

Yokogawa Electric

FA-M3 Link (SIO) Driver

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- This manual explains how to connect the target machine with other manufacturer devices. For information about how to use the Pro-Designer software, please refer to the Pro-Designer Online Help.
- The types of target machines that are compatible with Pro-Designer depends on the version of Pro-Designer. For information about the compatibility of target machines, please refer to the Pro-Designer Online Help.

1 System Structure

The following table describes the basic system setup for connecting the target machine to Yokogawa PLCs over a serial connection.

To view a cable connection diagram for a particular communication format, see Section 2 – [Cable Diagrams](#).

Series	CPU	Link I/F	Comm. Format	Diagram
FA-M3 Series	F3SP21-0N	F3LC11-1N	RS-232C	Cable Diagram 1
	F3SP25-2N			
	F3SP28-3N	F3LC11-2N	RS-422 (4 wire)	Cable Diagram 2
	F3SP28-3S			
	F3SP35-5N			
	F3SP38-6N			
	F3SP38-6S			
	F3SP53-4H			
	F3SP53-4S			
F3SP58-6H	RS-422 (4 wire) (1:n)*1	Cable Diagram 3		
F3SP58-6S				
			RS-422 (2 wire)	Cable Diagram 4
			RS-422 (2 wire) (1:n)*1	Cable Diagram 5

*1 Up to 32 PLCs can be connected to the target machine.

2 Cable Diagrams

The illustrated cable diagrams and those recommended by Yokogawa may differ. However, Pro-face recommends using the following diagrammed connections.

- Ground the PLC's FG terminal according to your country's applicable standard. For details, refer to the PLC manual.
- When making your own communication cable, be sure to connect the SG signal.

Diagram 1 RS-232C

To connect the target machine and the PLC, create your own cable using the following specifications.

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	User-Created Cable	Cable length: 15m max.

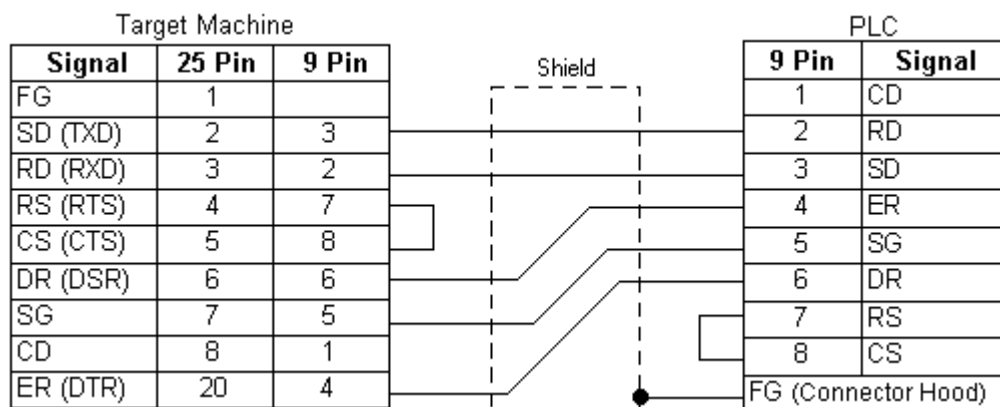


Diagram 2 RS-422 (4-wire)

To connect the target machine and the PLC, use a signal converter or create your own cable using the following specifications.

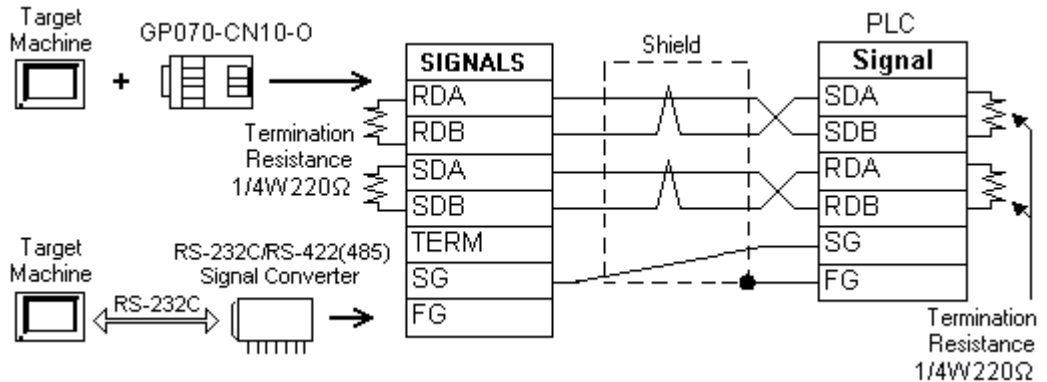
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

*1 Connect to COM1.

