



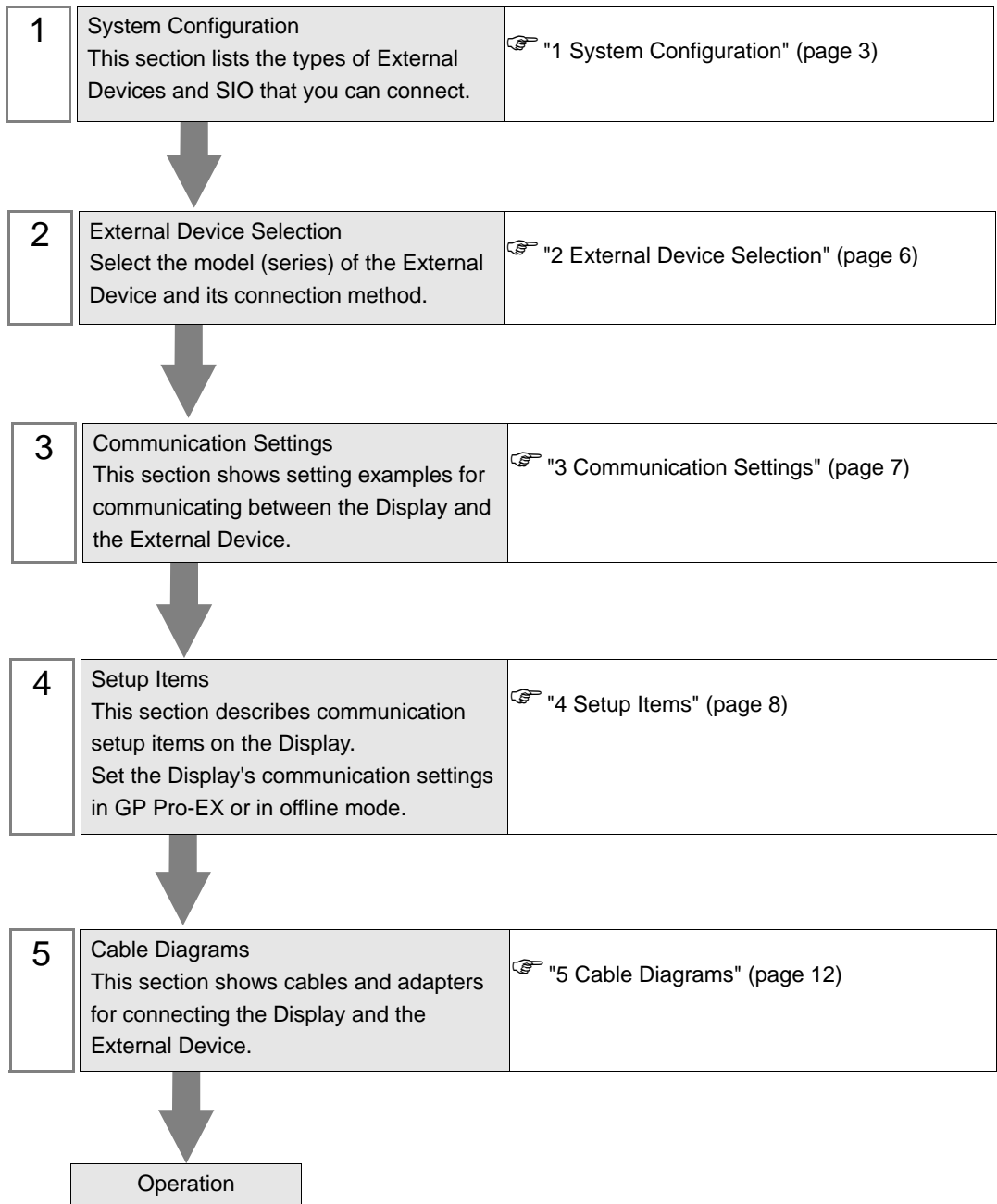
KV-10_80RW/TW CPU Direct Driver

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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 is described in the sections identified below:



1 System Configuration

The following table lists system configurations for connecting KEYENCE Corporation External Devices and the Display.

