		Bit F)
		1R00000 - 1R32767		Bit F)
		2R00000 - 2R32767		Bit F)
File Register (0R-31R)*2	:	:		:
,		30R00000 - 30R32767		Bit F
		31R00000 - 31R26623		Bit F

^{*1} The setting of the Multi CPU System is possible also in the system data area.

^{*2} Set the block No. on the head of device name. This is the device name for conversion with GP-Pro/PB III for Windows. When you newly specify the device, we recommend that you should use the file register (Block switching is not necessary).

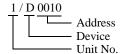
NOTE

• The notation of addresses differs depending on a selected Unit No.

<Ex.>When 0 is selected for Unit No.,



<Ex.>When 1 is selected for Unit No.,



- Please refer to the GP-Pro EX Reference Manual for system data area.
 - Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- Please refer to the precautions on manual notation for icons in the table.
 - "Manual Symbols and Terminology"

6.2 Q02UCPU/Q03UDCPU/Q04UDHCPU/Q06UDHCPU/Q13UDHCPU/Q26UDHCPU

This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Notes
Input Relay	X0000-X1FFF	X0000-X1FF0		*** 0]
Output Relay	Y0000-Y1FFF	Y0000-Y1FF0		<u>***</u> 0]
Internal Relay	M00000-M32767	M00000-M32752		÷16]
Special Relay	SM0000-SM2047	SM0000-SM2032		÷16)
Latch Relay	L00000-L32767	L00000-L32752		÷16)
Annunciator	F00000-F32767	F00000-F32752		÷16)
Edge Relay	V00000-V32767	V00000-V32752		÷16
Step Relay	S0000-S8191	S0000-S8176		÷16)
Link Relay	B0000-B7FFF	B0000-B7FF0		*** 0
Special Link Relay	SB0000-SB7FFF	SB0000-SB7FF0		<u>***</u> 0
Timer (Contact)	TS00000-TS25023			
Timer (Coil)	TC00000-TC25023			
Retentive Timer (Contact)	SS00000-SS25023			
Retentive Timer (Coil)	SC00000-SC25023		[L/H]	
Counter (Contact)	CS00000-CS25023			
Counter (Coil)	CC00000-CC25023			
Timer (Current Value)		TN00000-TN25023		
Retentive Timer (Current Value)		SN00000-SN25023		
Counter (Current Value)		CN00000-CN25023		
Data Register		D00000-D28159		*1 B i t F)
Special Register		SD0000-SD2047]	Bit F)
Link Register		W0000-W6DFF		Bit F
Special Link Register		SW0000-SW6DFF	1	Bit F)
File Register (Normal)		R00000-R32767	1	Bit F)
File Register (Block switching is not necessary)		ZR0000000- ZR4184063		Bit F)

Device	Bit Address	Word Address	32 bits	Notes
		0R00000-0R32767		Bit F
File Register (0R-31R)*2				Bit F
		2R00000-2R32767		Bit F)
	:	:	[L/H]	:
		30R00000-30R32767		B i + F)
		31R00000-31R32767		<u>B i t </u> F)

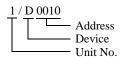
^{*1} The setting of the Multi CPU System is possible also in the system data area.

NOTE

• The notation of addresses differs depending on a selected Unit No. <Ex.>When 0 is selected for Unit No.,



<Ex.>When 1 is selected for Unit No.,



- Please refer to the GP-Pro EX Reference Manual for system data area.
 - Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- Please refer to the precautions on manual notation for icons in the table.
 - "Manual Symbols and Terminology"

^{*2} Set the block No. on the head of device name. This is the device name for conversion with GP-Pro/PB III for Windows. When you newly specify the device, we recommend that you should use the file register (Block switching is not necessary).

6.3 Q172HCPU

This address can be specified as system data area.

Device	Bit Address	Bit Address Word Address		Notes
Input Relay	X0000-X1FFF	X0000-X1FF0		*** 0
Output Relay	Y0000-Y1FFF	Y0000-Y1FF0		*** 0
Internal Relay	M00000-M08191	M00000-M08176		÷16
Special Relay	SM0000-SM0255	SM0000-SM0240		÷16ì
Latch Relay	L00000-L08191	L00000-L08176		÷16
Annunciator	F00000-F02047	F00000-F02032	_1 211	÷16
Link Relay	B0000-B1FFF	B0000-B1FF0	[L/H]	*** 0
Data Register		D00000-D08191		B i t F
Special Register		SD0000-SD0255		B i t F
Link Register		W0000-W1FFF		Bit F
Motion Register (#)*1		%MR0000- %MR8191*2		(B i t F)

^{*1} No. 2 to No. 4 can be allocated to the motion CPU.

