MITSUBISHI
PROGRAMMABLE CONTROLLERS
MELSEC-F

FX2N-232-BD COMMUNICATION BOARD

USER'S GUIDE

JY992D66001A

This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX2N-232-BD and should be read and understood before attempting to install or use the unit. Further information can be found in the FX SERIES PROGRAMMING MANUAL, FX2N SERIES HARDWARE MANUAL and FX-485PC-IF USER'S MANUAL.

1 INTRODUCTION

The communication board FX2N-232-BD for RS232C (hereinafter referred to as "232BD") can be connected to the main unit of the FX2N Series programmable controller, and used as the port for the following applications.

(1) To perform data transfer between RS232C devices such as personal computers, bar code readers and printers.

(2) To perform data transfer using the dedicated protocol between RS232C devices. For details of the dedicated protocol, refer to the users manual of the FX-485PC-IF.

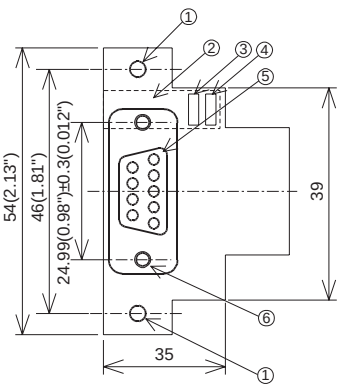
(3) To connect a programming tool.

And when the 232BD is used for the application (1) or (2) above, the communication format including the baud rate, the parity and the data length is specified by the parameters or the contents of the special data register D8120 of the FX2N programmable controller.

Only one 232BD can be connected to one base unit. Accordingly, the 232BD cannot be used together with the FX2N-485-BD or the FX2N-422-BD. When two or more RS232C units are required to be connected for the application, use the special block for RS232C communication.

1.1 EXTERNAL DIMENSIONS

Dimensions : mm (inches) Accessory : M3 self-tapping screws × 2, mounting bracket × 2



① Mounting holes <2-ϕ 4.0 (0.16")>

② Connector for programmable controller

③ RXD LED : Flashes at high speed during sending.

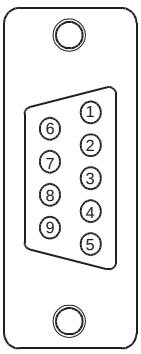
④ TXD LED : Flashes at high speed during sending.

⑤ Connector (9-pin D-SUB type) for peripheral unit
The top face of this connector is higher than the top face of the panel cover of the programmable controller by approximately 3 mm (0.12") or by approximately 50 mm when the cable is connected.

⑥ Mounting holes of connector <2 - M2.7 (0.11") × 0.635 (0.025")>

2 TERMINAL LAYOUTS

The connector is a 9-pin D-SUB type, and the pin configuration is as shown below.



Pin No.	Signal	Meaning	Function
1	CD(DCD)	Carrier detection	ON when carrier is detected for data reception
2	RD(RXD)	Receive data	Receive data (RS232C device to 232BD)
3	SD(TXD)	Send data	Send data (232BD to RS232C device)
4	ER(DTR)	Send request	Signal requesting preparation for data sending to RS232C device
5	SG(GND)	Signal ground	Signal ground
6	DR(DSR)	Send enable	Shows RS232C device is ready to receive
7,8,9	NC	No connection	

3 SPECIFICATION

3.1 General specification

General specifications is same as those for the FX2N series programmable controller.

3.2 Power supply specification

5 V DC, 60 mA is required from the programmable controller.

3.3 Specification

Transmission standard	Conforming to RS232C
Transmission distance	Max. 15m
Connector	9-pin D-SUB type
Pin layout of connector	1:CD(DCD) 2:RD(RXD) 3:SD(TXD) 4:ER(DTR) 5:SG(GND) 6:DR(DSR) 7,8,9:NC(No connection)
LED indicators	RXD, TXD
Communication method	Half-duplex communication system
Protocol	Programming protocol, dedicated protocol (format 1 or 4), non protocol
Isolation	No isolation

3.4 Related flag and data registers

Diagnostic devices	Operation
M8121	Data transmission delayed (RS instruction)
M8122	Data transmission flag (RS instruction)
M8123	Finished receiving data (RS instruction)
M8124	Carrier detection flag (RS instruction)
M8126	Global flag (dedicated protocol)
M8127	On demand handshake flag (dedicated protocol)
M8128	On demand error flag (dedicated protocol)
M8129	On demand Byte/Word flag (dedicated protocol)
M8161	Selection of 8 bit operations for applied instructions ASC, RS, ASCI, HEX, CCD (RS instruction)

Diagnostic devices	Operation
D8120	Communications format (RS instruction, dedicated protocol)
D8121	Local station number (dedicated protocol)
D8122	Amount of data to be transmitted (RS instruction)
D8123	Amount of remaining data already received (RS instruction)
D8124	Data header <default STX (02H)> (RS instruction)
D8125	Data terminator <default ETX (03H)> (RS instruction)
D8127	On demand head device register (dedicated protocol)
D8128	On demand data length register (dedicated protocol)
D8129	Data network 'time-out' timer value (dedicated protocol)

3.5 Communication format D8120

To send and receive the data between the RS232C unit using the 232BD, the communication format including the transmission speed (baud rate) and the parity must be consistent between the 232BD and the RS232C unit.
The communication format can be set using parameters or the contents of special data register D8120 of the FX2N programmable controller. Make sure to set appropriately the communication format in accordance with the RS232C unit used. For the setting method using the parameters of the FX2N programmable controller, refer to the manual of the peripheral unit used.
Make sure to turn off the power of the programmable controller and turn it on again after modifying the setting.

