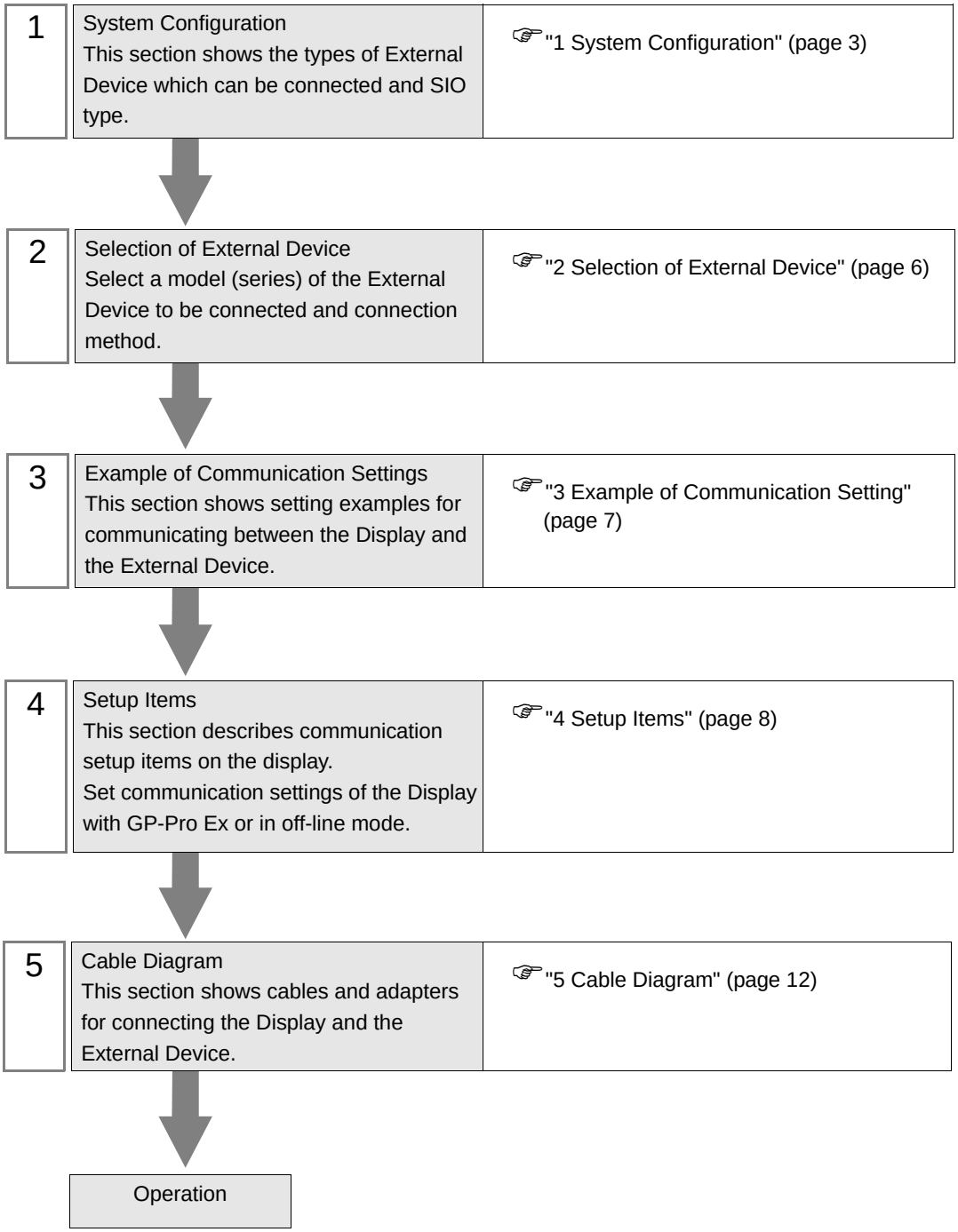
Mitsubishi Electric Corporation

Q Series CPU Direct 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

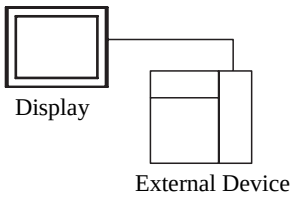
The system configuration in the case when the External Device of Mitsubishi Electric Corp. and the Display are connected is shown.

Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
MELSEC Q Series	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	CPU Direct	RS232C	Setting Example 1 (page 7)	Cable Diagram 1 (page 12)
	Q172HCPU	RS232C port on High Performance Model Q CPU*1			

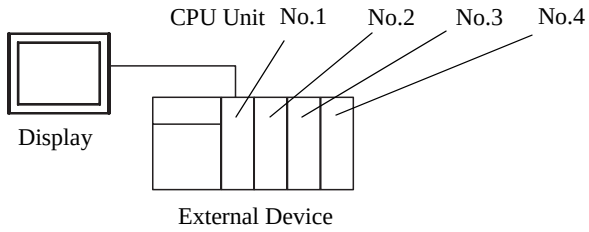
*1 Since the motion CPU (Q172HCPU) cannot be directly connected to the Display, use it with a Multi CPU System.

■ 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.
- Use the motion CPU within the No. 2 to No. 4 range. The motion CPU cannot be used as No. 1.

■ COM Port of IPC

When connecting IPC with External Device, the COM port which can be used changes with series and SIO type. Please refer to the manual of IPC 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	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	COM1[*1*2], COM2[*1], COM3, COM4	COM1[*1*2]	COM1[*1*2]

*1 The RI/5V can be switched. Please switch with the change switch of IPC.

*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-232C

Dip switch	Setting	Description
1	OFF[*1]	Reserve (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): Does not Exist
8	OFF	Short-circuit of SDB (TXB) and RDB (RXB): Does not Exist
9	OFF	RS (RTS) Auto control mode: Disable
10	OFF	

*1 It is necessary to turn ON the set value, only when using PS-3450A and PS-3451A.

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

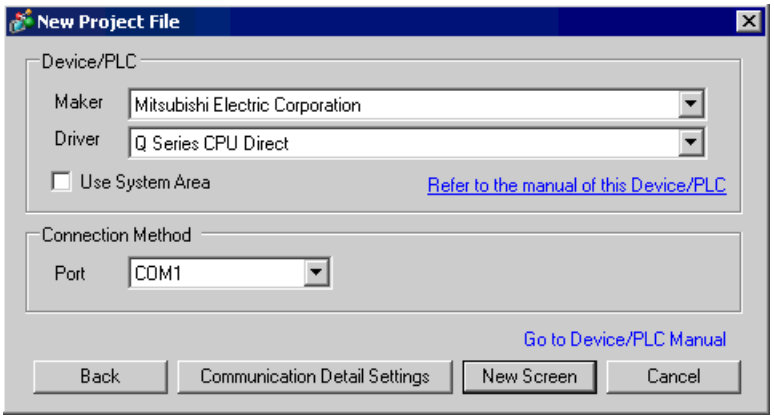
Dip switch	Setting	Description
1	OFF	Reserve (always OFF)
2	ON	SIO type: RS-422/485
3	ON	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA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

Dip switch setting: RS-422/485 (2 wire)

Dip switch	Setting	Description
1	OFF	Reserve (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): Exist
8	ON	Short-circuit of SDB (TXB) and RDB (RXB): Exist
9	ON	RS (RTS) Auto control mode: Enable
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. ☞"1 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 (only for 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 " 5.14.6 Setting Guide of [System Setting Window]■[Main Unit Settings] Settings Guide◆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

