Mitsubishi Electric

Mitsubishi Electric Melsec-FX (CPU) 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 structure for connecting the target machine to Mitsubishi Melsec-FX Series PLCs.
To view a cable diagram for a particular communication format, see Section 2 – *Cable Diagrams*.

Series	CPU	Link I/F	Comm. Format	Diagram
Melsec-FX Series	FX0S FX0N FX1NC FX2NC	Programming Port	RS-232C	Cable Diagram 1
		2Port Adapter II GP070-MD11	RS-422(4-wire)	Cable Diagram 2
	FX1S FX1N	Programming Port	RS-232C	Cable Diagram 1
		2Port Adapter II GP070-MD11	RS-422(4-wire)	Cable Diagram 2
		FX1N-422-BD	RS-232C	Cable Diagram 3
	FX2N	Programming Port	RS-232C	Cable Diagram 1
		2Port Adapter II GP070-MD11	RS-422(4-wire)	Cable Diagram 2
		FX2N-422-BD	RS-232C	Cable Diagram 3

2   Cable Diagrams

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

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

Diagram 1   RS-232C

Use the following cables or a signal converter to connect the PLC to the target machine.

Target Machine		Cable/Adapter	Note
GP[*1], PS-P[*1]	a	RS-422 Cable (Mitsubishi: FX-20P-CADP 0.3m) and Exclusive Programming Console I/F Cable for Melsec-FX Series (Pro-face: GP430-IP11-O 5m)	
PC/AT(PL), PS-G	b	RS-422 Cable (Mitsubishi: FX-422CAB0 1.5m), RS-232C/RS-422 Signal Converter (Mitsubishi: FX-232AWC or FX-232AW), and RS-232C Cable (Mitsubishi: F2-232CAB or F2-232CAB-1)	- When connecting to a 25pin port on the target machine, use the F2-232CAB Cable. When connecting to a 9pin port, use the F2-232CAB-1 Cable. - FX-232AWC is an external unit. FX-232AW is an internal unit.

*1   Connect to COM1.

a. RS-422 Cable (Mitsubishi: FX-20P-CADP) and Exclusive Programming Console I/F Cable for Melsec-FX Series (Pro-face: GP430-IP11-O)
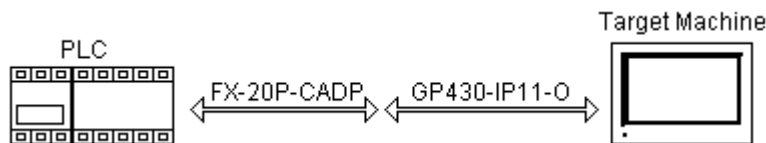
b. RS-422 Cable (Mitsubishi: FX-422-CAB0), RS-232C/RS-422 Signal Converter (Mitsubishi: FX-232AW or FX232AWC), and RS-232C Cable (Mitsubishi: F2-232CAB or F2-232CAB-1)
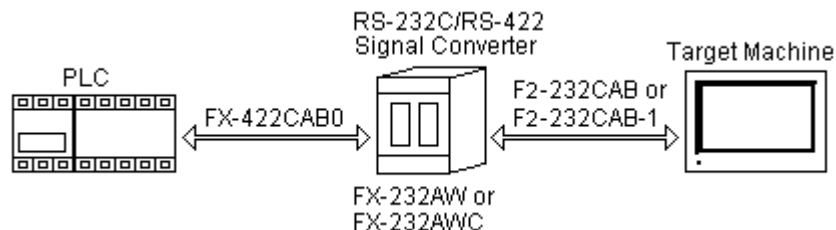
Diagram 2   RS-422 (4-wire)

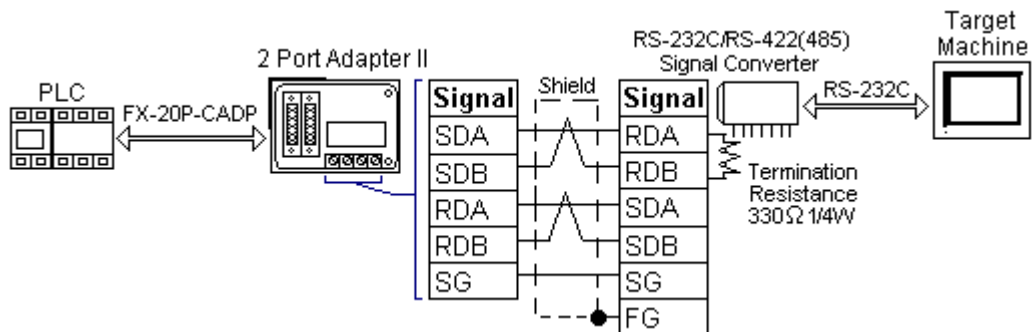Use the 2 Port Adapter II with the following cables to connect the PLC to the target machine.

