KEYENCE Corporation

Visual KV 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 sections below:

| 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 the model (series) of the External Device to be connected and its connection method. | ☞ "2 Selection of External Device" (page 4) |

| 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 5) |

| 4 | Setup Items
This section describes communication setup items on the Display.
Set the communication settings of the Display with GP-Pro EX or in off-line mode. | ☞ "4 Setup Items" (page 6) |

| 5 | Cable Diagram
This section shows cables and adapters for connecting the Display and the External Device. | ☞ "5 Cable Diagram" (page 10) |

Operation

1 System Configuration

The following shows the system configuration where the External Device of KEYENCE Corporation and the Display are connected.
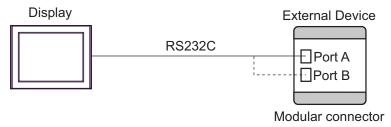
Series	CPU	Link I/F	SIO Type	Setting Example	Cable Diagram
Visual KV Series	KV-10 KV-16 KV-24 KV-40	-	RS232C	Setting Example 1 (page 5)	Cable Diagram 1 (page 10)

NOTE • Set the execution time of the logic functions in the Display to "100 ms" or less. If the longer time is set, an error may occur in the communication with the external device.
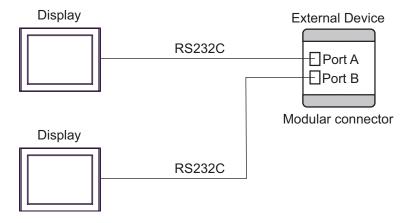
■ Connection Configuration

• 1:1 Connection

NOTE • For 1:1 connection, connect to either port A or port B.
• KV-10 has only one communication port.
• This driver cannot use IPC and PC/AT for Display.

• Simultaneous Port Connection

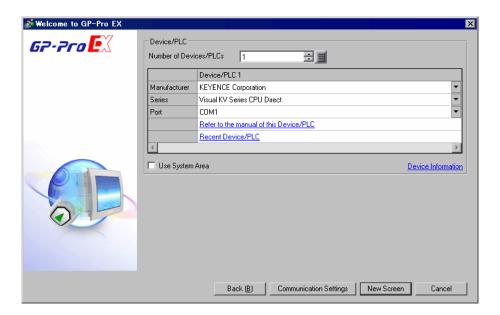

NOTE • Simultaneous port connection is not available to KV-10 with only one communication port.
• This driver cannot use IPC and PC/AT for Display.

2 Selection of External Device

Select the External Device to be connected to the Display.

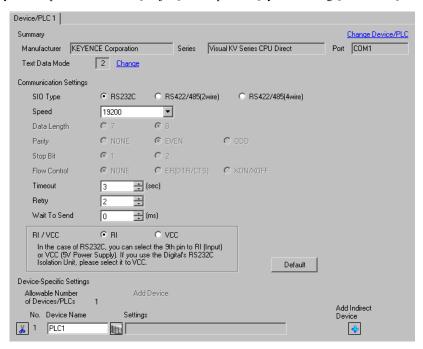| Setup Items	Setup Description
Number of Devices/ PLC	Enter an integer from 1 to 4 to define the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to connect. Select "KEYENCE Corporation".
Series	Select the External Device model (series) and the connection method. Select "Visual KV Series CPU Direct". In System configuration, make sure the External Device you are connecting is supported by "Visual KV Series CPU Direct". ☞ "1 System Configuration" (page 3)
Port	Select the port of the Display 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 Example of Communication Setting

The following shows examples of communication settings of the Display and the External Device, which are 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/PLC 1

Summary   Change Device/PLC

Manufacturer KEYENCE Corporation   Series Visual KV Series 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   Add Device
of Devices/PLCs   1
                                                                         Add Indirect
No. Device Name   Settings   Device

1 PLC1

■ Setting of External Device

The External Device does not require communication settings.

Baud rate transmission speed is automatically changed within the range of "9600 to 57600" according to the setting on the Display.