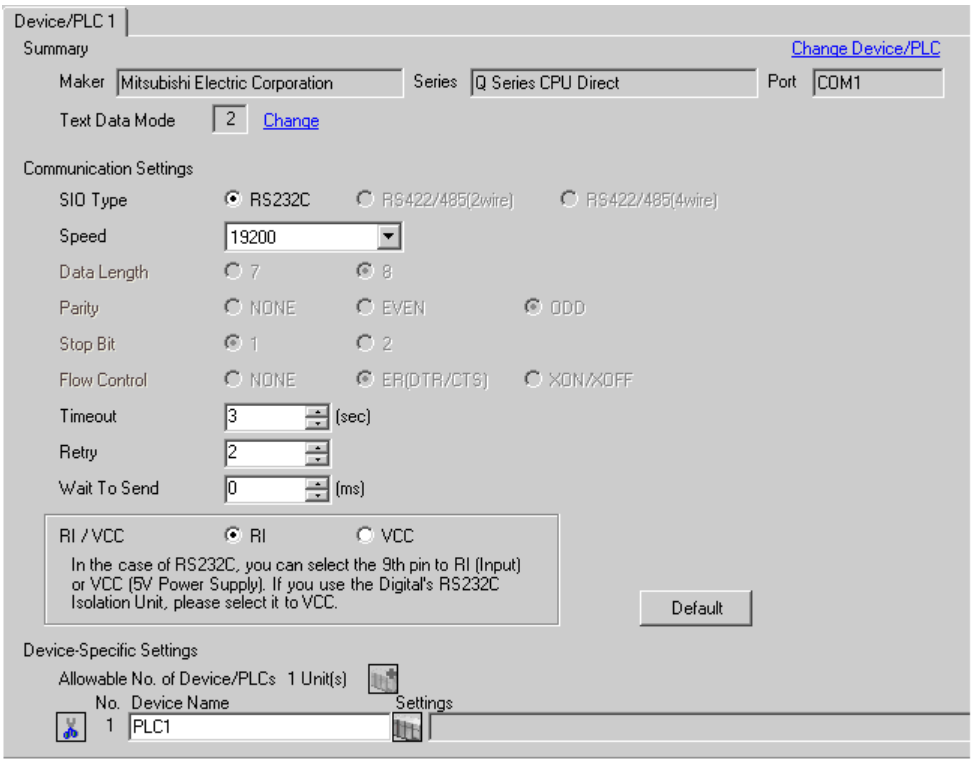
Examples of communication settings of the Display and the External Device, recommended by Pro-face, are shown.

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.

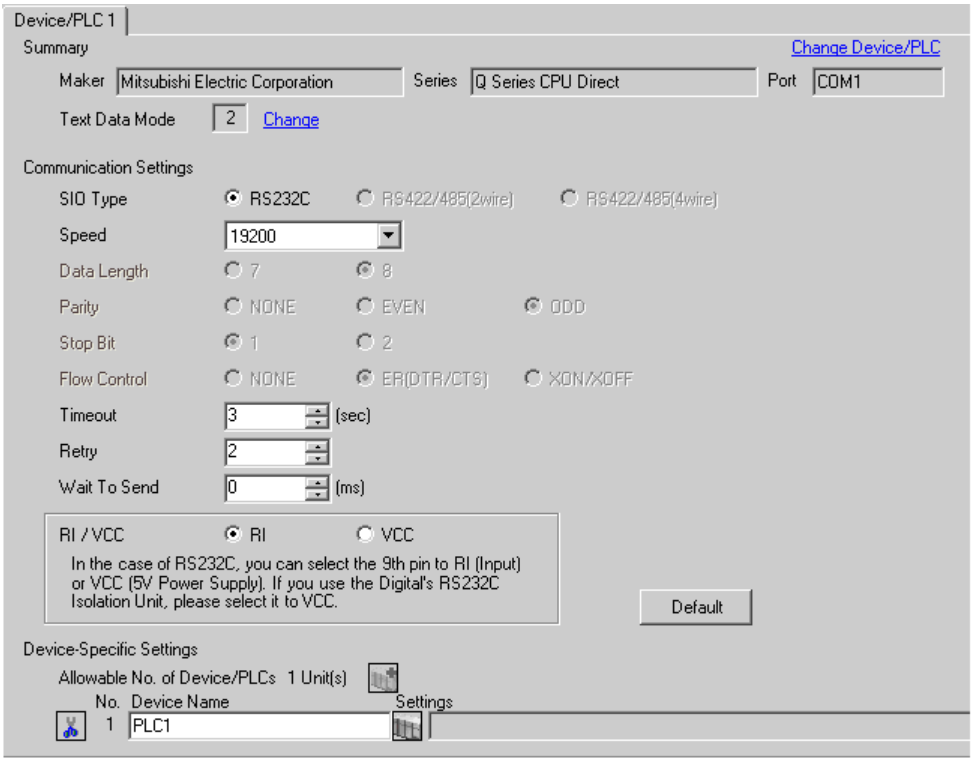
The setting of each parameter must be identical to that of External Device.

