

# Toshiba

## Toshiba PROSEC T-Series (SIO) Driver

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- This manual explains how to connect the target machine with devices from other manufacturers. 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 Pro-Designer version. For information about target machine compatibility, 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 Toshiba 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
PROSEC T-Series	T1	CPU Programmer Port	RS-232C	Cable Diagram 1
		CU111	RS-485	Cable Diagram 2
			RS-485 (1:n) <sup>*1 *2</sup>	Cable Diagram 3
	T1S	CPU Programmer Port	RS-232C	Cable Diagram 1
		CU111	RS-485	Cable Diagram 2
			RS-485 (1:n) <sup>*1</sup>	Cable Diagram 3
			CPU Computer Link Port	RS-485
		RS-485 (1:n) <sup>*1</sup>	Cable Diagram 5	
	T2	CPU Module: Computer Link Port (PU224 only)	RS-485	Cable Diagram 6
			RS-485 (1:n) <sup>*1</sup>	Cable Diagram 7
	T2E	CPU Module: Programmer Port	RS-232C	Cable Diagram 8
		CM231E	RS-485	Cable Diagram 9
		CM232E	RS-232C	Cable Diagram 10
	T2N	CPU Module: Programmer Port	RS-232C	Cable Diagram 8
		CPU Module: Computer Link Port	RS-232C	Cable Diagram 11
			RS-485	Cable Diagram 6
RS-485 (1:n) <sup>*1</sup>			Cable Diagram 7	
T3 T3H	CPU Module: Computer Link Port	RS-485	Cable Diagram 12	
		RS-485 (1:n) <sup>*1</sup>	Cable Diagram 13	

\*1 Up to 32 PLCs can connect to the target machine.

\*2 Supports PLC version 1.1 or higher.

## 2 Cable Diagrams

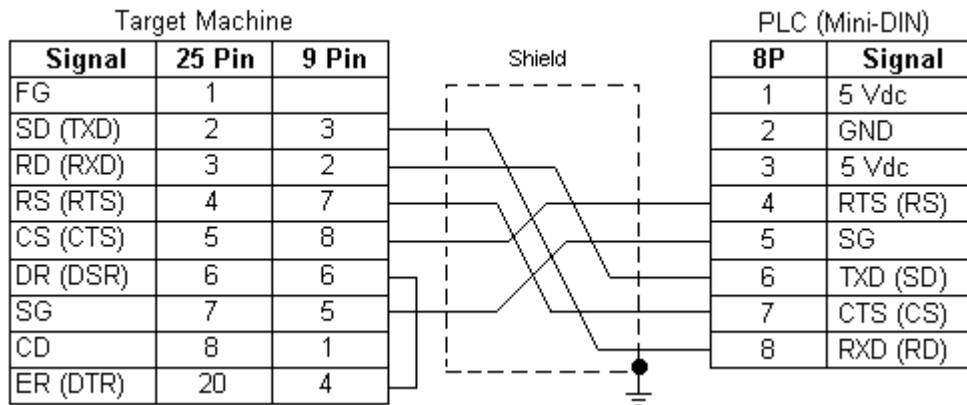
The illustrated cable diagrams and those recommended by Toshiba may differ. However, Pro-face recommends using the following diagrammed connections.

- Ground the PLC's FG terminal according to your country's applicable standard. For details, refer to the PLC manual.
- When using a connector hood, and you are grounding the FG line, be sure to use an electrical conductor.
- 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, use a recommended cable (and a pin adapter if necessary), or create your own cable using the following specifications.

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	RS-232C Cable (Toshiba: PT16S) 2m	Cable length: 15m max.
	User-created Cable	



#### MEMO

Do NOT connect wires to Pins 1, 2, or 3 on the PLC. Pins 1, 2, and 3 are NOT used for communication.

## Diagram 2 RS-485

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.

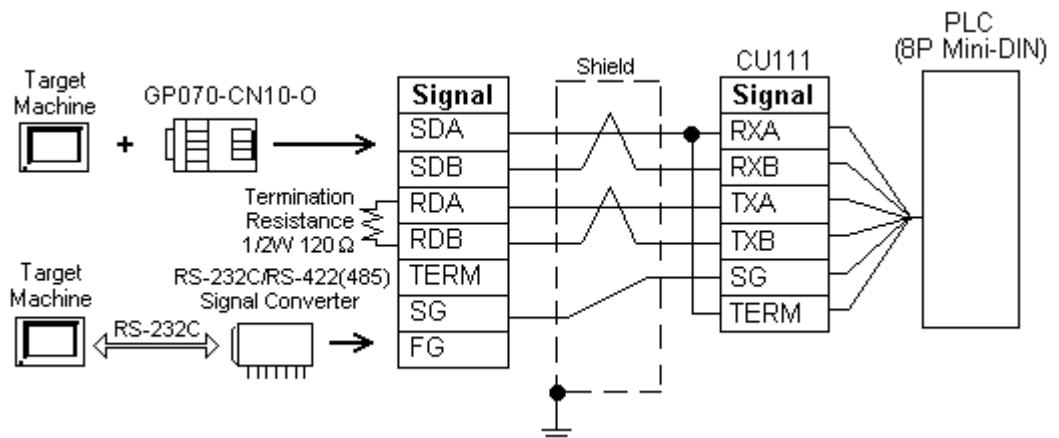
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b RS-422 Cable (Pro-face: GP230-IS11-O)	
	c User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*1 Connect to COM1.

**MEMO**

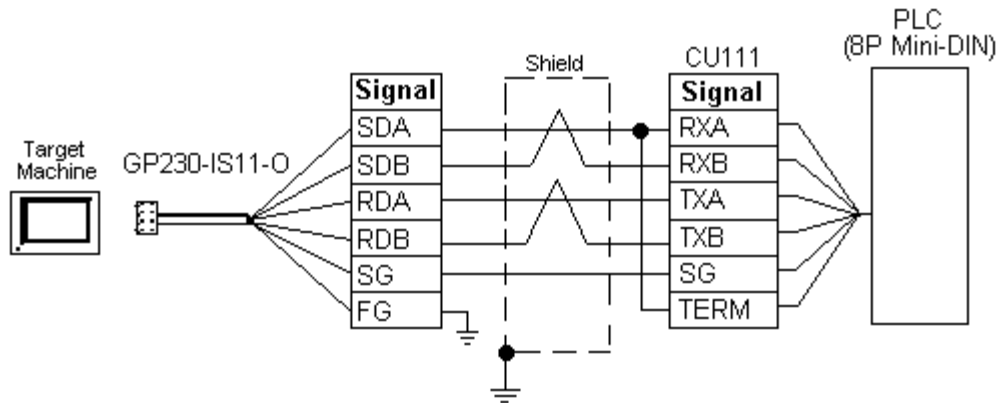
Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.

