

# Modicon

## Modicon Modbus (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 system setups, which have been tested, that connect the target machine to Modbus Series PLCs. Use these as the basis for connecting your own system. To view a cable connection diagram for a particular communication format, see Section 2 – [Cable Diagrams](#).

Series	CPU	Link I/F	Comm. Format	Diagram
Modbus	Quantum 140 CPU 113 02	CPU Unit's Modbus Port	RS-232C	Cable Diagram 1
	Quantum 140 CPU 113 03			
	Quantum 140 CPU 434 12A			
	Quantum 140 CPU 534 14A			
	Momentum 171 CCS 780 00	CPU Unit's RS-485 port	RS-422(4-wire)	Cable Diagram 2
	Momentum 171 CCS 780 10			
	Momentum 171 CCC 980 20			
	Momentum 171 CCC 980 30			

## 2 Cable Diagrams

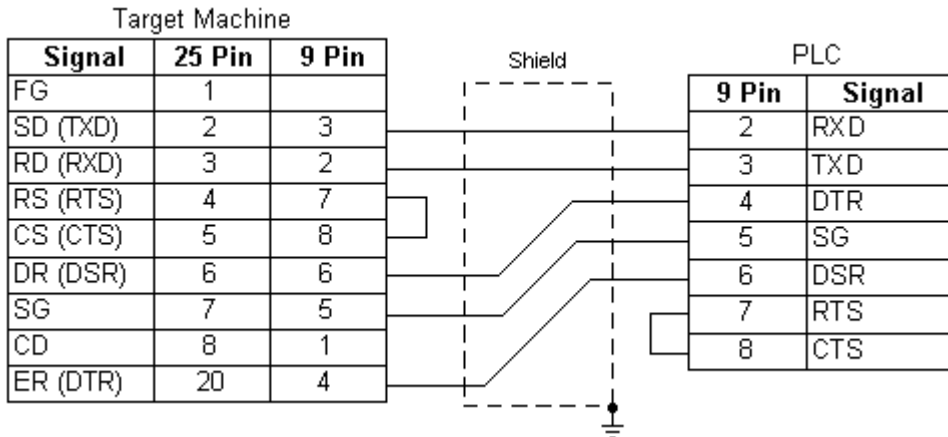
The illustrated cable diagrams and those recommended by Modicon may differ. However, Pro-face recommends using the following diagrammed connections.

- 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 connection terminal, signal converter, or create your own cable using the following specifications.

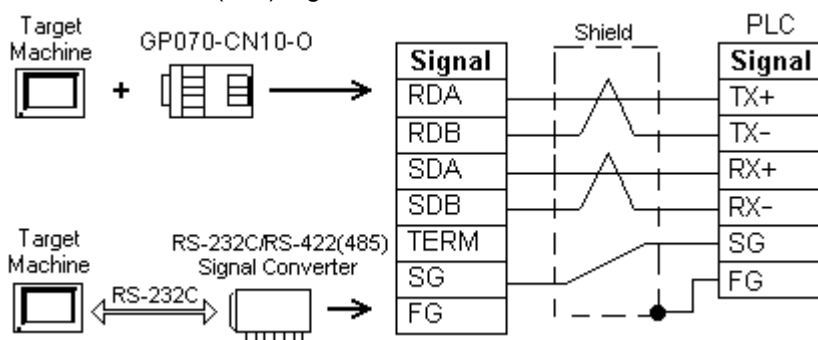
Target Machine	Cable / Adapter	Comments
GP*1, PS-P*1	a RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b User-created Cable	
PC/AT(PL), PS-G	a RS-232C / RS-422(485) Signal Converter	

\*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.

