

Device/PLC Connection Manuals



About the Device/PLC Connection Manuals

Prior to reading these manuals and setting up your device, be sure to read the "Important: Prior to reading the Device/PLC Connection manual" information. Also, be sure to download the "Preface for Trademark Rights, List of Units Supported, How to Read Manuals and Documentation Conventions" PDF file. Furthermore, be sure to keep all manual-related data in a safe, easy-to-find location.

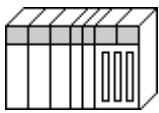

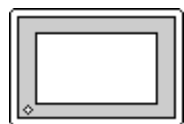
2.8 Yokogawa Electric

2.8.1 System Structure

The following describes the system structure for connecting the GP to Yokogawa Electric Corp. PLCs.

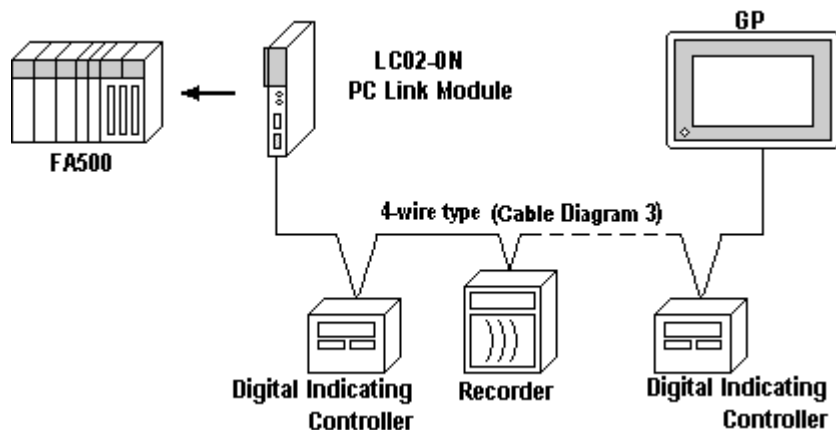
Reference The Cable Diagrams mentioned in the following tables are listed in the section titled "2.8.2 Cable Diagrams".

■ FACTORY ACE Series/FA500 (using Link I/F)

CPU	Link I/F	Cable Diagram	Cables	GP
				
FA500	LC01-ON	RS-232C (Cable Diagram 1)	Digital's GP-410-IS00-O (5m)	GP Series
	LC02-ON	RS-232C (Cable Diagram 1)	RS-232C Digital's GP410-IS00-O (5m)	
		RS-422 (Cable Diagram 2)		
		RS-422 1:n communication *1 (Cable Diagram 3)		

* 1 1:n Communication

The system structure of 1:n communication for Yokogawa PLCs (FA500), or equipment supporting its protocol (n#), and a GP unit (1) used as an upper link protocol is described here.



(See next page)

(Continued from previous page)

* FA500 and equipment (Digital Indicating Controller, <UT37/38/2000> and Recorder, <μR-Series>...etc) supporting the same protocol are hereafter referred to as *PA Equipment*.

- Be sure to use only one GP in the system.
- In the Link above, maximum 32 PA Equipment can be connected to one GP.
- When Sequence Control is unnecessary, the system structure is possible without the PLC.
- Using the method above, Unit No. s 1~16 can be setup; a Unit No. of 17 or higher cannot be used.



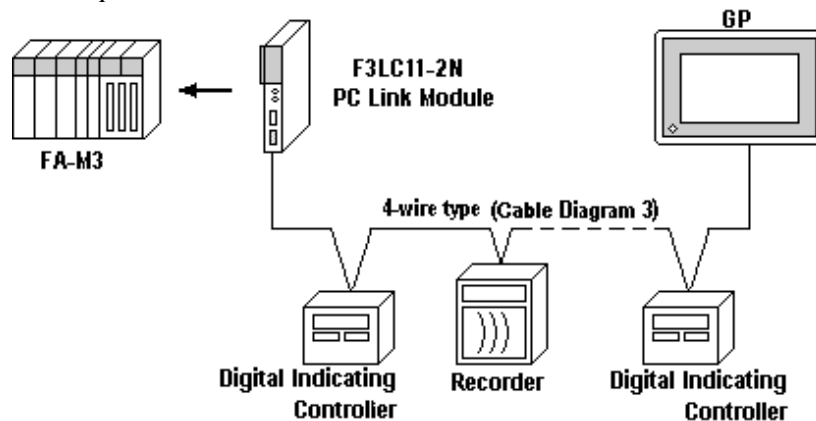
Wherever RS-422 appears in the table, RS-485 can be used on the PLC.

■ **FACTORY ACE Series/FA-M3** (using Link I/F)

CPU	Link I/F	Cable Diagram	Cables	GP
		← PC Link Module →		
F3SP10-0N	F3LC01-1N	RS-232C (Cable Diagram 4)		GP Series
F3SP20-0N, F3SP21-0N, F3SP25-2N, F3SP28-3N, F3SP30-0N, F3SP35-5N, F3SP38-6N, F3SP53-4H, F3SP58-6H, F3FP36-3N, F3SP28-3S, F3SP38-6S, F3SP53-4S, F3SP58-6S, F3SP59-7S	F3LC11-1N	RS-232C (Cable Diagram 4)		
	F3LC11-1F			
	F3LC12-1F			
	F3LC11-2N	RS-422 (4-wire type) (Cable Diagram 2)		
F3LC11-2N	RS-422 (2-wire type) (Cable Diagram 5)			
	F3LC11-2N	RS-422, 4-wire type 1:n communication ^{*1} (Cable Diagram 3)		
		RS-422, 2-wire type 1:n communication (Cable Diagram 6)		

***1 1:n Communication**

The system structure of 1:n communication for Yokogawa PLCs (FA-M3), or equipment supporting its protocol (n#), and a GP unit (1) used as an upper link protocol is described here.



