

FX_{2N}

FX_{2N}-232IF RS232C INTERFACE BLOCK

HARDWARE MANUAL

JY992D73501A

This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX_{2N}-232IF RS232C Interface Block. It should be read and understood before attempting to install or use the unit. Further information can be found in the FX PROGRAMMING MANUAL, FX_{2N} series hardware manuals.

If in doubt at any stage during the installation of the FX_{2N}-232IF RS232C Interface Block always consult a professional electrical engineer who is qualified and trained to the local and national standards.

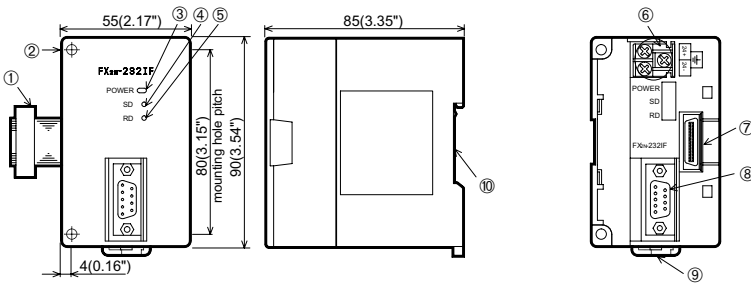
1. INTRODUCTION

The RS232C interface block FX_{2N}-232IF (hereinafter referred to as "232IF") is connected to the FX_{2N} programmable controller to realize full duplex serial data communication with another RS232C interface such as a personal computer, bar code reader, printer, etc.

- 1) Two or more devices with RS232C interfaces can be connected to an FX_{2N} programmable controller by using the RS232C special function block. Up to eight special function block can be added to the FX_{2N} series programmable controller. (Refer to section 2.1)
- 2) Communication requires no protocol
Full-duplex asynchronous communication between RS232C devices is specified through buffer memory (BFM). The FROM/TO instruction is used for the buffer memory.
- 3) The send/receive buffer can accommodate 512 bytes/256 words.
When the RS232C interlink connection mode is used, data exceeding 512 bytes/256 words can also be received.
- 4) ASCII/HEX conversion function
The function to convert and send and a hexadecimal numeric (0 to F) saved in the send data buffer as well as the function to convert a received ASCII code into a hexadecimal numeric (0 to F) and save it to the receive buffer are provided.

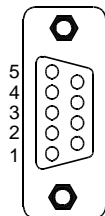
1.1 External Dimensions

Dimensions:mm(inches) Weight: Approx. 0.3 kg Accessory:Special block No. label



- ① Extension cable
- ② Mounting hole (2- \varnothing 4.5(0.18"))
- ③ POWER LED :Lit when both the 5V DC power supplied from the main unit and the 24V DC power supplied from the external terminal are supplied.
- ④ SD LED :Lit while data is sent to the RS232C equipment connected to the 232IF.
- ⑤ RD LED :Lit while data is received from the RS232C equipment connected to the 232IF.
- ⑥ Terminal screws (M3 (0.12"))
- ⑦ Next step extension connector
- ⑧ RS232C connector (9-pin D-SUB connector :#4-40unc inch screw thread)
- ⑨ DIN rail clip
- ⑩ DIN rail groove (35(1.38"))