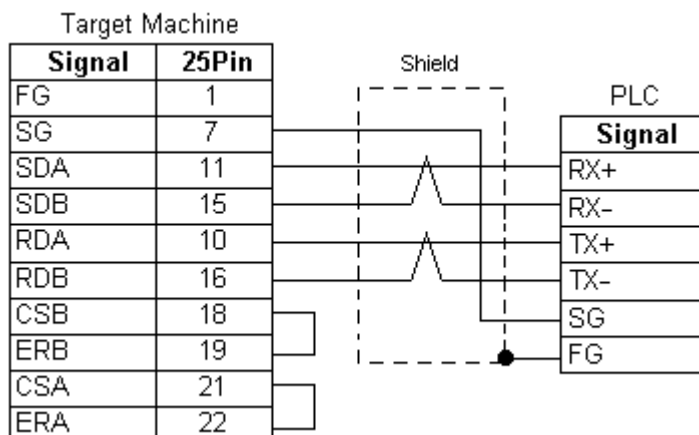
- a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O) or RS-232C/RS-422(485) Signal Converter



**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](#). Use the [Protocol Configuration](#) dialog box to map the device addresses supported on your Modbus PLC to the device types listed in this table.

For actual device address ranges supported by the PLC, refer to the corresponding PLC manual.

Device	Bit Address	Word Address	16 bit	32 bit
Coils (C)	00001-65536	—	L/H <sup>*3</sup>	L/H <sup>*3</sup>
Discrete Inputs (DI) <sup>*1</sup>	00001-65536	—		
Input Registers (IR) <sup>*1*2</sup>	00001:00-65536:15	00001-65536		
Holding Registers (HR) <sup>*2</sup>	00001:00-65536:15	00001-65536		

\*1 Read-only.

\*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 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)	
1	15	...	8	H (High)	
			0	15	...
			1	31	...
				16	H (High)

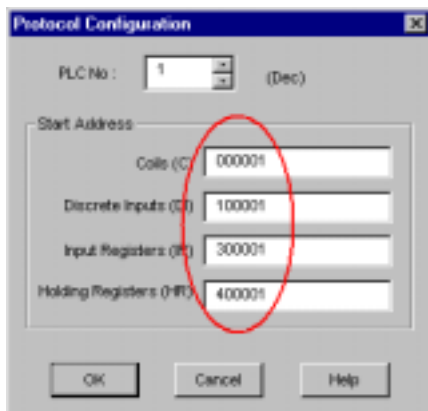
#### 3.1 Device Address Example

The following illustrates how to configure Modbus PLC device addresses.

In this example, the PLC uses these device addresses.

Device	Address
Coils (C)	000001
Discrete Inputs (DI)	100001
Input Registers (IR)	300001
Holding Registers (HR)	400001

To transfer this information to the Pro-Designer Modbus protocol, configure the values in the Protocol Configuration dialog box as shown below.



These settings result in the following range of device addresses that you can use for Pro-Designer variables.

Coils (C): 000001 to 065536  
 Discrete Inputs (DI): 100001 to 165536  
 Input Registers (IR): 300001 to 365536  
 Holding Registers (HR): 400001 to 465536

## 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
Coils (C)	512 bits	127 bits
Discrete Inputs (DI)		
Input Registers (IR)	125 words	24 words
Holding Registers (HR)		

## 5 Environment Setup

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

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	Even	Parity Bit	Even
	Stop Bit	1 bit	Stop Bit	1 bit
	Data Length	8 bit	—	
	Rcv. Time Out	10 s	—	
	TXWait Time	0 ms	—	
	—		Mode/Data Bits	RTU (8)
Protocol	PLC No.	1	Station Address	1

### RS-422 (4-wire)

Target Machine Settings			PLC Settings		
		GP, PS-P	PC/AT(PL),PS-G		
Driver Interface	Serial Interface	RS-422(4-wire)	RS-232C*1	Connection Format	RS-485
	Flow Control	None	DTR(ER)/CTS	—	
	Transmission Speed	19200 bps		Baud Rate	19200 bps
	Retry Count	2		—	
	Parity Bit	Even		Parity Bit	Even
	Stop Bit	1 bit		Stop Bit	1 bit
	Data Length	8 bit		—	
	Rcv. Time Out	10 s		—	
	TXWait Time	0 ms		—	
	—			Mode/Data Bits	RTU (8)
Protocol	PLC No.	1		Station Address	1