(See next page)

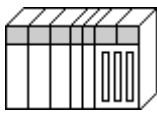
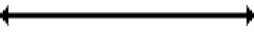
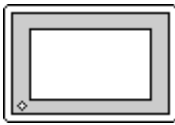
* FA-M3 and equipment (Digital Indicating Controller, <UT37/38/2000> and Recorder, <mR-Series>...etc) supporting the same protocol is referred to as *PA Equipment*, below.

- *Be sure to use only one GP in the system.*
- *In the Link above, maximum 32 PA Equipment can be connected to one GP.*
- *When Sequence Control is unnecessary, the system structure can be created without the PLC.*
- *In the method above, Unit No. of 1~16 can be setup; a Unit No. of 17 or more cannot be used.*



Wherever RS-422 appears in the table, RS-485 can be used on the PLC.

■ FACTORY ACE Series/FA-M3 (CPU Direct Connection)

CPU	Cables	GP
		
F3SP21-0N, F3SP25-2N, F3SP28-3N, F3SP35-5N, F3SP38-6N, F3SP53-4H, F3SP58-6H, F3SP28-3S, F3SP38-6S, F3SP53-4S, F3SP58-6S, F3SP59-7S	Yokogawa's cable for programming tool KM11- 2N*A	GP Series



Two GP units cannot be connected at the same time using the PC Link I/F.

■ STARDOM Standalone Type Controller

CPU	Cables	GP
FCN FCJ	RS-232C (Cable Diagram 4)	GP Series

2.8.2 Cable Diagrams

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

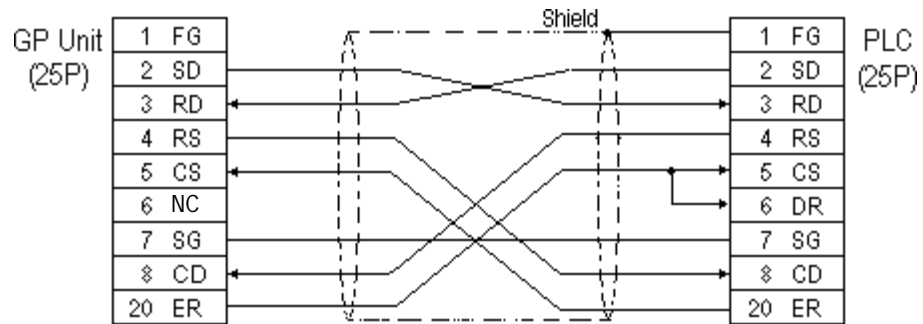


Ground your PLC's FG terminal according to your country's applicable standard. For details, refer to the corresponding PLC manual.



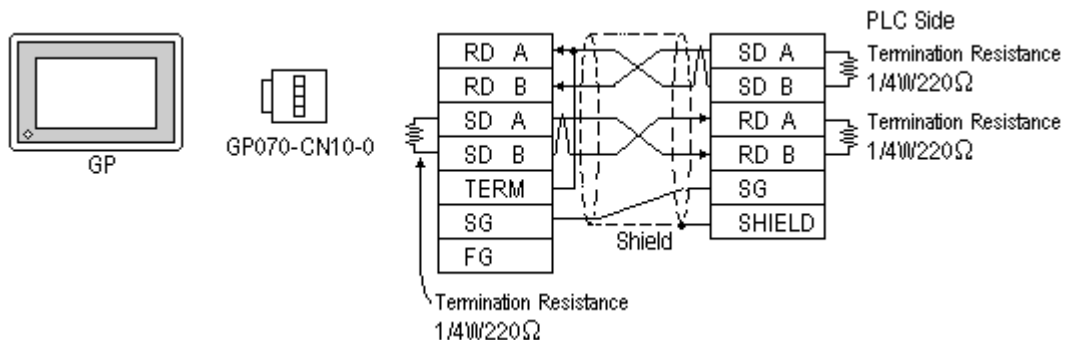
- **Connect the FG line of the Shield cable to either the GP or PLC, depending on your environment. When using a connector hood and grounding the FG line, be sure to use an electrical conductor. The following connection diagrams show examples for connecting a shielded cable to the PLC.**
- **For the 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 Yokogawa's PLC manual for the cable length.**

Cable Diagram 1 (RS-232C)

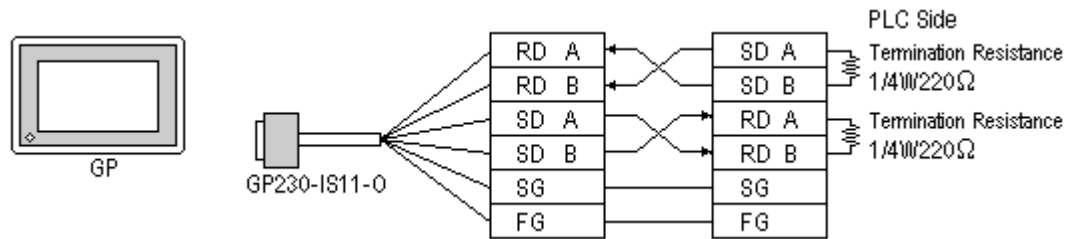


Cable Diagram 2 (RS-422)

