

Motoman XRC Controller XFB03 Board Instruction Manual

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SECTION 1

INTRODUCTION

1.1 About this Document

This manual provides instructions for XFB03 Board and contains the following sections:

SECTION 1 – INTRODUCTION

General information about this manual, a list of reference documents, and customer service information.

SECTION 2 – SAFETY

Provides information for the safe use and operation of Motoman products.

SECTION 3 – XFB03 BOARD INSTRUCTIONS

Provides detailed instructions to utilize the XFB03 Board.

1.2 Reference to Other Documentation

For additional information refer to the following:

- Concurrent I/O Parameters Manual (P/N 142102-1)
- Operator's Manual for General Purpose (P/N 142099-1)
- Operator's Manual for Handling (P/N 142100-1)
- Operator's Manual for Spot Welding (P/N 142101-1)
- Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman UP6, XRC Manipulator Manual (P/N 142104-1)
- Motoman UP20, XRC Manipulator Manual (P/N 144342-1)
- Motoman UP50, XRC Manipulator Manual (P/N 144343-1)
- Motoman UP130, XRC Manipulator Manual (P/N 142107-1)

1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6, SK16X, etc.)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

NOTES

SECTION 2

SAFETY

2.1 Introduction

It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

Robotic Industries Association

900 Victors Way

P.O. Box 3724

Ann Arbor, Michigan 48106

TEL: (734) 994-6088

FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

2.2 **Standard Conventions**

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



DANGER!

Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.



WARNING!

Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.



CAUTION!

Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

NOTE: *Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.*

2.3 General Safeguarding Tips

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

2.4 Mechanical Safety Devices

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

2.5 **Installation Safety**

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 **Programming Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the MRC controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

2.7 Operation Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

2.8 Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

YASNAC XRC OPTIONS INSTRUCTIONS

FOR JARCR-XFB03 BOARD

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN SETUP MANUAL
MOTOMAN-□□□ INSTRUCTIONS
YASNAC XRC INSTRUCTIONS
YASNAC XRC OPERATOR'S MANUAL
YASNAC XRC OPERATOR'S MANUAL for BEGINNERS

The YASNAC XRC operator's manuals above correspond to specific usage.
Be sure to use the appropriate manual.





MANDATORY

- This manual explains the JARCR-XFB03 board of the YASNAC XRC. Read this manual carefully and be sure to understand its contents before handling the YASNAC XRC.
- General items related to safety are listed in Section 1: Safety of the Setup Manual. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.



CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the YASNAC XRC.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.



MANDATORY

Always be sure to follow explicitly the items listed under this heading.



PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.



WARNING

- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.
When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned off.

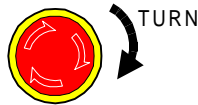
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



Emergency Stop Button

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.



Release of Emergency Stop

- Always set the Teach Lock before entering the robot work envelope to teach a job.

Operator injury can occur if the Teach Lock is not set and the manipulator is started from the playback panel.

- Observe the following precautions when performing teaching operations within the working envelope of the manipulator :
 - View the manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no persons are present in the manipulator's work envelope and that you are in a safe location before:
 - Turning on the YASNAC XRC power
 - Moving the manipulator with the programming pendant
 - Running check operations
 - Performing automatic operations

Injury may result if anyone enters the working envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop button is located on the right side of both the YASNAC XRC playback panel and programming pendant.



CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
 - Check for problems in manipulator movement.
 - Check for damage to insulation and sheathing of external wires.

- Always return the programming pendant to the hook on the XRC cabinet after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of the Alarm Display in the setup manual before operating the manipulator.



PROHIBITED

- Do not use or keep the board in the following environmental conditions.
 - Where exposed to direct sunshine
 - Where vibration or impact occurs
 - Where high humidity exists
 - Where a strong magnetic field exists
 - Where much dust exists
 - Where a sudden change in the temperature occurs
 - Where corrosive gases occur
 - Where condensation occurs

Improper usage of the board may damage the board.