Bit No.	Meaning	Contents	
		0 (OFF)	**1 (ON)**
b0	Data length	7 bit	8 bit
b1 **b2**	Parity	b2,b1 (0, 0) : None (0, 1) : Odd	b2,b1 (1, 1) : Even
b3	Stop bit	1 bit	2 bit
b4 **b5** **b6** **b7**	Baud rate (bps)	b7,b6,b5,b4 (0, 0, 1, 1) : 300 (0, 1, 0, 0) : 600 (0, 1, 0, 1) : 1,200 (0, 1, 1, 0) : 2,400	b7,b6,b5,b4 (0, 1, 1, 1) : 4,800 (1, 0, 0, 0) : 9,600 (1, 0, 0, 1) : 19,200

Bit No.	Meaning	Contents	
		0 (OFF)	**1 (ON)**
b8	Header character *1	None	D8124 *2
b9	Terminator character *1	None	D8125 *3
b10	Reserved		
b11	DTR check (Control line) *4	Send and receive	Receive
b12	Control line *4	None	H / W
b13	Sum check *5	Sum check code is not added	Sum check code is added automatically
b14	Protocol	No protocol	Dedicated protocol
b15	Transmission control protocol *5	Protocol format 1	Protocol format 4

*1 Set to "0" when using the dedicated protocol.

*2 Effective only when no protocol (RS instruction) is selected, and has an initial value of STX (02H: Can be modified by the user).

*3 Effective only when no protocol (RS instruction) is selected, and has an initial value of ETX (03H: Can be modified by the user).

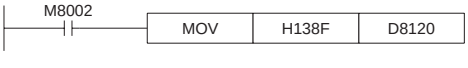
*4 Set to (b11, b12) = (1, 0) when using the dedicated protocol.

*5 Set to "0" when using no protocol.

3.5.1 Example program of setting

The communication format is set by special data register D8120.
Setting the communication format using D8120 is effective only at the time the RS instruction is driven, and therefore if changed after driving, it is not actually accepted.

An example of setting D8120 is shown below.



H138F = 0001 0011 1000 1111(binary)

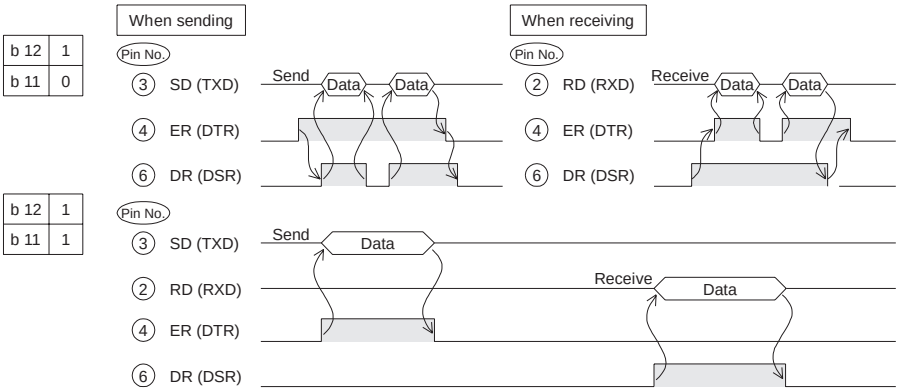
The settings for the above program are as right.

Data length	8 bit
Parity	Even
Stop bit	2 bit
Baud rate	9,600
Protocol	No protocol
Header	Used
Terminator	Used
Control line	H / W
DTR check	Send and receive

The control line is set by b12.

b12 = 0 : No hardware hand shaking. Send and receive are controlled by software protocol.

b12 = 1 : Hardware hand shaking. Signal lines ER(DTR)and DR(DSR)are used to control send and receive of data.



4 WIRING

To connect the 232BD to RS232C device use an RS232C cable. Make sure that the shield of cables is connected to ground (100 Ω or less).

The connector of the 232BD is 9-pin D-SUB (see Section 1.2 and Chapter 2). The connections of RS232C devices varies with each device being used. Check the specification of the device, and connect.