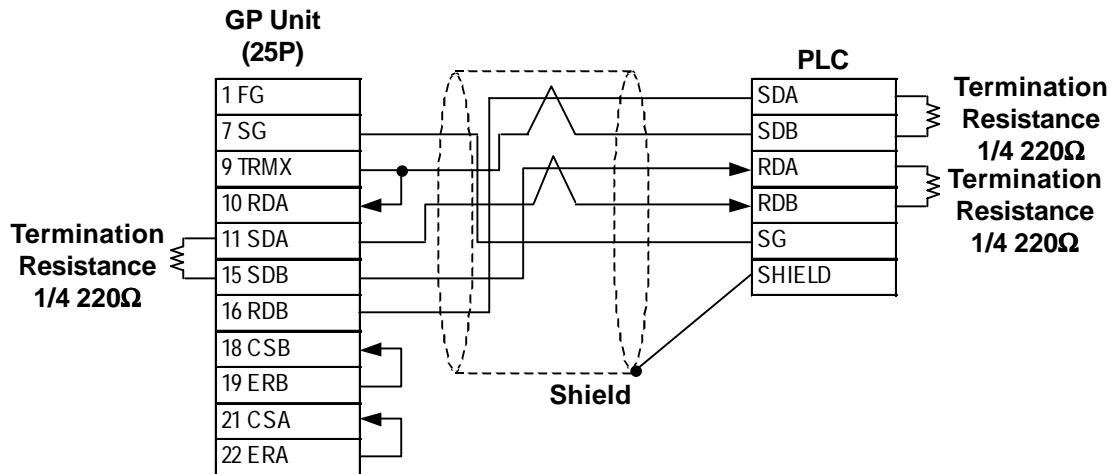
- When using Digital's RS-422 connector terminal adapter GP070-CN10-0



- When using Digital's RS-422 Cable, GP230-IS11-0



- When making your own cable connections



- When making your own connections, we recommend using Hitachi Densen's CO-SPEV-SB(A)3P*0.5SQ 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.

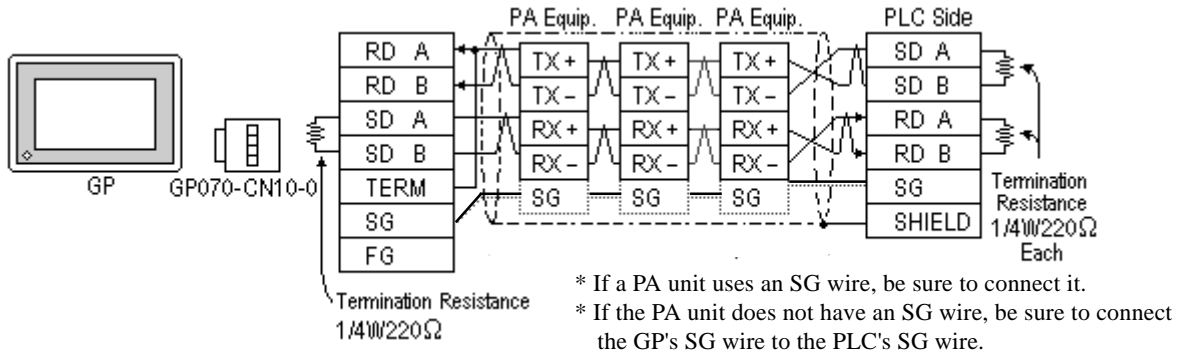
Cable Diagram 3 (RS-422)

The diagrams below are examples of wire connections on both ends of the GP and PLC. Setup the termination resistors on both ends of the equipment, as illustrated.

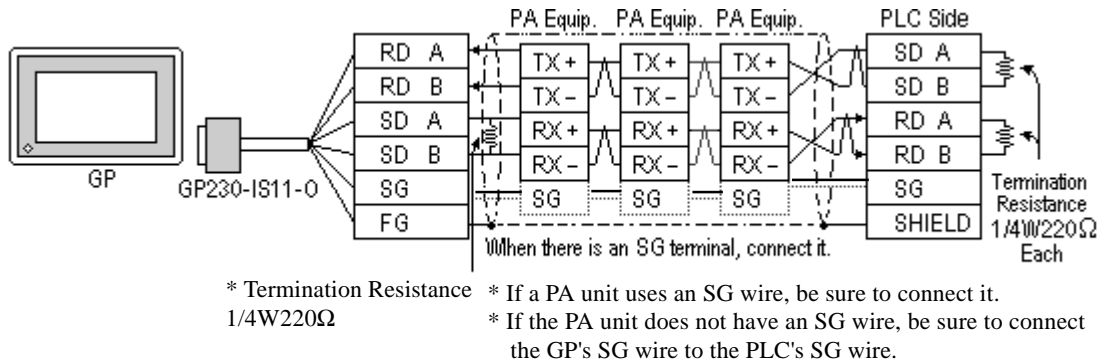


- **Be careful as the reading of the A signal and B signal is opposite on the GP and the LC02-0N (PLC).**
- **Make the PC Link I/F Station Number from 2 to 32.**
- **Setup the PA unit connected to the GP using different Unit Numbers. An error will develop if multiple PA units are setup using the same Unit Number. When an error occurs, the error message "Receiving Data Error occurs (02:FD:*)" (** indicates the unit No.) will appear.**
- **Setup the GP (1) and PA units (n#) with the same Communication Settings.**

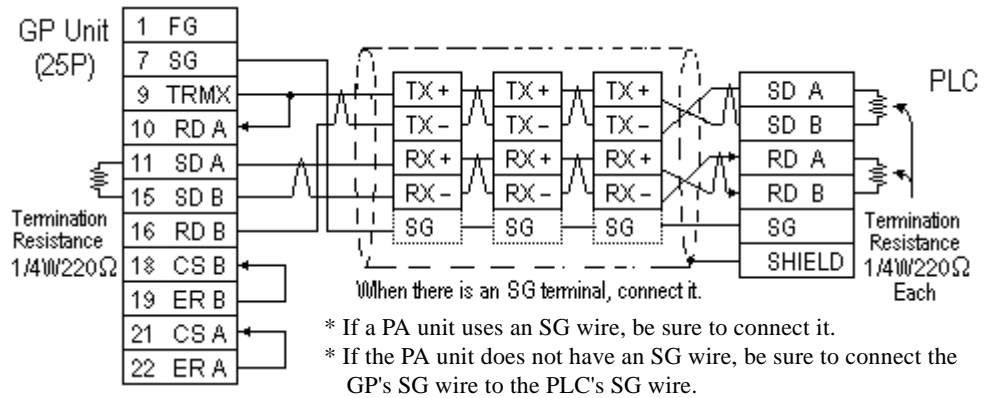
- When using Digital's RS-422 connector terminal adapter GP070-CN10-0



