SCIENCE GATE
Your Automation Partner
SCIGATE AUTOMATION (S) PTE LTD
No.1 Bukit Batok Street 22 #01-01 Singapore 659592
Tel: (65) 6561 0488 Fax: (65) 6562 0588
Email: sales@scigate.com.sg Web: www.scigate.com.sg
Business Hours: Monday - Friday 8.30am - 6.15pm

Yaskawa Electric

Yaskawa Electric MP900 Series 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.

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1 System Structure

The following table describes the basic system setup for connecting the target machine to Yaskawa 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
MP900 Series	MP920	Memobus Port (Port1, Port2) JEPMC-CM200 (CN1, CN2)	RS-232C	Cable Diagram 1
		JEPMC-CM200 (CN3)	RS-422(4-wire)	Cable Diagram 2
			RS-422(4-wire) (1:n)*1	Cable Diagram 3
	MP930	Memobus Port (Port1, Port2)	RS-232C	Cable Diagram 1
	MP940	Memobus Port (Port1)	RS-232C	Cable Diagram 4
		Memobus Port (Port2)	RS-422(4-wire)	Cable Diagram 2
			RS-422(4-wire) (1:n)*1	Cable Diagram 3

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

2 Cable Diagrams

The illustrated cable diagrams and those recommended by Yaskawa 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.

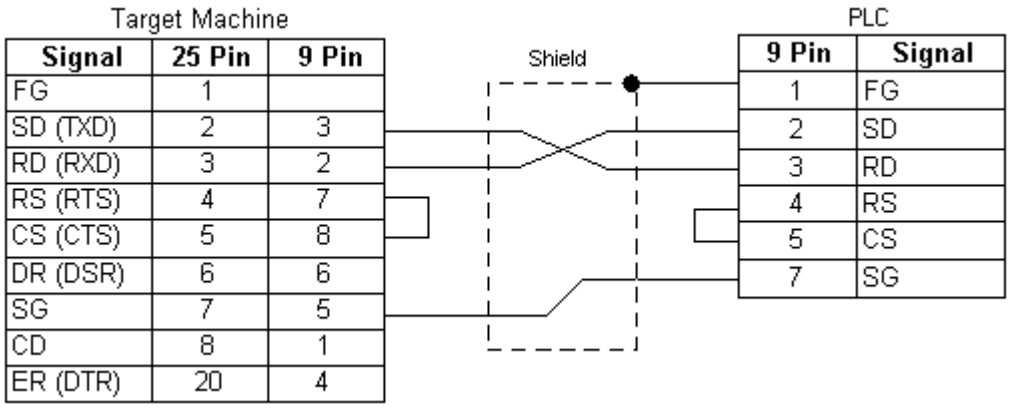


Diagram 2 RS-422 (4-wire)

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

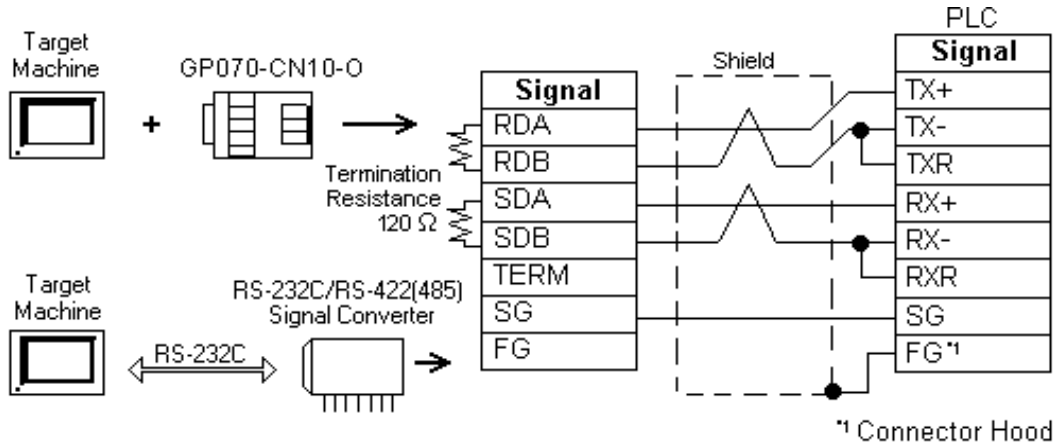
Target Machine	Cable / Adapter		Comments
GP[*1], PS-P[*1]	a	RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 300m max.
	b	User-created Cable	
PC/AT(PL), PS-G	a	RS-232C / RS-422(485) Signal Converter	

*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.
- When connecting TX- and TXR, and RX- and RXR on the PLC, termination resistance is added between TX+ and TX-, and RX+ and RX-.