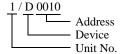
NOTE

• The notation of addresses differs depending on a selected Unit No.

<Ex.>When 0 is selected for Unit No.,



<Ex.>When 1 is selected for Unit No.,



- Please refer to the GP-Pro EX Reference Manual for system data area.
 - Cf. GP-Pro EX Reference Manual "Appendix 1.4 LS Area (Direct Access Method)"
- Please refer to the precautions on manual notation for icons in the table.
 - "Manual Symbols and Terminology"

^{*2} Device name with motion CPU is #.

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
	X	0080	
	1/X	0180	
Input Relay	2/X	0280	Value of word address divided by 0x10
	3/X	0380	
	4/X	0480	
	Y	0081	
	1/Y	0181	
Output Relay	2/Y	0281	Value of word address divided by 0x10
	3/Y	0381	
	4/Y	0481	
	M	0082	
	1/M	0182	
Internal Relay	2/M	0282	Value of word address divided by 16
	3/M	0382	
	4/M	0482	
	SM	0083	
	1/SM	0183	
Special Relay	2/SM	0283	Value of word address divided by 16
	3/SM	0383	
	4/SM	0483	
	L	0084	
	1/L	0184	
Latch Relay	2/L	0284	Value of word address divided by 16
	3/L	0384	-
	4/L	0484	

Device	Device Name	Device Code (HEX)	Address Code
Annunciator	F	0085	
	1/F	0185	
	2/F	0285	Value of word address divided by 16
	3/F	0385	
	4/F	0485	
	V	0086	
	1/V	0186	
Edge Relay	2/V	0286	Value of word address divided by 16
	3/V	0386	
	4/V	0486	
	S	0087	
	1/S	0187	
Step Relay	2/S	0287	Value of word address divided by 16
	3/S	0387	, , , ,
	4/S	0487	
	В	0088	
	1/B	0188	
Link Relay	2/B	0288	Value of word address divided by 0x10
	3/B	0388	
	4/B	0488	
	SB	0089	
	1/SB	0189	
Special Link Relay	2/SB	0289	Value of word address divided by 0x10
	3/SB	0389	, ,, ,,,,,,
	4/SB	0489	
	TN	0060	
	1/TN	0160	
Timer (Current Value)	2/TN	0260	Word Address
	3/TN	0360	
	4/TN	0460	

Device	Device Name	Device Code (HEX)	Address Code
Retentive Timer (Current Value)	SN	0062	
	1/SN	0162	
	2/SN	0262	Word Address
	3/SN	0362	
	4/SN	0462	
	CN	0061	
	1/CN	0161	
Counter (Current Value)	2/CN	0261	Word Address
	3/CN	0361	
	4/CN	0461	
	D	0000	
	1/D	0100	
Data Register	2/D	0200	Word Address
	3/D	0300	
	4/D	0400	
	SD	0001	
	1/SD	0101]
Special Register	2/SD	0201	Word Address
	3/SD	0301	
	4/SD	0401	
	W	0002	
	1/W	0102]
Link Register	2/W	0202	Word Address
	3/W	0302	
	4/W	0402	1
	SW	0003	
	1/SW	0103	
Special Link Register	2/SW	0203	Word Address
	3/SW	0303	1
	4/SW	0403	1

Device	Device Name	Device Code (HEX)	Address Code
	R	000F	
	1/R	010F	
File Register (Normal)	2/R	020F	Word Address
	3/R	030F	
	4/R	040F	
	ZR	000E	
File Register (Block	1/ZR	010E	
switching is not necessary)	2/ZR	020E	Word Address
	3/ZR	030E	
	4/ZR	040E	

Device	Device Name	Device Code (HEX)	Address Code
	0R	0010	
	1/0R	0110	
	2/0R	0210	Word Address
	3/0R	0310	
	4/0R	0410	
	1R	0011	
	1/1R	0111	
	2/1R	0211	Word Address
	3/1R	0311	
	4/1R	0411	
	2R	0012	
	1/2R	0112	
File Register	2/2R	0212	Word Address
(0R-31R)	3/2R	0312	
	4/2R	0412	
	:	:	:
	30R	002E	
	1/30R	012E	
	2/30R	022E	Word Address
	3/30R	032E	
	4/30R	042E	
	31R	002F	
	1/31R	012F	
	2/31R	022F	Word Address
	3/31R	032F	
	4/31R	042F	
	2/% MR	0234	
Motion Register (#)	3/%MR	0334	Word Address
	4/%MR	0434	

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.
	Displays IP address or device address of External Device where error occurs, or error codes received from External Device.
Error Occurrence Area	 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])"



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