GP-PRO/PBⅢ

PLC CONNECTION MANUAL

ADDITIONAL MANUAL

Keyence Corporation

KV-700 Series

CPU Direct Connection

Pro-face
Human Machine Interface

Reading the GP-PRO/PBIII Device/PLC Connection Manual

This document is designed as an addition to the latest GP-PRO/PBIII Device/PLC Connection manual. It covers the Keyence Corporation's KV700 Series unit (CPU Direct Connection) information.

Please be aware that:

• Page numbers are not sequential

• Chapter numbers do not agree.

• No introduction is included.

• Titles have been omitted.

This document is intended to be used together with the latest version of your Device/PLC Connection manual.

Please read the KV-700 Series (CPU Direct Connection) items.

The information in this document will be included in the next version of the Device/PLC Connection manual. Therefore, please consider this a provisional document.

Installation

This CD-ROM includes all the protocol files required by the GP/GLC to communicate with a KEYENCE Corporation PLC. Also, you will need to have the GP Screen Editor software (GP-PRO/PBIII for Windows95 version 2.1 or higher) installed on your personal computer's hard disk. For information about the installation of the GP Screen Editor software, refer to that software's Operation Manual.

1) Be sure to Confirm that the GP Screen Editor software is installed in your PC prior to starting this driver installation.

2) To install the Keyence protocol files, click on this CD-ROM's "kv700p.exe" file icon.

3) Once the setup program starts, follow the instructions given to install the protocol files.

⚠️ *Important*

When using the KV-700 Series (CPU Direct Connection) unit, select [KEYENCE KV-700 SERIES (CPU)] for the "PLC Type".
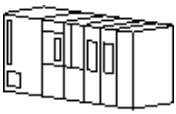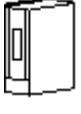
2.18 Keyence

2.18.1 System Structure

The following describes the system structure for connecting the GP to Keyence PLCs.

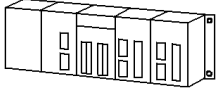*Reference* *The Cable Diagrams mentioned in the following tables are listed in the section titled "**2.18.2 Cable Diagrams**".*

■ **KZ-300/KZ-350 Series** (using Link I/F)

CPU	Link I/F	Cable Diagram	GP
	PC Link Unit		
KZ-300 KZ-350	KZ-L2	RS-232C Port 1 Connection (Cable Diagram 1)	
		RS-232C Port 2 Connection (Cable Diagram 2)	GP Series
		RS-422 Port 2 Connection (Cable Diagram 3)	

Note: **Port 1 and Port 2 can be connected at the same time on the GP. When connected at the same time, the Communication Setup for Port 1 and Port 2 must be the same.**
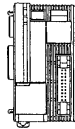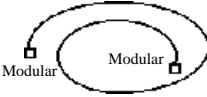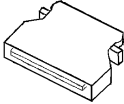
■ **KZ-A500 Series** (using Link I/F)

CPU	Link I/F	Cable Diagram	GP
KZ-A500	KZ-L10	RS-232C, connected to Port 1. (Cable Diagram 4)	
		RS-232C, connected to Port 2. (Cable Diagram 2)	GP Series
		RS-232C, connected to Port 2. (Cable Diagram 3)	
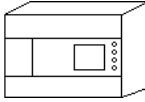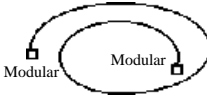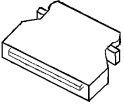
Important *Port 1 (RS232C), Port 2 (RS232-C or RS422) and the modular controller on CPU unit can be used at the same time.*

■ **KZ-A500** (CPU Direct Connection)

CPU	Cables	Connector	GP
KZ-A500	Keyence Corp.'s OP-26487	Keyence Corp.'s OP-26485	GP Series
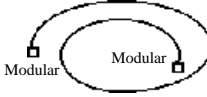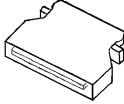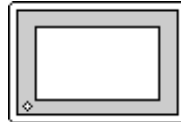
■ **KV Series** (CPU Direct Connection)

CPU	Cables	Connector	GP/GLC
KV-10 KV-16 KV-24 KV-40	Keyence Corp.'s OP-26487	Keyence Corp.'s OP-26485	GP Series GLC Series

■ **KV-700 Series** (using Link I/F)

CPU	Link I/F	Cable Diagram	GP/GLC
	PC Link Unit 		
KV-700	KV-L20	RS-232C (Communication Port 1) <Cable Diagram 5>	GP Series GLC Series
		RS-232C (Communication Port 2) <Cable Diagram 6>	
		RS-422 (Communication Port 2) <Cable Diagram 7>	

■ **KV-700 Series** (CPU Direct Connection)

CPU	Cables	Connector	GP/GLC
KV-700	Keyence Corp.'s OP-26487	Keyence Corp.'s OP-26485	GP Series GLC Series

2.18.2 **Cable Diagrams**

The cable diagrams illustrated below and the cable diagrams recommended by Keyence may differ, however, using these cables for your PLC operations will not cause any problems.