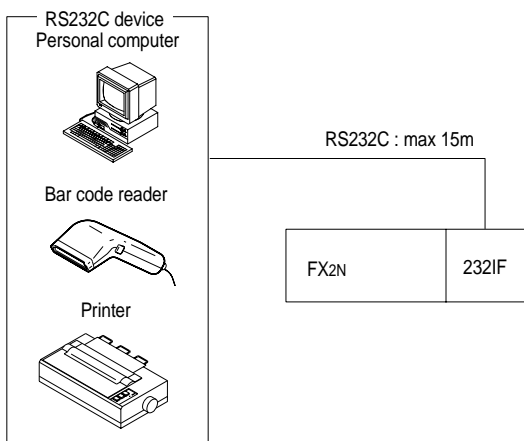
1.2 Connector Pin Layout



Pin No.	Signal name	Meaning	Function
1	CD(DCD)	Carrier detection	This signal indicates only status.
2	RD(RXD)	Receive data	Receive data (RS232C device to 232IF)
3	SD(TXD)	Send data	Send data (232IF to RS232C device)
4	ER(DTR)	Data terminal ready	ON when Send/Receive enable is ON
5	SG	Signal ground	Signal ground
6	DR(DSR)	Data set ready	This signal indicates only status.
7	RS(RTS)	Request to send <Clear to receive>*	ON when Send command is ON <ON when 232IF is Receive enabled>*
8	CS(CTS)	Clear to send	ON when RS232C device is ready to receive
9	CI(RI)	Calling indication	This signal indicates only status.

* <> At selection of interlink connection mode

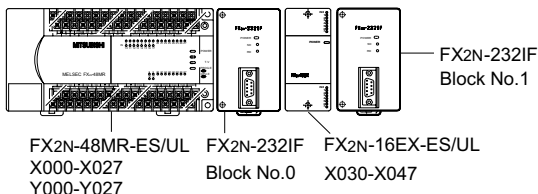
1.3 System Configuration



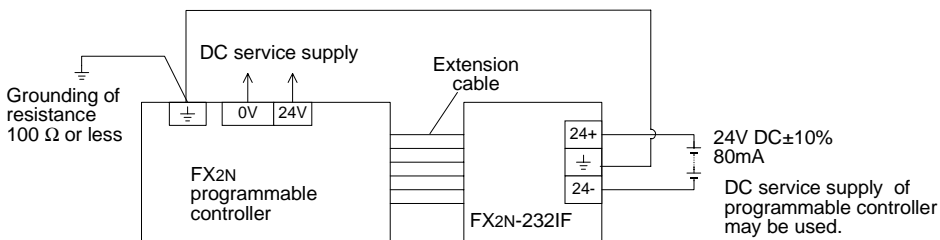
2. WIRING AND CONNECTION

2.1 Connection with the programmable controller

The 232IF can be directly connected to the basic unit of the FX2N programmable controller or connected on the right side of another extension block/unit. A number is assigned to each special unit/block counting from the one nearest the main unit in the way of No.0, No.1 . . . No.7". Up to eight special units/blocks in all can be connected in principle. However, the capacity of the 5V DC power supplied from the programmable controller is limited. The current consumption of the 5V DC power in the 232IF is 40 mA. Make sure that the total current consumption of the 5V DC power supply including other special blocks is equivalent to or less than that available.



2.2 Power Supply Wiring



Handling of the crimp-style terminal



Use the crimp-style terminals of the dimensions shown on the figure on the left. Make sure that the tightening torque of the terminal is 0.5 to 0.8 N (5 to 8 kgf·cm).

Tighten each terminal securely to avoid malfunction.

2.3 Connection Example

The signal wiring of the RS232C equipment varies depending on the RS232C specifications connected. Check the specifications of the RS232C equipment used, then connect the signals correctly. Representative wiring examples are shown below.

- 1) Connection with counterpart equipment of terminal specifications (when control line is not used)
 BFM #0 communication format: b9 = 0, b8 = 0, without control line

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
SG(GND)	5	SG(GND)	5	7

Communication is performed in accordance with the condition determined by the software in the 232IF and the counterpart equipment.

- 2) Connection with counterpart equipment of terminal specifications (when control line is used)
 Cross cable used, BFM #0 communication format: b9 = 0, b8 = 1, standard RS232C mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
RS(RTS)	7	RS(RTS)	7	4
CS(CTS)	8	CS(CTS)	8	5
CD(DCD)	1	CD(DCD)	1	8
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7

Because the carrier to send (CS) signal pin of the 232IF itself receives the request to send (RS) signal, signal transfer is performed as if the counterpart equipment is functioning.