Definition of Terms Used Often in This Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.


The manipulator usually consists of the controller, the playback panel, the programming pendant, and supply cables.

The MOTOMAN manipulator is the YASKAWA industrial robot product.

In this manual, the equipment is designated as follows.

Equipment	Manual Designation
YASNAC XRC Controller	XRC
YASNAC XRC Playback Panel	Playback Panel
YASNAC XRC Programming Pendant	Programming Pendant

Descriptions of the programming pendant and playback panel keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with []. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. page ke  The cursor key is an exception, and a picture is not shown.
	Axis Keys Number Keys	“Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}
Playback Panel	Buttons	Playback panel buttons are enclosed in brackets. ex. [TEACH] on the playback panel

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select •••" means that the cursor is moved to the object item and the SELECT key is pressed.

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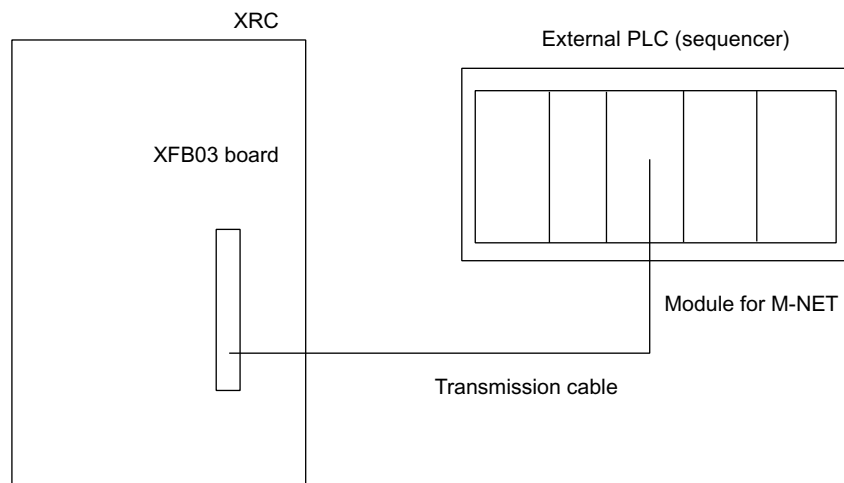
1 Outline

By using the JARCR-XFB03 board (M-NET) for the XRC, the cost for wiring between modules (sequencer, positioning unit, measuring unit, etc.) that configure a system, can be reduced. This manual explains how to use the JARCR-XFB03 board (hereinafter called the XFB03 board).

1.1 Features of System with the XFB03 Board

- Wiring between modules requires only one transmission cable.
- The transmission cable can be extended up to 100 m (total length of cables).
- A system can be constructed at lower cost because of minimal wiring.
- Up to 112 transmission I/O points are available (input: 112 points, output: 112 points).
- The XFB03 board is used exclusively for a slave station.

1.2 System Configuration Example



2.2 Board Specifications

Items	Specifications
Interface to external devices	Interface between modules (M-NET)
Board mounting position	Optional board mounting space in the XRC
Error indicator	LED display
Number of transmission I/O points	Maximum number of I/O points Input: 112 points Output: 112 points Note: The number of input points and the number of output points can not be set individually.

2.3 Communication Specifications

Items	Specifications
Communication method	Half-duplex system
Synchronization method	Asynchronous system
Transmission distance	Max. 100 m
Bit configuration	JIS 7-unit system, 10 bits
Parity check	Vertical parity detection (Even parity) Horizontal parity detection (Even parity)
Signal level	EIA standard, in conformity with RS-422
Transmission cable specifications ^{*1}	JKEV-SB, 0.75 sq × 2 p (Polyethylene insulation sheath cable with pair-type copper braid shielding for measurement)
Transmission speed	19.2/38.4/57.6 kbps
Slave station address ^{*2}	1 to 7
Transmission mode ^{*3}	T-mode/Y-mode
Number of transmission I/O points	Maximum number of I/O points Input: 112 points Output: 112 points Note: The number of input points and the number of output points can not be set individually.