Series	CPU*1	Link I/F	SIO Type	Setting Example	Cable Diagram
KV Series	KV-10□ KV-16□ KV-24□ KV-40□ KV-80□	Port on the CPU unit	RS-232C	Setting Example 1 (page 7)	Cable Diagram 1 (page 12)

*1 □ varies depending on the External Device.

■ 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}

*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.

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

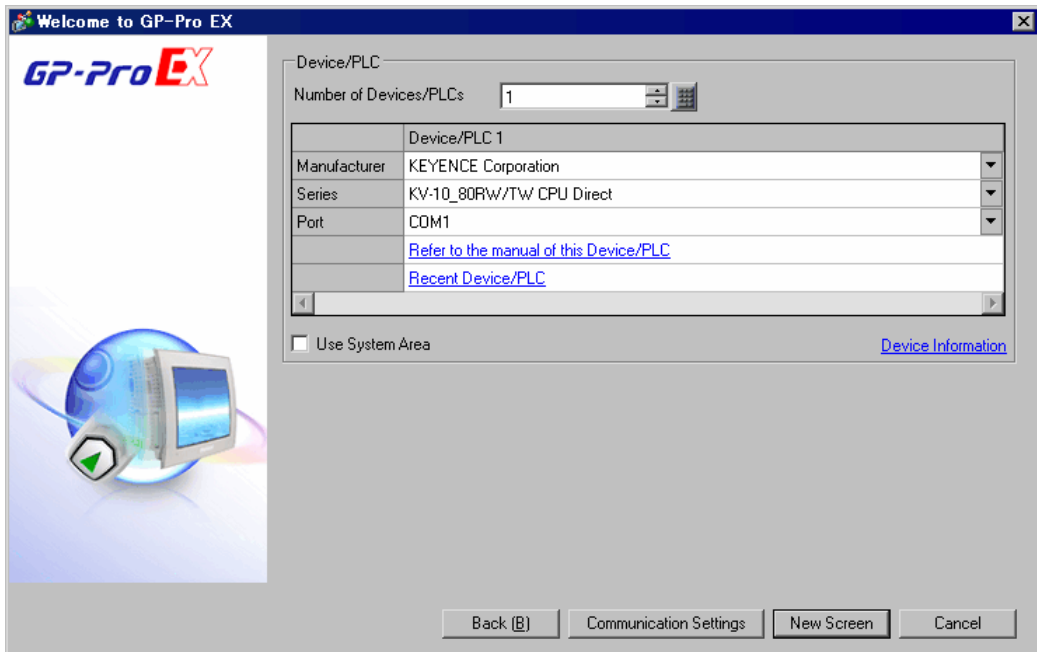
DIP Switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO type: RS-422/485
3	ON	
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA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

2 External Device Selection

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Number of Devices/PLCs	Enter an integer from 1 to 4 to define the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to connect. Select "KEYENCE Corporation".
Series	Select the External Device model (series) and the connection method. Select "KV-10_80RW/TW CPU Direct". In System configuration, make sure the External Device you are connecting is supported by "KV-10_80RW/TW CPU Direct". ☞ "1 System Configuration" (page 3)
Port	Select the Display port to be connected to the External Device.
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. Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This feature can also be set in GP-Pro EX or in the Display's offline mode. Cf. GP-Pro EX Reference Manual "System Settings [Display Unit] - [System Area] Settings Guide" Cf. Maintenance/Troubleshooting Guide "Main Unit - System Area Settings"

3 Communication Settings

This section provides examples of communication settings recommended by Pro-face for the Display and the External Device.