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

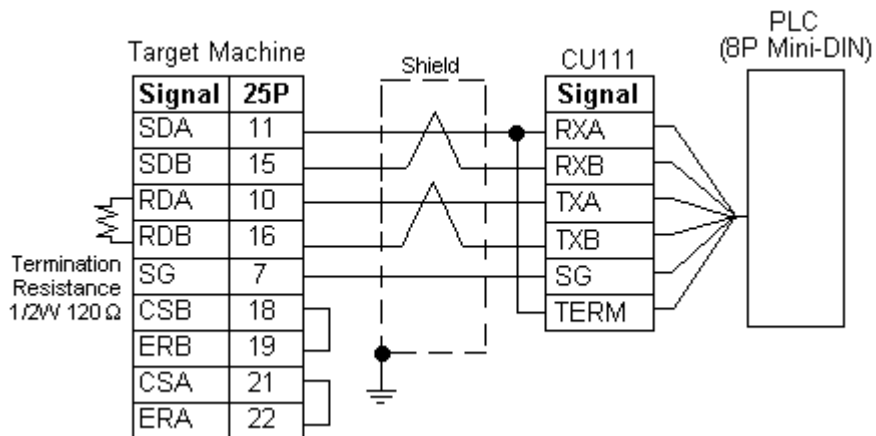
**MEMO**

- 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. RS-422 Cable (Pro-face: GP230-IS11-O)



## c. User-created Cable



## Diagram 3 RS-485 (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.

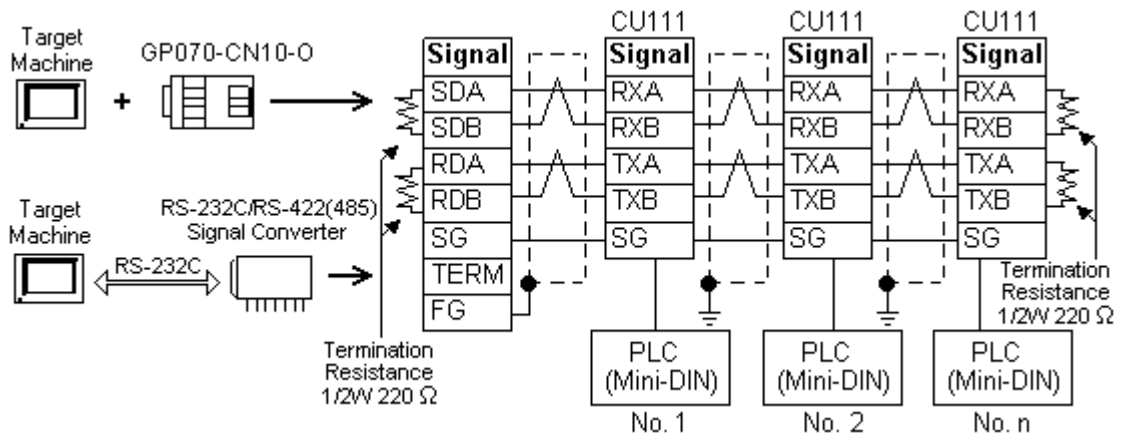
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a   RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b   User-created Cable	
PC/AT(PL), PS-G	a   RS-232C / RS-422(485) Signal Converter	

\*1 Connect to COM1.

**MEMO**

- Normally, the T1S uses the CPU's computer link port (RS-485) for multi-drop connections.
- Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.
- Up to 32 PLCs can connect to the target machine.

- 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

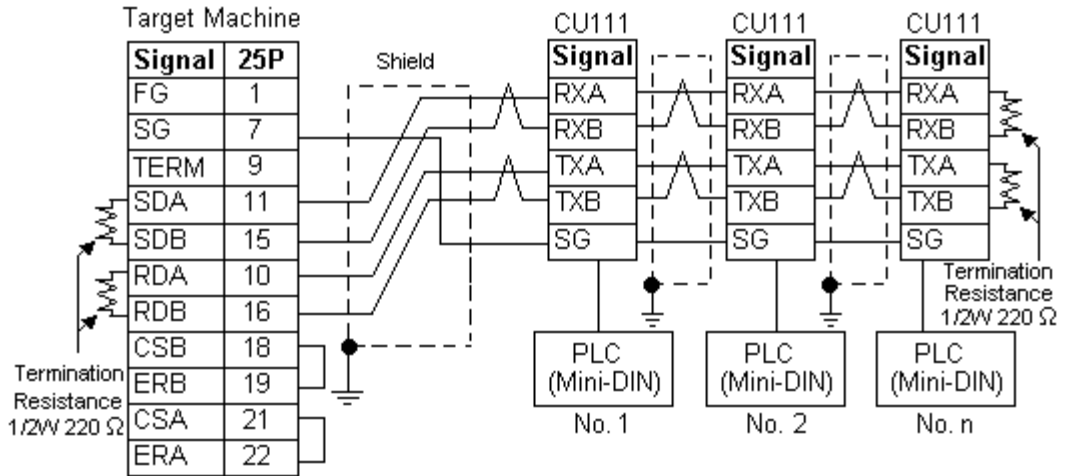


Diagram 4 RS-485

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

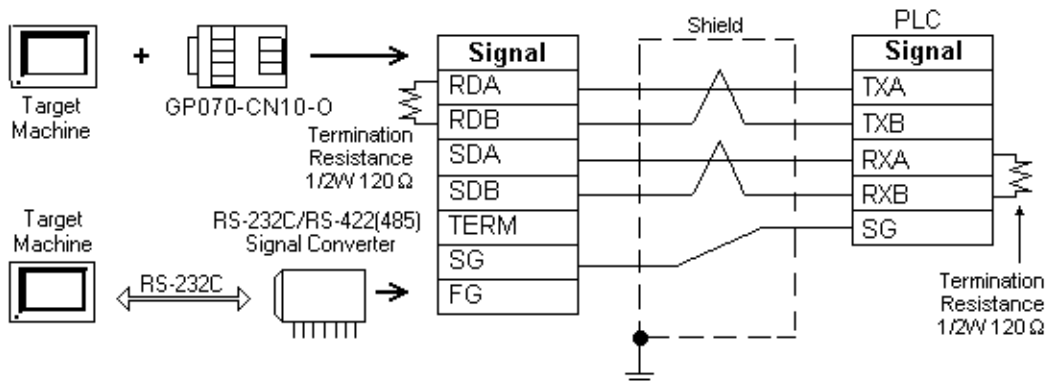
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*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 on the PLC side.