Careful!

- *Connect the FG line of the Shield cable to the GP.*

- *For the RS-232C connection, use a cable length less than 15m.*

- *If a communications cable is used, it must be connected to the SG (signal ground).*

- *For the RS-422 connection, refer to Keyence's PLC manual for the cable length.*

Cable Diagram 1 *(RS-232C)*
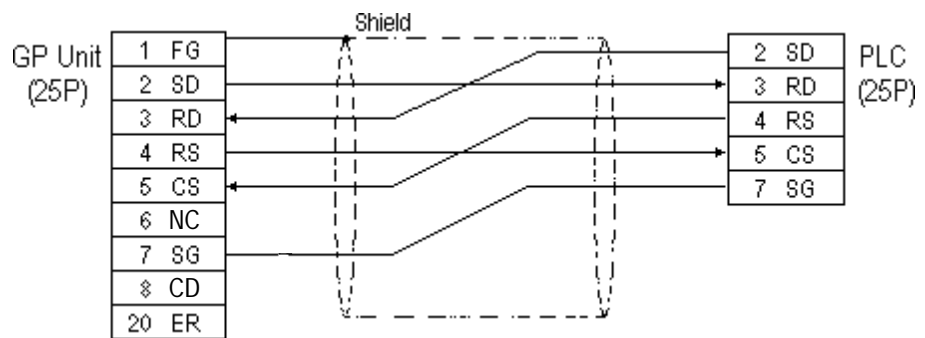
Cable Diagram 2 (RS-232C)
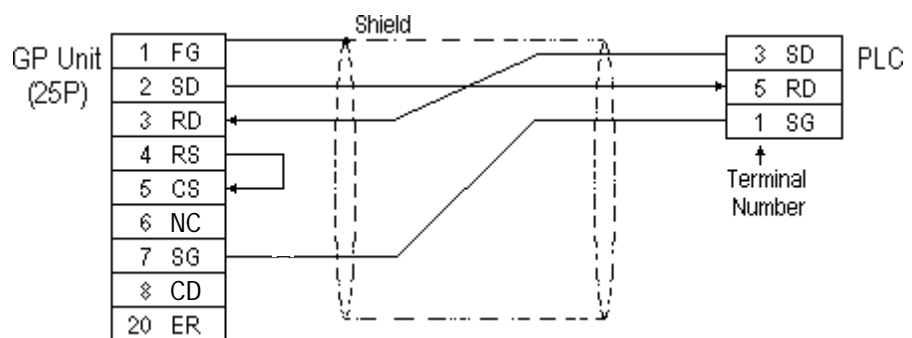
Cable Diagram 3 (RS-422)

Careful! *Turn the PLC's Termination Resistor switch ON.*

Important **The reading of the A and B signals is reversed on the GP and PLC.**

• When using Digital's RS-422 connector terminal adapter, GP070-CN10-0
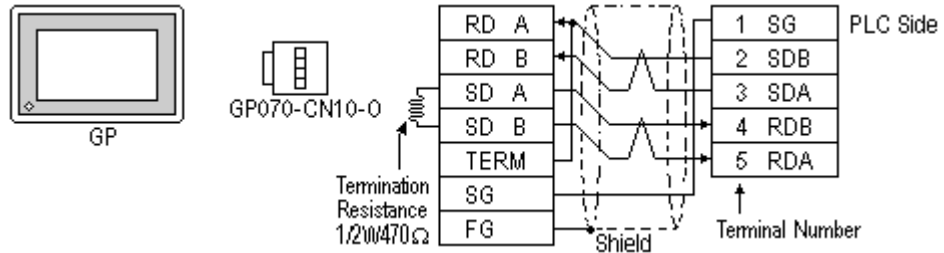
• When using Digital's RS-422 Cable, GP230-IS11-0