3.1 Setting Example 1

■ GP-Pro EX Settings

◆ Communication Settings

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

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer: KEYENCE Corporation Series: KV-10_80RW/TW CPU Direct Port: COM1

Text Data Mode: 2 [Change](#)

Communication Settings

SIQ Type: RS232C RS422/485(2wire) RS422/485(4wire)

Speed: 19200

Data Length: 7 8

Parity: NONE EVEN ODD

Stop Bit: 1 2

Flow Control: NONE ER(DTR/CTS) XON/XOFF

Timeout: 3 (sec)

Retry: 2

Wait To Send: 0 (ms)

RI / VCC: RI VCC

In the case of RS232C, you can select the 9th pin to RI (Input) or VCC (5V Power Supply). If you use the Digital's RS232C Isolation Unit, please select it to VCC.

Default

Device-Specific Settings

Allowable Number of Devices/PLCs: 1 [Add Device](#)

No.	Device Name	Settings
1	PLC1	There is no setting item.

[Add Indirect Device](#)

■ External Device Settings

The External Device does not require communication settings.

The communication speed changes between 9600 and 38400 according to the Display setting.

4 Setup Items

Set up the Display's communication settings in GP Pro-EX or in the Display's offline mode.

The setting of each parameter must match that of the External Device.

☞ "3 Communication Settings" (page 7)

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].

Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer: KEYENCE Corporation Series: KV-10_80RW/TW CPU Direct Port: COM1

Text Data Mode: 2 [Change](#)

Communication Settings

SIO Type: RS232C RS422/485(2wire) RS422/485(4wire)

Speed: 19200

Data Length: 7 8

Parity: NONE EVEN ODD

Stop Bit: 1 2

Flow Control: NONE ER(DTR/CTS) XON/XOFF

Timeout: 3 (sec)

Retry: 2

Wait To Send: 0 (ms)

RI / VCC: RI VCC

In the case of RS232C, you can select the 9th pin to RI (Input) or VCC (5V Power Supply). If you use the Digital's RS232C Isolation Unit, please select it to VCC.

Default

Device-Specific Settings

Allowable Number of Devices/PLCs: 1 [Add Device](#)

No. Device Name Settings

1 PLC1 [Add Indirect Device](#)

There is no setting item.

Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device. IMPORTANT <ul style="list-style-type: none"> In the communication settings, set [SIO Type] correctly according to the serial interface specifications of the Display. If you select an SIO type that the serial interface does not support, proper operation cannot be guaranteed. Refer to your Display manual for details on the serial interface specifications.
Speed	Select the communication speed between the External Device and the Display.
Data Length	Displays the data length.
Parity	Displays how to check parity.
Stop Bit	Displays the stop bit length.

Continues to the next page.

Setup Items	Setup Description
Flow Control	Displays the communication control method to prevent transmission and reception data overflow.
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 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)"

4.2 Setup Items 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 offline mode.

Touch the External Device you want to set from the displayed list.

Comm.	Option			
KV-10_80RW/TW CPU Direct		[COM1]	Page 1/1	
SIO Type	RS232C			
Speed	19200			
Data Length	8			
Parity	EVEN			
Stop Bit	1			
Flow Control	NONE			
Timeout(s)	3			
Retry	2			
Wait to Send(ms)	0			
Exit		Back		2008/08/01 16:15:31