4.1 Connection examples

4.1.1 Terminal specification device

RS232C device					
Uses ER, DR *			Uses RS, CS		
Meaning	25-pin D-SUB	9-pin D-SUB	Meaning	25-pin D-SUB	9-pin D-SUB
RD (RXD)	③	②	RD (RXD)	③	②
SD (TXD)	②	③	SD (TXD)	②	③
ER (DTR)	⑳	④	RS (RTS)	④	⑦
SG (GND)	⑦	⑤	SG (GND)	⑦	⑤
DR (DSR)	⑥	⑥	CS (CTS)	⑤	⑧

232BD
9-pin D-SUB
② RD (RXD)
③ SD (TXD)
④ ER (DTR)
⑤ SG (GND)
⑥ DR (DSR)

***** When using ER and DR signals, please also check if RS and CS signals are needed according to the RS232C device's specifications.

4.1.2 Modem specification device

RS232C device					
Uses ER, DR *			Uses RS, CS		
Meaning	25-pin D-SUB	9-pin D-SUB	Meaning	25-pin D-SUB	9-pin D-SUB
CD (DCD)	⑧	①	CD (DCD)	⑧	①
RD (RXD)	③	②	RD (RXD)	③	②
SD (TXD)	②	③	SD (TXD)	②	③
ER (DTR)	⑳	④	RS (RTS)	④	⑦
SG (GND)	⑦	⑤	SG (GND)	⑦	⑤
DR (DSR)	⑥	⑥	CS (CTS)	⑤	⑧

232BD
9-pin D-SUB
① CD (DCD)
② RD (RXD)
③ SD (TXD)
④ ER (DTR)
⑤ SG (GND)
⑥ DR (DSR)

***** When using ER and DR signals, please also check if RS and CS signals are needed according to the RS232C device's specifications.

4.1.3 When programming or monitoring

Use F_2-232CAB-1 and 25-pin D-SUB to 9-pin D-SUB adapter or make a suitable cable.

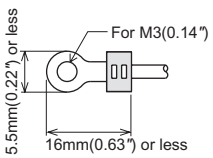
5 MOUNTING PROCEDURE

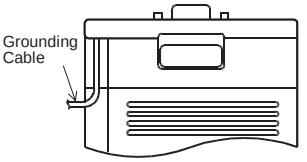
Turn off the power of the programmable controller, and mount the 232BD using the following procedure.

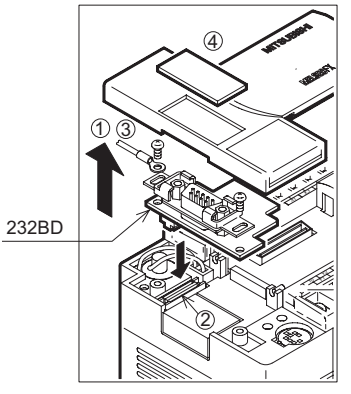
① Remove the panel cover from the top face of the main unit.

② Connect the 232BD to the board mounting connector provided on the base unit.

③ Fix the 232BD to the main unit using the M3 self-tapping screws provided, fitting the mounting bracket and the round crimp-style terminal with the ground cable as shown in the figure on the right.
Make sure that the crimp-style terminal is attached in the direction shown in the figure on the right, and that the ground cable extends from the unit shown in the figure below.
Tightening torque: 0.3 to 0.6 Nm (3 to 6 kgf·cm)







④ Cut out the hole provided on the left portion of the panel cover using a tool such as nippers and cutter so that the terminal block can be seen. The top face of this connector is higher than the top face of the panel cover of the programmable controller by approximately 7 mm (0.27").

6 CAUTION FOR USE

1) When programming tool is connected the 232BD, do not use any other communication format or parameters. If communication format or parameters is set, programming is not possible.

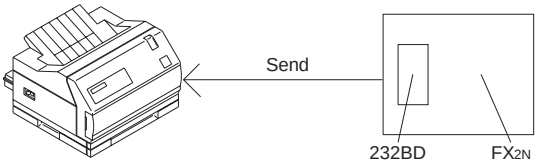
2) Only one programming tool (such as FX-10P, FX-20P, etc.) should be connected to either the programming port or the port provided on the 232BD. If a programming tool is connected to both connectors, the following may occur.

   a) The program inside the programmable controller may not be consistent with the program inside the programming tool. If the program is modified or the set value for the timer or the counter is modified, a part of the program may be damaged and the programmable controller may malfunction.

   b) When the sampling trace function of the programmable controller is used from both ports, the correct sampling trace result cannot be obtained.

7 PROGRAM EXAMPLES

1) Connecting 232BD and a printer, and printing out the data sent from the PC.