• When making your own cable connections

Note:
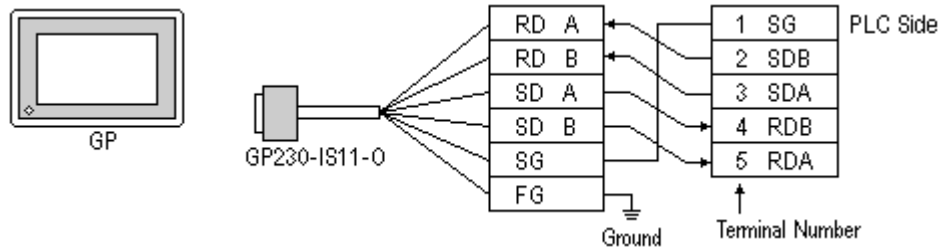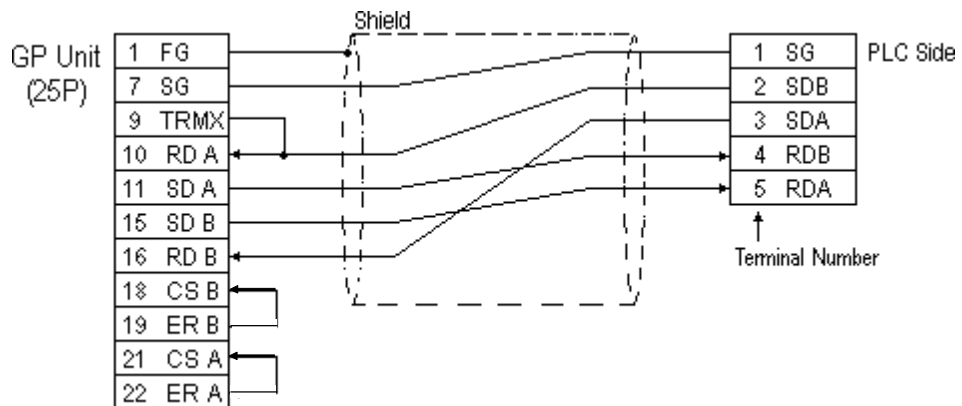
• **Hirakawa Densen's H-9293A (C0-HC-ESV-3P*7/0.2) is the recommended cable.**

• **When connecting the #9 and #10 pins in the GP Serial I/F, a termination resistance of 100Ω is added between RDA and RDB.**

• **When using RS-422 connection, please check the cable length with Keyence PLC users manual.**

Cable Diagram 4 (RS-232C) port1

Note:
- **When using an RS-232C cable, the cable must be no longer than 15meters.**
- **When using an RS-422 cable, the cable must be no longer than 500meters.**

GP Unit (25P)		Shield		PLC (25P)
1	FG		2	SD
2	SD		3	RD
3	RD		4	RS
4	RS		5	CS
5	CS		7	SG
7	SG			

Cable Diagram 5 (RS-232C) port 1

GP Unit (D-sub 25P Male)		Shield		PLC (D-sub 25P Female)
1	FG		2	RD
2	SD		3	SD
3	RD		7	RS
4	RS		8	CS
5	CS		5	SG
6	NC			
7	SG			
8	CD			
20	ER			
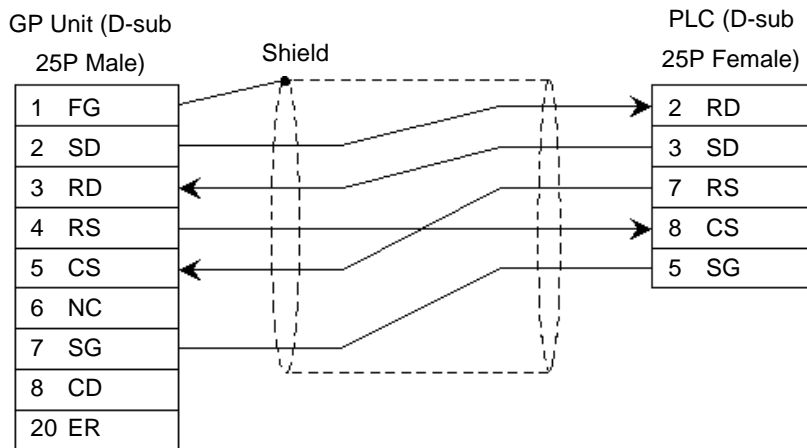
Cable Diagram 6 (RS-232C) port 2

GP Unit (D-sub 25P Male)		Shield		Terminal for communication
1	FG		1	SG
2	SD		3	SD
3	RD		5	RD
4	RS			
5	CS			
6	NC			
7	SG			
8	CD			
20	ER			
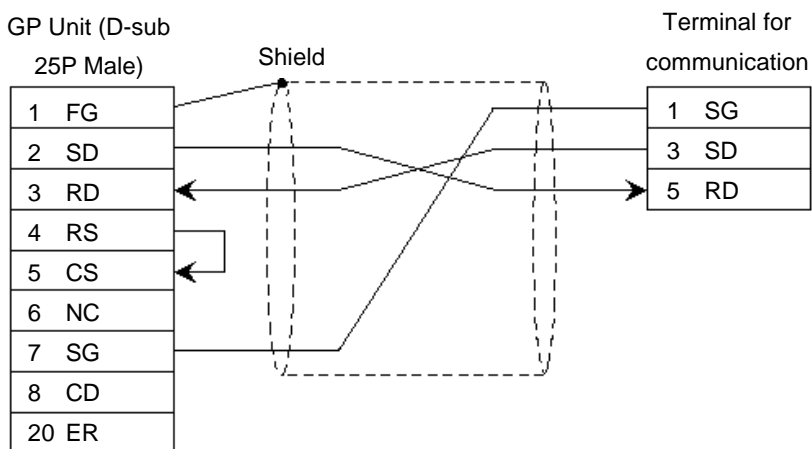
Cable Diagram 7 (RS-422) 4-wire type