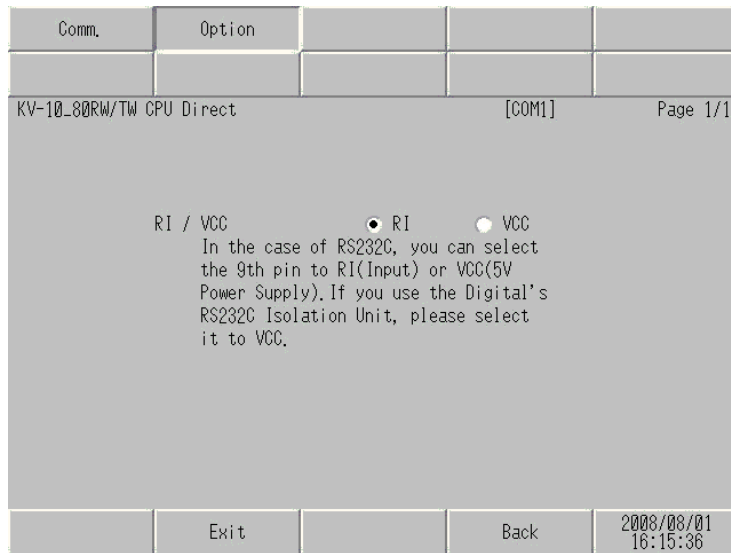
Setup Items	Setup Description
SIO Type	Select the SIO type to communicate with the External Device. IMPORTANT <ul style="list-style-type: none"> In the communication settings, set [SIO Type] correctly according to the serial interface specifications of the Display. If you select an SIO type that the serial interface does not support, proper operation cannot be guaranteed. Refer to your Display manual for details on the serial interface specifications.
Speed	Select the communication speed between the External Device and the Display.
Data Length	Displays the data length.
Parity	Displays how to check parity.
Stop Bit	Displays the stop bit length.
Flow Control	Displays the communication control method to prevent transmission and reception data overflow.
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.

Continues to the next page.

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 Settings

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 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

- GP-4100 series and GP-4*0ITM do not have the [Option] setting in the offline mode.

5 Cable Diagrams

The following cable diagrams may be different from those recommended by KEYENCE Corporation. Please be assured, however, there is no operational problem in applying the cable diagrams shown in this manual.

- The FG pin of the External Device body must be D-class grounded. Refer to your External Device manual for details.
- The SG and FG are connected inside the Display. When connecting the External Device to the SG, design your system to avoid short-circuit loops.
- Connect an isolation unit if the communication is not stable due to noise or other factors.

Cable Diagram 1

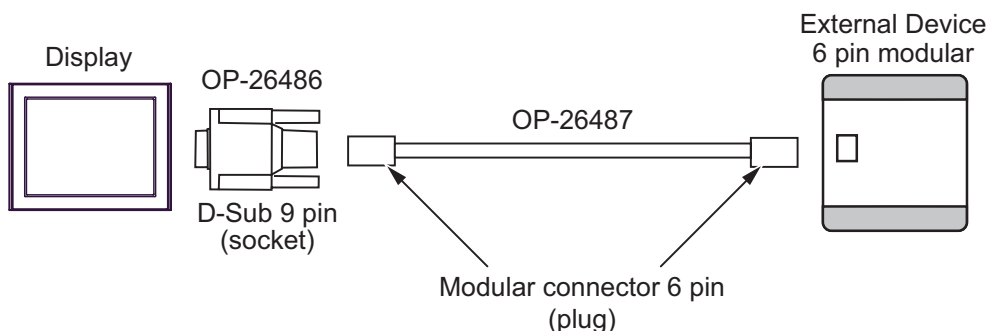
Display (Connection Port)	Cable		Remarks
GP3000 (COM1) GP4000* ¹ (COM1) ST (COM1) LT3000 (COM1) IPC* ² PC/AT	1A	D-Sub 9-pin connector by KEYENCE Corporation OP-26486 + Connection cable by KEYENCE Corporation OP-26487	-
GP-4105 (COM1)	1B	User-created cable + D-Sub 9-pin connector by KEYENCE Corporation OP-26486 + Connection cable by KEYENCE Corporation OP-26487	