MEMO

Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground.

- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)
OR: RS-232C/RS-422(485) Signal Converter

**MEMO**

- As the RS-422(485) side of the RS-232C/RS-422(485) signal converter is a terminal, use any external line other than the communication line for the power cable.
- Follow the specifications for your RS-232C/RS-422(485) signal converter when connecting termination resistance on the RS-422(485) terminal.
- The RS-232C connection between the RS-232C/RS-422(485) signal converter and target machine depends on the signal converter. Refer to its specifications when connecting the signal converter and target machine.

- b. User-created Cable

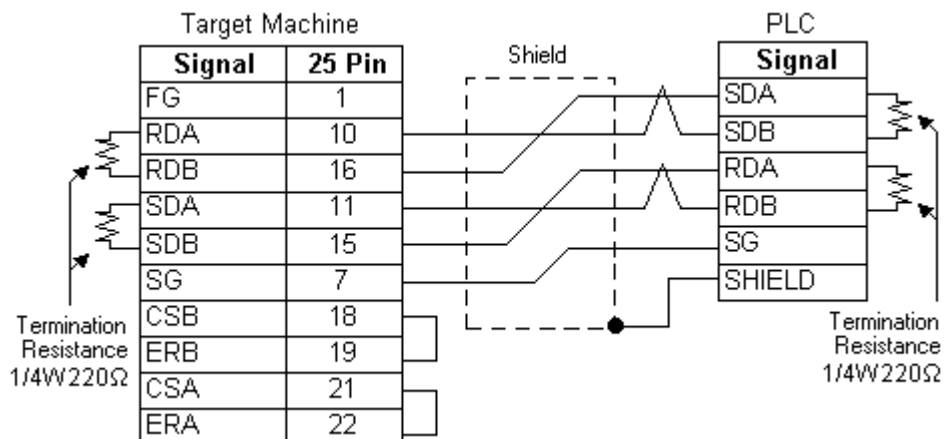


Diagram 3 RS-422 (4-wire) (1:n)

To connect the target machine and the PLC, use a signal converter or create your own cable using the following specifications.

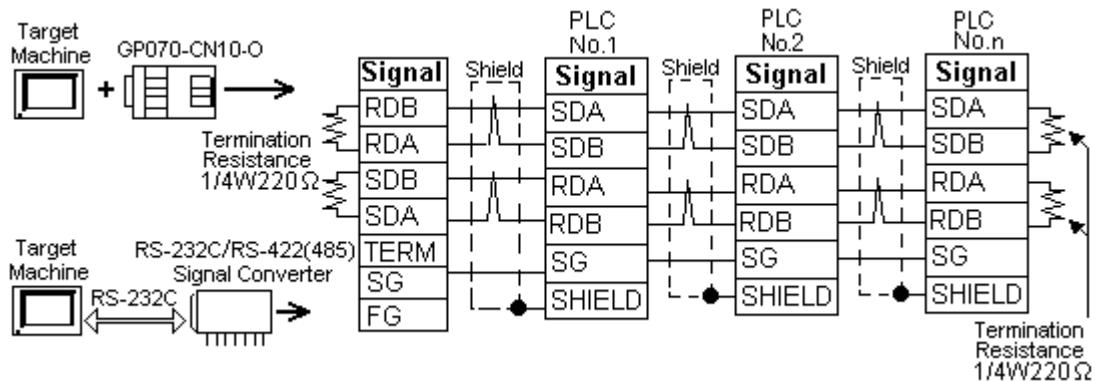
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

*1 Connect to COM1.

MEMO

Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground.

- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)
OR: RS-232C/RS-422(485) Signal Converter



- b. User-created Cable

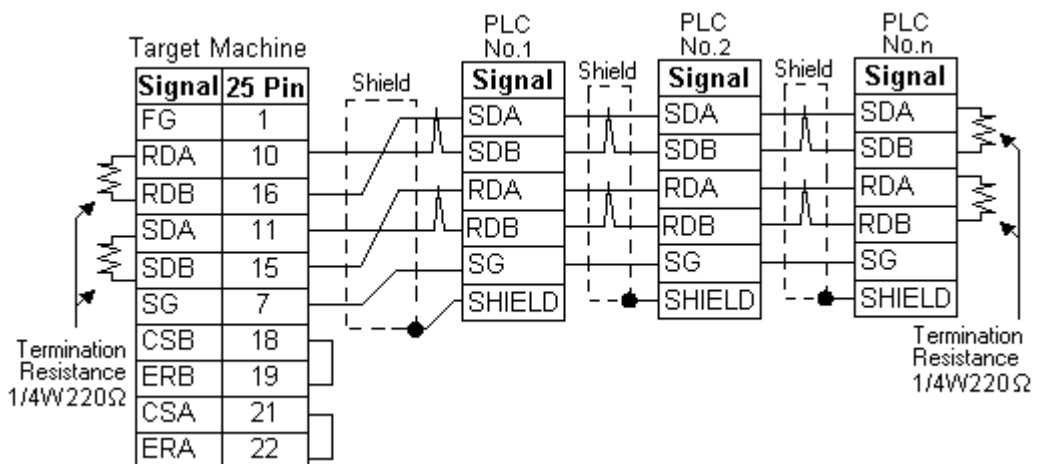


Diagram 4 RS-422 (2-wire)

To connect the target machines and the PLC, use a recommended cable (and a pin adapter if necessary), a signal converter, or create your own cable using the following specifications.

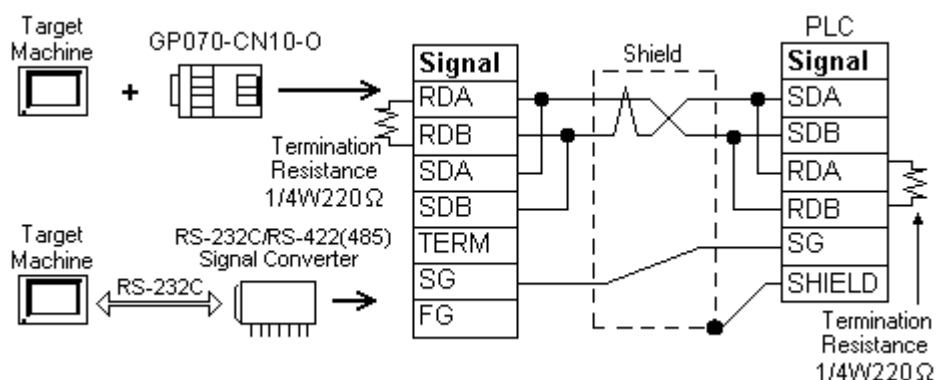
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

*1 Connect to COM1.

MEMO

Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground.

- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)
OR: RS-232C/RS-422(485) Signal Converter

**MEMO**

- As the RS-422(485) side of the RS-232C/RS-422(485) signal converter is a terminal, use any external line other than the communication line for the power cable.
- Follow the specifications for your RS-232C/RS-422(485) signal converter when connecting termination resistance on the RS-422(485) terminal.
- The RS-232C connection between the RS-232C/RS-422(485) signal converter and target machine depends on the signal converter. Refer to its specifications when connecting the signal converter and target machine.