Careful!

• *The termination resistance on the PLC side becomes active when the Terminator Select switch on the unit is turned ON.*

• *The names of poles A and B are inverted between the GP and the PLC.*

• *The cable length should be within 500 meters.*

• When using Digital's RS-422 connector terminal adapter, GP070-CN10-0
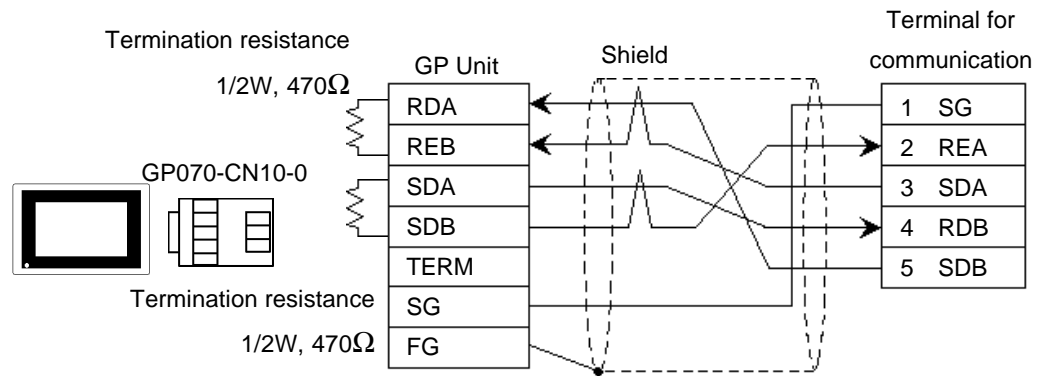
• When using Digital's RS-422 Cable, GP230-IS11-0
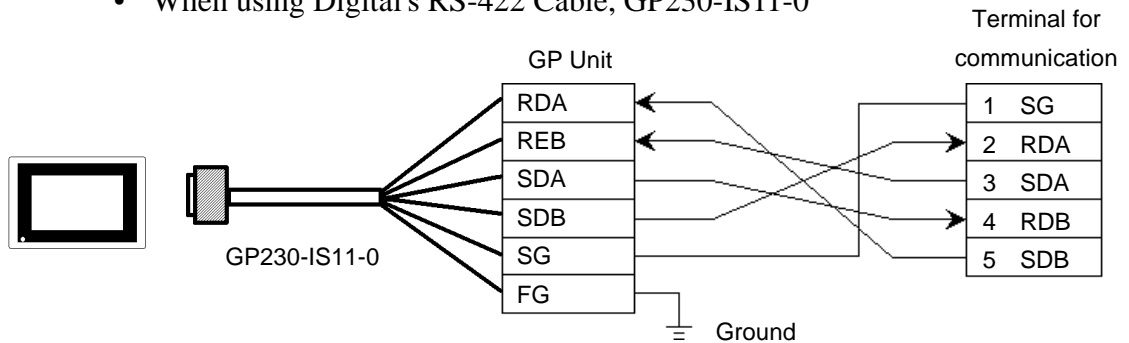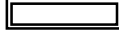
• When making your own cable connections
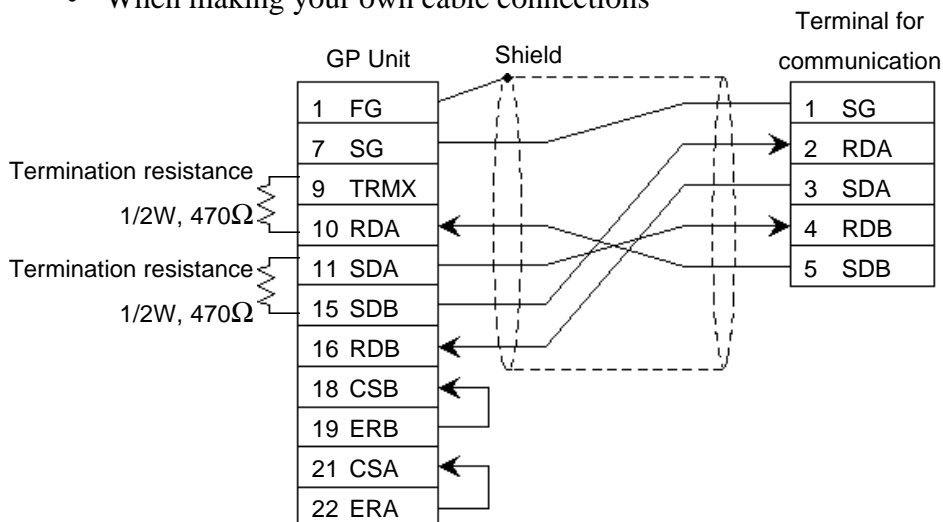
2.18.3 Supported Devices

