Mitsubishi Electric

Melsec-Q Link(SIO) Driver

- 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 Mitsubishi MELSEC-Q Series link module 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
MELSEC-Q Series	Q00JCPU Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	QJ71C24-R2	RS-232C	Cable Diagram 1
		QJ71C24	RS-232C	Cable Diagram 1
			RS-422(4-wire)	Cable Diagram 2
	Q00CPU Q01CPU	CPU Direct[1]	RS-232C	Cable Diagram 3
		QJ71C24-R2	RS-232C	Cable Diagram 1
		QJ71C24	RS-232C	Cable Diagram 1
			RS-422(4-wire)	Cable Diagram 2

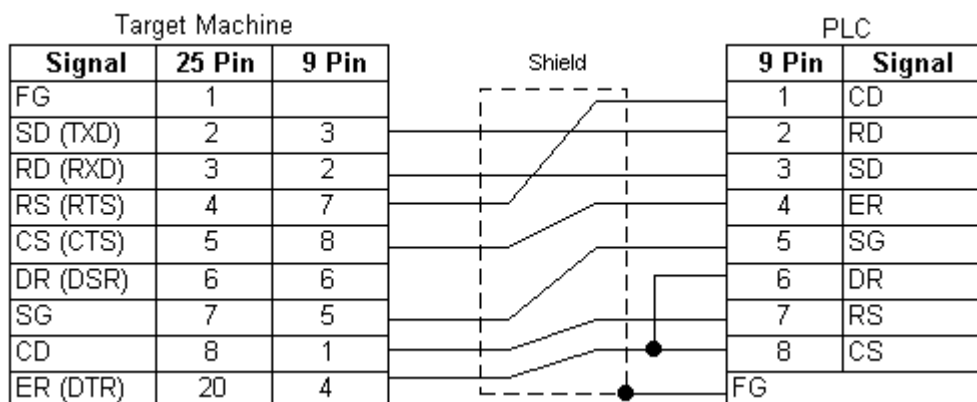*1   Connect to the CPU's RS-232C port.

2 Cable Diagrams

The illustrated cable diagrams and those recommended by Mitsubishi 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.

Cable Diagram 1   RS-232C

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

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	Mitsubishi Exclusive RS-232C Cable (Proface: GP000-IS02-MS (3m))	When connecting to a 9pin port on the target machine, use a 9-25pin conversion adapter.
	User-created Cable	Cable length: 15m max.

Target Machine

Signal	25 Pin	9 Pin
FG	1	
SD (TXD)	2	3
RD (RXD)	3	2
RS (RTS)	4	7
CS (CTS)	5	8
DR (DSR)	6	6
SG	7	5
CD	8	1
ER (DTR)	20	4

Shield

PLC

| 9 Pin	Signal
1	CD
2	RD
3	SD
4	ER
5	SG
6	DR
7	RS
8	CS
FG	

Cable Diagram 2　　RS-422 (4-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.

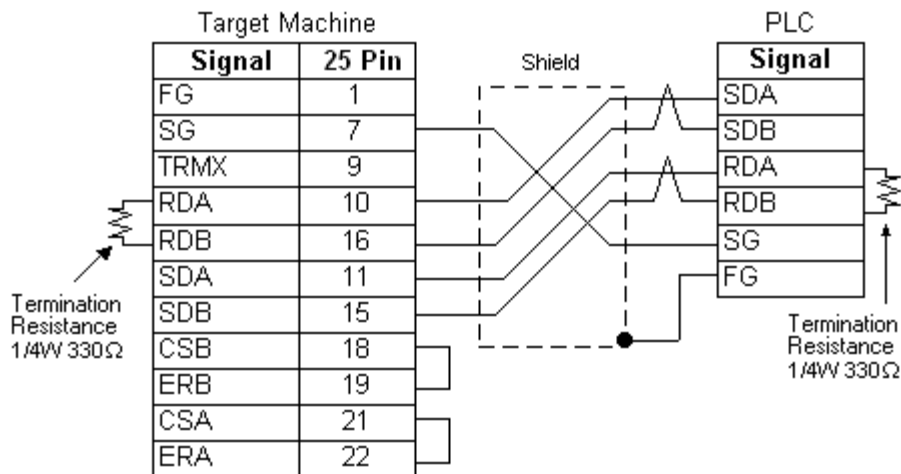| Target Machine	Cable / Adapter		Comments
GP, PS-P	a	RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)	Cable length: 500m max.
	b	User-created Cable	
PC/AT(PL), PS-G	a	RS-232C / RS-422(485) Signal Converter	