Target Machine		Cable/Adapter	Note
GP[*1], PS-P[*1]	a	RS-422 Cable (Mitsubishi: FX-20P-CADP 0.3m), 2 Port Adapter II (Pro-face: GP070-MD11), and RS-422 Cable for the 2 Port Adapter II (Pro-face: GP070-MDCB11 5m)	When connecting to a 9pin port on the target machine, use a 9/25 pin adapter.
PC/AT(PL), PS-G	b	RS-422 (Mitsubishi: FX-20P-CADP), 2 Port Adapter II (Pro-face: GP070-MD11), User-created Cable, and RS-232C/RS-422(485) Signal Converter	Cable Length: 500m max.

*1   Connect to COM1.

a. RS-422 (Mitsubishi: FX-20P-CADP), 2 Port Adapter II (Pro-face: GP070-MD11), and RS-422 Cable for the 2 Port Adapter II (Pro-face: GP070-MDCB11)
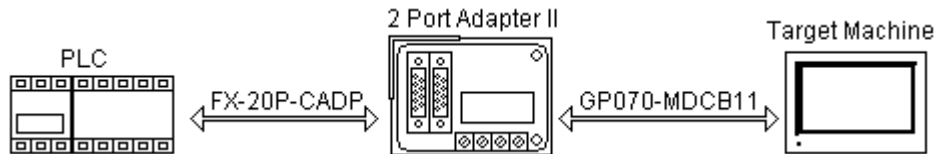
b. RS-422 (Mitsubishi: FX-20P-CADP), 2 Port Adapter II (Pro-face: GP070-MD11), User-created Cable, and RS-232C/RS-422(485) Signal Converter

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.
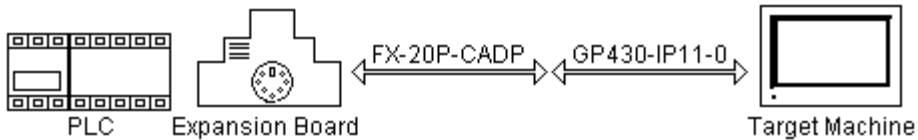
Diagram 3   RS-232C

Use the expansion board with the following cables to connect the PLC to the target machine.

Target Machine		Cable/Adapter	Note
GP[*1], PS-P[*1]	a	RS-422 Cable (Mitsubishi: FX-20P-CADP 0.3m) and Exclusive Programming Console I/F Cable for Melsec-FX Series (Pro-face: GP430-IP11-O 5m)	
PC/AT(PL), PS-G	b	RS-422 Cable (Mitsubishi: FX-422CAB0), RS-232C/RS-422 Signal Converter (Mitsubishi: FX-232AW or FX232AWC), and RS-232C Cable (Mitsubishi: F2-232CAB or F2-232CAB-1)	- When connecting to a 25pin port on the target machine, use the F2-232CAB Cable. When connecting to a 9pin port, use the F2-232CAB-1 Cable. - FX-232AWC is an external unit. FX-232AW is an internal unit.

*1   Connect to COM1.

a. RS-422 Cable (Mitsubishi: FX-20P-CADP 0.3m) and Exclusive Programming Console I/F Cable for Melsec-FX Series (Pro-face: GP430-IP11-O 5m)

b. RS-422 Cable (Mitsubishi: FX-422CAB0), RS-232C/RS-422 Signal Converter (Mitsubishi: FX-232AW or FX232AWC), and RS-232C Cable (Mitsubishi: F2-232CAB or F2-232CAB-1)
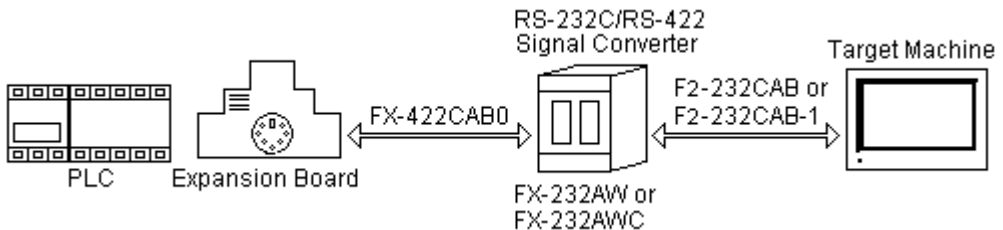
3   Supported Devices

The following tables list the device address ranges you can enter from the Device Address Keypad in Pro-Designer.
For actual device address ranges supported by the PLC, refer to the corresponding PLC manual.
Supported PLC device addresses differ from protocol to protocol, and from PLC to PLC.

3.1   FX0S, FX1S, FX0N Series

Device	Bit Address	Word Address	16 bit	32 bit
Input Relay	X0000-X0177	X0000-X0160[*1]		
Output Relay	Y0000-Y0177	Y0000-Y0160[*1]		
Auxiliary Relay	M0000-M0511	M0000-M0496[*2]		
Special Auxiliary Relay	M8000-M8255	M8000-M8240		
State	S0000-S0127	S0000-S0112[*2]		
Timer (contact)	TS000-TS063	—		
Counter (contact)	CS000-CS031 CS235-CS255	—	L/H[*6]	L/H[*6]
Timer	—	TN000-TN063		
Counter	—	CN000-CN031 CN235-CN255		
Data Register[*3]	D0000:0-D0255:15[*4] D1000:0-D2499:15[*4]	D0000-D0255 D1000-D2499[*5]		
Special Data Register[*3]	D8000:0-D8255:15[*4]	D8000-D8255		