The following describes the range of devices supported by the GP.

■ **KZ-300/KZ-350 Series** ⬚ Set up System Area here.

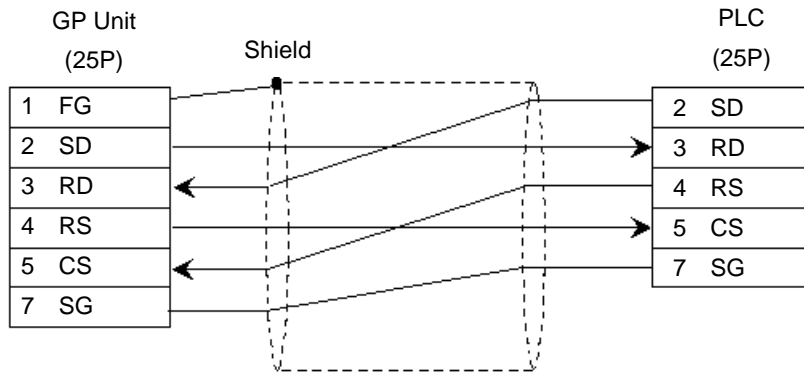| Device	Bit Address	Word Address	Particulars	
Input Relay	00000 ~ 0009	00 ~ 00		
	7000 ~ 17415	70 ~ 174	[*1]	
Output Relay	0500 ~ 0503	05 ~ 05		
	7500 ~ 17915	75 ~ 179	[*2]	
Help Relay	0504 ~ 0915	---		
Internal Help Relay	1000 ~ 6915	10 ~ 69		
Special Help Relay	2000 ~ 2915	20 ~ 29		L/H
Timer (contact)	T000 ~ T249	---		
Counter (contact)	C000 ~ C249	---		
Timer (current value)	---	T000 ~ T249		
Counter (current value)	---	C000 ~ C249		
Data Memory	---	DM0000 ~ DM9999	Bit 15	
Temporary Data Memory	---	TM00 ~ TM31	Bit 15	

*1 Address numbers *000~*400 are available for the bit device addresses, and *0~*4 are available for the word addresses displayed.

Bit Address	Word Address
addr 7000	70
addr 7001 to addr 7400	71 to 74
addr 8000	80
addr 8100 to addr 8400	81 to 84
addr 17000 to addr 17400	170 to 174

*2 Address numbers *500~*900 are available for the bit device addresses, and *5~*9 are available for the word addresses displayed.

Bit Address	Word Address
addr 7500	75
addr 7600 to addr 7900	76 to 79
addr 8500	85
addr 8600 to addr 8900	86 to 89
addr 17500 to addr 17900	175 to 179

■ **KZ-A500** (CPU Direct Connection)

Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	X0000 ~ X07FF	X0000 ~ X07F0	xxx(0)	
Output Relay	Y0000 ~ Y07FF	Y0000 ~ Y07F0	xxx(0)	
Internal Relay	M0000 ~ M8191	M000 ~ M8176	÷16	
Latch Relay	L0000 ~ L8191	---		
Special Relay	M9000 ~ M9255	M9000 ~ M9240	÷16	
Annunciator	F0000 ~ F2047	F0000 ~ F2032	÷16	
Link Relay	B0000 ~ B0FFF	---		
Timer (contact)	TS0000 ~ TS2047	---		
Timer (coil)	TC0000 ~ TC2047	---		L/H
Counter (contact)	CS0000 ~ CS1023	---		
Counter (coil)	CC0000 ~ CC1023	---		
Timer (current value)	---	TN0000 ~ TN2047		
Counter (current value)	---	CN0000 ~ CN1023		
Data Register	---	D0000 ~ D6143	Bit 15	
Special Register	---	D9000 ~ D9255	Bit 15	
Link Register	---	W0000 ~ W0FFF	Bit F	
File Register	---	R0000 ~ R8191	Bit 15	