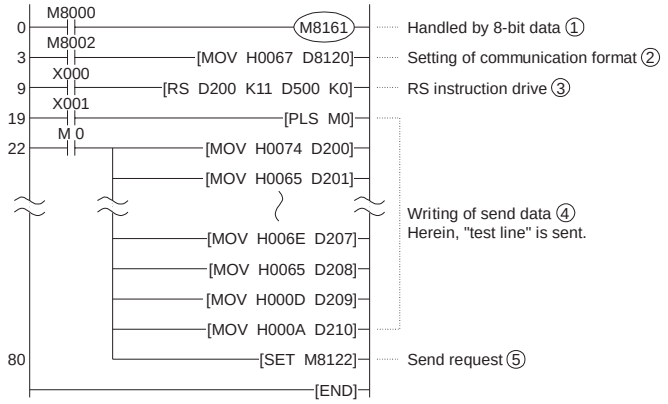


• Receive data • Send data

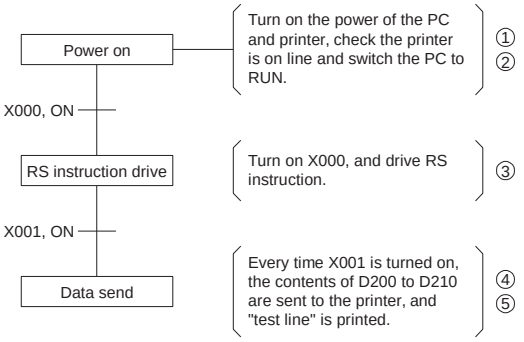
• The communication format of the serial printer is as follows.

Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400 bps

Sequence program



Operation



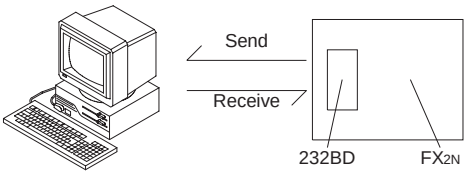
• In this example, CR (H000D) and LF (H000A) are written at the end of the message. The printer moves down one line for each message.

CR : Carriage Return

LF : Line Feed

Note: It may be necessary to set the DIP switches of your printer. Check your printer manual for how to configure the serial communications.

2) Connect 232BD and a personal computer, and exchange data with PC.



- Receive data
- Send data

- Send data
- Receive data

- Use the communication cable suited to the connector pin configuration of the personal computer. (For representative wiring see section 4.)

Preparation of software

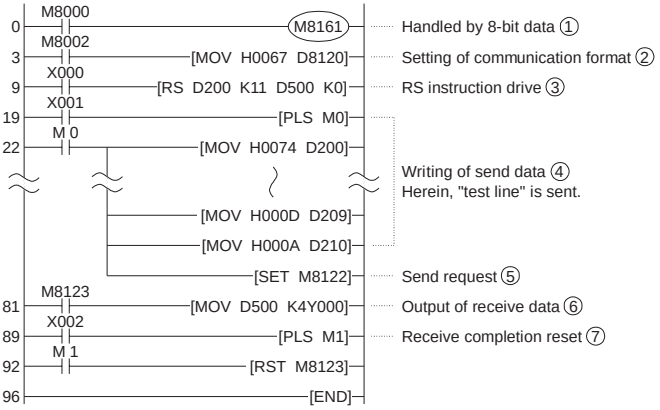
- Use ordinary communication software (terminal emulator) or dedicated program in the personal computer.

The communication format of the PC for this example is as follows.

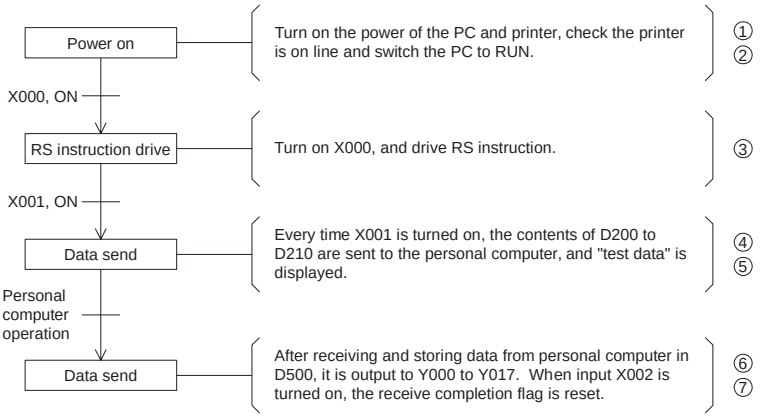
Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400

If the communication format of the soft ware cannot be adjusted to this setting, adjust the PC and the software to be the same.

Sequence program



Operation



8 DIAGNOSTICS

8.1 Common items

1) Make sure that the programmable controller is connected and that the POWER LED is lighted on the programmable controller.
2) Make sure that the VRRD or VRSC instruction is not used in the program. If such an instruction is used, delete it, turn off the power of the programmable controller, then turn it on again.
3) When the special auxiliary relay M8070 or M8071 is turned on, turn off the relay using the peripheral unit, turn off the power of the programmable controller, then turn on the power again.
4) Make sure that wiring is performed correctly. Refer to Section 4.
5) Make sure using the peripheral unit that the communication parameters are set correctly in accordance with the application. If the setting is not correct, set the parameters correctly using the peripheral unit.

8.2 When the parallel link function is used

1) Make sure that the communication format is in the initial state (D8120 = K0). Check using the peripheral unit how the communication parameters are set. If the no protocol (RS instruction) or the dedicated protocol is selected, set the parameters correctly using the peripheral unit.
2) If the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.