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

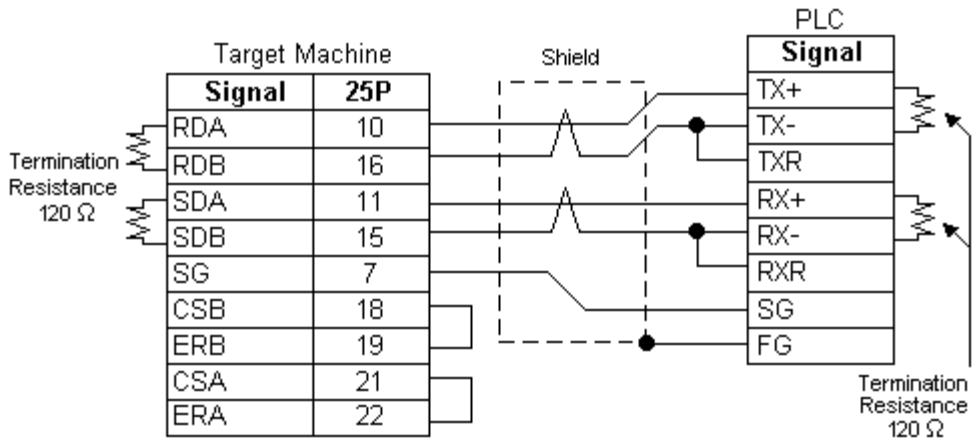


Diagram 3 RS-422 (4-wire) (1:n)

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

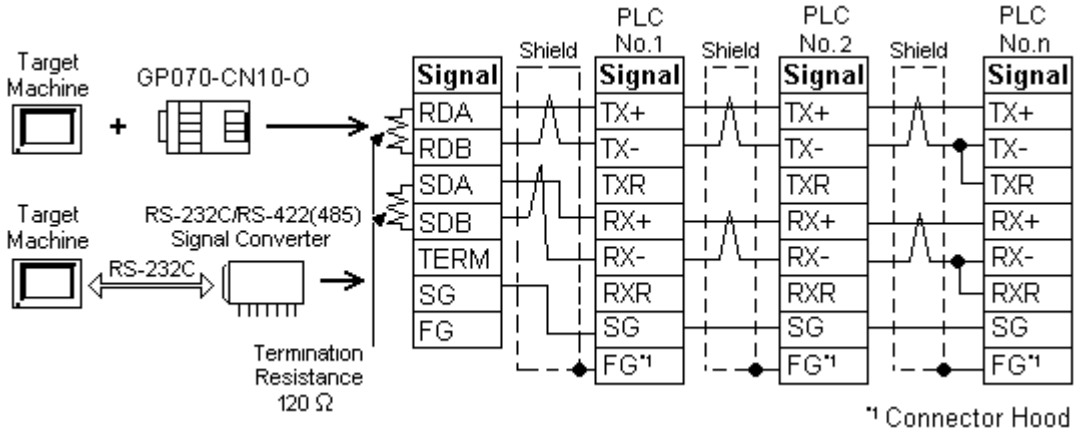
Target Machine	Cable / Adapter		Comments
GP*1, PS-P*1	a	RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length 300m max.
	b	User-created Cable	
PC/AT(PL), PS-G	a	RS-232C / RS-422(485) Signal Converter	

*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.
- When connecting TX- and TXR, and RX- and RXR on the PLC, termination resistance is added between TX+ and TX-, and RX+ and RX-.
- Up to 32 PLCs can be connected to a 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