b. User-created Cable

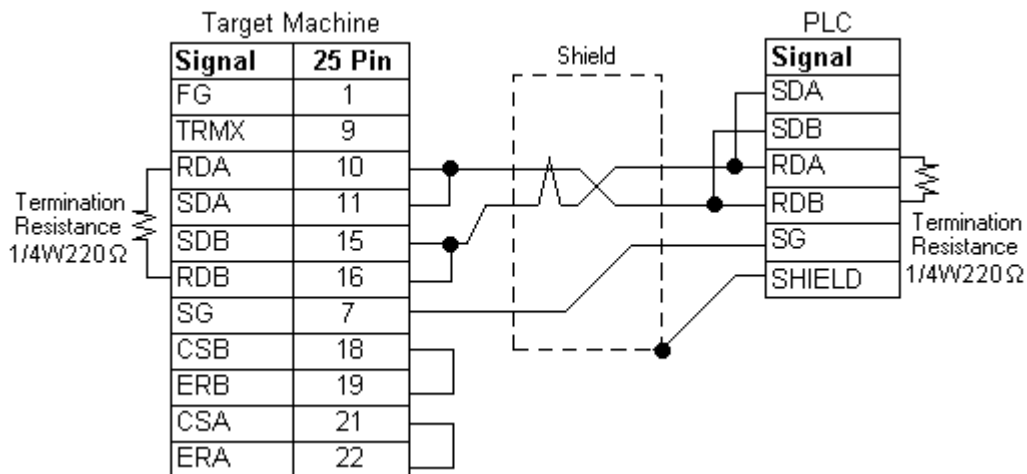


Diagram 5 RS-422 (2-wire) (1:n)

To connect the target machines and the PLC, use a recommended cable (and a pin adapter if necessary), a signal converter, or create your own cable using the following specifications.

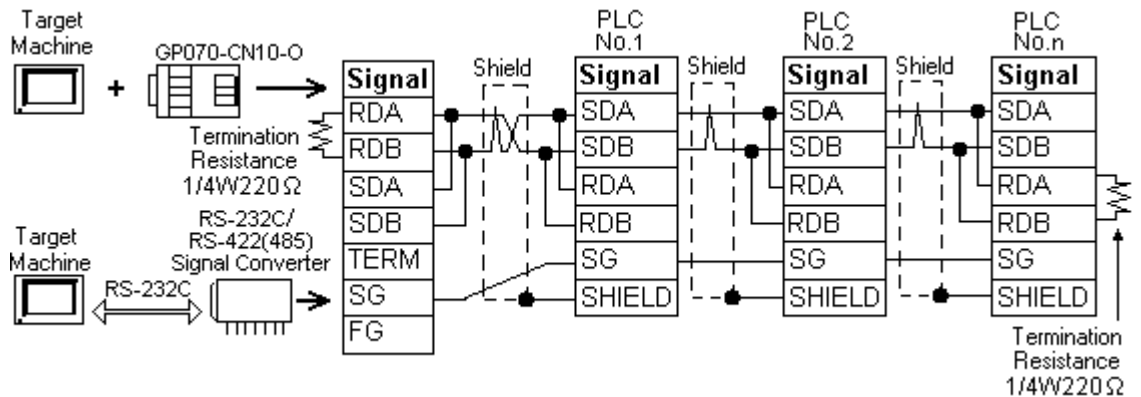
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

*1 Connect to COM1.

MEMO

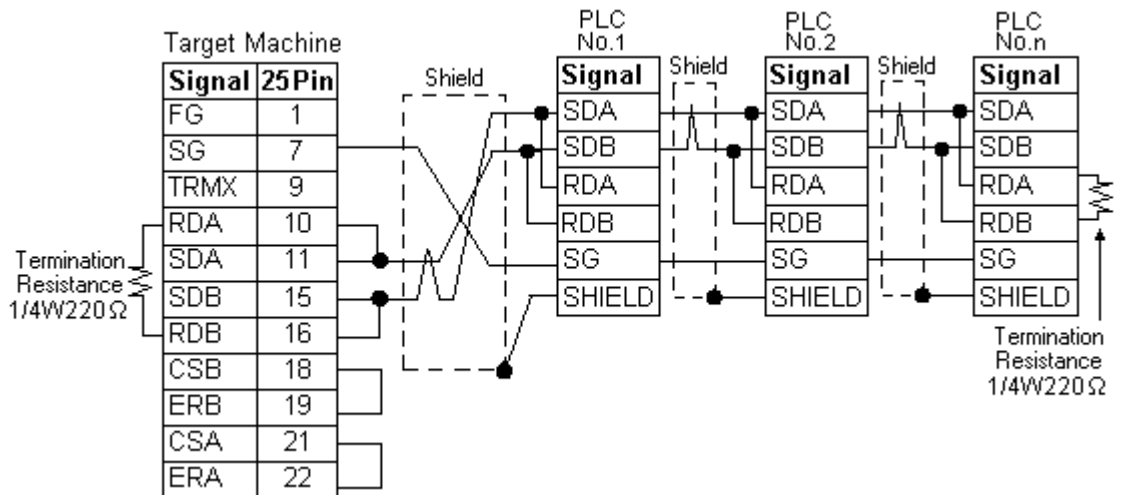
Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground.

- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)
OR: RS-232C/RS-422(485) Signal Converter

**MEMO**

- As the RS-422(485) side of the RS-232C/RS-422(485) signal converter is a terminal, use any external line other than the communication line for the power cable.
- Follow the specifications for your RS-232C/RS-422(485) signal converter when connecting termination resistance on the RS-422(485) terminal.
- The RS-232C connection between the RS-232C/RS-422(485) signal converter and target machine depends on the signal converter. Refer to its specifications when connecting the signal converter and target machine.

- b. User-created Cable



3 Supported Device Addresses

The following table lists the device address ranges you can enter from the [Device Address Keypad](#).

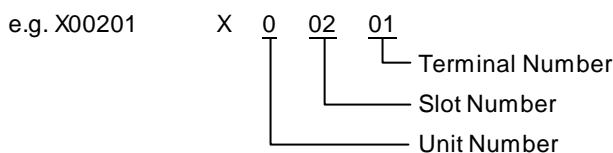
For actual device address ranges supported by the PLC, refer to the corresponding PLC manual. Supported device addresses differ from protocol to protocol and between PLC models.

Device	Bit Address ^{*1}	Word Address	16 bit	32 bit
Input Relay ^{*2}	X00201-X71664	X00201-X71649 ^{*3}	L/H ^{*7}	L/H ^{*7}
Output Relay	Y00201-Y71664	Y00201-Y71649 ^{*3}		
Internal Relay	I00001-I32768	I00001-I32753 ^{*4}		
Joint Relay ^{*5}	E0001-E4096	E0001-E4081 ^{*4}		
Special Relay	M0001-M9984	M0001-M9969 ^{*4}		
Link Relay	L00001-L78192	L00001-L78177 ^{*4}		
Timer (Timer Flag)	TU0001-TU3072	--		
Timer (Current Value)	--	TP0001-TP3072		
Timer (Setup Value)	--	TS0001-TS3072 ^{*2}		
Counter (Counter Flag)	CU0001-CU3072	--		
Counter (Current Value)	--	CP0001-CP3072		
Counter (Setup Value)	--	CS0001-CS3072 ^{*2}		
Data Register	D00001:00-D32768:15	D00001-D32768 ^{*6}		
Joint Register ^{*5}	R0001:00-R4096:15	R0001-R4096 ^{*6}		
File Register	B00001:00-B:99999:15	B00001-B99999 ^{*6}		
Link Register	W00001:00-W74096:15	W00001-W74096 ^{*6}		
Special Register	Z0001:00-Z1024:15	Z0001-Z1024 ^{*6}		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the new word address to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incorrect.

*2 Read-only.

*3 The last two digits represent the terminal number.



To use as a word address, the terminal number must be 49 or less, and a multiple of 16 plus 1.

*4 To use as a word address, the bit number must be a multiple of 16 plus 1.

*5 You cannot write to the Joint Register or Joint Relay when the same device area exists on the CPU. The CPU area has precedence, so if you write values to a R or E device address that also exists in the CPU, it's overwritten by the CPU.

*6 You can define a bit address by adding a colon followed by the bit position (0-15) at the end of the word. (e.g. D0001:15)

*7 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

Byte	16 bit		Word	32 bit	
0	7 ... 0	L (Low)	0	15 ... 0	L (Low)
1	15 ... 8	H (High)	1	31 ... 16	H (High)

4 Consecutive Device Addresses

The following table lists the maximum number of consecutive addresses that can be read by each PLC. Refer to this table when using block transfers.

MEMO

- To speed up data communication, use consecutive device addresses on the same panel screen.
- The following situations increase the number of times that the device is read, and reduces the data communication speed between the target machine and the PLC:
 - when the number of consecutive addresses exceeds the maximum
 - when an address is designated for division
 - when different device types are used

Device	Max. Consecutive Addresses	Gap Span
Input Relay (X)	256 bits	15 bits
Output Relay (Y)		
Internal Relay (I)		
Joint Relay (E)		
Special Relay (M)		
Link Relay (L)		
Timer [Timer Flag] (TU)		
Counter [Counter Flag] (CU)		
Timer [Setup Value] (TS)	64 words	16 words
Counter [Setup Value] (CS)		
Timer [Current Value] (TP)		
Counter [Current Value] (CP)		
Data Register (D)		
Joint Register (R)		
File Register (B)		
Link Register (W)		
Special Register (Z)		

5 Environment Setup

The following table lists the communication settings, recommended by Pro-face, for the target machine and Yokogawa Electric PLCs.