☞"3 Example of Communication Setting" (page 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	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.

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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.
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.

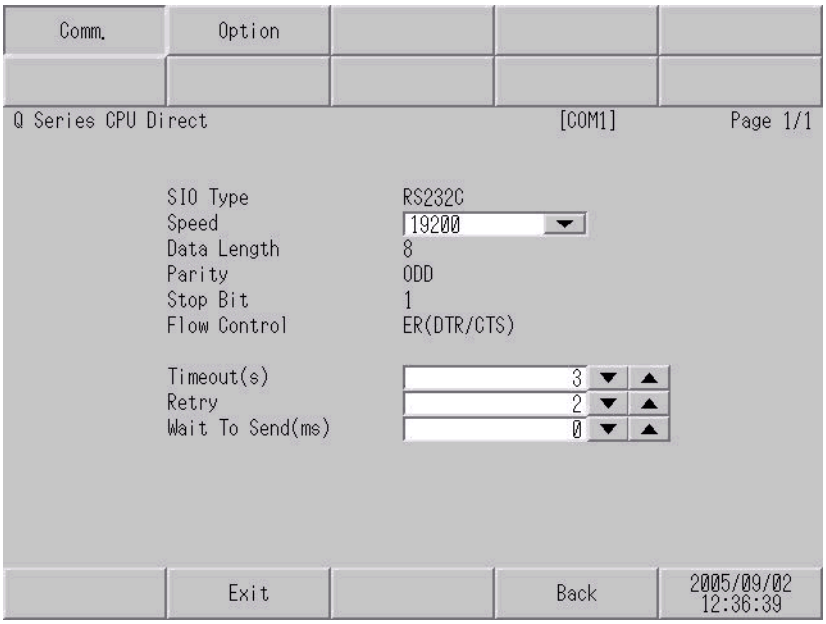
4.2 Setup Items in Off-Line Mode

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



Setup Items	Setup Description
SIO Type	SIO type to communicate with the External Device is displayed. **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	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.

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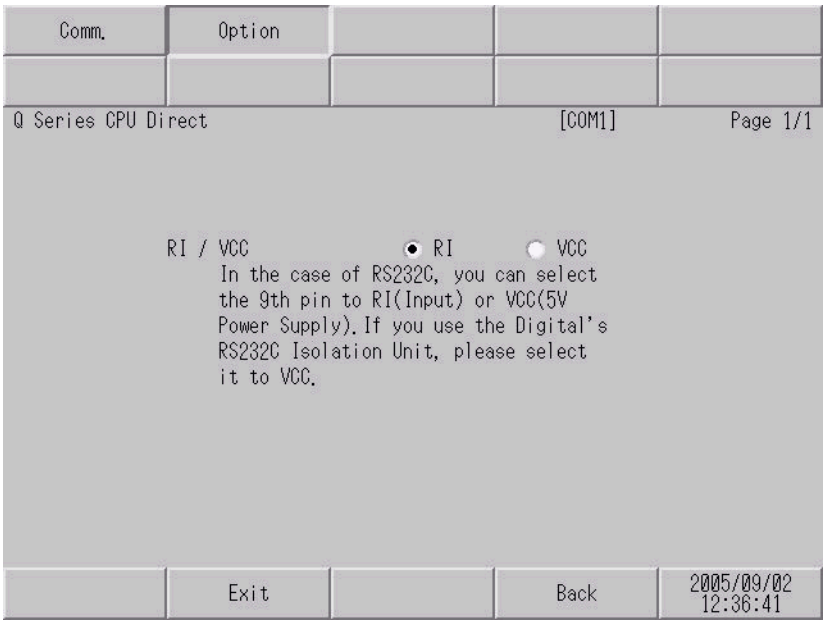
Setup Items	Setup Description
Retry	In case of no response from the External Device, use an integer from 0 to 255 to enter how many times the Display retransmits the command.
Wait To Send	Use an integer from 0 to 255 to enter standby time (ms) for the Display from receiving packets to transmitting next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