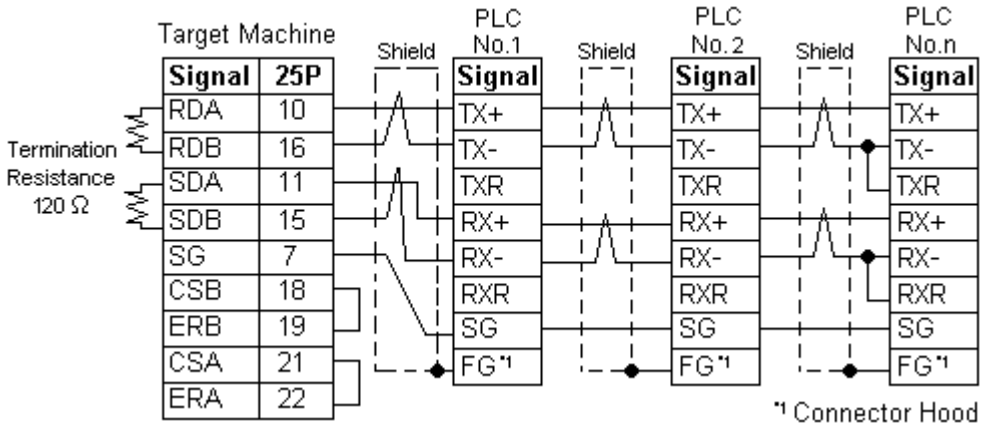
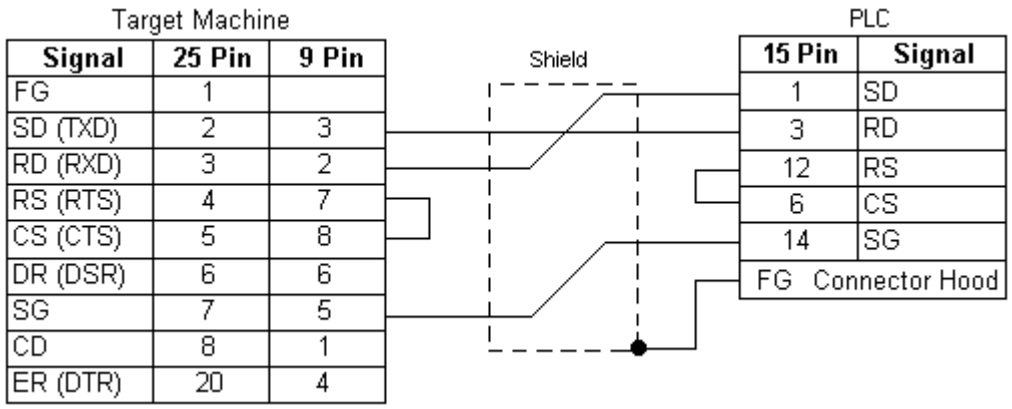


Diagram 4 RS-232C

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.



3 Supported Device Addresses

The following table lists the device address ranges you can enter from the PLC 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	Word Address	16 Bit	32 Bit
Coil	MB000000 – MB65535F[*1]	–	L/H[*3]	L/H[*3]
Input Relay[*2]	IB00000 – IBFFFFF[*1]	–		
Input Register[*2]	–	IW0000 – IWFFFF		
Hold Register	–	MW00000 – MW65535		

*1 Read-modify-write applies to these Coil addresses (MB40960-MB65535F) and Input Relay addresses (IB10000-IBFFFFF).
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 value to the word address on 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 High and Low refer to 16-bit and 32-bit data as defined in the following examples.

16 bit

Byte				
0	7	. . .	0	L (Low)
1	15	. . .	8	H (High)

32 bit

Word				
0	15	. . .	0	L (Low)
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.
- 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
Coil (MB)	2000 Bits	127 Bits
Input Relay (IB)		
Input Register (IW)	125 Words	24 Words
Hold Register (MW)		

5 Environment Setup

The following table lists the communication settings, recommended by Pro-face, for the target machine and Yaskawa PLCs.
For details, see Section 8 – *Driver Configuration,* and Section 9 – *Protocol Configuration*.