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

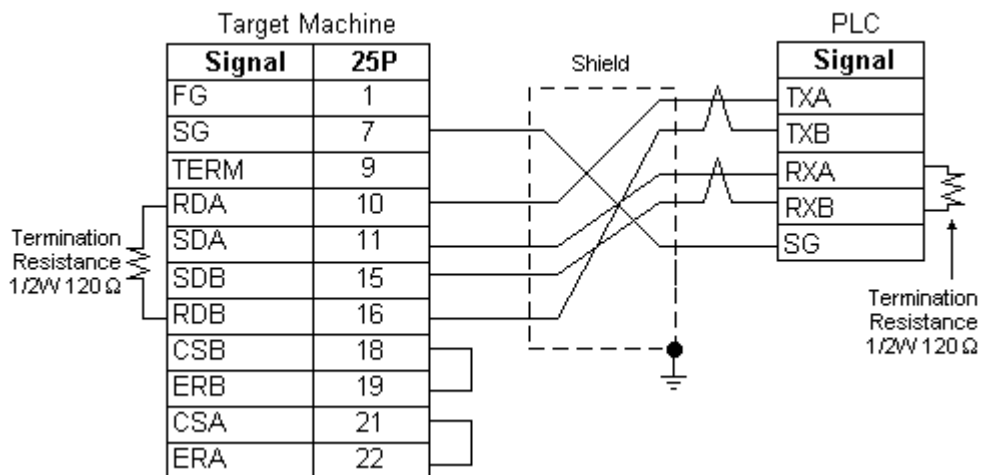


Diagram 5 RS-485 (1:n)

To connect the target machines 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	

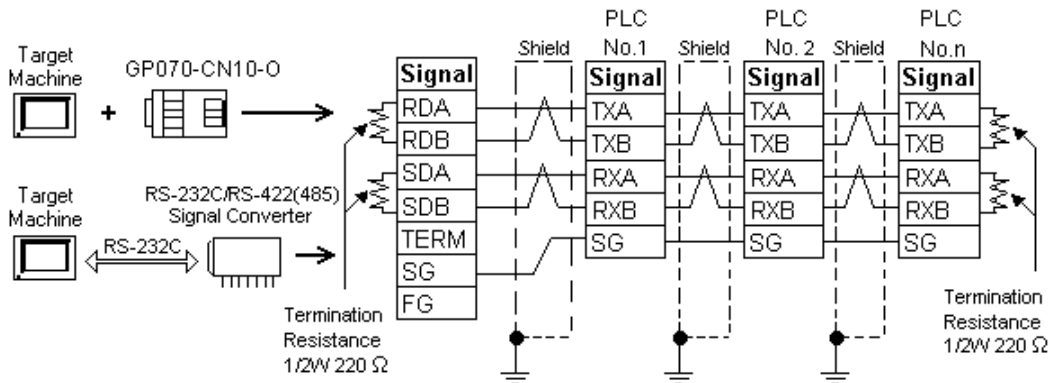
\*1 Connect to COM1.

**MEMO**

- Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.
- Up to 32 PLCs can connect to the target machine.

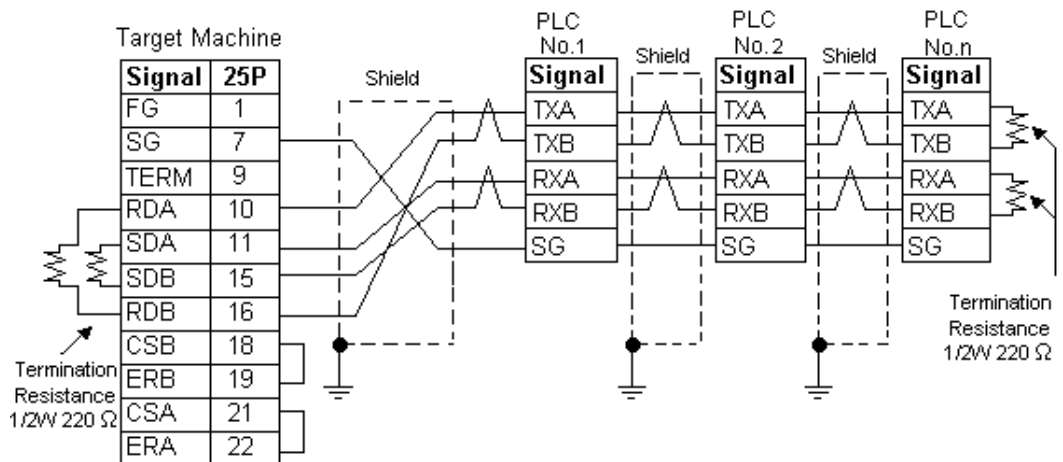


- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)  
OR: RS-232C/RS-422(485) Signal Converter

**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 6 RS-485

To connect the target machine 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.

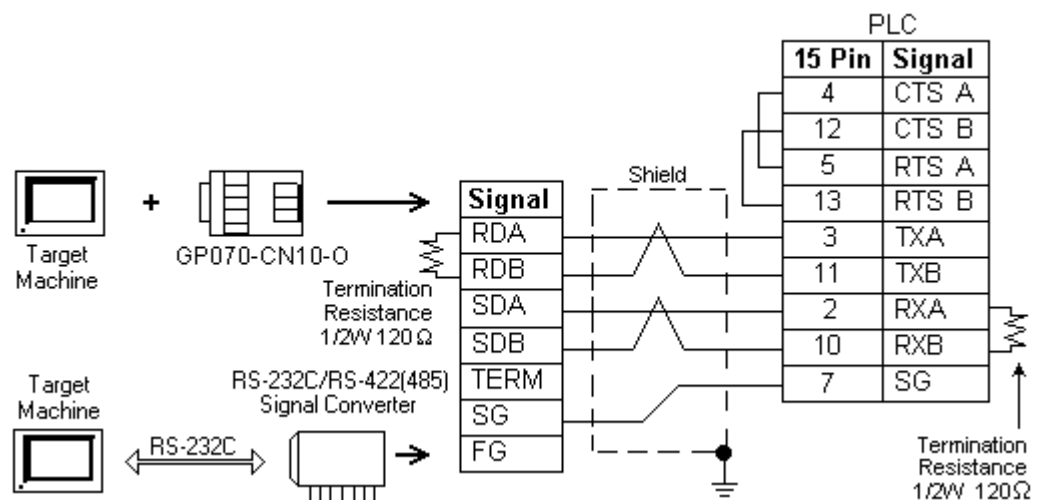
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b RS-422 Cable (Pro-face: GP230-IS11-O)	
	c User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*1 Connect to COM1.