- *1 When the CD signal is not monitored, the CD signal pin is not required to be connected. With regard to the CD signal, the 232IF only indicates the status.
- *2 The 232IF only indicates the status.

- 3) Interlink serial cross cable used,
 BFM #0 communication format: b9 = 1, b8 = 1, RS232C interlink connection mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
RS(RTS)	7	RS(RTS)	7	4
CS(CTS)	8	CS(CTS)	8	5
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7

In the interlink connection mode, data exceeding 512 bytes (upper limit of the receive buffer in the 232IF) can be received.

- *1 The 232IF only indicates the status.
- *2 In this mode, the request to send (RS) signal functions as the signal to enable receive in the 232IF. When receiving data exceeding 512 bytes (upper limit of the receive buffer in the 232IF), the 232IF sets the request to send (RS) signal to "OFF" and requests the counterpart equipment to suspend the send operation. When the data saved in the receive buffers is read by the sequence program, the remaining data can be received.

- 4) Connection with counterpart equipment of modem specifications (Control line is essential.)
 Straight cable used, BFM #0 communication format: b9 = 0, b8 = 1, standard RS232C mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
RS(RTS)	7	RS(RTS)	7	4
CS(CTS)	8	CS(CTS)	8	5
CD(DCD)	1	CD(DCD)	1	8
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7
CI(RI)	9	CI(RI)	9	22

- *1 The 232IF indicates the status exclusively.
- *2 When the CD signal is not monitored, the CD signal pin is not required to be connected. With regard to the CD signal, the 232IF indicates the status exclusively.
- *3 When the CI signal is not required, the CI signal pin is not required to be connected. With regard to the CI signal, the 232IF indicates the status exclusively.

3. SPECIFICATIONS

3.1 General specifications

General specifications excluding withstand voltage	Same as those of the main unit
Withstand voltage	500V AC, 1 minute (between the entire external terminal and the ground terminal)

3.2 Power Supply Specifications

Internal power supply from programmable controller	5V DC 40mA
External power supply	24V DC \pm 10% 80mA

3.3 Specifications

Item	Content
Transmission Standard	Conforming RS232C
Transmission distance	Max. 15m
Connected the number	1:1
Connector	9-pin D-SUB type
Pin layout of connector	1:CD(DCD), 2:RD(RXD), 3:SD(TXD), 4:ER(DTR), 5:SG, 6:DR(DSR), 7:RS(RTS), 8:CS(CTS), 9:CI(RI)
Indication (LED)	POWER, SD, RD
Communication method	No protocol by full-duplex asynchronous
Sported baud rate	300, 600, 1200, 2400, 4800, 9600, 19200
Isolation	Photo-coupler

Item	Content
Number of I/O points occupied	8 points taken from the programmable controller extension bus (can be either input or output)
Applicable programmable controller	FX _{2N} series
Communication with programmable controller	FROM/TO instruction

4. DIAGNOSTICS

For error code, refer to the FX Communication User's Manual.

- 1) Check the status of the POWER LED provided in the 232IF.
 - When it is lit, the drive power is correctly supplied.
 - If it is extinguished, supply the drive power correctly.
- 2) Check the status of the SD LED and the RD LED provided in the 232IF.
 - If the RD LED is not lit while data is received or the SD LED is not lighted while data is sent, check the instruction and the wiring.
 - When the RD LED is lit while data is received or the SD LED is lit while data is sent, the installation and the wiring are correct.
- 3) Make sure that the communication setting (BFM #0) of the 232IF is equivalent to that of the external equipment. If they are not equivalent each other, correct as required.
- 4) Verify the status of the data send/receive device. For example, make sure that the counterpart equipment is ready to receive before starting to send data to it.
- 5) When the terminator is not used, check whether the send data capacity is equivalent to the acceptable data capacity. Use the terminator, if the send data capacity may be changed.
- 6) Make sure that the external equipment is correctly operating.
- 7) Check whether the type of send data and the type of receive data are equivalent. If they are different, make them equivalent.