RS-232C

Target Machine Settings			PLC Settings	
Driver Interface	Serial Interface	RS-232C	Comm.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 bits	Data Length	8 bits
	Rcv. Timeout	10 sec	—	
	TX Wait Time	0 msec	—	
	—		Mode	RTU
	—		Master Slave	Slave
	—		Transmission Protocol	Memobus
Protocol	Station No.	1	Station No.	1

MEMO

To connect multiple CN ports (CN1, CN2, or CN3) on the JEPMC-CM200 at the same time, or to connect CN ports to MP930 Memobus Ports (Port1, Port2), create a ladder program for each. See Section 6, *Sample Ladder Program*.

RS-422(4-wire) (1:1 or 1:n)

Target Machine Settings				PLC Settings	
		GP, PS-P	PC/AT(PL),PS-G		
Driver Interface	Serial Interface	RS-422(4-wire)	RS-232C*1	Comm.Format	RS-422/485
	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 bits		Data Length	8 bits
	Rcv. Timeout	10 sec		—	
	TX Wait Time	0 msec		—	
	—			Mode	RTU
	—			Master Slave	Slave
	—			Transmission Protocol	Memobus
Protocol	Station No.	1		Station No.*2	1

*1 By using a RS-232C/RS-422(485) signal converter, you can use RS-422/485 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.

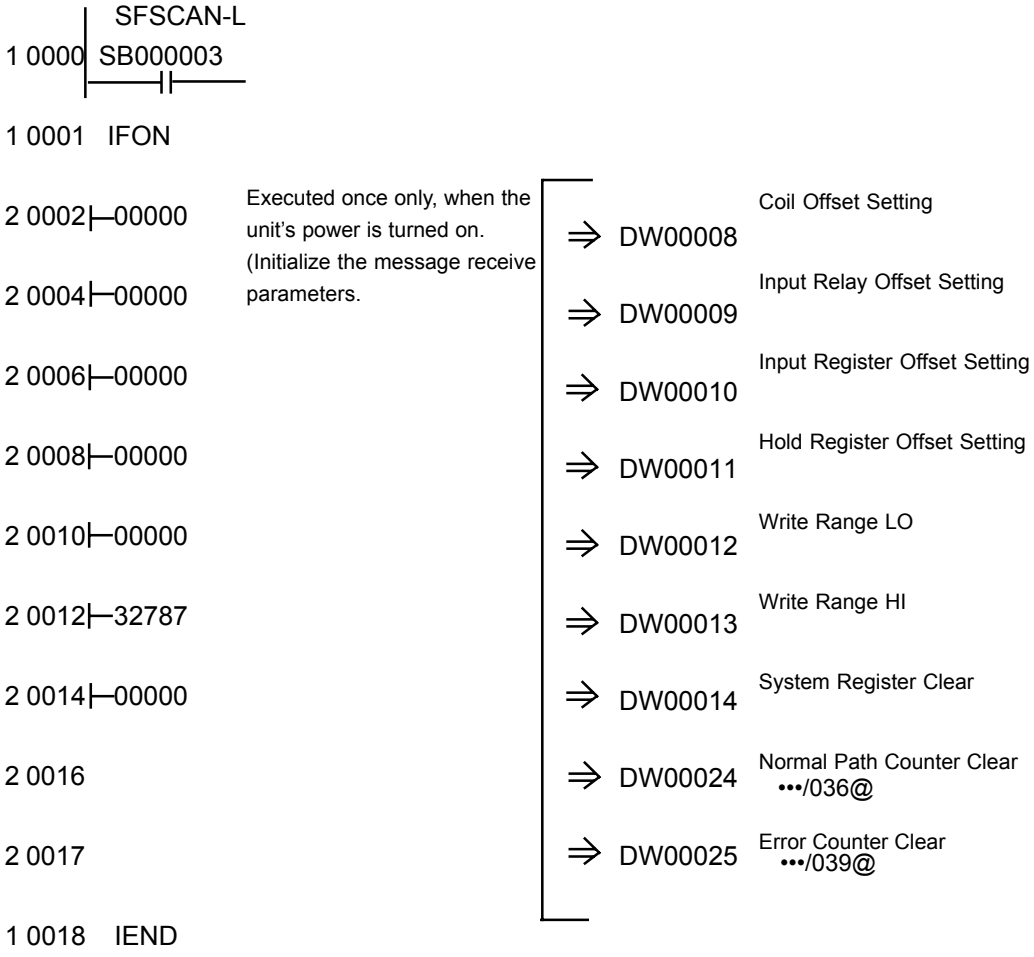
*2 When using a 1:n connection, set up a different Station No. for each PLC. You can connect a maximum 32 PLCs.