- When using Digital's RS-422 Cable, GP230-IS11-0

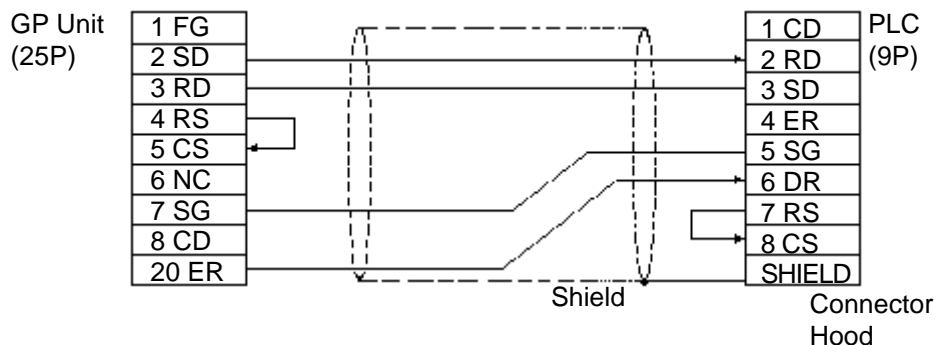


- When making your own cable connections



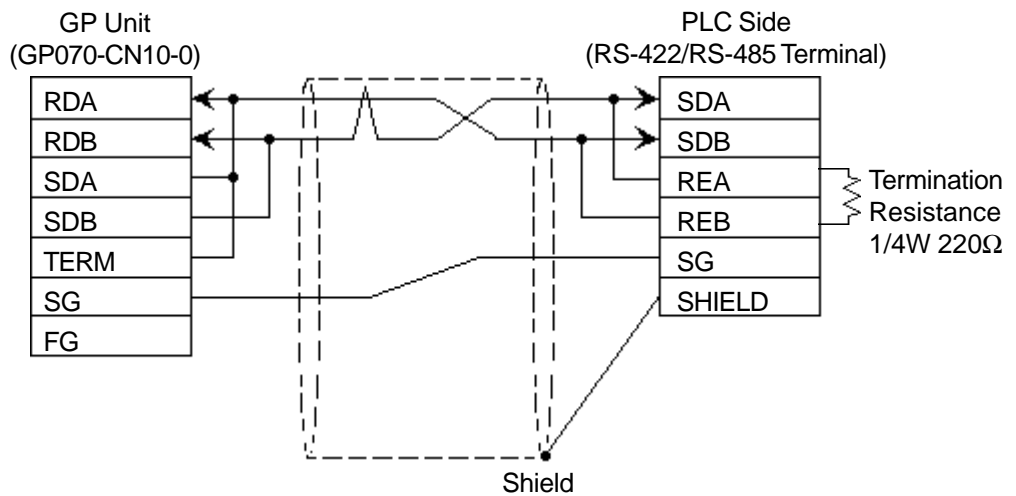
When connecting the #9 and #10 pins in the GP Serial I/F, a termination resistance of 100Ω is added between RDA and RDB.

Cable Diagram 4 (RS-232C)

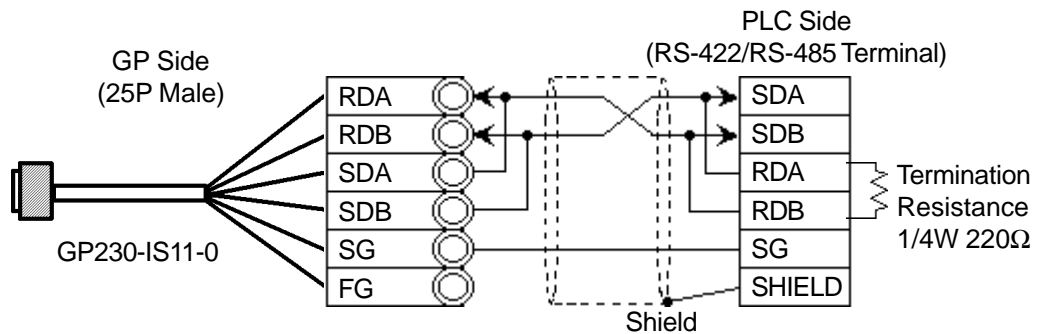


Cable Diagram 5 (RS-422)

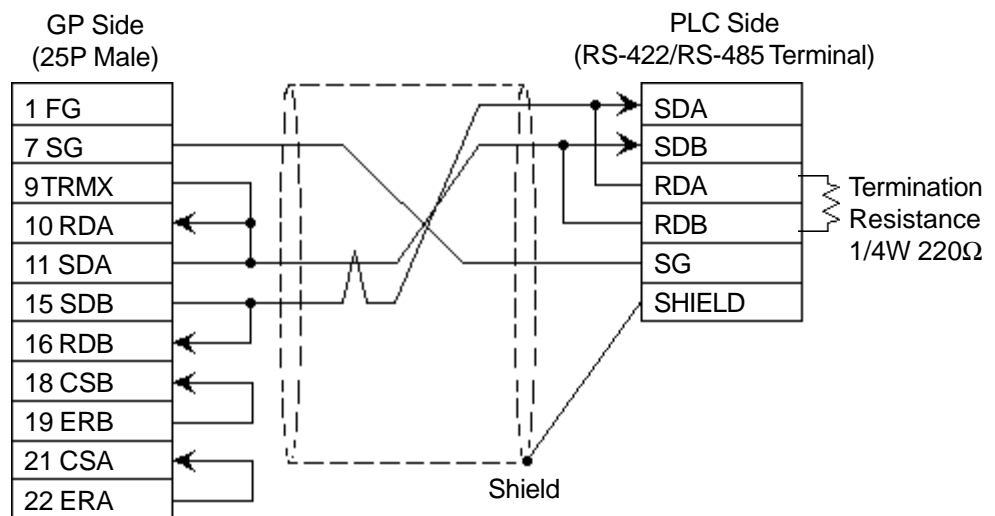
- When using Digital's RS-422 connector terminal adapter GP070-CN10-0