■ **KZ-A500** (using Link I/F)

⬚ Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	X0000 ~ X07FF	X0000 ~ X07F0	⁎⁎⁎0	
Output Relay	Y0000 ~ Y07FF	Y0000 ~ Y07F0	⁎⁎⁎0	
Internal Relay	M0000 ~ M8191	M0000 ~ M8176	÷16	
Latch Relay	L0000 ~ L8191	L0000 ~ L8176	÷16	
Link Relay	B0000 ~ B0FFF	————		
Annunciator Relay	F0000 ~ F2047	F0000 ~ F2032	÷16	
Special Relay	M9000 ~ M9255	M9000 ~ M9240	÷16	
Timer (connect)	TS0000 ~ TS2047	————		
Timer (coil)	TC0000 ~ TC2047	————		L/H
Counter (connect)	CS0000 ~ CS1023	————		
Counter (coil)	CC0000 ~ CC1023	————		
Timer (current value)	————	TN0000 ~ TN2047		
Counter (current value)	————	CN0000 ~ CN1023		
Data Register	————	D0000 ~ D6143	Bit15	
Link Register	————	W0000 ~ W0FFF	BitF	
File Register	————	R0000 ~ R8191	Bit15	
Special Register	————	D9000 ~ D9255	Bit15	

■ **KV Series** (KV-10/KV-16/KV-24/KV-40)

| Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input/Output Relay	00000 ~ 00915	000 ~ 009		
	07000 ~ 17915	070 ~ 179		
Internal AUX Relay	01000 ~ 01915	010 ~ 019		
	03000 ~ 06915	030 ~ 069		
Special AUX Relay	02000 ~ 02915	020 ~ 029	*1	
Timer (contact)	T000 ~ T249	———————		
Counter (contact)	C000 ~ C249	———————		
High-Speed Counter Comparator (contact)	CTC0 ~ CTC3	———————	*2	
Timer (set value)	———————	TS000 ~ TS249		L/H
Counter (set value)	———————	CS000 ~ CS249		
Timer (current value)	———————	TC000 ~ TC249		
Counter (current value)	———————	CC000 ~ CC249		
Data Memory	———————	DM0000 ~ DM1999	Bit 15	
Temporary Data Memory	———————	TM00 ~ TM31	Bit 15	
Digital Trimmer	———————	AT0 ~ AT1	*2	
High-Speed Counter (current value)	———————	CTH0 ~ CTH1		
High-Speed Counter Comparator (set value)	———————	CTC0 ~ CTC3		

*1 Some addresses are not available for writes.

*2 Not available for writes

■ **KV-700 Series** (using the KZ-300 series protocol)

⬜ Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	00000 ~ 00009	000 ~ 000	*1	
Output Relay	00500 ~ 00503	005 ~ 005		
Internal AUX Relay	00504 ~ 00915	005 ~ 009		
Extended Input/Output Relay Internal AUX Relay	01000 ~ 59915	010 ~ 599		
Control Relay	60000 ~ 63915	600 ~ 639	*2	
Timer (contact)	T000 ~ T511	———————	*3	L/H
Counter (contact)	C000 ~ C511	———————	*3	
Timer (current value)	———————	T000 ~ T511	*3	
Counter (current value)	———————	C000 ~ C511	*3	
Data Memory	———————	DM0000 ~ DM9999	Bit 15 *4	
Temporary Data Memory	———————	TM000 ~ TM511	Bit 15	
Control Memory	———————	TM0520 ~ TM4519	Bit 15 *5	

*1 PLC or GP data writing is not possible.

*2 GP cannot write data to any address.

*3 Only available when the timer command and the counter command exist in the ladder program.

*4 The device range for the PLC is between DM0000 and DM19999, but addresses up to DM9999 are only accessible to the GP.

*5 Some addresses are not available for writes.

■ **KV-700 Series** (using the KZ-A500 (link) protocol)

☐ Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	X000 ~ X009	X00 ~ X00	xxx◯] *1*2	
Output Relay	X050 ~ X053	X05 ~ X05	xxx◯] *2	
Internal AUX Relay	X054 ~ X09F	X05 ~ X09	xxx◯] *2	
Control Relay	M0000 ~ M3915	M0000 ~ M3904	÷16] *3*4	
Timer (contact)	TS000 ~ TS511	————	*5	
Counter (contact)	CS000 ~ CS511	————	*5	
High-Speed Counter Comparator (contact)	CS512 ~ CS515	————	*5*6	L/H
Timer (current value)	————	TN000 ~ TN511	*5	
Counter (current value)	————	CN000 ~ CN511	*5	
High-Speed Counter (current value)	————	CN512 ~ CN513	*5	
Data Memory	————	D00000 ~ D19999	Bit15] *7*8	
Control Memory	————	D50000 ~ D53999	Bit15] *7*3	

*1 PLC or GP data writing are not available for writes.