MEMO
- Use shielded twisted-pair cables for noise immunity. Connect the cable shields, then connect the cable to a single-point ground.
- Turn on the PLC's termination resistance switch. If no dip switch is available, depending on the PLC model you may need to add a termination resistance of 330Ω 1/2W on the PLC between SDA and SDB, and also between RDA and RDB. (Not illustrated)

a. RS-422 Connection Terminal Adapter (Pro-face: GP070-CN10-O)
   OR: RS-232C/RS-422(485) Signal Converter
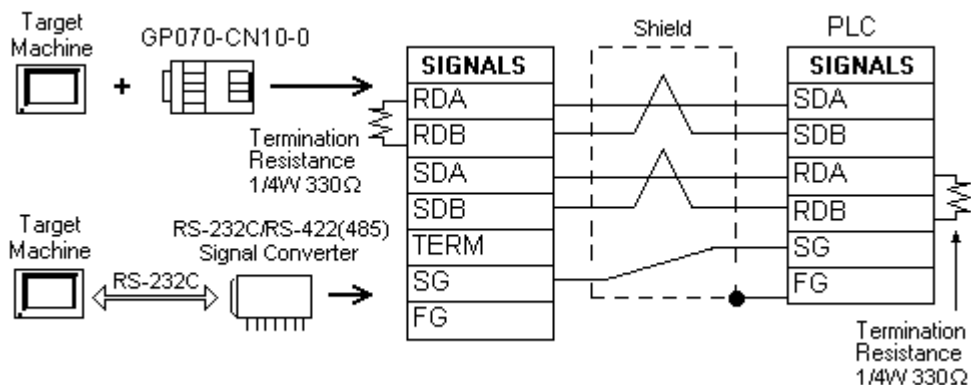
MEMO
- As the RS-422(485) side of the RS-232C/RS-422(485) signal converter is a terminal, use any external line other than the communication line for the power cable.
- Follow the specifications for your RS-232C/RS-422(485) signal converter when connecting termination resistance on the RS-422(485) terminal.
- 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.
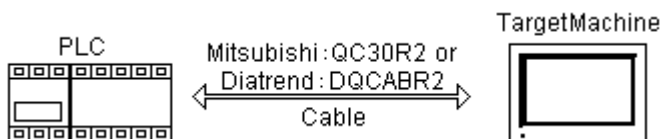
b. User-created Cable
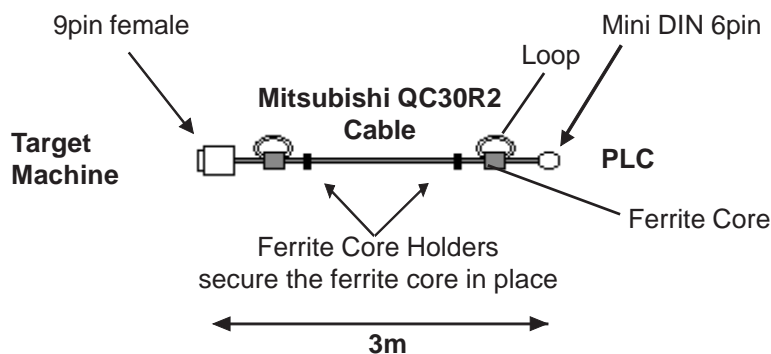