- When using Digital's RS-422 cable, GP230-IS11-0

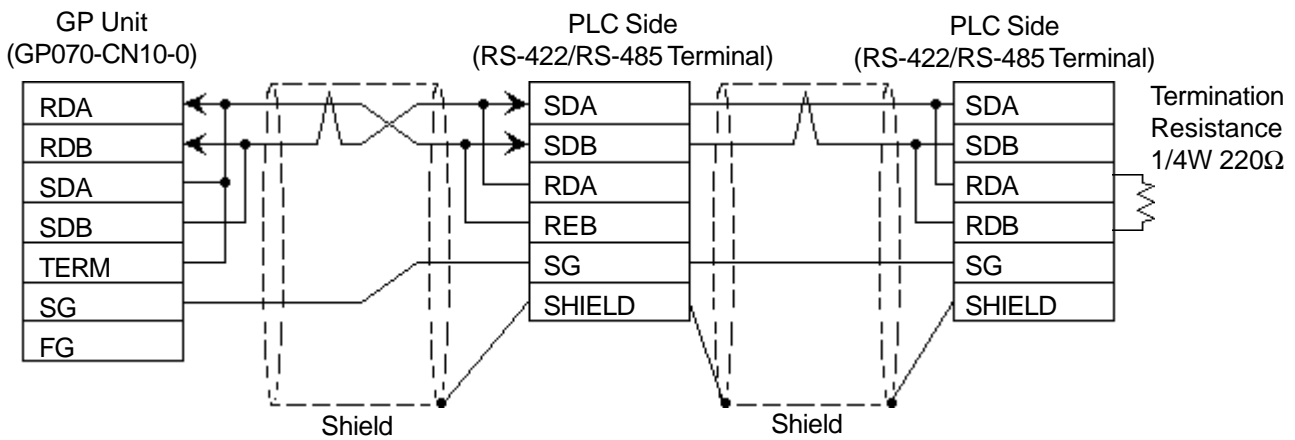


- When making your own cable connections

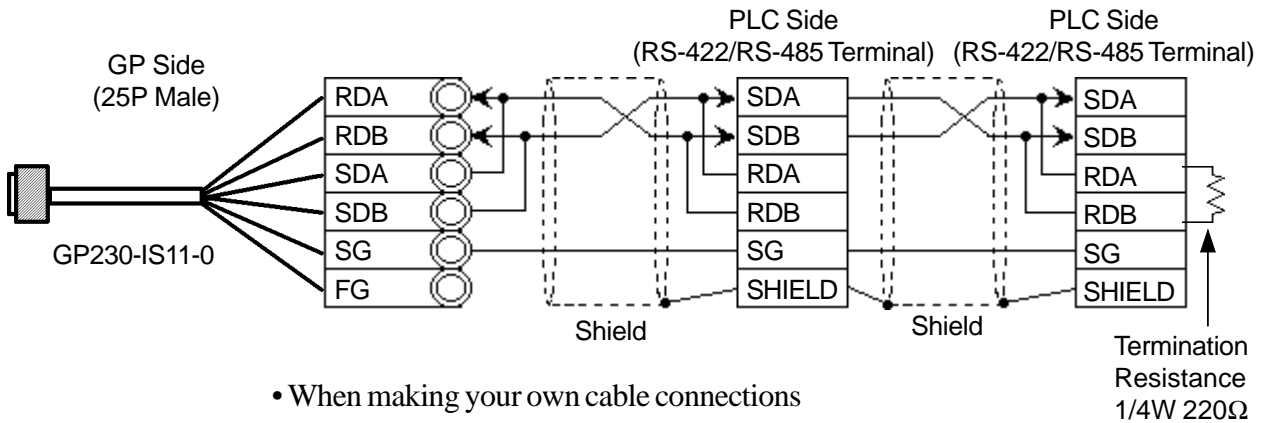


Cable Diagram 6 (RS-422)

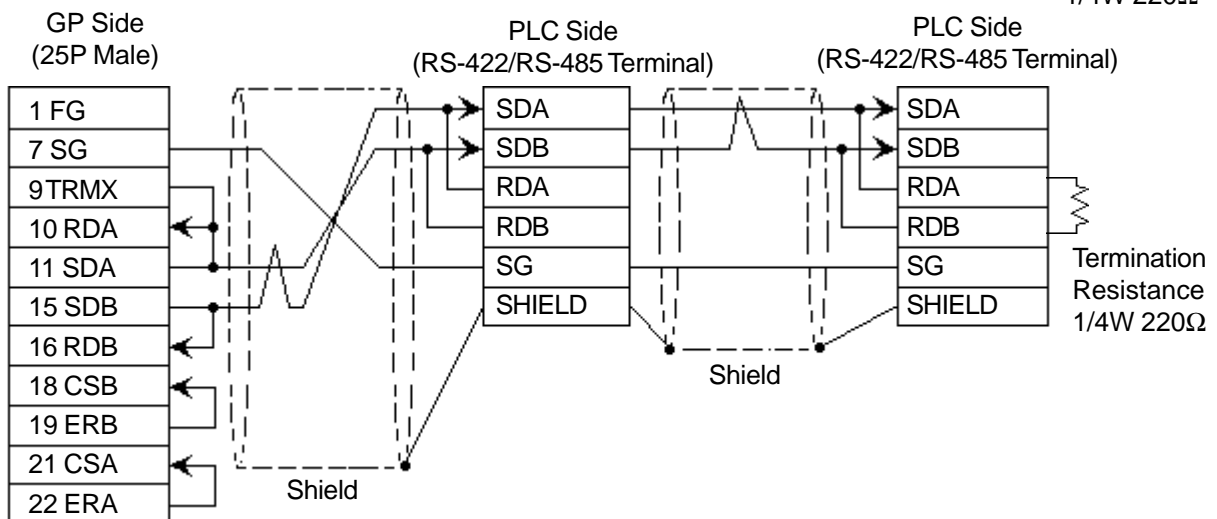
- When using Digital's RS-422 connector terminal adapter GP070-CN10-0