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

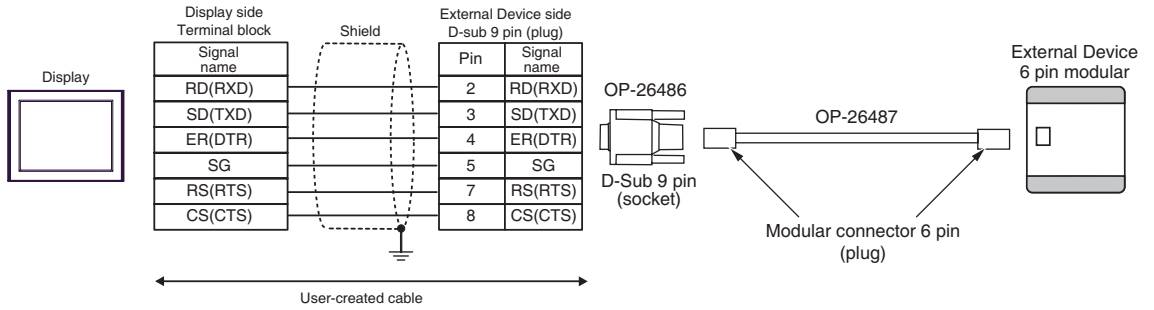
*2 Only the COM port which can communicate by RS-232C can be used.

 ■ IPC COM Port (page 4)

1A)



1B)



6 Supported Devices

The following table shows the range of supported device addresses. 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.

■ KV-10 Series

 : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Input/Output Relay	0000 - 0005 0100 - 0415 0500 - 0503 0600 - 0915	----	L/H	*1
Internal Auxiliary Relay	1000 - 1915	----		
Special Auxiliary Relay	2000 - 2915	----		*1
Timer (Contact)	T000 - T063	----		
Counter (Contact)	C000 - C063	----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	----		*2
Timer (Setting Value)	----	TS000 - TS063		
Counter (Setting Value)	----	CS000 - CS063		
Timer (Current Value)	----	TC000 - TC063		
Counter (Current Value)	----	CC000 - CC063		
Data memory	----	DM0000 - DM0999		Bit 15
Temporary Data Memory	----	TM00 - TM31		Bit 15 *1
Analog Timer	----	AT0		*2
High-speed Counter (Current Value)	----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	----	CTC0 - CTC3		

*1 Some device addresses are disabled to write.

*2 Write disabled.

NOTE

- For system data area, refer to the GP-Pro EX Reference Manual.

Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

- Refer to the precautions on manual notation for icons in the table.

 "Manual Symbols and Terminology"

■ KV-16 Series

 : This address can be specified as system data area.

Device	Bit Address	Word address	32 bits	Remarks
Input/Output Relay	0000 - 0009 0100 - 0415 0500 - 0505 0600 - 0915	----	L/H	*1
Internal Auxiliary Relay	1000 - 1915	----		
Special Auxiliary Relay	2000 - 2915	----		*1
Timer (Contact)	T000 - T063	----		
Counter (Contact)	C000 - C063	----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	----		*2
Timer (Setting Value)	----	TS000 - TS063		
Counter (Setting Value)	----	CS000 - CS063		
Timer (Current Value)	----	TC000 - TC063		
Counter (Current Value)	----	CC000 - CC063		
Data memory	----	DM0000 - DM0999		Bit 15
Temporary Data Memory	----	TM00 - TM31		Bit 15 *1
Analog Timer	----	AT0		*2
High-speed Counter (Current Value)	----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	----	CTC0 - CTC3		

*1 Some device addresses are disabled to write.

*2 Write disabled.

NOTE

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

■ KV-24 Series

 : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Input/Output Relay	0000 - 0415 0500 - 0507 0600 - 0915	----	L/H	*1
Internal Auxiliary Relay	1000 - 1915 3000 - 6915	----		
Special Auxiliary Relay	2000 - 2915	----		*1
Timer (Contact)	T000 - T119	----		
Counter (Contact)	C000 - C119	----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	----		*2
Timer (Setting Value)	----	TS000 - TS119		
Counter (Setting Value)	----	CS000 - CS119		
Timer (Current Value)	----	TC000 - TC119		
Counter (Current Value)	----	CC000 - CC119		
Data memory	----	DM0000 - DM1999		Bit 15
Temporary Data Memory	----	TM00 - TM31		Bit 15 *1
Analog Timer	----	AT0 - AT1		*2
High-speed Counter (Current Value)	----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	----	CTC0 - CTC3		

*1 Some device addresses are disabled to write.