Guidelines for the safety of the user and protection of the FX2N-232IF RS232C INTERFACE BLOCK

- 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-232IF 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-232IF 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 : JUL 1998

 **MITSUBISHI ELECTRIC CORPORATION**

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HIMEJI WORKS : 840, CHIYODA CHO, HIMEJI, JAPAN

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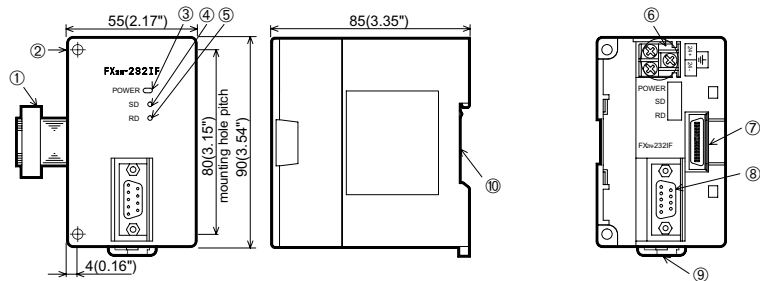
1. INTRODUCTION

The RS232C interface block FX_{2N}-232IF (hereinafter referred to as "232IF") is connected to the FX_{2N} programmable controller to realize full duplex serial data communication with another RS232C interface such as a personal computer, bar code reader, printer, etc.

- Two or more devices with RS232C interfaces can be connected to an FX_{2N} programmable controller by using the RS232C special function block. Up to eight special function block can be added to the FX_{2N} series programmable controller. (Refer to section 2.1)
- Communication requires no protocol
Full-duplex asynchronous communication between RS232C devices is specified through buffer memory (BFM). The FROM/TO instruction is used for the buffer memory.
- The send/receive buffer can accommodate 512 bytes/256 words.
When the RS232C interlink connection mode is used, data exceeding 512 bytes/256 words can also be received.
- ASCII/HEX conversion function
The function to convert and send and a hexadecimal numeric (0 to F) saved in the send data buffer as well as the function to convert a received ASCII code into a hexadecimal numeric (0 to F) and save it to the receive buffer are provided.

1.1 External Dimensions

Dimensions:mm(inches) Weight: Approx. 0.3 kg Accessory:Special block No. label



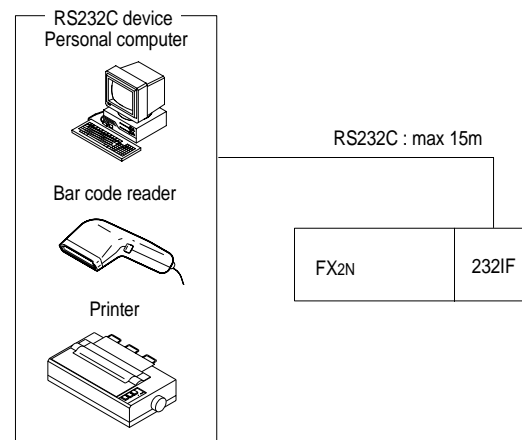
- Extension cable
- Mounting hole (2- \varnothing 4.5(0.18"))
- POWER LED :Lit when both the 5V DC power supplied from the main unit and the 24V DC power supplied from the external terminal are supplied.
- SD LED :Lit while data is sent to the RS232C equipment connected to the 232IF.
- RD LED :Lit while data is received from the RS232C equipment connected to the 232IF.
- Terminal screws (M3 (0.12"))
- Next step extension connector
- RS232C connector (9-pin D-SUB connector :#4-40unc inch screw thread)
- DIN rail clip
- DIN rail groove (35(1.38"))