- When using Digital's RS-422 cable, GP230-IS11-0



- When making your own cable connections

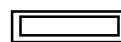








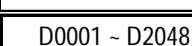




- If the connection is terminated while 2-wire type communication is being carried out, use the 2-wire termination resistance switch on the PC link module (F3LC11-2N).
- The names of the poles A and B are reversed between the GP and the PLC.

2.8.3 Supported Devices

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

■ **FA500** (1:1 communication)

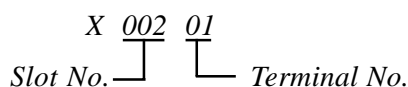
 Setup System Area here.

Device	Bit Address	Word Address	Particulars
Input Relay	X00201 ~ X61164	X00201 ~ X61149	 *1*2
Output Relay	Y00201 ~ Y61164	Y00201 ~ Y61149	 *1*2
Internal Relay	I0001 ~ I2048	I0001 ~ I2033	 *2
Joint Relay	E0001 ~ E2048	E0001 ~ E2033	
Special Relay	M001 ~ M512	M001 ~ M497	 *2*3
Link Relay	L0001 ~ L1024	L0001 ~ L1009	 *2*3
Timer (contact)	T001 ~ T256	---	*2
Counter (contact)	C001 ~ C256	---	*2
Timer (current value)	---	TP001 ~ TP256	*2
Timer (setup value)	---	TS001 ~ TS256	*2
Counter (current value)	---	CP001 ~ CP256	*2
Counter (setup value)	---	CS001 ~ CS256	*2
Data Register	---	 D0001 ~ D2048	 *2
Common Register	---	B0001 ~ B2048	 *2
Special Register	---	Z001 ~ Z128	 *2*3
Link Register	---	W0001 ~ W1024	 *2*3

L/H

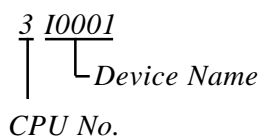
* 1 The value of the terminal number (bit), 01~49, of the last two digits for the Input Relay and Output Relay can only be a multiple of 16 +1.

E.g. For X00201



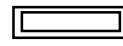
* 2 Write the CPU Number (1~4) in front of the device name.











E.g. For Internal Relay I0001, CPU #3:



* 3 Cannot perform data write.

■ FA500 (1:n communication)

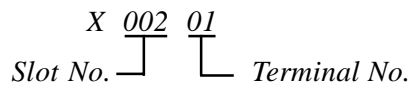
 Setup System Area here.

Device	Bit Address	Word Address	Particulars
Input Relay	X00201 ~ X61164	X00201 ~ X61149	 *1*2
Output Relay	Y00201 ~ Y61164	Y00201 ~ Y61149	 *1*2
Internal Relay	I0001 ~ I2048	I0001 ~ I2033	 *2
Joint Relay	E0001 ~ E2048	E0001 ~ E2033	 *2
Special Relay	M001 ~ M512	M001 ~ M497	 *2*3
Link Relay	L0001 ~ L1024	L0001 ~ L1009	 *2*3
Timer (contact)	T001 ~ T256	---	*2
Counter (contact)	C001 ~ C256	---	*2
Timer (current value)	---	TP001 ~ TP256	*2
Timer (setup value)	---	TS001 ~ TS256	*2
Counter (current value)	---	CP001 ~ CP256	*2
Counter (setup value)	---	CS001 ~ CS256	*2
Data Register	---	D0001 ~ D2047	 *2
Common Register	---	B0001 ~ B2047	 *2
Special Register	---	Z001 ~ Z128	 *2*3
Link Register	---	W0001 ~ W1024	 *2*3

L/H

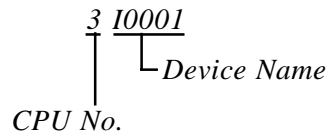
* 1 When setting Word Address, set the value of the terminal number, 01~49, of the last two digits for the Input Relay and Output Relay to a multiple of 16+1.

E.g. For X00201



* 2 Write the CPU Number (1~4) in front of the device name.

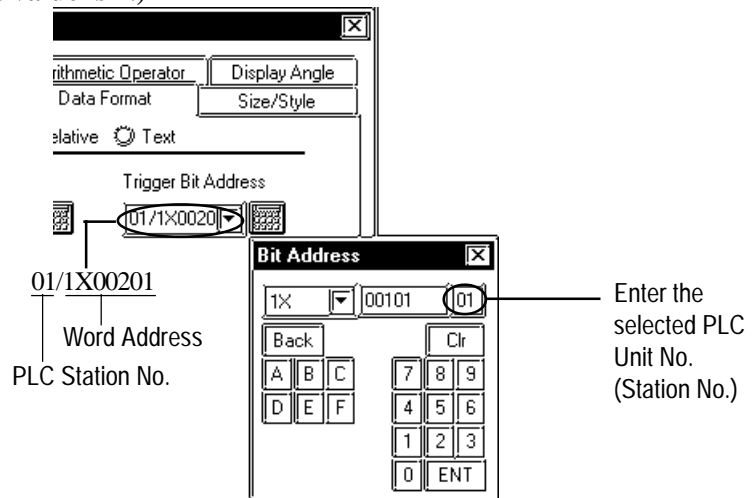
E.g. For Internal Relay I0001, CPU #3:



* 3 Cannot perform data write.