8.3 When communication is performed between the computer using the no protocol

1) Make sure that the communication format is consistent between the external unit (RS232C unit) and the programmable controller (D8120). If it is not consistent, correct the setting of the communication parameters or correct the contents of the D8120. When the D8120 is modified, turn on the RS instruction again. When the communication parameters are modified, turn off the power of the programmable controller, then turn it on again.
2) Check the timing for sending and receiving the data. For example, confirm that the counterpart unit is ready for receiving before sending the data.
3) If a terminator is not used, make sure that the send data quantity is consistent with the receivable data quantity. If both quantities are not consistent with each other, make them be consistent. (If the send data quantity varies, use a terminator.)
4) Make sure that the external unit is operating correctly.
5) Make sure that the data format transferred is equivalent. If it is not equivalent, correct it.
6) When the RS instruction is used twice or more in the program, make sure that only one RS instruction is turned on in one calculation cycle. Never set the RS instruction to OFF state while the data is being received or sent.

8.4 When the dedicated protocol is used for communication between the computer

1) Make sure that the communication format is consistent between the computer (RS232C unit) and the programmable controller (D8120). If it is not consistent, correct the setting of either the computer or the programmable controller. When the programmable controller is modified, turn off the power of the programmable controller, then turn it on again.
2) Make sure that the station No. of the programmable controller which is the target of data transfer is equivalent to the station No. set in the communication procedure. If they are not equivalent, correct the wrong one.
3) Make sure that the communication procedure is correct. If it is not correct, modify the setting of the RS232 unit to realize correct procedure.
4) Check whether errors have occurred in the RS232 unit and the programmable controller. For the check method and the countermeasures, refer to the users manual of the FX-485PC-IF.
5) If the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.

Guidelines for the safety of the user and protection of the FX2N-232-BD

- This manual has been written to be used by trained and competent personnel. This is defined by the European directives for machinery, low voltage and EMC.
- If in doubt at any stage during the installation of the FX2N-232-BD always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX2N-232-BD please consult the nearest Mitsubishi Electric distributor.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

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Manual revision : A
Date : JUNE 1997

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE:MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100 TELEX:J24532 CABLE MELCO TOKYO
HIMEJI WORKS:840, CHIYODA CHO, HIMEJI, JAPAN

Effective JUN. 1997
Specifications are subject to change without notice

ADVANCED AND EVER ADVANCING MITSUBISHI ELECTRIC

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PROGRAMMABLE CONTROLLERS
MELSEC-F

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(3) To connect a programming tool.

And when the 232BD is used for the application (1) or (2) above, the communication format including the baud rate, the parity and the data length is specified by the parameters or the contents of the special data register D8120 of the FX2N programmable controller.

Only one 232BD can be connected to one base unit. Accordingly, the 232BD cannot be used together with the FX2N-485-BD or the FX2N-422-BD. When two or more RS232C units are required to be connected for the application, use the special block for RS232C communication.

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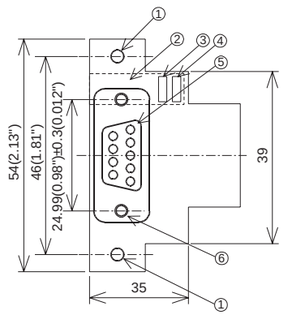
Dimensions : mm (inches) Accessory : M3 self-tapping screws × 2, mounting bracket × 2



① Mounting holes <2-ϕ 4.0 (0.16")>

② Connector for programmable controller

③ RXD LED : Flashes at high speed during sending.

④ TXD LED : Flashes at high speed during sending.

⑤ Connector (9-pin D-SUB type) for peripheral unit
The top face of this connector is higher than the top face of the panel cover of the programmable controller by approximately 3 mm (0.12") or by approximately 50 mm when the cable is connected.

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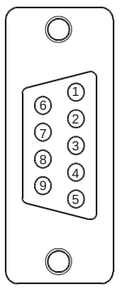

Pin No.	Signal	Meaning	Function
1	CD(DCD)	Carrier detection	ON when carrier is detected for data reception
2	RD(RXD)	Receive data	Receive data (RS232C device to 232BD)
3	SD(TXD)	Send data	Send data (232BD to RS232C device)
4	ER(DTR)	Send request	Signal requesting preparation for data sending to RS232C device
5	SG(GND)	Signal ground	Signal ground
6	DR(DSR)	Send enable	Shows RS232C device is ready to receive
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3.1 General specification

General specifications is same as those for the FX2N series programmable controller.

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LED indicators	RXD, TXD
Communication method	Half-duplex communication system
Protocol	Programming protocol, dedicated protocol (format 1 or 4), non protocol
Isolation	No isolation

3.4 Related flag and data registers

Diagnostic devices	Operation
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M8127	On demand handshake flag (dedicated protocol)
M8128	On demand error flag (dedicated protocol)
M8129	On demand Byte/Word flag (dedicated protocol)
M8161	Selection of 8 bit operations for applied instructions ASC, RS, ASCI, HEX, CCD (RS instruction)