1.2 Connector Pin Layout

Pin No.	Signal name	Meaning	Function
1	CD(DCD)	Carrier detection	This signal indicates only status.
2	RD(RXD)	Receive data	Receive data (RS232C device to 232IF)
3	SD(TXD)	Send data	Send data (232IF to RS232C device)
4	ER(DTR)	Data terminal ready	ON when Send/Receive enable is ON
5	SG	Signal ground	Signal ground
6	DR(DSR)	Data set ready	This signal indicates only status.
7	RS(RTS)	Request to send <Clear to receive>*	ON when Send command is ON <ON when 232IF is Receive enabled>*
8	CS(CTS)	Clear to send	ON when RS232C device is ready to receive
9	CI(RI)	Calling indication	This signal indicates only status.

* < > At selection of interlink connection mode

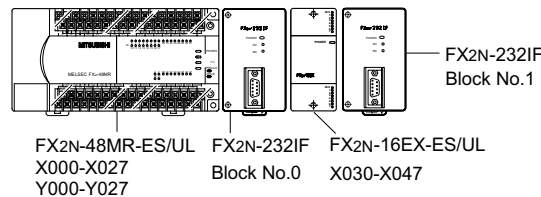
1.3 System Configuration



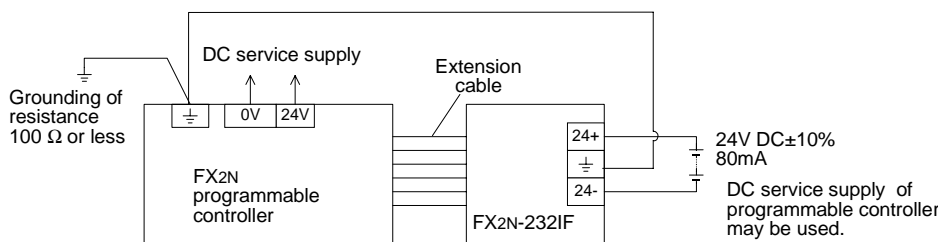
2. WIRING AND CONNECTION

2.1 Connection with the programmable controller

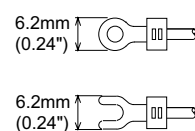
The 232IF can be directly connected to the basic unit of the FX_{2N} programmable controller or connected on the right side of another extension block/unit. A number is assigned to each special unit/block counting from the one nearest the main unit in the way of No.0, No.1 . . . No.7". Up to eight special units/blocks in all can be connected in principle. However, the capacity of the 5V DC power supplied from the programmable controller is limited. The current consumption of the 5V DC power in the 232IF is 40 mA. Make sure that the total current consumption of the 5V DC power supply including other special blocks is equivalent to or less than that available.



2.2 Power Supply Wiring



Handling of the crimp-style terminal



Use the crimp-style terminals of the dimensions shown on the figure on the left. Make sure that the tightening torque of the terminal is 0.5 to 0.8 N (5 to 8 kgf•cm). Tighten each terminal securely to avoid malfunction.

2.3 Connection Example

The signal wiring of the RS232C equipment varies depending on the RS232C specifications connected. Check the specifications of the RS232C equipment used, then connect the signals correctly. Representative wiring examples are shown below.

- Connection with counterpart equipment of terminal specifications (when control line is not used)
BFM #0 communication format: b9 = 0, b8 = 0, without control line

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
SG(GND)	5	SG(GND)	5	7

Communication is performed in accordance with the condition determined by the software in the 232IF and the counterpart equipment.

- Connection with counterpart equipment of terminal specifications (when control line is used)
Cross cable used, BFM #0 communication format: b9 = 0, b8 = 1, standard RS232C mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
RS(RTS)	7	RS(RTS)	7	4
CS(CTS)	8	CS(CTS)	8	5
CD(DCD)	1	CD(DCD)	1	8
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7

Because the carrier to send (CS) signal pin of the 232IF itself receives the request to send (RS) signal, signal transfer is performed as if the counterpart equipment is functioning.