When setting tags up in GP-PRO/PBIII for Windows, the PLC Station number can be specified during address Input. If a station number is not indicated, it automatically uses the previously entered station number. (The initial default value is 1.)



■ **FA-M3 (1:1 Communication)**

 Setup System Area here.

Device	Bit Address	Word Address	Particulars
Input Relay	X00201 ~ X71664	X00201 ~ X71649	÷16+ *1*2
Output Relay	Y00201 ~ Y71664	Y00201 ~ Y71649	÷16+ *1
Internal Relay	I00001 ~ I65535	I00001 ~ I65521	÷16+
Joint Relay	E0001 ~ E4096	E0001 ~ E4081	÷16+
Special Relay	M0001 ~ M9984	M0001 ~ M9969	÷16+
Link Relay	L00001 ~ L78192	L00001 ~ L78177	÷16+ *6
Timer (contact)	T0001 ~ T3072	---	*2
Counter (contact)	C0001 ~ C3072	---	*2
Timer (current value)	---	TP0001 ~ TP3072	
Timer (setup value)	---	TS0001 ~ TS3072	*2
Counter (current value)	---	CP0001 ~ CP3072	
Counter (setup value)	---	CS0001 ~ CS3072	*2
Data Register	---	D00001 ~ D65535	Bit 5
File Register	---	B00001 ~ B065536	Bit 5 *3*4
		B065537 ~ B131072	
		B131073 ~ B196608	
		B196609 ~ B262144	
Joint Register	---	R0001 ~ R4096	Bit 5
Special Register	---	Z001 ~ Z1024	Bit 5
Link Register	---	W00001 ~ W74096	Bit 5 *5*6

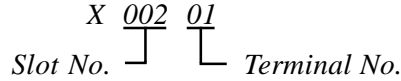
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(See next page)

*1 The value of the terminal number (bit), 01~49, of the last two digits for the Input Relay and

Output Relay can only be a multiple of 16 +1.

E.g. For X00201



*2 Cannot perform data write.

*3 File registers are each 65,535 words on your GP application.

You cannot extend over more than a single data "block" when performing the following features.

Be sure to set these features' settings so they are within a single data block.

1) "a-tag " settings

2) Performing Block read/write from Pro-Server

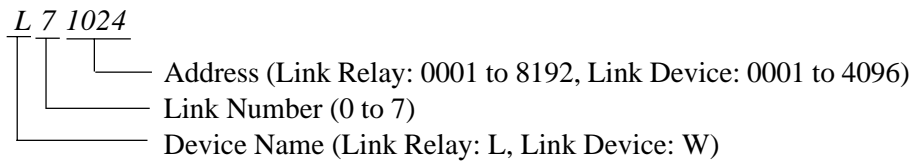
3) Designating the "Convert from" and "Conver to" address for the "Address Conversion" features

*4 When using a PC Link module, only Link Register up to B99999 can be used.

*5 A total of up to 4,096 link registers can be used.

*6 Enter Link Relay (L) and Link Register (W) data as follows:

(Ex.) When entering Link Relay "L71024" data.



The address data's left-most digit is the Link Number, and the next four digits are the address.



- Write the CPU Number (1~4) in front of the device name.

E.g. For Internal Relay I0001, CPU #3:

3 0001

CPU No.	Device Name
---------	-------------

- The range of device that can be used will vary depending on the type of PLC.

For detailed information refer to the Yokogawa's Sequence CPU manual.

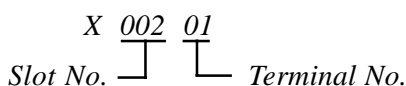
■ FA-M3 (1:n Communication)

 Setup System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	X00201 ~ X71364	X00201 ~ X71349	÷16+1 *1*2	
Output Relay	Y00201 ~ Y71364	Y00201 ~ Y71349	÷16+1 *1	
Internal Relay	I0001 ~ I32768	I0001 ~ I32753	÷16+1	
Joint Relay	E0001 ~ E4096	E0001 ~ E4081	÷16+1	
Special Relay	M0001 ~ M9984	M0001 ~ M9969	÷16+1	
Link Relay	L00001 ~ L72048	L00001 ~ L72033	÷16+1	
Timer (contact)	T0001 ~ T2047	---	*2	
Counter (contact)	C0001 ~ C2047	---	*2	
Timer (current value)	---	TP0001 ~ TP2047	L/H	
Timer (setup value)	---	TS0001 ~ TS2047		
Counter (current value)	---	CP0001 ~ CP2047		
Counter (setup value)	---	CS0001 ~ CS2047		
Data Register	---	D0001 ~ D2047		Bit 5
File Register	---	B0001 ~ B2047		Bit 5
Joint Register	---	R0001 ~ R2047		Bit 5
Special Register	---	Z001 ~ Z1024		Bit 5
Link Register	---	W0001 ~ W11024		Bit 5 *3

*1 The value of the terminal number (bit), 01~49, of the last two digits for the Input Relay and Output Relay can only be a multiple of 16 +1.

E.g. For X00201



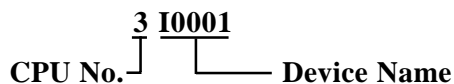
*2 Cannot perform data write.