- *1** The transmission cable specifications “JKEV-SB” is a standard of Japan Cable Industry Association.
The following shows the cable name of each manufacturer:
Sumitomo Electric Industries, Ltd.: DPEV-SB
Fujikura Ltd.: IPEV-SB
The Furukawa Electric Co., Ltd.: KPEV-SB
- *2** The XFB03 board is exclusive-use for a slave station.
- *3** “Y-mode” can be used only when the master station is a sequencer for YASKAWA M-NET and a communication is performed in “Y-mode”.

2.4 Connector

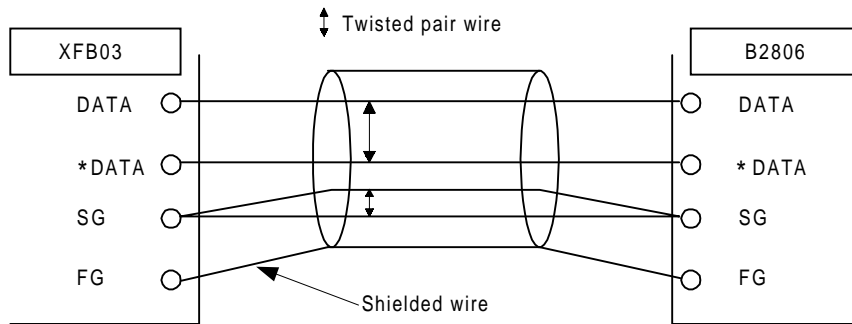
CN02 (Terminal Stand for Transmission Cable Connection)

Terminal No.	Signal Name	Meaning
1	DATA	RS-422 communication signal (Terminal A)
2	*DATA	RS-422 communication signal (Terminal B)
3	SG	Signal line ground
4	FG	Frame ground (For connecting transmission cable shielded wire)
5	DATA	RS-422 communication signal (Terminal A)
6	*DATA	RS-422 communication signal (Terminal B)
7	SG	Signal line ground
8	FG	Frame ground (For connecting transmission cable shielded wire)

2.5 Connection of Transmission Cable

Connect the CN02 (terminal stand) on the XFB03 board and an external sequencer with a transmission cable (refer to Section 2.3 “Communication Specifications”).

The connection example between the XFB03 board and the B2806 (Memocon-SC 2000 series) is shown below.



3 Setting the Functions

3.1 Function Setting Switches

The section explains the switches that set the functions of the XFB03 board following the instructions. Make the correct settings. For more details about the settings, refer to "3.2 Switch Setting Method".

S1: I/O POINT

Sets the number of transmission I/O points.

(Set value of S1) × 8 is the actual number of I/O points.

The range for the S1 setting is from "1" to "E". (Max. 112 points each for input and output)

Set the number of points to be transferred to the sequencer side.

<Example>

When S1 is set to "E", the number of I/O points is as follows.

Input: 112 points

Output: 112 points

S2: Sets the stations for the XFB03 board on the XRC.

The range for the station setting is from "1" (ST#01) to "E" (ST#14).

Do not set to "0" because the station is not allocated to "0". Also do not set to "F" because ST#15 is specially designed for use with the JANCD-XIO01 and the JANCD-XIO02 boards.

S3: RST

Resets the XFB03 board.



Do not use the S3 since it is for maintenance only.

S4-1: TERM

Sets the termination resistance. When the XFB03 board is at the termination of the network, set to "ON: termination resistance provided".

S4-3: FIL

Sets a noise filter for the communication line.

If problems occur during communications, noise may be the cause. To reduce the noise, set to "Filter provided".

Normally, set S4-3 to "Filter not provided".

3.1 Function Setting Switches

S4-4: Same as S4-3.

Be sure to set it to the same setting as S4-3.

S5: SLAVE ADDRESS

Sets a slave address. The XFB03 board is regarded as one of the slave stations by an external sequencer, the master station. Using S5, set a slave address. The setting range of S5 is "1" to "7".