- *1 When the CD signal is not monitored, the CD signal pin is not required to be connected. With regard to the CD signal, the 232IF only indicates the status.
- *2 The 232IF only indicates the status.

- Interlink serial cross cable used,
BFM #0 communication format: b9 = 1, b8 = 1, RS232C interlink connection mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
SD(TXD)	3	SD(TXD)	3	2
RD(RXD)	2	RD(RXD)	2	3
RS(RTS)	7	RS(RTS)	7	4
CS(CTS)	8	CS(CTS)	8	5
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7

In the interlink connection mode, data exceeding 512 bytes (upper limit of the receive buffer in the 232IF) can be received.

- *1 The 232IF only indicates the status.
- *2 In this mode, the request to send (RS) signal functions as the signal to enable receive in the 232IF. When receiving data exceeding 512 bytes (upper limit of the receive buffer in the 232IF), the 232IF sets the request to send (RS) signal to "OFF" and requests the counterpart equipment to suspend the send operation. When the data saved in the receive buffers is read by the sequence program, the remaining data can be received.

- Connection with counterpart equipment of modem specifications (Control line is essential.)
Straight cable used, BFM #0 communication format: b9 = 0, b8 = 1, standard RS232C mode

232IF side		RS232C device side		
Signal name	Pin No.	Signal name	9-pin D-SUB	25-pin D-SUB
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CD(DCD)	1	CD(DCD)	1	8
ER(DTR)	4	ER(DTR)	4	20
DR(DSR)	6	DR(DSR)	6	6
SG(GND)	5	SG(GND)	5	7
CI(RI)	9	CI(RI)	9	22

- *1 The 232IF indicates the status exclusively.
- *2 When the CD signal is not monitored, the CD signal pin is not required to be connected. With regard to the CD signal, the 232IF indicates the status exclusively.
- *3 When the CI signal is not required, the CI signal pin is not required to be connected. With regard to the CI signal, the 232IF indicates the status exclusively.

3. SPECIFICATIONS

3.1 General specifications

General specifications excluding withstand voltage	Same as those of the main unit
Withstand voltage	500V AC, 1 minute (between the entire external terminal and the ground terminal)

3.2 Power Supply Specifications

Internal power supply from programmable controller	5V DC 40mA
External power supply	24V DC \pm 10% 80mA

3.3 Specifications

Item	Content
Transmission Standard	Conforming RS232C
Transmission distance	Max. 15m
Connected the number	1:1
Connector	9-pin D-SUB type
Pin layout of connector	1:CD(DCD), 2:RD(RXD), 3:SD(TXD), 4:ER(DTR), 5:SG, 6:DR(DSR), 7:RS(RTS), 8:CS(CTS), 9:CI(RI)
Indication (LED)	POWER, SD, RD
Communication method	No protocol by full-duplex asynchronous
Spoted baud rate	300, 600, 1200, 2400, 4800, 9600, 19200
Isolation	Photo-coupler

Item	Content
Number of I/O points occupied	8 points taken from the programmable controller extension bus (can be either input or output)
Applicable programmable controller	FX _{2N} series
Communication with programmable controller	FROM/TO instruction

4. DIAGNOSTICS

For error code, refer to the FX Communication User's Manual.

- 1) Check the status of the POWER LED provided in the 232IF.
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 - If the RD LED is not lit while data is received or the SD LED is not lighted while data is sent, check the instruction and the wiring.
 - When the RD LED is lit while data is received or the SD LED is lit while data is sent, the installation and the wiring are correct.
- 3) Make sure that the communication setting (BFM #0) of the 232IF is equivalent to that of the external equipment. If they are not equivalent each other, correct as required.
- 4) Verify the status of the data send/receive device. For example, make sure that the counterpart equipment is ready to receive before starting to send data to it.
- 5) When the terminator is not used, check whether the send data capacity is equivalent to the acceptable data capacity. Use the terminator, if the send data capacity may be changed.
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 **MITSUBISHI ELECTRIC CORPORATION**

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