*3 A total of up to 4,096 link registers can be used.



• Write the CPU Number (1~4) in front of the device name.

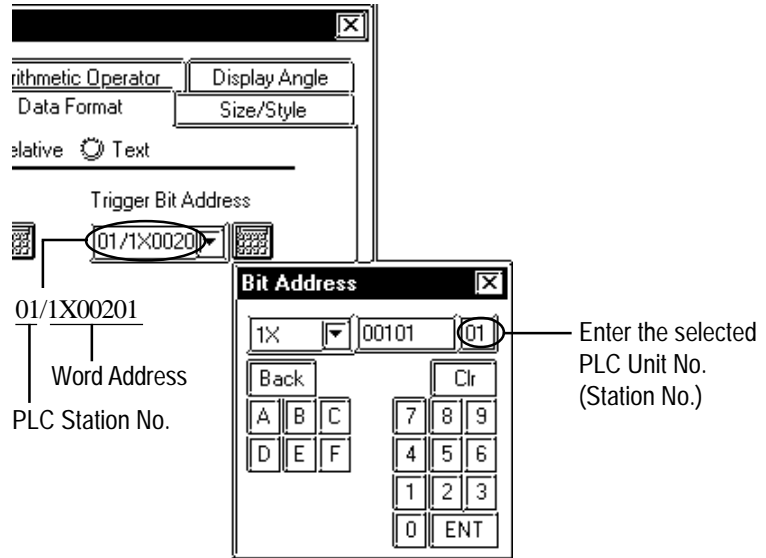
E.g. For Internal Relay I0001, CPU #3:



The range of device that can be used will vary depending on the type of PLC. For detailed information refer to the Yokogawa's Sequence CPU manual.



- When running tag setup in GP-PRO/PBIII for Windows, the PLC Station number can be specified at address Input. If a station number is not indicated, it automatically uses the previously entered station number. (The initial default value is 1.)



■ STARDOM Standalone Type Controller

Register Image	Bit Address	Word Address	Particulars
Internal Relay	I0001 ~ I32767	I0001 ~ 32753	$\div 16 + 1$
Data Register	---	D00001 ~ D32767	Bit 5
File Register	---	B000001 ~ B032767	Bit 5



- Set each device using a CPU number of 1.

2.8.4 Environment Setup

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

■ FACTORY ACE Series (using Link I/F RS-232C connection)

GP Setup		PC Link Module Setup	
Baud Rate	19200 bps	Baud Rate ^{*1}	19200 bps
Data Length	8 bits	Data Length	8 bits
Stop Bit	1 bit	Stop Bit	1 bit
Parity Bit	None	Parity Bit	None
Data Flow Control	ER Control	---	
Communication Format	RS-232C	---	
---		Check Sum	No
---		Specify End Character	Yes
---		Protect Function	No
---		Data Format Setup Switch	8 OFF
Unit No.	1	Station Number ^{*2}	1

**1 The PC Link I/F F3LC11-1F can be communicated by 115.2kbps.*

**2 The PC Link I/F F3LC01-1N does not have this setting.*

■ FACTORY ACE Series (using Link I/F RS-422 connection)

GP Setup		PC Link Module/PA Equipment Setup	
Baud Rate (1:1 comm)	19200 bps	Baud Rate (1:1 comm)	19200 bps
Baud Rate (1:n comm)	9600 bps	Baud Rate (1:n comm)	9600 bps
Data Length	8 bits	Data Length	8 bits
Stop Bit	1 bit	Stop Bit	1 bit
Parity Bit	None	Parity Bit	None
Data Flow Control	ER Control	---	
Communication Format (Select 4-wire type)	4-wire type	---	
Communication Format (Select 2-wire type)	2-wire type	---	
---		Check Sum	No
---		Specify End Character	Yes
---		Protect Function	No
---		Data Format Setup Switch	8 OFF
Unit No. (1:1 comm)	FA-500: 2 FA-M3: 1	Station No. (1:1 comm)	FA-500: 2 FA-M3: 1
Unit No. (1:n comm)	Match with PC Link Module station No.	Station No. (1:n comm)	Set up so that all PA Equip., PC Link module No.s are different

■ **FACTORY ACE Series (FA-M3 CPU Direct Connection)**

GP Setup		CPU Communication Port Setup	
Baud Rate	19200 bps	Baud Rate	19200 bps ^{*1}
Data Length	8 bits	---	
Stop Bit	1 bit	---	
Parity Bit	Even	Parity Bit	Even
Data Flow Control	ER Control	---	
Communication Format	RS-232C	---	
---		PC Link Function	Use
---		Check Sum	No
---		Specify End Character	Yes
---		Protect Function	No
Unit No.	1	---	

**1 For F3SP28-3N, F3SP38-6N, F3SP53-4H, and F3SP58-6H, a baud rate of 115200 bps is also available.*

■ **STARDOM Standalone Type Controller**

GP Setup		CPU Communication Port Setup	
Baud Rate	19200 bps ^{*4}	Baud Rate	19200 bps ^{*1,4}
Data Length	8 bits	Data Length	8 bits ^{*1}
Stop Bit	1 bit	Stop Bit	1 bit ^{*1}
Parity Bit	None	Parity Bit	None ^{*1}
Data Flow Control	ER Control	---	
Communication Format	RS-232C	---	
---		Check Sum	No ^{*2}
---		Specify End Character	Yes ^{*2}
Unit No.	1	Station No.	1 ^{*2}

**1 Set these parameters in the COM port setup using the Web browser.*

**2 Pass the settings to the task startup FB parameters.*

**3 Set the COM port as follows:*

Com1SioDriver=DUONUS_S10

Com2SioDriver=DUONUS_S10

ConsoleComPort=(blank)

**4: Communication at 115.2 kbps is possible.*