**MEMO**

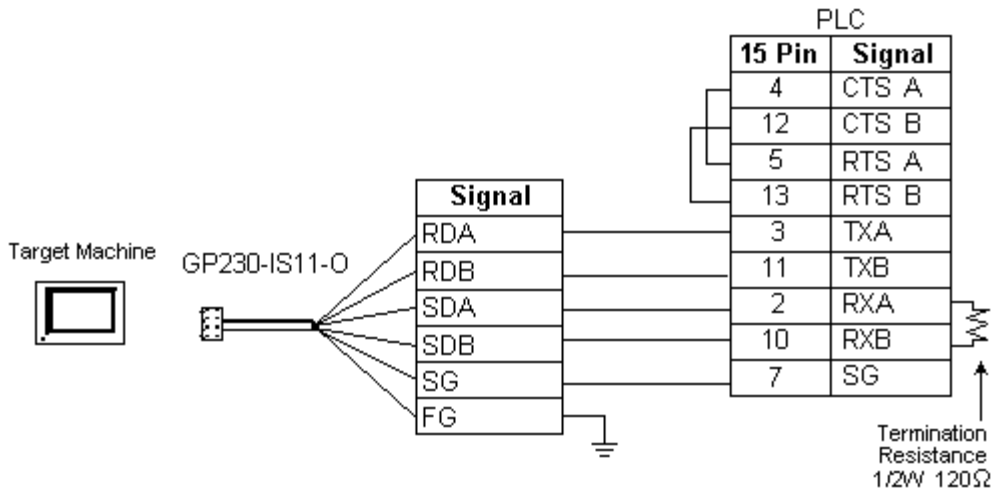
Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.

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

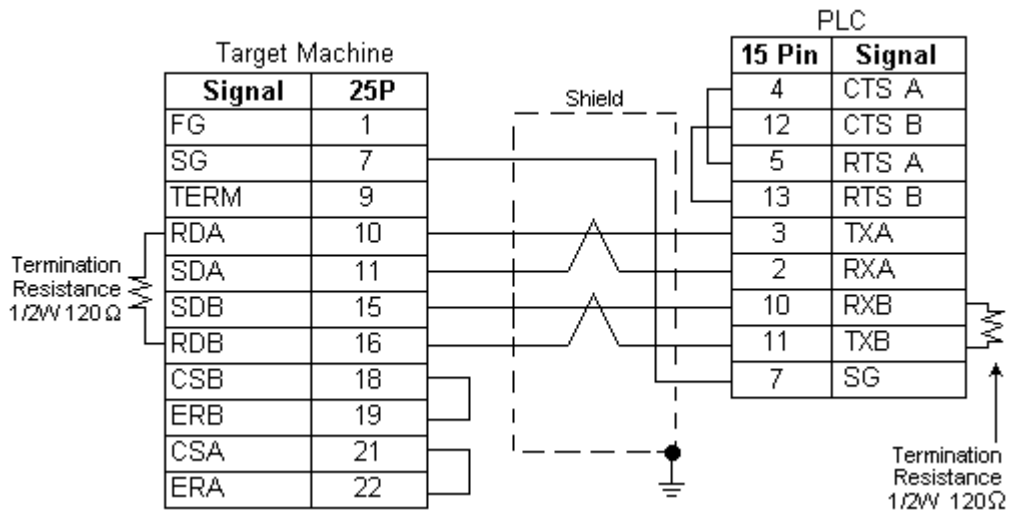
**MEMO**

- 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. RS-422 Cable (Pro-face: GP230-IS11-O)



## c. User-created Cable



## Diagram 7 RS-485 (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.

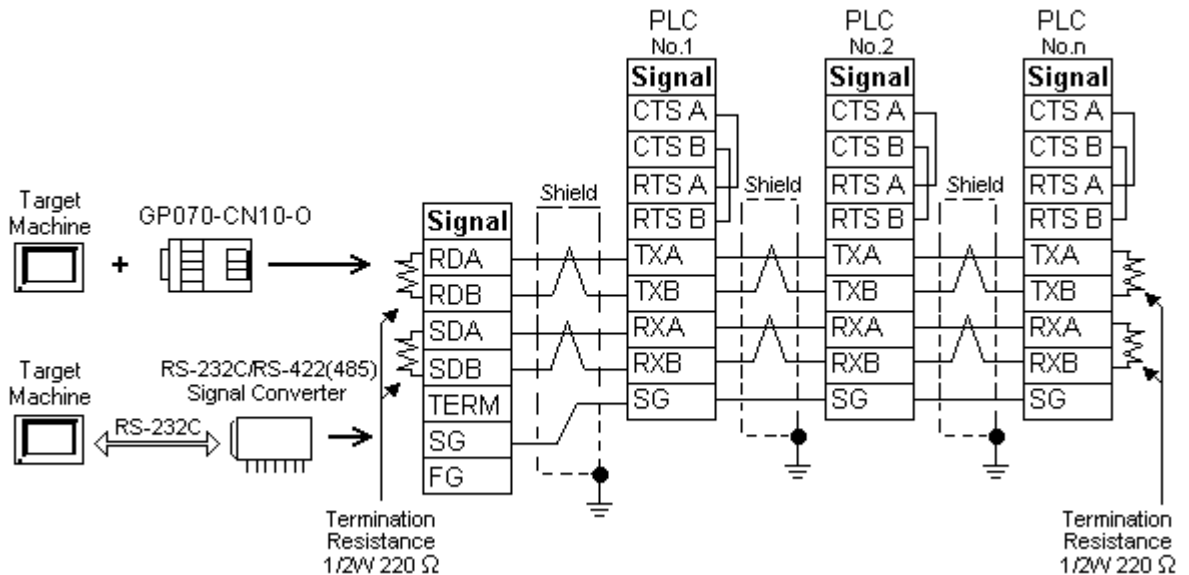
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*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 on the PLC side.
- Up to 32 PLCs can connect to the target machine.