S6: 16/17 BYTE

Switches the communication modes between 16 and 17 bytes. The default setting is 16 bytes. In "5.1 Setting I/O Module", when the communication cable and the power cable are connected correctly but the I/O points of the XFB03 board do not appear on the P.P., the CN10 of the JANCD-XIO01 board in the JZNC-XIU01 may be set to 17 bytes. In this case, set the XFB03 board to 17 bytes.

S7, 8, and 9: 19.2 K, 38.4 K, 57.6 K

Sets a transmission baud rate for the M-NET.

Choose from 19.2 kbps, 38.4 kbps, and 57.6 kbps.

S10: Y/T MODE

Sets the transmission mode for the M-NET. In the "T-mode", a communication of interface specifications between modules is performed. The "Y-mode" can be used when the master station is a sequencer for YASKAWA M-NET and communications are performed in the "Y-mode". (Communications are performed according to the YASKAWA specifications.)

For details on the "Y-mode", refer to the instruction manual for the station sequencer.



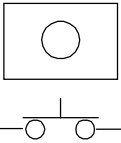
S11: Y/T MODE

Sets the operation mode of the XFB03 board.

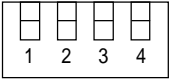
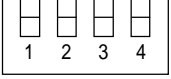

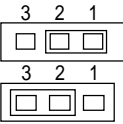
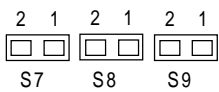


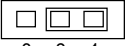

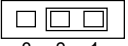

Set S11 to "SYS" (normal mode). Never set to "TEST" (test mode) since the test mode is for maintenance only.

3.2 Switch Setting Method

Switches	Setting Method																
<p>S1</p> <p>Setting of the number of I/O points</p>	 <p>Sets the number of transmission I/O points. Turn the arrows to the numbers corresponding to the desired number of I/O points. Use a flat tipped driver.</p> <p>The following shows the relation between the switch settings and the actual number of I/O points.</p> <table border="0"> <tr> <td>0: Setting error (SW error)</td> <td>8: 64 [72]</td> </tr> <tr> <td>1: 8 [16]</td> <td>9: 72 [80]</td> </tr> <tr> <td>2: 16 [24]</td> <td>A: 80 [88]</td> </tr> <tr> <td>3: 24 [32]</td> <td>B: 88 [96]</td> </tr> <tr> <td>4: 32 [40]</td> <td>C: 96 [104]</td> </tr> <tr> <td>5: 40 [48]</td> <td>D: 104 [112]</td> </tr> <tr> <td>6: 48 [56]</td> <td>E: 112 [120]</td> </tr> <tr> <td>7: 56 [64]</td> <td>F: Setting error (SW error)</td> </tr> </table> <p>The value in [] is the number of I/O points reserved for the XFB03 board inside the XRC. (The area for the board status is included.)</p>	0: Setting error (SW error)	8: 64 [72]	1: 8 [16]	9: 72 [80]	2: 16 [24]	A: 80 [88]	3: 24 [32]	B: 88 [96]	4: 32 [40]	C: 96 [104]	5: 40 [48]	D: 104 [112]	6: 48 [56]	E: 112 [120]	7: 56 [64]	F: Setting error (SW error)
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6: 48 [56]	E: 112 [120]																
7: 56 [64]	F: Setting error (SW error)																
<p>S2</p> <p>Setting of the station</p>	 <p>Sets the station. Turn the arrows to the numbers corresponding to the desired station number. Use a flat tipped driver.</p> <p>The following shows the relation between the switch settings and the station.</p> <table border="0"> <tr> <td>0: Do not set.</td> <td>8: ST#08</td> </tr> <tr> <td>1: ST#01</td> <td>9: ST#09</td> </tr> <tr> <td>2: ST#02</td> <td>A: ST#10</td> </tr> <tr> <td>3: ST#03</td> <td>B: ST#11</td> </tr> <tr> <td>4: ST#04</td> <td>C: ST#12</td> </tr> <tr> <td>5: ST#05</td> <td>D: ST#13</td> </tr> <tr> <td>6: ST#06</td> <td>E: ST#14</td> </tr> <tr> <td>7: ST#07</td> <td>F: Do not set. (specially designed for use with the JANCD-XIO01 (XIO02) board)</td> </tr> </table> <p>The value of ST# is the station number display on the programming pendant of the XRC when setting the I/O modules. The default setting is ST#05.</p>	0: Do not set.	8: ST#08	1: ST#01	9: ST#09	2: ST#02	A: ST#10	3: ST#03	B: ST#11	4: ST#04	C: ST#12	5: ST#05	D: ST#13	6: ST#06	E: ST#14	7: ST#07	F: Do not set. (specially designed for use with the JANCD-XIO01 (XIO02) board)
0: Do not set.	8: ST#08																
1: ST#01	9: ST#09																
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5: ST#05	D: ST#13																
6: ST#06	E: ST#14																
7: ST#07	F: Do not set. (specially designed for use with the JANCD-XIO01 (XIO02) board)																
<p>S3</p> <p>Resetting the switch</p>	 <p>The push button S3 resets the XFB03 board. Never use the S3 since it is for maintenance only.</p>																