*2 Addresses must be specified using hexadecimal numbers.

*3 Some addresses are not available for writes.

*4 For addresses, only multiples of 16 may be specified.

*5 Only available when the timer command, the counter command, and the high-speed timer command exist in the ladder program.

*6 GP cannot write data to any address.

*7 Even if the file registers are registered as R50000 to R539999, similar device addresses can be used, e.g., R51111 = D51111.

■ **KV-700 Series** (CPU Direct Connection)

[____] Set up System Area here.

Device	Bit Address	Word Address	Particulars	
Input/Output Relay	00000~59915	000~599		L/H
Internal AUX Relay				
Control Relay	CR0000~CR3915	CR00~CR39		
Timer (contact)	T000~T511	—————		
Counter (contact)	C000~C511	—————		
High-Speed Counter Comparator (contact)	CTC0~CTC3	—————	*1	
Timer (set value)	—————	TS000~TS511	*2	
Counter (set value)	—————	CS000~CS511	*2	
Timer (current value)	—————	TC000~TC511	*2	
Counter (current value)	—————	CC000~CC511	*2	
Data Memory	—————	DM00000~DM39999	Bit 15	
Temporary Data Memory	—————	TM000~TM511	Bit 15	
Control Memory	—————	CM0000~CM3999	Bit 15	
Digital Trimmer	—————	TRM0~TRM7	*2	
High-Speed Counter (current value)	—————	CTH0~CTH1	*2	
High-Speed Counter Comparator (set value)	—————	CTC0~CTC3	*2	

*1 Not available for writes.

*2 32-bit device

2.18.4　　**Environment Setup**

The following lists Digital's recommended PLC and GP communication setups.

■ KZ-300/KZ-350 Series

GP Setup		PC Link Unit Setup	
Baud Rate	19200 bps	Baud Rate	19200 bps
Data Length	7 bits	Data Bit	7 bits
Stop Bit	2 bits	Stop Bit	2 bits
Parity Bit	Even	Parity Bit	Even
Data Flow Control	ER Control	---	
Communication Format (RS-232C)	RS-232C	Port 2 Toggle Switch (RS-232C) [*1]	RS-232C
Communication Format (RS-422)	4-wire type	Port 2 Toggle Switch (RS-422) [*1]	RS-422A
---		RUN Mode	Link Mode
Unit No.	0	Station Number	0

　*1　*Setup not necessary when using Port1.*

■ KZ-A500 (CPU Direct Connection)

GP Setup		PLC Setup
Baud Rate	9600 bps	---
Data Length	8 bits (fixed)	---
Stop Bit	1 bit (fixed)	---
Parity Bit	Odd (fixed)	---
Data Flow Control	ER Control	---
Communication Format (RS-232C)	RS-232C	---
Unit No.	0 (fixed)	---

Effect of PLC program on cycle time

⚠ *Caution*

If the KZ-A500 is connected directly to the CPU, the cycle time of the PLC program is delayed by about 8% after communication with the GP begins.

■ KZ-A500 (using Link I/F)

GP Setup		PLC Setup	
Baud Rate	19200bps [*1]	Baud Rate	19200bps
Data Length	7	Data Length	7
Stop Bit	1	Stop Bit	1
Parity Bit	None	Parity Bit	None
Data Flow Control	ER	———	———
Communication Format (RS-232C)	RS-232C	RS-232C Communication Port	Port 1 or Port 2 [*2]
Communication Format (RS-422)	4-Wire Type	RS-422 Communication Port	Port 2 [*3]
——		Communication Type	Normal
——		Changing device data during RUN	Possible
——		Checksum	Yes
——		Operation Mode	Protocol Mode 4
Unit No.	0	STATION No.	0

1 The maximum baud rate is 38400bps.

2 When using an RS-232C cable on port 2, be sure to set the INTERFACE switch to "232C"(right side setting.) Also, set the TERMINATOR switch to OFF, since it will not be used.