Diagnostic devices	Operation
D8120	Communications format (RS instruction, dedicated protocol)
D8121	Local station number (dedicated protocol)
D8122	Amount of data to be transmitted (RS instruction)
D8123	Amount of remaining data already received (RS instruction)
D8124	Data header <default STX (02H)> (RS instruction)
D8125	Data terminator <default ETX (03H)> (RS instruction)
D8127	On demand head device register (dedicated protocol)
D8128	On demand data length register (dedicated protocol)
D8129	Data network 'time-out' timer value (dedicated protocol)

3.5 Communication format D8120

To send and receive the data between the RS232C unit using the 232BD, the communication format including the transmission speed (baud rate) and the parity must be consistent between the 232BD and the RS232C unit.
The communication format can be set using parameters or the contents of special data register D8120 of the FX2N programmable controller. Make sure to set appropriately the communication format in accordance with the RS232C unit used. For the setting method using the parameters of the FX2N programmable controller, refer to the manual of the peripheral unit used.
Make sure to turn off the power of the programmable controller and turn it on again after modifying the setting.

Bit No.	Meaning	Contents	
		0 (OFF)	1 (ON)
b0	Data length	7 bit	8 bit
b1 b2	Parity	b2,b1 (0, 0) : None (0, 1) : Odd	b2,b1 (1, 1) : Even
b3	Stop bit	1 bit	2 bit
b4 b5 b6 b7	Baud rate (bps)	b7,b6,b5,b4 (0, 0, 1, 1) : 300 (0, 1, 0, 0) : 600 (0, 1, 0, 1) : 1,200 (0, 1, 1, 0) : 2,400	b7,b6,b5,b4 (0, 1, 1, 1) : 4,800 (1, 0, 0, 0) : 9,600 (1, 0, 0, 1) : 19,200

Bit No.	Meaning	Contents	
		0 (OFF)	1 (ON)
b8	Header character *1	None	D8124 *2
b9	Terminator character *1	None	D8125 *3
b10	Reserved		
b11	DTR check (Control line) *4	Send and receive	Receive
b12	Control line *4	None	H / W
b13	Sum check *5	Sum check code is not added	Sum check code is added automatically
b14	Protocol	No protocol	Dedicated protocol
b15	Transmission control protocol *5	Protocol format 1	Protocol format 4

*1 Set to "0" when using the dedicated protocol.

*2 Effective only when no protocol (RS instruction) is selected, and has an initial value of STX (02H: Can be modified by the user).

*3 Effective only when no protocol (RS instruction) is selected, and has an initial value of ETX (03H: Can be modified by the user).

*4 Set to (b11, b12) = (1, 0) when using the dedicated protocol.

*5 Set to "0" when using no protocol.

3.5.1 Example program of setting

The communication format is set by special data register D8120.
Setting the communication format using D8120 is effective only at the time the RS instruction is driven, and therefore if changed after driving, it is not actually accepted.

An example of setting D8120 is shown below.

H138F = 0001 0011 1000 1111(binary)

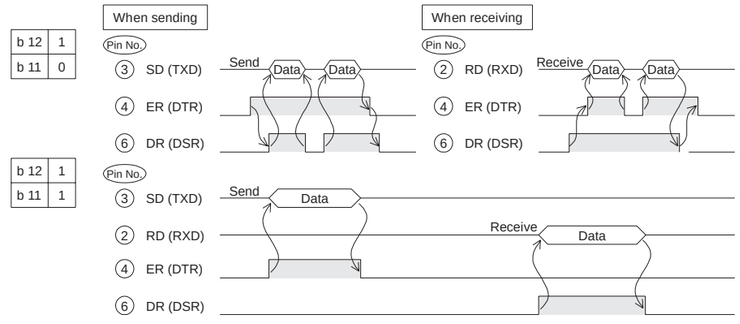
The settings for the above program are as right.

Data length	8 bit
Parity	Even
Stop bit	2 bit
Baud rate	9,600
Protocol	No protocol
Header	Used
Terminator	Used
Control line	H / W
DTR check	Send and receive

The control line is set by b12.

b12 = 0 : No hardware hand shaking. Send and receive are controlled by software protocol.

b12 = 1 : Hardware hand shaking. Signal lines ER(DTR)and DR(DSR)are used to control send and receive of data.



4 WIRING

To connect the 232BD to RS232C device use an RS232C cable. Make sure that the shield of cables is connected to ground (100 Ω or less).

The connector of the 232BD is 9-pin D-SUB (see Section 1.2 and Chapter 2). The connections of RS232C devices varies with each device being used. Check the specification of the device, and connect.

4.1 Connection examples

4.1.1 Terminal specification device

RS232C device						232BD
Uses ER, DR *			Uses RS, CS			9-pin D-SUB
Meaning	25-pin D-SUB	9-pin D-SUB	Meaning	25-pin D-SUB	9-pin D-SUB	
RD (RXD)	③	②	RD (RXD)	③	②	② RD (RXD)
SD (TXD)	②	③	SD (TXD)	②	③	③ SD (TXD)
ER (DTR)	⑳	④	RS (RTS)	④	⑦	④ ER (DTR)
SG (GND)	⑦	⑤	SG (GND)	⑦	⑤	⑤ SG (GND)
DR (DSR)	⑥	⑥	CS (CTS)	⑤	⑧	⑥ DR (DSR)

* When using ER and DR signals, please also check if RS and CS signals are needed according to the RS232C device's specifications.