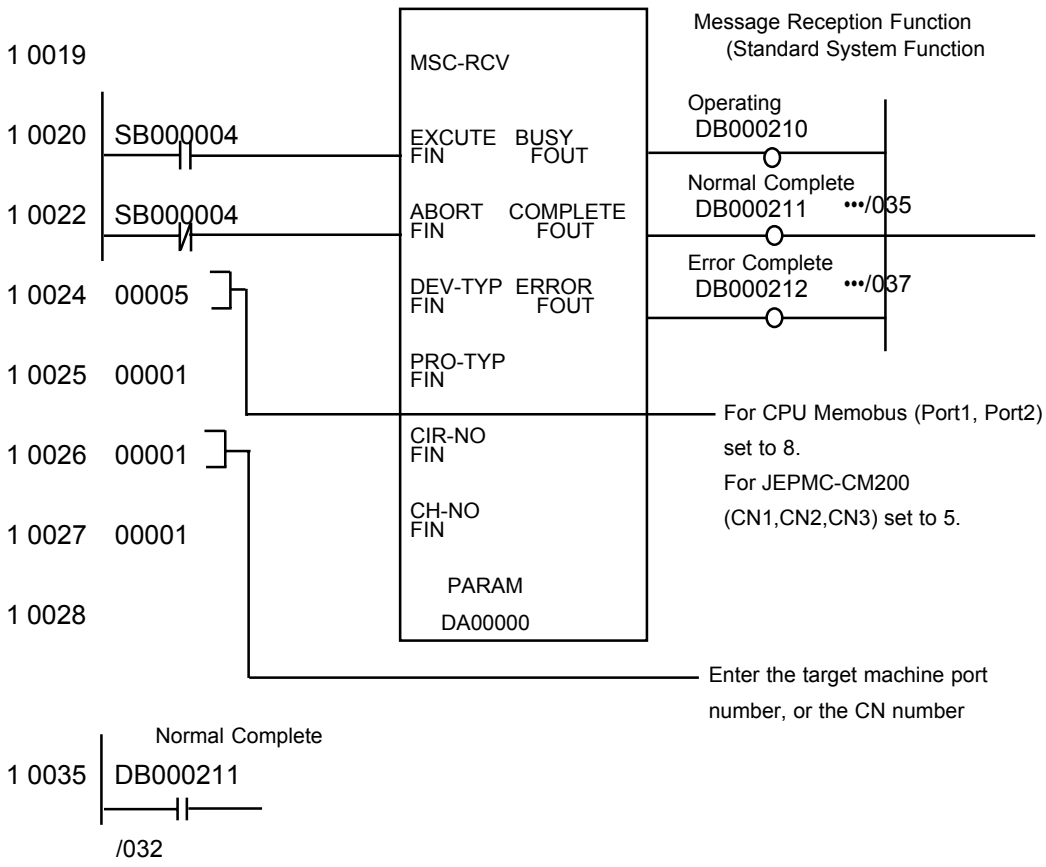
MEMO

To connect multiple CN ports (CN1, CN2, or CN3) on the JEPMC-CM200 at the same time, or to connect CN ports to MP930 Memobus Ports (Port1, Port2), create a ladder program for each. See Section 6, *Sample Ladder Program*.

6 Sample Ladder Program

To connect multiple CN ports (CN1, CN2, or CN3) on the JEPMC-CM200 at the same time, or to connect CN ports to MP930 Memobus Ports (Port1, Port2), create a ladder program for each.