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

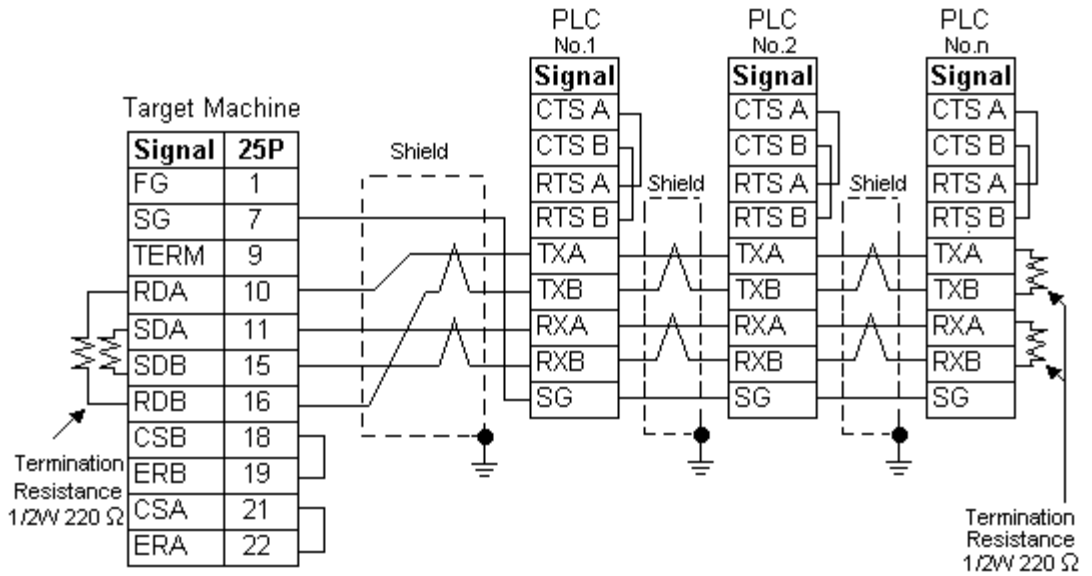
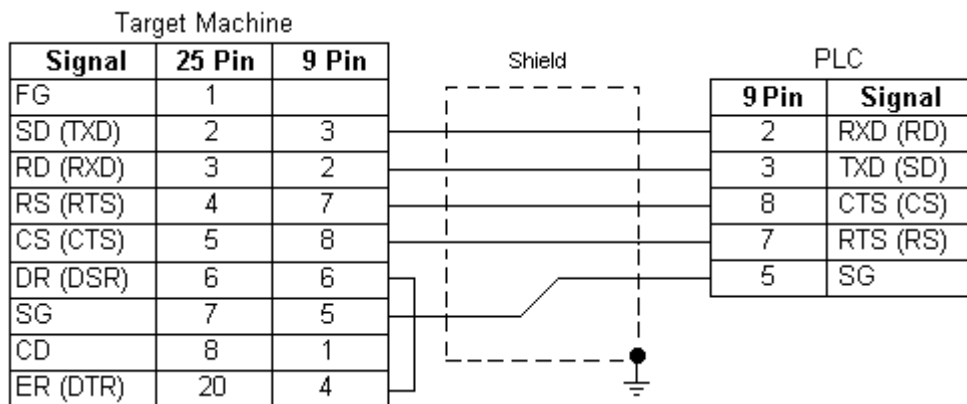


Diagram 8 RS-232C

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 9 RS-485

To connect the target machine 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.

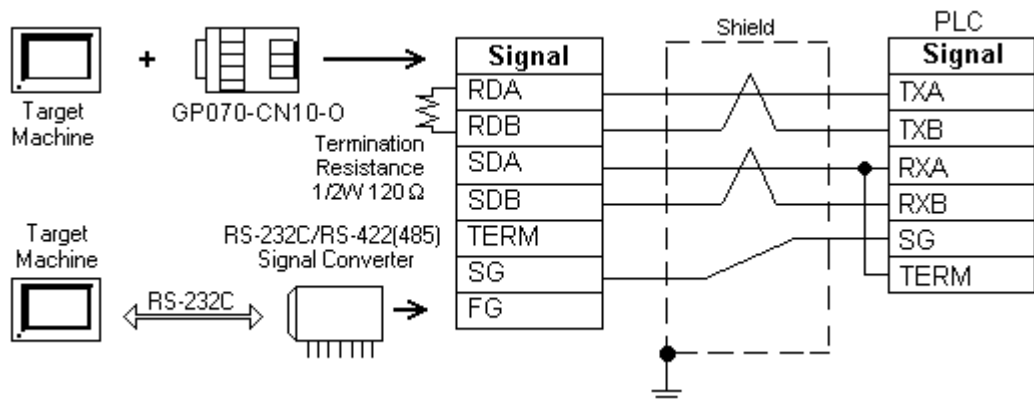
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b RS-422 Cable (Pro-face: GP230-IS11-O)	
	c User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*1 Connect to COM1.

**MEMO**

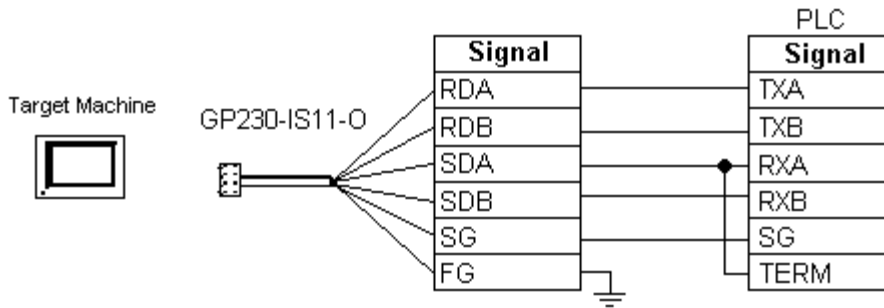
Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.

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

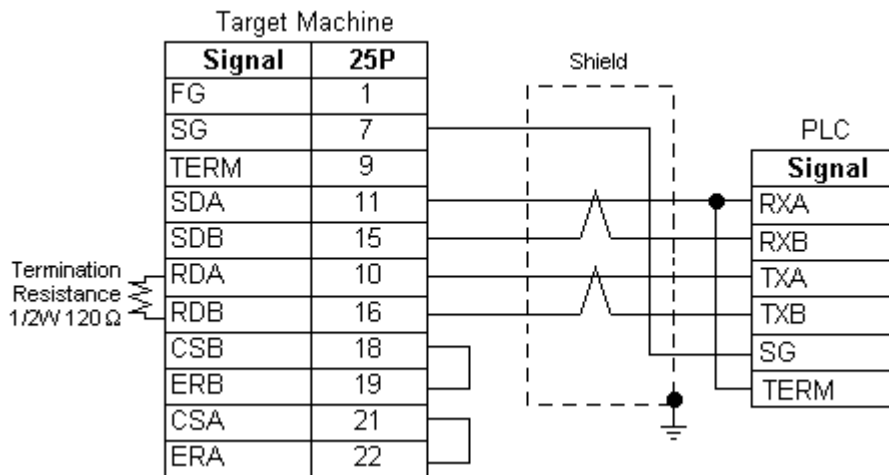
**MEMO**

- 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. RS-422 Cable (Pro-face: GP230-IS11-O)