4.1.2 Modem specification device

RS232C device						232BD
Uses ER, DR *			Uses RS, CS			9-pin D-SUB
Meaning	25-pin D-SUB	9-pin D-SUB	Meaning	25-pin D-SUB	9-pin D-SUB	
CD (DCD)	⑧	①	CD (DCD)	⑧	①	① CD (DCD)
RD (RXD)	③	②	RD (RXD)	③	②	② RD (RXD)
SD (TXD)	②	③	SD (TXD)	②	③	③ SD (TXD)
ER (DTR)	⑳	④	RS (RTS)	④	⑦	④ ER (DTR)
SG (GND)	⑦	⑤	SG (GND)	⑦	⑤	⑤ SG (GND)
DR (DSR)	⑥	⑥	CS (CTS)	⑤	⑧	⑥ DR (DSR)

* When using ER and DR signals, please also check if RS and CS signals are needed according to the RS232C device's specifications.

4.1.3 When programming or monitoring

Use F2-232CAB-1 and 25-pin D-SUB to 9-pin D-SUB adapter or make a suitable cable.

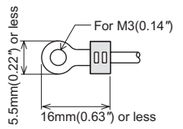
5 MOUNTING PROCEDURE

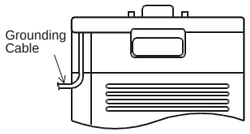
Turn off the power of the programmable controller, and mount the 232BD using the following procedure.

① Remove the panel cover from the top face of the main unit.

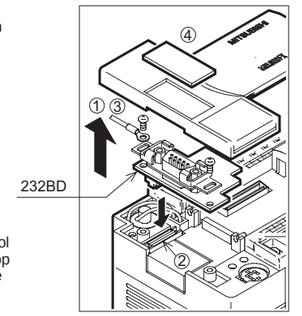
② Connect the 232BD to the board mounting connector provided on the base unit.

③ Fix the 232BD to the main unit using the M3 self-tapping screws provided, fitting the mounting bracket and the round crimp-style terminal with the ground cable as shown in the figure on the right.
Make sure that the crimp-style terminal is attached in the direction shown in the figure on the right, and that the ground cable extends from the unit shown in the figure below.
Tightening torque: 0.3 to 0.6 Nm (3 to 6 kgf·cm)





④ Cut out the hole provided on the left portion of the panel cover using a tool such as nippers and cutter so that the terminal block can be seen. The top face of this connector is higher than the top face of the panel cover of the programmable controller by approximately 7 mm (0.27").

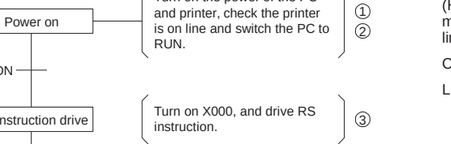


6 CAUTION FOR USE

1) When programming tool is connected the 232BD, do not use any other communication format or parameters. If communication format or parameters is set, programming is not possible.
2) Only one programming tool (such as FX-10P, FX-20P, etc.) should be connected to either the programming port or the port provided on the 232BD. If a programming tool is connected to both connectors, the following may occur.
   a) The program inside the programmable controller may not be consistent with the program inside the programming tool. If the program is modified or the set value for the timer or the counter is modified, a part of the program may be damaged and the programmable controller may malfunction.
   b) When the sampling trace function of the programmable controller is used from both ports, the correct sampling trace result cannot be obtained.

7 PROGRAM EXAMPLES

1) Connecting 232BD and a printer, and printing out the data sent from the PC.

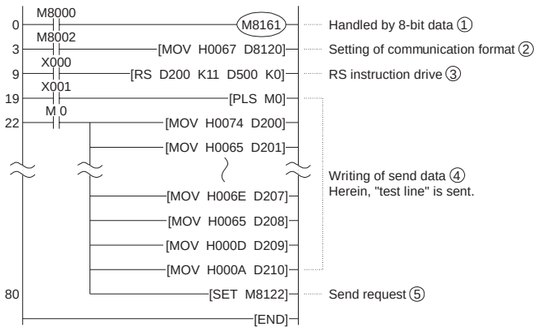


• Receive data • Send data

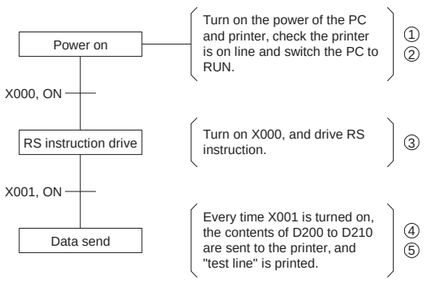
• The communication format of the serial printer is as follows.

Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400 bps

Sequence program



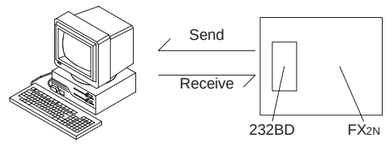
Operation



• In this example, CR (H000D) and LF (H000A) are written at the end of the message. The printer moves down one line for each message.
  CR : Carriage Return
  LF : Line Feed

Note: It may be necessary to set the DIP switches of your printer. Check your printer manual for how to configure the serial communications.