For details, see Section 7 – [Driver Configuration](#), and Section 8 – [Protocol Configuration](#).

RS-232C

Target Machine Settings			PLC Settings	
Driver Interface	Serial Interface	RS-232C	Connection Format	RS-232C
	Flow Control	DTR(ER)/CTS	--	
	Transmission Speed	19200 bps	Baud Rate	19200 bps
	Retry Count	2	--	
	Parity Bit	None	Parity	None
	Stop Bit	1 bit	Stop Bit	1 bit
	Data Length	8 bit	Data Length	8 bit
	Rcv. Time Out	10 s	--	
	TX Wait Time	0 ms	--	
	--	--	Checksum	No
	--	--	Specify End Character	Yes
	--	--	Protect Function	No
	--	--	Data Format Setup Switch	8 OFF
Protocol	Station No.	1	Station Number	1
	CPU No.	1	CPU No.	1

RS-422 (1:1)

		Target Machine Settings		PLC Settings	
		GP, PS-P	PC/AT(PL),PS-G		
Driver Interface	Serial Interface	RS-422(4 wire) or RS-422(2-wire)	RS-232C*1	Connection Format	RS-422(4 wire) or RS-422(2-wire)
	Flow Control	None	DTR(ER)/CTS	--	
	Transmission Speed	19200 bps		Baud Rate	19200 bps
	Retry Count	2		--	
	Parity Bit	None		Parity	None
	Stop Bit	1 bit		Stop Bit	1 bit
	Data Length	8 bit		Data Length	8 bit
	Rcv. Time Out	10 s		--	
	TX Wait Time	0 ms		--	
		--		Checksum	No
		--		Specify End Character	Yes
		--		Protect Function	No
		--		Data Format Setup Switch	8 OFF
Protocol	Station No.	1		Station Number	1
	CPU No.	1		CPU No.	1

*1 By using a RS-232C/RS-422(485) signal converter, you can use RS-422 connections with PC/AT (PL Series) and PS Series Type G target machines. In such a configuration, make sure you set the Driver's Serial Interface to RS-232C.

RS-422 (1:n)

		Target Machine Settings		PLC Settings	
		GP, PS-P	PC/AT(PL),PS-G		
Driver Interface	Serial Interface	RS-422(4 wire) or RS-422(2-wire)	RS-232C ^{*1}	Connection Format	RS-422(4 wire) or RS-422(2-wire)
	Flow Control	None	DTR(ER)/CTS	--	
	Transmission Speed	9600 bps		Baud Rate	9600 bps
	Retry Count	2		--	
	Parity Bit	None		Parity	None
	Stop Bit	1 bit		Stop Bit	1 bit
	Data Length	8 bit		Data Length	8 bit
	Rcv. Time Out	10 s		--	
	TX Wait Time	0 ms		--	
		--		Checksum	No
		--		Specify End Character	Yes
		--		Protect Function	No
		--		Data Format Setup Switch	8 OFF
	--		Termination Resistance Switch ^{*2}	Yes	
Protocol	Station No.	1		Station Number ^{*3}	1
	CPU No.	1		CPU No.	1

*1 By using a RS-232C/RS-422(485) signal converter, you can use RS-422 connections with PC/AT (PL Series) and PS Series Type G target machines. In such a configuration, make sure you set the Driver's Serial Interface to RS-232C.

*2 If the connection is terminated in 2-wire communications, use the 2-wire Termination Resistance Switch on the PC link module.

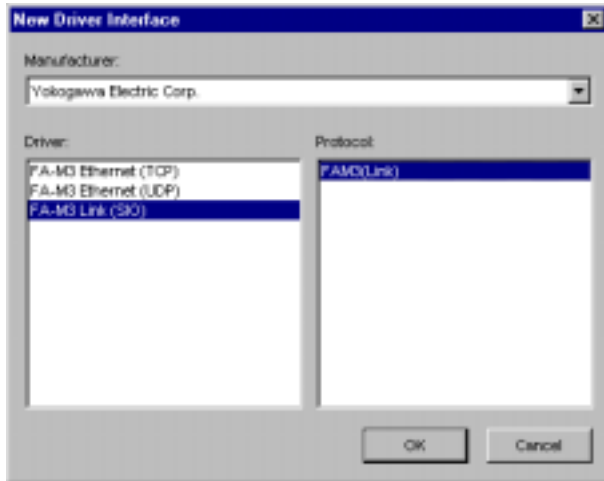
*3 When using a 1:n connection, set up a different Station Number for each PLC. You can connect a maximum 32 PLCs.