Cable Diagram 3   RS-232C

To connect the target machine and the PLC, use th recommended cable (and a pin adapter if necessary).
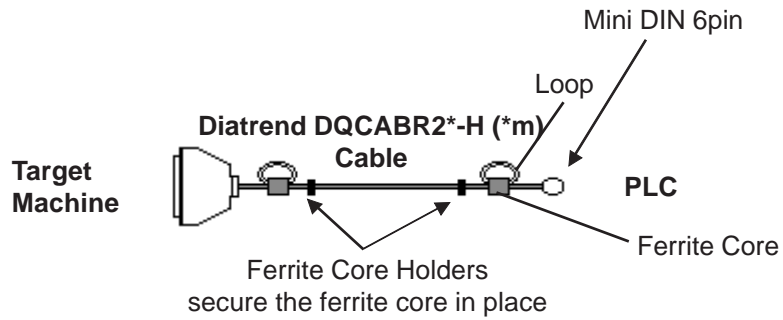
| Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	RS-232C Cable (Mitsubishi: QC30R2 (3m) OR Diatrend: DQCABR2*-H (*m))	Be sure the cable type used/selected fits the target unit's serial I/F connector.

MEMO • Attaching a ferrite core will reduce the amount of noise in the cable (see the following diagrams.)
Attach two ferrite cores to the cable, one at each end.
Loop the cable once around each ferrite core.

Mini DIN 6pin

Loop

Diatrend DQCABR2*-H (*m)
Cable

Target
Machine

PLC

Ferrite Core

Ferrite Core Holders
secure the ferrite core in place

• When you require a cable 3m or longer, use the Diatrend cable.
· **Recommended Ferrite Core**
  Maker :Seiwa Electronics Corporation

39mm

34mm

13mm 30mm
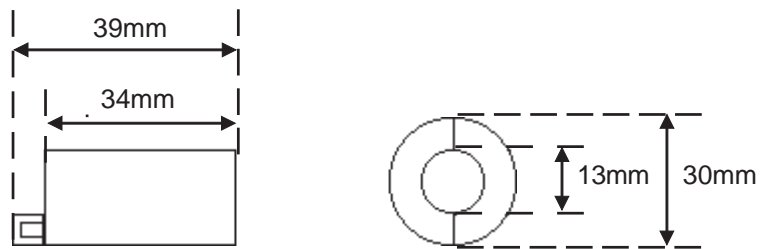
Model :E04SR301334
You can use ferrite cores from other manufacturers, but make sure they
are the same size as defined here.