3.2 Switch Setting Method

Switches	Setting Method
<p>S4-1</p> <p>Setting of termination resistance</p>	 <p>ON: Termination resistance provided (upper) OFF: Termination resistance not provided (lower)</p> <p>When the XFB03 board is configured at the termination of slave stations, set the S4-1 to "Termination provided". The default setting is "OFF" (termination resistance not provided).</p>
<p>S4-3 and S4-4</p> <p>Setting of noise filter for communication</p>	 <p>OFF: Noise filter not provided (upper) ON: Noise filter provided (lower)</p> <p>When the XFB03 board is used under the conditions with excessive noise, set the S4-3 and S4-4 to "ON" (Noise filter provided). The default setting is "OFF" (noise filter not provided).</p>
<p>S5</p> <p>Setting of slave address</p>	 <p>Sets the slave address of XFB03 board. Turn the arrows to the numbers corresponding to the desired slave address. Use a flat tipped driver.</p> <p>The following shows the relation between the switch settings and the slave addresses.</p> <p>0: Setting error (SW error) 1: Address 1 2: Address 2 3: Address 3 4: Address 4 5: Address 5 6: Address 6 7: Address 7 8: Setting error (SW error) 9: Setting error (SW error)</p> <p>The default setting is "5" (address 5).</p>
<p>S6</p> <p>Setting of communication bytes</p>	 <p>Short-circuited between 1 and 2: 17-byte mode Short-circuited between 2 and 3: 16-byte mode</p> <p>Set to "16-byte mode" normally.</p> <p>Sets the communication bytes in the XFB03 board. The default setting is "16-byte mode".</p>
<p>S7, S8, S9^{*1}</p> <p>Setting of communication baud rate</p>	 <p>Short-circuited between 1 and 2 of S7: 19.2 kbps Short-circuited between 1 and 2 of S8: 38.4 kbps Short-circuited between 1 and 2 of S9: 57.6 kbps</p> <p>The default setting is "19.2 kbps".</p>

Switches	Setting Method
S10 Setting of communication mode	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p style="text-align: center;">3 2 1</p>  </div> <div> <p>Short-circuited between 1 and 2: Y-mode</p> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p style="text-align: center;">3 2 1</p>  </div> <div> <p>Short-circuited between 2 and 3: T-mode</p> </div> </div> <p>“Y-mode” can be used only when the master station is a sequencer for YASKAWA M-NET and a communication is performed in the “Y-mode”.</p> <p>The default setting is “Y-mode”.</p> </div>
S11 Setting of the operation mode	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p style="text-align: center;">3 2 1</p>  </div> <div> <p>Short-circuited between 1 and 2: normal (SYS) mode</p> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p style="text-align: center;">3 2 1</p>  </div> <div> <p>Short-circuited between 2 and 3: test mode (Do not set S11 to the test mode since it is for maintenance only.)</p> </div> </div> <p>Set to the “normal (SYS) mode”.</p> <p>The default setting is “normal (SYS) mode.”</p> </div>