*2 Write disabled.

NOTE

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

■ KV-40 Series

L/H : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Input/Output Relay	0000 - 0107 0200 - 0415 0500 - 0507 0600 - 0607 0700 - 0915	----	L/H	*1
Internal Auxiliary Relay	1000 - 1915 3000 - 6915	----		
Special Auxiliary Relay	2000 - 2915	----		*1
Timer (Contact)	T000 - T119	----		
Counter (Contact)	C000 - C119	----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	----		*2
Timer (Setting Value)	----	TS000 - TS119		
Counter (Setting Value)	----	CS000 - CS119		
Timer (Current Value)	----	TC000 - TC119		
Counter (Current Value)	----	CC000 - CC119		
Data memory	----	DM0000 - DM1999		Bit 15
Temporary Data Memory	----	TM00 - TM31		Bit 15 *1
Analog Timer	----	AT0 - AT1		*2
High-speed Counter (Current Value)	----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	----	CTC0 - CTC3		

*1 Some device addresses are disabled to write.

*2 Write disabled.

NOTE

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

■ KV-80 Series

 : This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Remarks
Input/Output Relay	0000 - 0415 0500 - 0915	----	L / H	*1
Internal Auxiliary Relay	1000 - 1915 3000 - 6915	----		
Special Auxiliary Relay	2000 - 2915	----		*1
Timer (Contact)	T000 - T119	----		
Counter (Contact)	C000 - C119	----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	----		*2
Timer (Setting Value)	----	TS000 - TS119		
Counter (Setting Value)	----	CS000 - CS119		
Timer (Current Value)	----	TC000 - TC119		
Counter (Current Value)	----	CC000 - CC119		
Data memory	----	DM0000 - DM1999		Bit 15
Temporary Data Memory	----	TM00 - TM31		Bit 15 *1
Analog Timer	----	AT0 - AT1		*2
High-speed Counter (Current Value)	----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	----	CTC0 - CTC3		

*1 Some device addresses are disabled to write.

*2 Write disabled.

NOTE

- For system data area, refer to the GP-Pro EX Reference Manual.
Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"
- 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 set "Device Type & Address" for the address type of the data display or other devices.

Device	Device Name	Device Code (HEX)	Address Code
Timer (Setting Value)	TS	0062	Word address
Counter (Setting Value)	CS	0063	Word address
Timer (Current Value)	TC	0060	Word address
Counter (Current Value)	CC	0061	Word address
Data memory	DM	0000	Word address
Temporary Data Memory	TM	0001	Word address
Analog Timer	AT	0067	Word address
High-speed Counter (Current Value)	CTH	0065	Word address
High-speed Counter Comparator (Setting Value)	CTC	0066	Word address

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 number
Device Name	Name of the External Device where an error has occurred. Device/PLC name is the title of the External Device set with GP Pro-EX.(Initial value [PLC1])
Error Messages	Displays messages related to an error that has occurred.
Error Occurrence Area	<p>Displays the IP address or device address of the External Device where an error has occurred, or error codes received from the External Device.</p> <p>NOTE</p> <ul style="list-style-type: none"> • IP addresses are displayed as "IP address (Decimal): MAC address (Hex)". • Device addresses are displayed as "Address: Device address". • Received error codes are displayed as "Decimal [Hex]".

Examples of Error Messages

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

NOTE

- 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 Code	Description
0x02	No ladder program is registered in the External Device.
0x04	Accessed the device not defined as device in the External Device.* ¹
0x13	Tried to change the setting values of Counter, Timer, and/or High-speed Counter Comparator in the write protected program.

*1 When you write to Timer (Contact/Current Value/Setting Value), Counter (Contact/Current Value/Setting Value), High-speed Counter and High-speed Counter Comparator (Setting Value), you must adjust the corresponding settings in the ladder program in advance.