4 Setup Items

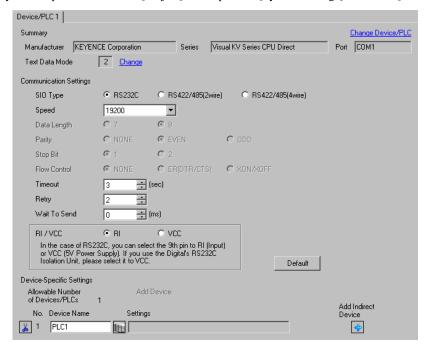Set the communication settings of the Display with GP-Pro Ex or in off-line mode of the Display.

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

☞ "3 Example of Communication Setting" (page 5)

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 for communicating with the External Device. IMPORTANT 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 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.

Continues to the next page.

Setup Items	Setup Description
Timeout	Enter the time (s) for which the Display waits for the response from the External Device, from "1 to 127".
Retry	In case of no response from the External Device, enter how many times the Display retransmits the command, from "0 to 255".
Wait To Send	Enter the standby time (ms) from when the Display receives packets until it transmits the next command, from "0 to 255".
RI/VCC	You can switch RI/VCC of the 9th pin when you select RS232C for the SIO type. To connect to the IPC, you need to use the IPC selector switch to switch RI/5V. Please refer to the manual of the IPC for details.

NOTE

• Refer to the GP-Pro EX Reference Manual for Indirect Device.

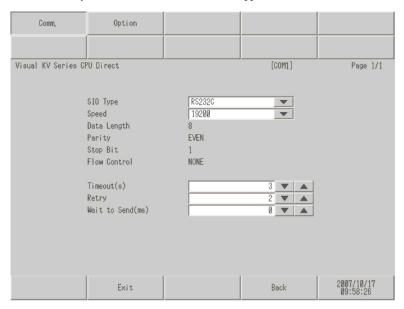   Cf.   GP-Pro EX Reference Manual "Changing the Device/PLC at Runtime (Indirect Device)"

4.2　Setup Items in Off-line 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 off-line mode. Touch the External Device you want to set from the list that appears.
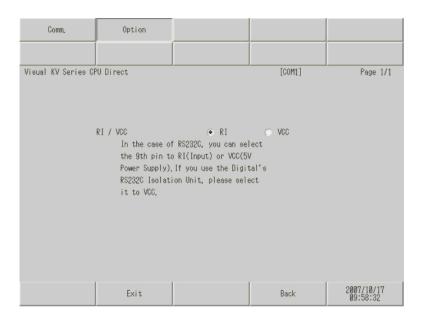

Setup Items	Setup Description
SIO Type	Select the SIO type for communicating with the External Device. IMPORTANT In the communication settings, set [SIO Type] correctly according to the serial interface specifications of the Display. If you select an SIO type that the serial interface does not support, 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 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.

Setup Items	Setup Description
Timeout	Enter the time (s) for which the Display waits for the response from the External Device, from "1 to 127".
Retry	In case of no response from the External Device, enter how many times the Display retransmits the command, from "0 to 255".
Wait To Send	Enter the standby time (ms) from when the Display receives packets until it transmits the next command, from "0 to 255".

■ 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 list that appears, and touch [Option].

Setup Items	Setup Description
RI/VCC	You can switch RI/VCC of the 9th pin when you select RS232C for the SIO type. To connect to the IPC, you need to use the IPC selector switch to switch RI/5V. Please refer to the manual of the IPC for details.

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

5   Cable Diagram

The following cable diagram may be different from that recommended by KEYENCE Corporation. Please be assured, however, there is no operational problem in applying the cable diagram shown in this manual.
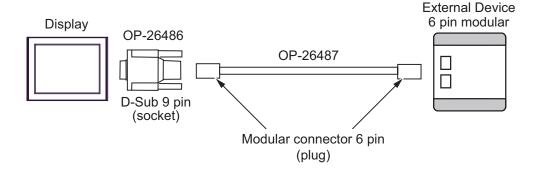
- The FG pin on the External Device must be D-class grounded. Please refer to the manual of the External Device for details.
- The SG and FG are connected inside the Display. If you connect the External Device to the SG, do not form any short-circuit loop in the system design.
- If the communication is not stable due to noise or other factors, connect an isolation unit.