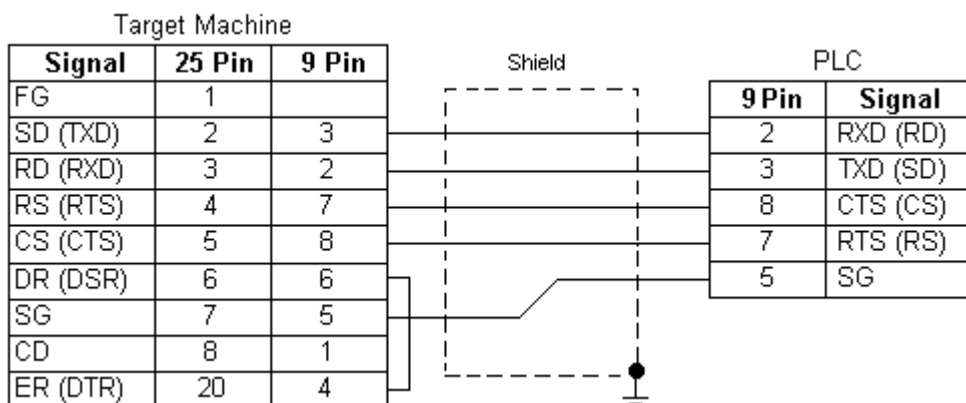
## c. User-created Cable



## Diagram 10 RS-232C

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

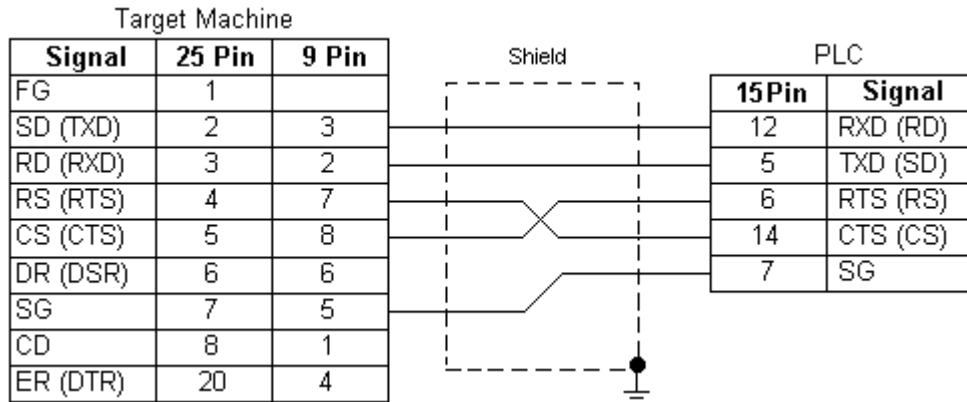
Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	User-created Cable	Cable length: 15m max.



## Diagram 11 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 12 RS-485

To connect the target machine 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   RS-422 Cable (Pro-face: GP230-IS11-O)	
	c   User-created Cable	
PC/AT(PL), PS-G	a   RS-232C / RS-422(485) Signal Converter	

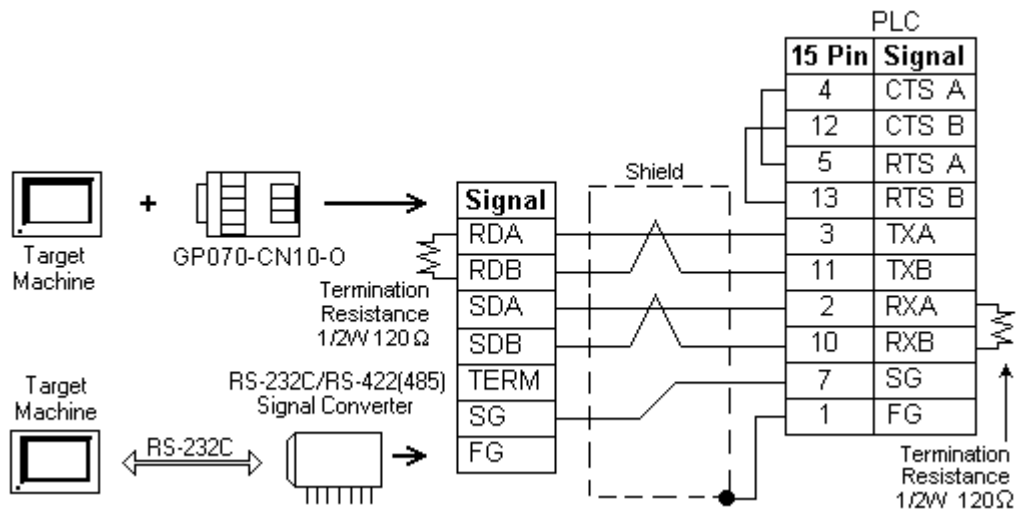
\*1 Connect to COM1.

### MEMO

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

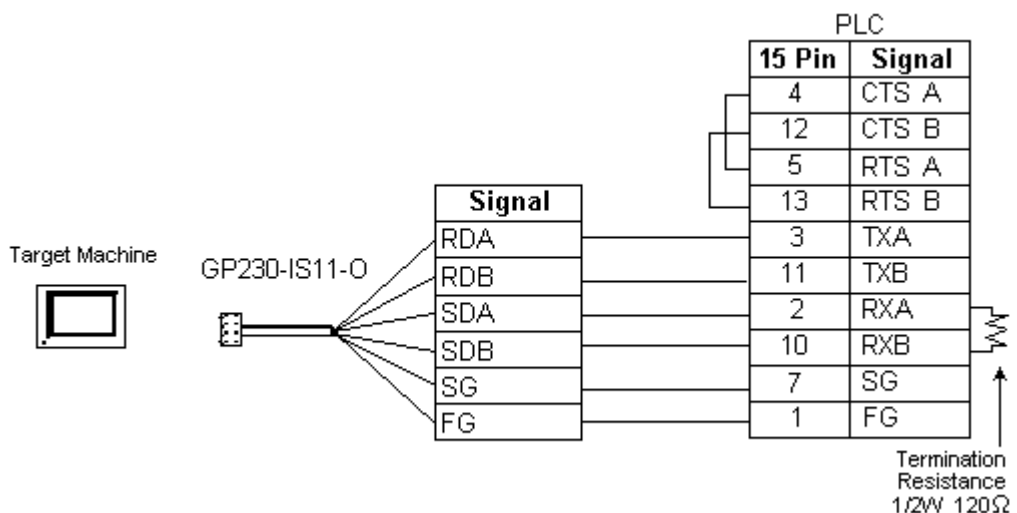


- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)  
OR: RS-232C/RS-422(485) Signal Converter