1 0019
1 0020
SB000004
1 0022
SB000004
1 0024
00005
1 0025
00001
1 0026
00001
1 0027
00001
1 0028
MSC-RCV
EXCUTE FIN
BUSY FOUT
ABORT FIN
COMPLETE FOUT
DEV-TYP FIN
ERROR FOUT
PRO-TYP FIN
CIR-NO FIN
CH-NO FIN
PARAM
DA00000
Message Reception Function
(Standard System Function
Operating
DB000210
Normal Complete
DB000211
•••/035
Error Complete
DB000212
•••/037
For CPU Memobus (Port1, Port2)
set to 8.
For JEPMC-CM200
(CN1,CN2,CN3) set to 5.
Enter the target machine port
number, or the CN number
Normal Complete
1 0035
DB000211
/032

Normal Counter

1 0036[INC DW00024]

•••/016

Error Complete

1 0037 DB000212

•••/034

1 0038 IFON

Error Counter

2 0039 INC DW00025

•••/017

2 0040 DW00000 ⇒ DW00026 Result Save •••/053S

2 0042 DW00001 ⇒ DW00027 Status Save

2 0044 DW00002 ⇒ DW00028 Command Receiver ST# Hold

2 0046 DW00004 ⇒ DW00029 FC Save

2 0048 DW00005 ⇒ DW00030 Data Address Hold

2 0050 DW00006 ⇒ DW00031 Data Size Hold

2 0052 DW00007 ⇒ DW00032 Destination CP Save

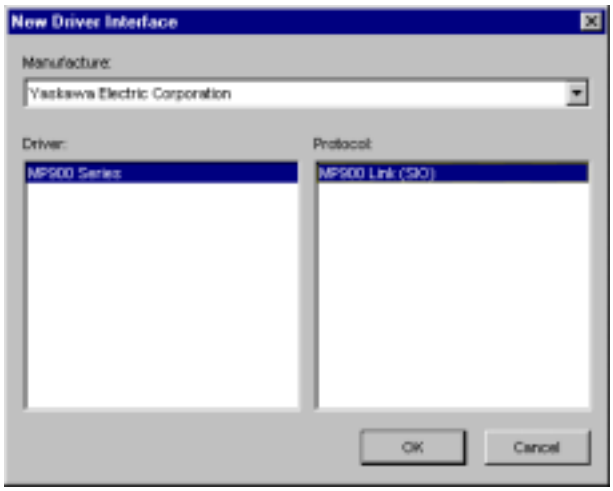
1 0054 IEND

0 0055 DEND

7 I/O Manager Configuration

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

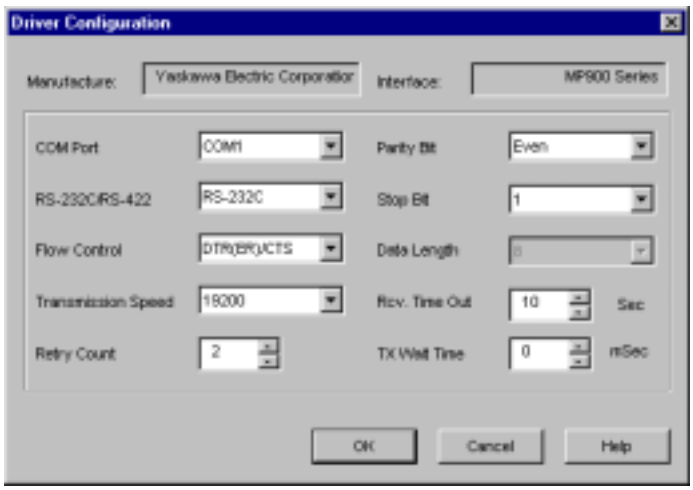
MEMO For information on how to display the [New Driver Interface] dialog box, or for details about the I/O Manager, see the online help.



8 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.

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.

9 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 (1–63) to identify the PLC unit.
Up to 32 PLCs can be connected to a target machine in 1:n connection.

10 Device Address Configuration

To set up a PLC variable in the Variable List, use the device address keypad in 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.