*1   Input (I) and Output (O) relay addresses are defined using Octal data format. Therefore, define word addresses in multiples of 20. E.g. 0, 20, 40, ... 140, 160.
*2   Define word addresses in multiples of 16. E.g. 0, 16, 32, 48, ... 480, 496.
*3   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 value 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.
*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. D0100:09)
*5   To access one of these addresses D1000-D2499, make sure it's setup in the ladder software. Otherwise, an invalid address error is produced at runtime.
*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)

3.2 FX1N, FX2N, FX1NC, FX2NC Series

Device	Bit Address	Word Address	16 bit	32 bit
Input Relay	X0000-X0267	X0000-X0240[*1]		
Output Relay	Y0000-Y0267	Y0000-Y0240[*1]		
Auxiliary Relay	M0000-M3071	M0000-M3056[*2]		
Special Auxiliary Relay	M8000-M8255	M8000-M8240		
State	S0000-S0999	S0000-S0992[*2]		
Timer (contact)	TS000-TS255	—	L/H[*6]	L/H[*6]
Counter (contact)	CS000-CS255	—		
Timer	—	TN000-TN255		
Counter	—	CN000-CN255[*3]		
Data Register[*4]	D0000:0-D7999:15[*5]	D0000-D7999		
Special Data Register[*4]	D8000:0-D8255:15[*5]	D8000-D8255		

*1 Input (I) and Output (O) relay addresses are defined using Octal data format. Therefore, define word addresses in multiples of 20. E.g. 0, 20, 40, ... 220, 240.

*2 Define word addresses in multiples of 16. E.g. 0, 16, 32, 48, ... 3040, 3056.

*3 Addresses CN0-CN199 are 16-bit counter devices. CN200-CN255 are 32-bit counter devices. Do not create variables that use devices in both ranges. For example, do not create a float variable (32-bit) in address CN199.

*4 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 value 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.

*5 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. D0100:09)

*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.
- 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 consecutive addresses exceed the maximum data number range
    - when an address is designated for division
    - when device types are different

Device	Max. Consecutive Addresses	Gap Span
Input Relay (X)	512 bits	120 bits
Output Relay (Y)		
Auxiliary Relay (M)		
Special Auxiliary Relay (M)		
State (S)		
Timer [contact] (TS)		
Counter [contact] (CS)		
Timer (TN)	32 words	15 words
Counter (CN)		
Data Register (D)		
Special Data Register (D)		

5 Environment Setup

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

For details, see Section 7 – *Driver Configuraton*.

RS-232C

Target Machine Settings			PLC Settings
Driver Interface	Serial Interface	RS-232C	—
	Flow Control	None	—
	Transmission Speed	9600 bps	—
	Retry Count	2	—
	Parity Bit	Even	—
	Stop Bit	1 bit	—
	Data Length	7 bits	—
	Rcv. Time Out	10 sec	—
	TX Wait Time	0 msec	—

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]	—
	Flow Control	None		—
	Transmission Speed	9600 bps		—
	Retry Count	2		—
	Parity Bit	Even		—
	Stop Bit	1 bit		—
	Data Length	7 bits		—
	Rcv. Time Out	10 sec		—
	TX Wait Time	0 msec		—

*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.

**MEMO** When using an expansion board (FX1N-422-BD, FX2N-422-BD), define the following settings.
- In the Mitsubishi ladder software's **PC System Setup** tab, clear **Use Communication Settings.**
- Write **0** to address D8120.

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, or for details about the I/O Manager, see the online help.
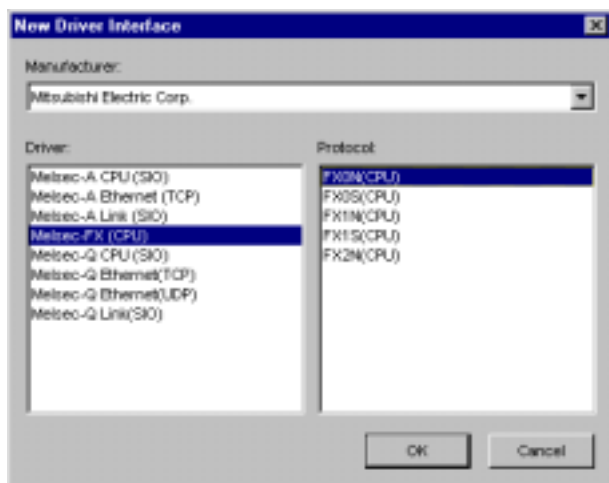
7   Driver Configuraton

To configure the communication settings of the serial driver in the target machine, use the [Driver Configuration] dialog box. Make sure these settings match those of the PLC.
For an overview of the driver 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: Mitsubishi Electric Corp.

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   When the target machine is a PS-G unit, select COM1. Connection using COM2 is not possible.

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
Set 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 Time Out

Defines the amount 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 the target machine waits, after receiving a communication packet, before sending a response.

8   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 you enter the correct format for bit and word devices.