<Adaptor : Roas Co. Model No. ZA-403>

Dsub 25pin male   **Dsub 9pin male**
Lock-screw (mm)   **Lock-nut (inch)**

Frame			Frame
8			1
3			2
2			3
20			4
7			5
6			6
4			7
5			8
22			9

6 cm
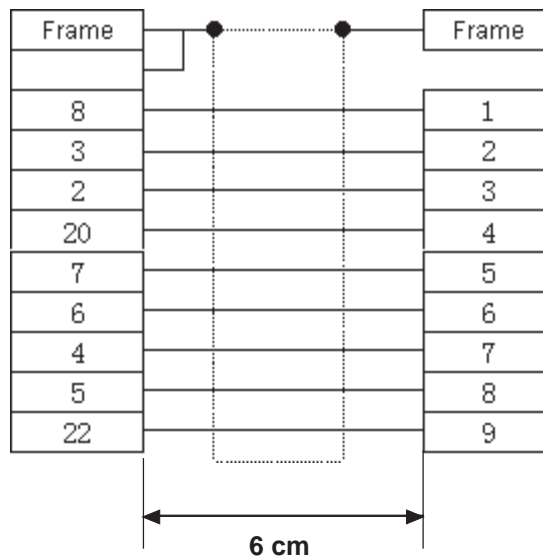
3   Supported Device Addresses

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	Word Address	16 bit	32 bit
Input Relay	X0000-XFFFF	X0000-XFFF0[*1]		
Output Relay	Y0000-YFFFF	Y0000-YFFF0[*1]		
Internal Relay	M00000-M65535	M00000-M65520[*2]		
Latch Relay	L00000-L65535	L00000-L65520[*2]		
Special Relay	SM0000-SM9999	SM0000-SM9984[*2]		
Annunciator	F00000-F65535	F00000-F65520[*2]		
Edge Relay	V00000-V65535	V00000-V65520[*2]		
Step Relay	S0000-S9999	S0000-S9984[*2]		
Link Relay	B0000-BFFFF	B0000-BFFF0[*1]		
Special Link Relay	SB000-SBFFF	SB000-SBFF0[*1]		
Timer (contact)	TS00000-TS65535	--		
Timer (coil)	TC00000-TC65535	--		
Retentive Timer (contact)	SS00000-SS65535	--		
Retentive Timer (coil)	SC00000-SC65535	--		
Counter (contact)	CS00000-CS65535	--	LH[*6]	LH[*6]
Counter (coil)	CC00000-CC65535	--		
Timer (current value)	--	TN00000-TN65535		
Retentive Timer (current value)	--	SN00000-SN65535		
Counter (current value)	--	CN00000-CN65535		
Data Register[*3]	D00000:0-D65535:15	D00000-D65535[*4]		
Special Register[*3]	SD0000:0-SD9999:15	SD0000-SD9999[*4]		
Link Register[*3]	W0000:0-WFFFF:F	W0000-WFFFF[*5]		
Special Link Register[*3]	SW000:0-SWFFF:F	SW000-SWFFF[*5]		
File Register(Normal)[*3]	R00000:0-R65535:15	R00000-R65535[*4]		
File Register(0R-31R)[*3]	0R0000:0-0R7FFF:F	0R0000-0R7FFF[*5]		
	1R0000:0-1R7FFF:F	1R0000-1R7FFF[*5]		
	2R0000:0-2R7FFF:F	2R0000-2R7FFF[*5]		
	...	...		
	30R0000:0-30R7FFF:F	30R0000-30R7FFF[*5]		
	31R0000:0-31R7FFF:F	31R0000-31R7FFF[*5]		

*1   To use as word address, the bit column (last column) must be 0.
*2   To use as word address, must be multiple of 16.
*3   When the bit write operation is performed, the Target Machine reads the PLC's corresponding word address and turns a bit ON, then send back to PLC. Do not write to the word address from the ladder program in the middle of this operation.
*4   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. D0100:8)
*5   You can define a bit address by adding a colon followed by the bit position (0~F) at the end of the word. (e.g. W0001:A)

*6   16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

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

Word	32 bit			
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 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)	2000 bits	15 bits
Output Relay (Y)		
Internal Relay (M)		
Latch Relay (L)		
Link Relay (B)		
Timer [contact] (TS)		
Timer [coil] (TC)		
Counter [contact] (CS)		
Counter [coil] (CC)		
Data Register (D)	480 words	16 words
Link Register (W)		
File Register (R)		
Extended File Register (R)		
Timer [current value] (TN)		
Counter [current value] (CN)		

5 Environment Setup

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

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

RS-232C

Target Machine			PLC Settings	
Driver	Serial Interface	RS-232C	Mode	5 (Format 5 Protocol mode)
	Flow Control	DTR(ER)/CTS	--	
	Transmission Speed	19200 bps	Baud Rate	19200 bps
	Retry Count	2	--	
	Parity Bit	Even	Parity Check Parity Bit	YES EVEN
	Stop Bit	2 bit	Stop Bit	2 bit
	Data Length	8 bits	Data Length	8 bits
	Rcv Timeout	10 sec	--	
	TX Wait Time	0 msec	--	
	--		Write possible in RUN mode	Possible
	--		Checksum	Yes
Protocol	Station No.	0	Station No.	0
	Network No.	0	Network No.	0
	PLC No.	255	PC No.	255
	Request destination module I/O No.	1023	--	
	Request destination module station No.	0	--	