2) Connect 232BD and a personal computer, and exchange data with PC.



• Receive data • Send data
• Send data • Receive data

• Use the communication cable suited to the connector pin configuration of the personal computer. (For representative wiring see section 4.)

Preparation of software

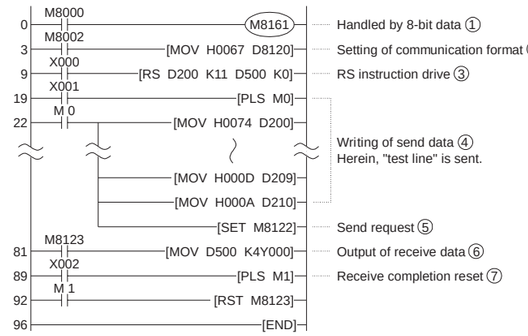
• Use ordinary communication software (terminal emulator) or dedicated program in the personal computer.

The communication format of the PC for this example is as follows.

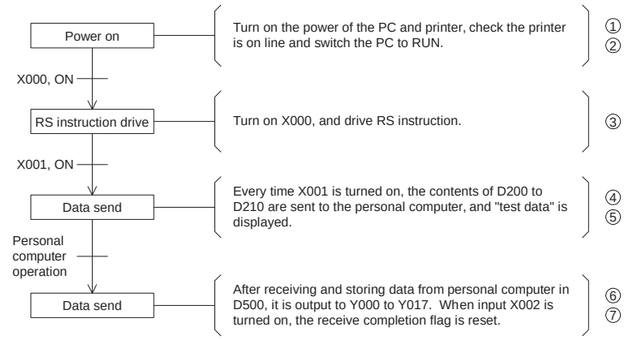
Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400

If the communication format of the soft ware cannot be adjusted to this setting, adjust the PC and the software to be the same.

Sequence program



Operation



8 DIAGNOSTICS

8.1 Common items

1) Make sure that the programmable controller is connected and that the POWER LED is lighted on the programmable controller.
2) Make sure that the VRRD or VRSC instruction is not used in the program. If such an instruction is used, delete it, turn off the power of the programmable controller, then turn it on again.
3) When the special auxiliary relay M8070 or M8071 is turned on, turn off the relay using the peripheral unit, turn off the power of the programmable controller, then turn on the power again.
4) Make sure that wiring is performed correctly. Refer to Section 4.
5) Make sure using the peripheral unit that the communication parameters are set correctly in accordance with the application. If the setting is not correct, set the parameters correctly using the peripheral unit.

8.2 When the parallel link function is used

1) Make sure that the communication format is in the initial state (D8120 = K0). Check using the peripheral unit how the communication parameters are set. If the no protocol (RS instruction) or the dedicated protocol is selected, set the parameters correctly using the peripheral unit.
2) If the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.

8.3 When communication is performed between the computer using the no protocol

1) Make sure that the communication format is consistent between the external unit (RS232C unit) and the programmable controller (D8120). If it is not consistent, correct the setting of the communication parameters or correct the contents of the D8120. When the D8120 is modified, turn on the RS instruction again. When the communication parameters are modified, turn off the power of the programmable controller, then turn it on again.
2) Check the timing for sending and receiving the data. For example, confirm that the counterpart unit is ready for receiving before sending the data.
3) If a terminator is not used, make sure that the send data quantity is consistent with the receivable data quantity. If both quantities are not consistent with each other, make them be consistent. (If the send data quantity varies, use a terminator.)
4) Make sure that the external unit is operating correctly.
5) Make sure that the data format transferred is equivalent. If it is not equivalent, correct it.
6) When the RS instruction is used twice or more in the program, make sure that only one RS instruction is turned on in one calculation cycle. Never set the RS instruction to OFF state while the data is being received or sent.

8.4 When the dedicated protocol is used for communication between the computer

1) Make sure that the communication format is consistent between the computer (RS232C unit) and the programmable controller (D8120). If it is not consistent, correct the setting of either the computer or the programmable controller. When the programmable controller is modified, turn off the power of the programmable controller, then turn it on again.
2) Make sure that the station No. of the programmable controller which is the target of data transfer is equivalent to the station No. set in the communication procedure. If they are not equivalent, correct the wrong one.
3) Make sure that the communication procedure is correct. If it is not correct, modify the setting of the RS232 unit to realize correct procedure.
4) Check whether errors have occurred in the RS232 unit and the programmable controller. For the check method and the countermeasures, refer to the users manual of the FX-485PC-IF.
5) If the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.

Guidelines for the safety of the user and protection of the FX2N-232-BD

- This manual has been written to be used by trained and competent personnel. This is defined by the European directives for machinery, low voltage and EMC.
- If in doubt at any stage during the installation of the FX2N-232-BD always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX2N-232-BD please consult the nearest Mitsubishi Electric distributor.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

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