**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. RS-422 Cable (Pro-face: GP230-IS11-O)



## c. User-created Cable

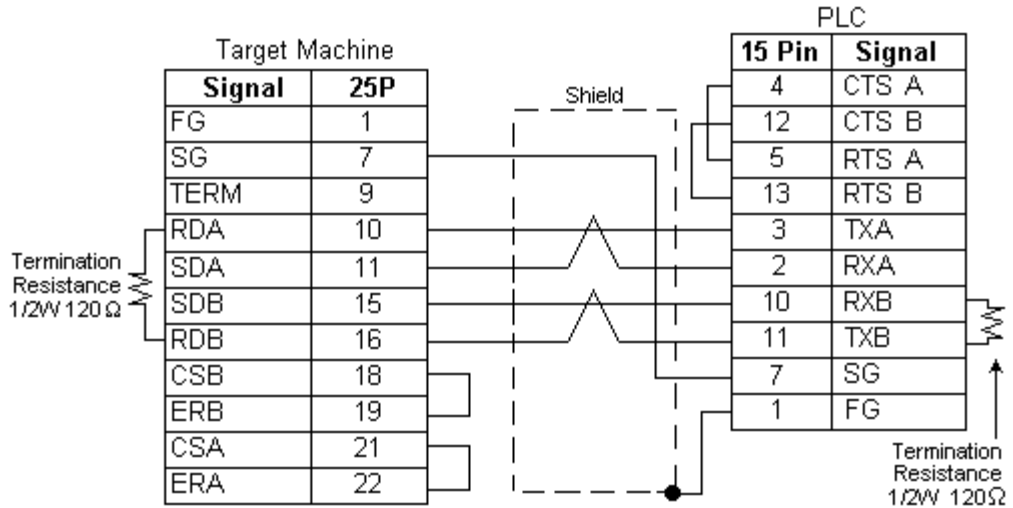


Diagram 13 RS-485 (1:n)

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.

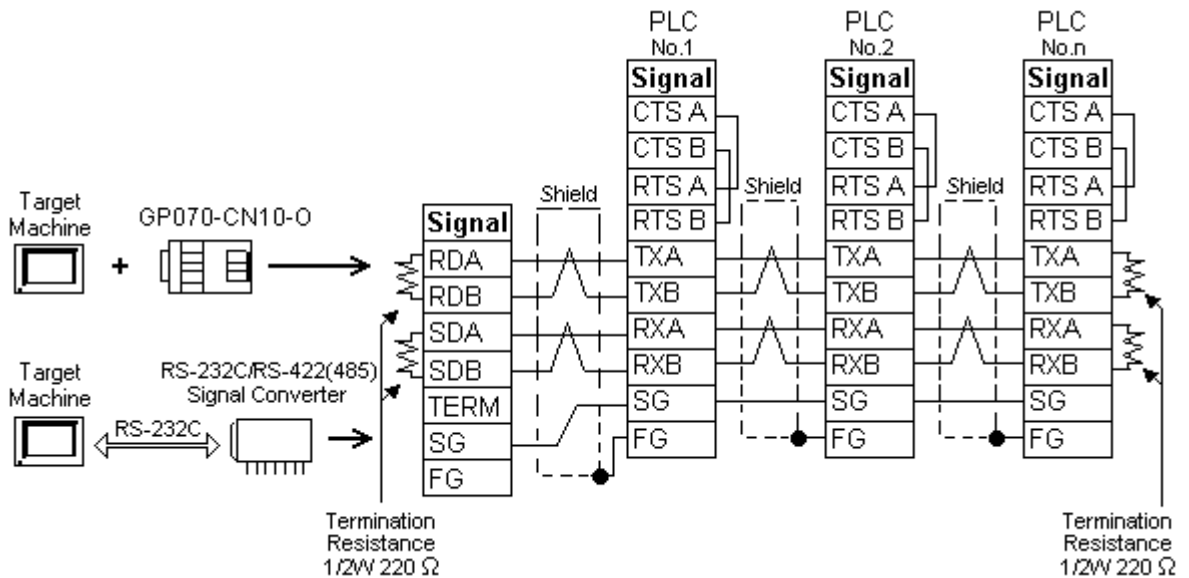
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*1 Connect to COM1.

**MEMO**

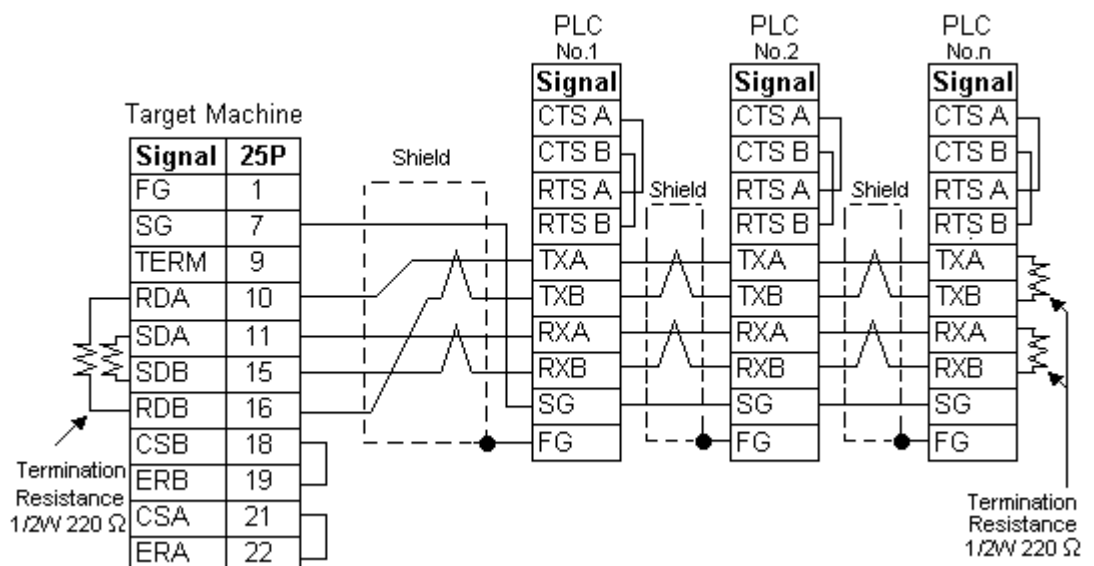
- Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground on the PLC side.
- Up to 32 PLCs can connect to the target machine.