6 I/O Manager Configuration

The driver and protocol, which enable communication between the target machine and the PLC, depends on the PLC type.

MEMO

For information on how to display the [New Driver Interface] dialog box, see the online help.



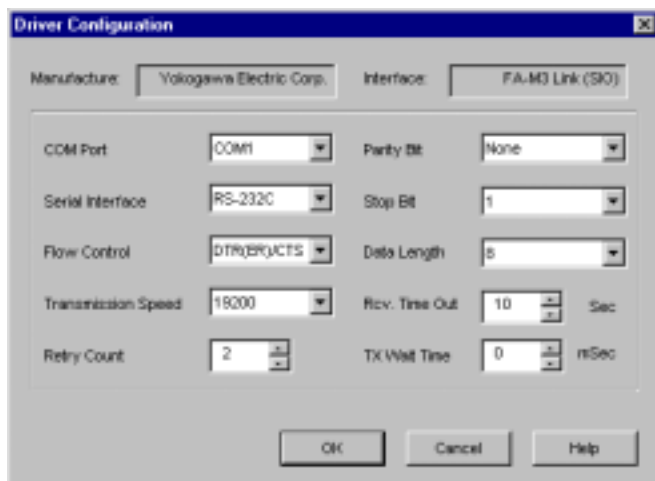
7 Driver Configuration

To configure the communication settings of the serial driver in the target machine, use the [Driver Configuration] dialog box. Make sure the settings match those of the PLC.

For an overview of the driver and protocol settings, see Section 5 – [Environment Setup](#).

MEMO

For information on how to display the [Driver Configuration] dialog box, see the online help.



Manufacturer

Displays the name of the PLC manufacturer.

Interface

Displays the type of serial connection used to connect the target machine to the PLC.

COM Port

Defines which COM port to use on the target machine, for connecting to the PLC.

MEMO

Select COM1 for PS Series Type G target machines. Connection is not possible using COM2.

Serial Interface

Defines the serial connection: RS-232C, RS-422 (2-wire), or RS-422 (4-wire).

For details about the supported connections, see Section 2 – [Cable Diagrams](#).

Flow Control

Defines the signals that control the data flow.

Transmission Speed

Sets the communication speed in bits per second. This setting must match the PLC baud rate.

Retry Count

Defines the number of times the driver tries to send or receive data when there is an error.

Parity Bit

Sets either a parity bit [Even or Odd] for use in detecting communication errors, or [None].

Stop Bit

Defines the stop bit: 1, 1.5, or 2 bits.

Data Length

Defines the length of each unit of data: 7 bit or 8 bit.

Rcv. Timeout

Defines the length of time the target machine waits for a response before it outputs a timeout error or sends another communication.

TX Wait Time

Defines the number of milliseconds that the target machine waits, after receiving a communication packet, before sending a response.

8 Protocol Configuration

To set up details about the communication process between the target machine and the PLC, use the [Protocol Configuration] dialog box.

For an overview of the driver and protocol settings, see Section 5 – [Environment Setup](#).

MEMO

For information on how to display the [Protocol Configuration] dialog box, see the online help.

**Station No.**

Enter a value to identify which PLC unit to communicate with. (1-32)

CPU No.

Select the slot number of the CPU that the protocol communicates with.

To communicate with multiple CPUs in the same module, add a Protocol for each CPU and configure the CPU No. so that it's different for each protocol.

9 Device Address Configuration

To set up a PLC variable in the Variable List, use the Device Address Keypad from the variable properties.

See Section 3 – [Supported Device Addresses](#).

MEMO

For information on how to display the Device Address Keypad, see the online help.



Device

Lists the PLC's discrete and word device types.

Address

Enter the device address for the PLC variable. The keypad ensures that you enter the correct format for bit and word devices.