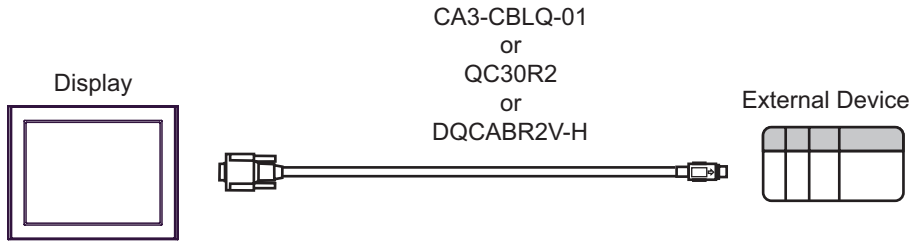
- The FG pin of the main body of the External Device must be D-class grounded. Please refer to the manual of the External Device for more details.
- SG and FG are connected inside the Display. When connecting SG to the External Device, design the system not to form short-circuit loop.
- Connect the isolation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

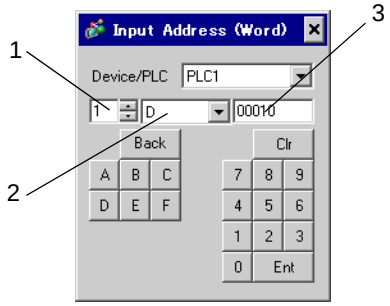
☞ ■ COM Port of IPC (page 4)



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.
2. Device	Specify a device.
3. Address	Specify an address.

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		÷16
Special Relay	SM0000 - SM2047	SM0000 - SM2032		÷16
Latch Relay	L00000 - L32767	L000000 - 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	L/H	***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	------		
Counter (Contact)	CS00000 - CS23087	------		
Counter (Coil)	CC00000 - CC23087	------		

Device	Bit Address	Word Address	32 bits	Notes
Timer (Current Value)	------	TN00000 - TN23087		
Retentive Timer (Current Value)	------	SN00000 - SN23087		
Counter (Current Value)	------	CN00000 - CN23087		
Data Register	------	D00000 - D25983		*1 Bit F
Special Register	------	SD0000 - SD2047		Bit F
Link Register	------	W0000 - W657F		Bit F
Special Link Register	------	SW000 - SW7FF		Bit F
File Register (Normal)	------	R00000 - R32767		Bit F
File Register (Block switching is not necessary)	------	ZR00000000 - ZR1042431	L / H	Bit F
File Register (0R-31R)*2	------	0R0000 - 0R32767		Bit F
	------	1R0000 - 1R32767		Bit F
	------	2R0000 - 2R32767		Bit F
	:	:		:
	------	30R0000 - 30R32767		Bit F
	------	31R0000 - 31R26623		Bit F
Motion Register (#)*3	------	%MR0000 - %MR8191*4		Bit F

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

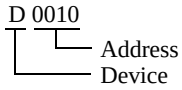
*2 Set the block No. on the head of device name. This is the device name for conversion with GP-Pro/PB III for Windows. When you newly specify the device, we recommend that you should use the file register (Block switching is not necessary).

*3 Usable only when accessing the motion CPUs. No. 2 to No. 4 can be allocated to the motion CPU.

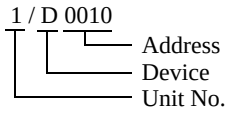
*4 Device name with motion CPU is #.

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 (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.

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

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

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

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

continued to next page

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

- Please refer to the manual of External Device for more detail of received error codes.
- Please refer to "When an error message is displayed (Error code list)" of "Maintenance/ Troubleshooting" for a common error message to the driver.