RS-232C (CPU Direct)

Target Machine			PLC Settings	
Driver	Serial Interface	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	--	
			Serial Communication Setting	Use
	--		Send Wait Time	None
	--		Write possible in RUN mode	Possible
	--		Checksum	Yes
Protocol	Station No.	0	Station No.	0
	Network No.	0	Network No.	0
	PLC No.	255	PC No.	255
	Request destination module I/O No.	1023	--	
	Request destination module station No.	0	--	

RS-422 (4-wire)

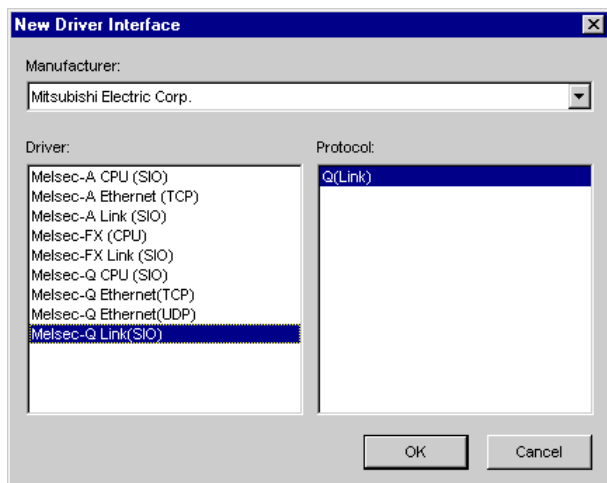| Target Machine			PLC Settings	
	GP, PS-P	PC/AT(PL), PS-G		
Driver	Serial Interface	RS-422 (4-wire)	RS-232C[*1]	Mode	5 (Format 5 Protocol mode)
	Flow Control	None		--	
	Transmission Speed	19200 bps		Baud Rate	19200 bps
	Retry Count	2		--	
	Parity Bit	Even		Parity Check Parity Bit	YES EVEN
	Stop Bit	2 bit		Stop Bit	2 bit
	Data Length	8 bits		Data Length	8 bits
	Rcv Timeout	10 sec		--	
	TX Wait Time	0 msec		--	
	--			Write possible in RUN mode	Possible
	--			Checksum	Yes
Protocol	Station No.	0		Station No.	0
	Network No.	0		Network No.	0
	PLC No.	255		PC No.	255
	Request destination module I/O No.	1023		--	
	Request destination module station No.	0		--	

*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.

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, 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.
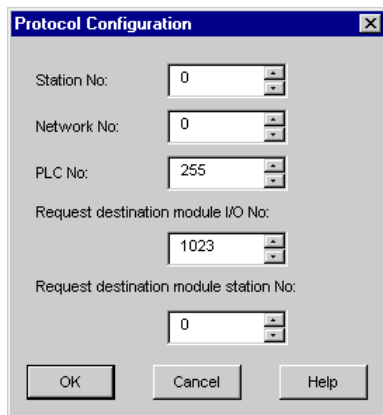
8   Protocol Configuration

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 the PLC unit. (0-31)

Network No.
    Enter a value to identify the PLC network. (0-239, or 254)

PLC No.
    Enter a value to identify the PLC on the network. (0-64, or 255)

Request destination module I/O No.
    Enter a value to identify the module. (0-511, or 1023)

Request destination module station No.
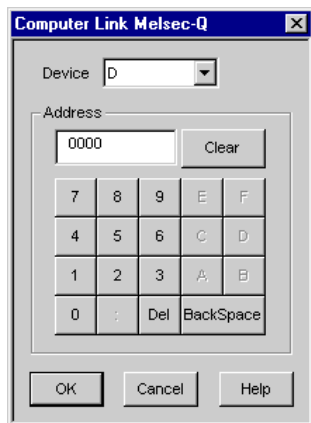   Enter a value to identify the module station number. (0 to 31)

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.