3 When using an RS-422 cable, set the INTERFACE switch to "422"(left side setting,) and the TERMINATOR switch to ON.

■ KV/KV-700 Series (CPU Direct Connection)

GP Setup		PLC Setup	
Baud Rate	19200bps	———	———
Data Length	8 bits (fixed)	———	———
Stop Bit	1 bit (fixed)	———	———
Parity Bit	Even (fixed)	———	———
Data Flow Control	ER Control	———	———
Communication Format	RS-232C	———	———
Unit No.	0	———	———

Note:
- **The baud rate can be from 9600 to 57600 bps.**
- **The PLC requires no setup due to its automatic recognition of settings.**

■ **KZ-700 Series** (using the KZ-300 series protocol)

GP Setup		PLC Setup	
Baud Rate	19200bps [*1]	Baud Rate	19200bps
Data Length	7 bits	Data Length	7 bits
Stop Bit	2 bits	Stop Bit	2 bits
Parity Bit	Even	Parity Bit	Even
Data Flow Control	ER Control	RS, CS Flow Control	No
Communication Format (RS-232C)	RS-232C	Communication Port 1	Fixed to 232C
		Communication Port 2 Selector Switch	232C
Communication Format (RS-422)	4-Wire Type	Communication Port 2 Selector Switch	422A
———		Operation Mode	Link Mode
Unit No.	0	Station No.	0

*1 The maximum baud rate is 115,200 bps.

■ **KZ-700 Series** (using the KZ-A500 series protocol)

| GP Setup		PLC Setup	
Baud Rate	19200bps [*1]	Baud Rate	19200bps
Data Length	7 bits	Data Length	7 bits
Stop Bit	2 bits	Stop Bit	2 bits
Parity Bit	None	Parity Bit	None
Data Flow Control	ER Control	———————	
Communication Format (RS-232C)	RS-232C	Communication Port 1	Fixed to 232C
		Communication Port 2 Selector Switch	232C
Communication Format (RS-422)	4-Wire Type	Communication Port 2 Selector Switch	422A
———		Operation Mode	Protocol Mode 4
———		Checksum	Yes
Unit No.	0	Station No.	0

*1 The maximum baud rate is 115,200 bps.

2.18.5　Error Codes

■PLC Error Codes

◆KV/KV-700 Series (CPU Direct Connection)

Controller error codes are represented by the "Host communication error (02:**)", and indicated in the left lower corner of the GP screen. (** stands for an error code.)

Host Communication Error (02:**)
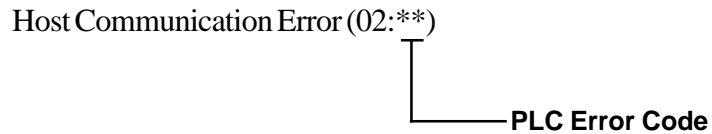
PLC Error Code

Error Code	Description
02	Occurs when you write to a device that cannot be written to. (High Speed Counter Comparator (contact))
04	Occurs when the PLC uses an unsupported baud rate to send data.
31	Occurs when an undefined device is accessed. [1]

*1 When writing to a Timer (contact/current value/set value), Counter (contact/current value/set value), High Speed Counter, High Speed Counter Comparator (set value), these values must be set in advance using a Ladder Program.

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Appendix

A1 Maximum Number of Consecutive PLC Addresses

The following lists the maximum number of consecutive addresses that can be read by each PLC. Refer to these tables to utilize *Block Transfer*.

KV-700 Series (CPU Direct Connection)

Device	Max No. of Consecutive Address
Input/Output Relay	124 Words
Internal AUX Relay	
Control Relay	40 Words
Timer (contact)	28 Bits
Counter (contact)	
High-Speed Counter Comparator (contact)	4 Bits
Timer (set value)	124 Words
Counter (set value)	
Timer (current value)	
Counter (current value)	
Data Memory	
Temporary Data Memory	
Control Memory	40 Words
Digital Trimmer	16 Words
High-Speed Counter (current value)	4 Words
High-Speed Counter Comparator (set value)	8 Words

A2 Device Codes and Address Codes

Device codes and address codes are used to specify indirect addresses for E-tags and K-tags.

KV-700 Series (CPU Direct Connection)

	Device	Word Address	Device Code	Address Code
Bit Device	Input/Output Relay	0000 ~	9000	Word Address
	Internal AUX Relay			
	Control Relay	CR000 ~	9200	
Word Device	Timer (set value)	TS000 ~	6000	Double Word Address
	Counter (set value)	CS000 ~	7000	Double Word Address
	Timer (current value)	TC000 ~	6800	Double Word Address
	Counter (current value)	CC000 ~	7800	Double Word Address
	Data Memory	DM0000 ~	0000	Word Address
	Temporary Data Memory	TM00 ~	4800	Word Address
	Control Memory	CM0000 ~	3800	Word Address
	Digital Trimmer	TRM0 ~	5800	Double Word Address
	High-Speed Counter (current value)	CTH0 ~	2000	Double Word Address
	High-Speed Counter Comparator (set value)	CTC0 ~	1000	Double Word Address
	LS area	LS0000 ~	4000	Word Address