- 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.

**MEMO**

The maximum length of String variables set up with the Prosec T-Series PLC is 64 bytes.

Device	Bit Address	Word Address	16 bit	32 bit
External Input	X0000 – X511F	XW000 – XW511	L/H*4	L/H*4
External Output	Y0000 – Y511F	YW000 – YW511		
Auxiliary Relay	R0000 – R999F	RW000 – RW511		
Special Relay	S0000 – S255F	SW000 – SW255		
Link Register Relay <sup>*1*2</sup>	Z0000 – Z999F	—		
Link Register <sup>*1*2</sup>	W00000 – W2047F	W0000 – W2047		
Link Relay	L0000 – L255F	LW000 – LW255		
Timer (contact)	T.000 – T.999 <sup>*3</sup>	—		
Counter (contact)	C.000 – C.511 <sup>*3</sup>	—		
Timer (current value)	—	T000 – T999		
Counter (current value)	—	C000 – C511		
Data Register <sup>*2</sup>	D00000 – D8191F	D0000 – D8191		
File Register <sup>*2</sup>	F00000 – F32767F	F0000 – F32767		

- \*1 Link Register Relay bit addresses (Z) and Link Register addresses (W) refer to the same memory location.
- \*2 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.
- \*3 Read-only.
- \*4 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 Address	Gap Span
Auxiliary Relay (R)	32 Words	20 words
Link Register Relay (Z)		
External Input (X, XW)		
External Output (Y, YW)		
Auxiliary Relay (RW)		
Special Relay (S, SW)		
Link Register (W)		
Link Relay (L, LW)		
Data Register (D)		
File Register (F)		
Timer [contact] (T.)	32 Words	13 Words
Counter [contact] (C.)		
Timer [current value] (T)		
Counter [current value] (C)		

## 5 Environment Setup

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

For details, see Section 7 – *Driver Configuration*, and Section 8 – *Protocol Configuration*.

### RS-232C

Target Machine			CPU Module	
Driver	Serial Interface	RS-232C	—	
	Flow Control	DTR(ER)/CTS	—	
	Transmission Speed	9600 bps <sup>*1</sup>	Baud Rate	9600 bps <sup>*1</sup>
	Retry Count	2	—	
	Parity Bit	Odd	Parity Bit	Odd
	Stop Bit	1 bit	Stop Bit	1 bit
	Data Length	8 bits	Data Length	8 bits
	Rcv. Timeout	10 sec	—	
	TX Wait Time	0 msec	—	
Protocol	Station No.	1	Station No.	1

\*1 You can use a Transmission Speed (Baud Rate) of 19200bps for T2N's computer link port and T2E's CM232E optional card.

### RS-485 (1:1 or 1:n)

Target Machine				CPU Module	
		GP, PS-P	PC/AT(PL),PS-G		
Driver Interface	Serial Interface	RS-422(4-wire)	RS-232C <sup>*1</sup>	Connection Format	RS-485
	Flow Control	None	DTR(ER)/CTS	—	
	Transmission Speed	19200 bps <sup>*2</sup>		Baud Rate	19200 bps <sup>*2</sup>
	Retry Count	2		—	
	Parity Bit	Odd		Parity Bit	Odd
	Stop Bit	1 bit		Stop Bit	1 bit
	Data Length	8 bits		Data Length	8 bits
	Rcv. Timeout	10 sec		—	
	TX Wait Time	0 msec		—	
Protocol	Station No.	1		Station No. <sup>*3</sup>	1

\*1 By using a RS-232C/RS-422(485) signal converter, you can use RS-485 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 When using the CU111 on T1 and T1S units, Transmission Speed (Baud Rate) is 9600bps.

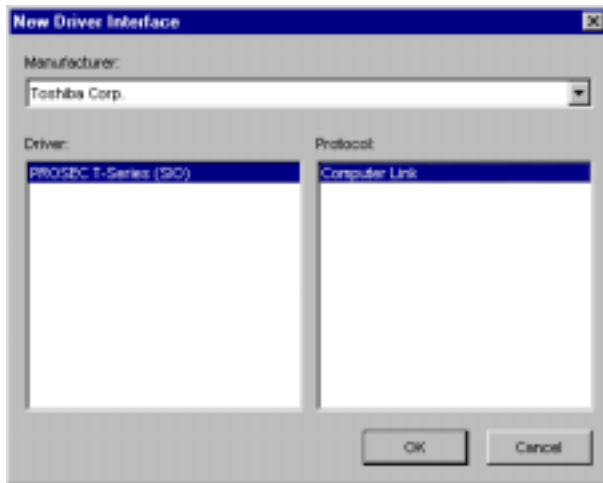
\*3 When using a 1:n connection, set up a different Station No. for each PLC. You can connect a maximum 32 PLCs.

## 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.



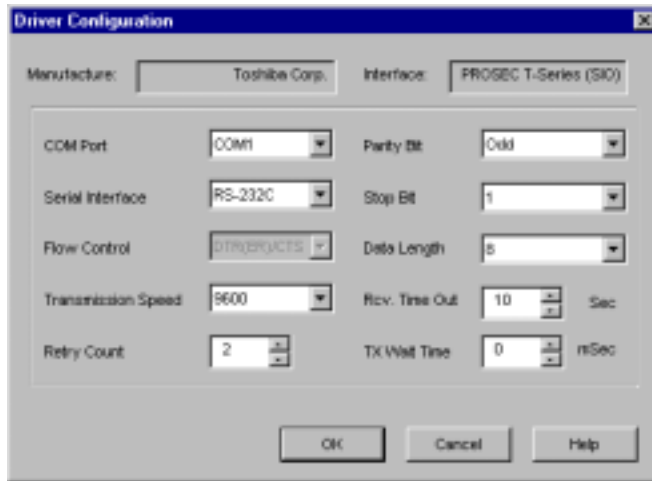
## 7 Driver Configuration

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 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] at all.

### Stop Bit

Defines the stop bit: 1 bit 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 (1–32) to identify which PLC unit to communicate with.

**MEMO**

Up to 32 PLCs can connect to the target machine.

## 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