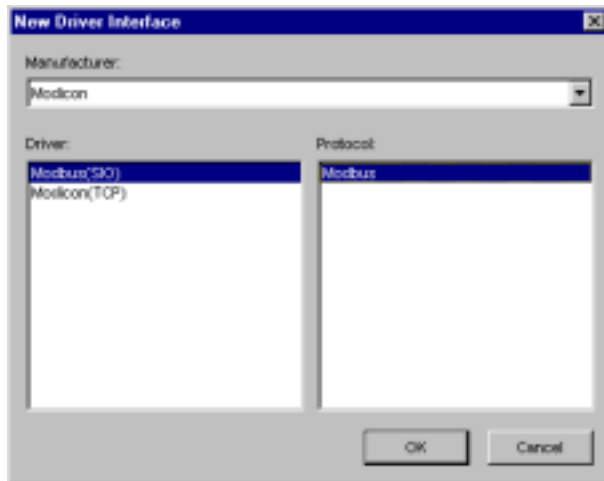
\*1 By using a RS-232C/RS-422(485) signal converter, you can use RS-485 connections with PC/AT (PL Series) or PS Series Type G target machines. In such a configuration, make sure you set the Driver's Serial Interface to RS-232C.

## 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.





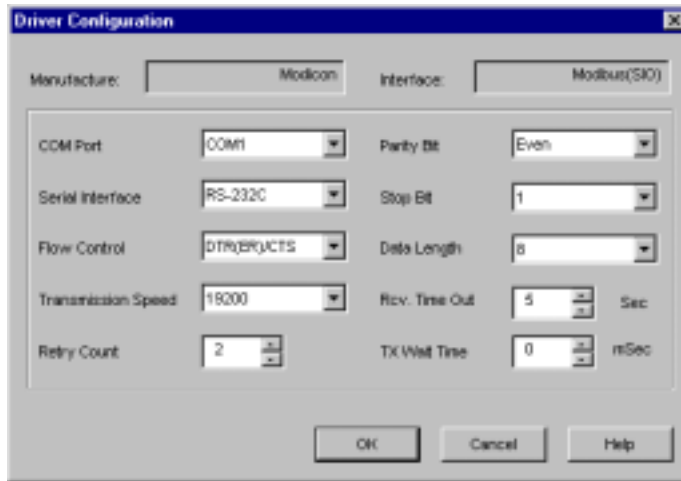
## 7 Driver Configuration

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 : select RS-232C.

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 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.

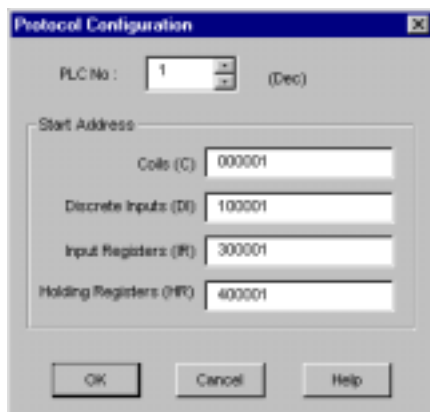
## 8 Protocol Configuration

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.



#### PLC No.

Enter a value (1-247) to identify the PLC. This value must match the Station Address set up on the PLC.

#### Start Address

PLC manufacturers may use different address ranges for their particular PLCs. Use Start Addresses to configure the addresses supported on your Modbus PLC.

#### Coils

Defines the start address for Coils as supported on your PLC. Coils begin from this start address and end at the Discrete Inputs start address (or Coils Start Address + 65535).

#### Discrete Inputs

Defines the start address for Discrete Inputs as supported on your PLC. Discrete Inputs begin from this start address and end at the Input Registers start address (or Discrete Inputs Start Address + 65535).

#### Input Registers

Defines the start address for Input Registers as supported on your PLC. Input Registers begin from this start address and end at the Holding Registers start address (or Input Registers Start Address + 65535).

#### Holding Registers

Defines the start address for Holding Registers as supported on your PLC. Holding Registers begin from this start address and end at the start address + 65535.

## 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 discrete and word device types.

### Address

Enter the address for the PLC variable. The keypad ensures you enter the correct address for the selected bit or word device, as configured in the [Protocol Configuration](#) dialog box.

**MEMO**

Instead of using the device address keypad, you can type the address directly in the Property Inspector. When doing so, you must also type the device (C, DI, IR, or HR). E.g. "HR400001"