Cable Diagram 1

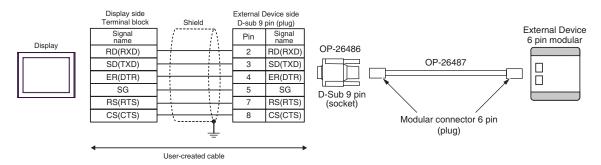| Display (Connection Port)		Cable	Remarks
GP3000 (COM1) GP4000[*1] (COM1) ST (COM1) LT3000 (COM1)	1A	Conversion connector by KEYENCE Corporation OP-26486 + Connection cable by KEYENCE Corporation OP-26487	
GP-4105 (COM1)	1B	User-created cable + Conversion connector by KEYENCE Corporation OP-26486 + Connection cable by KEYENCE Corporation OP-26487	-

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

1A)

1B)

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

Display

User-created cable

OP-26486

D-Sub 9 pin
(socket)

OP-26487

Modular connector 6 pin
(plug)

External Device
6 pin modular

6 Supported Devices

The following table shows the range of supported device addresses. Note that the actually supported range varies 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	32 bits	Remarks
I/O Relay	00000 - 00915	000 - 009		
	07000 - 17915	070 - 179		
Internal Auxiliary Relay	01000 - 01915	010 - 019		
	03000 - 06915	030 - 069		
Special Auxiliary Relay	02000 - 02915	020 - 029		
Timer (Contact)	T000 - T249	-----		
Counter (Contact)	C000 - C249	-----		
High-speed Counter Comparator (Contact)	CTC0 - CTC3	-----	⌐L / H⌐	*1
Timer (Current Value)	-----	TC000 - TC249		
Timer (Setting Value)	-----	TS000 - TS249		
Counter (Current Value)	-----	CC000 - CC249		
Counter (Setting Value)	-----	CS000 - CS249		
Data Memory	-----	DM0000 - DM1999		[Bit 15]
Temporary Data Memory	-----	TM00 - TM31		[Bit 15]
Digital Trimmer	-----	AT0 - AT1		*1
High-speed Counter (Current Value)	-----	CTH0 - CTH1		
High-speed Counter Comparator (Setting Value)	-----	CTC0 - CTC3		

*1 Write disable

NOTE

- Refer to the GP-Pro EX Reference Manual for system data area.

    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 select "Device Type & Address" for the address type of the data display or other devices.

Device	Device Name	Device Code (HEX)	Address Code
I/O Relay	-----	0080	Word Address
Internal Auxiliary Relay			
Special Auxiliary Relay			
Timer (Current Value)	TC	0060	Word Address
Timer (Setting Value)	TS	0062	Word Address
Counter (Current Value)	CC	0061	Word Address
Counter (Setting Value)	CS	0063	Word Address
Data Memory	DM	0000	Word Address
Temporary Data Memory	TM	0001	Word Address
Digital Trimmer	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 No.
Device Name	Name of the External Device where an error has occurred. Device name is the title of the External Device set with GP-Pro EX. (Initial value [PLC1])
Error Message	Displays messages related to an error that has occurred.
Error Occurrence Area	Displays the IP address or device address of the External Device where an error has occurred, or error codes received from the External Device. **NOTE** • IP address is displayed as "IP address (Decimal): MAC address (Hex)". • Device address is displayed as "Address: Device address". • Received error codes are displayed 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 "Display-related errors" in "Maintenance/Troubleshooting Manual" for details on the error messages common to the driver.

■ Error Code List of External Device

Error Code (HEX)	Error Description
04	Accessed the device not defined as device in the External Device.[1]

[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), the settings in the ladder program is necessary in advance.