***1** When no short pin is set to S7, S8, and S9, the communication baud rate is "9.6 kbps".

4 Mounting the XFB03 Board



WARNING

- Before wiring, be sure to turn OFF the power supply and put up a warning sign, such as "DO NOT TURN ON THE POWER".

Failure to observe this warning may result in an electric shock or an injury.

- Do not touch the inside of the panel for 5 minutes after the power is turned OFF.

The remaining charged voltage in the capacitor may cause an electric shock or an injury.

- Be sure to close the door and install the protection cover while the power is turned ON.

Failure to observe this warning may result in a fire or an electric shock.



CAUTION

- The wiring and mounting must be performed by authorized and qualified personnel.

Failure to observe this caution may result in a fire or an electric shock.

- Make sure that there is no foreign matter such as metal chips on the board.

In case of malfunction, etc. it may result in an injury or damage the board.

- Make sure that there is no damage or deflection of parts on the board.

In case of malfunction, etc. it may result in an injury or damage the board.

- Correctly connect each cable and connector.

Failure to observe this caution may result in a fire or damage the board.

- Set the switches, etc. correctly.

In case of malfunction, etc. it may result in an injury or damage the board.

- Never touch the mounting surfaces and the soldered surfaces of the board parts directly with fingers.

The generated static electricity may damage the IC, and protrusions on the soldered surface may result in an injury.

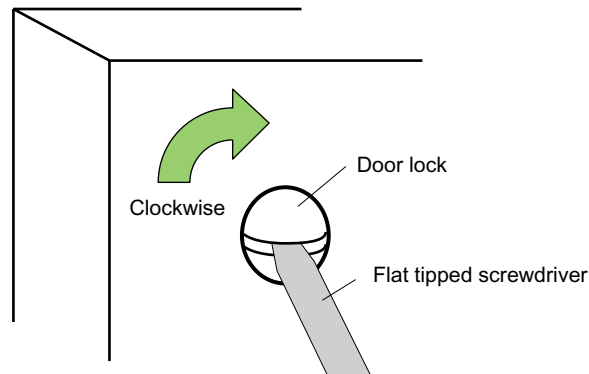
- Never give any shock to the board.

The shock may damage the board.

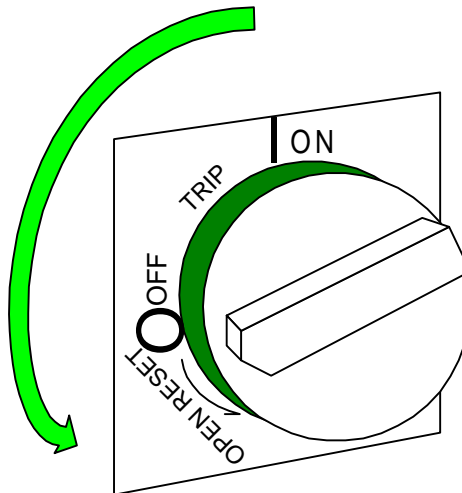
4.1 Opening Front Door of the XRC

Mount the XFB03 board in the following manner.

1. Turn the two door locks on the front face of the XRC clockwise for 90° with a coin or a flat-tipped screwdriver.



2. With the door locks turned clockwise for 90°, turn the main switch handle to the “OPEN RESET” position, and slowly open the door.



4.2 Confirming the Switch Settings on the XFB03 Board

1. Be sure that the main power supply is turned OFF.
2. Be sure that the settings of switches on the board are correct.
3. For the switch settings, refer to “3 Setting the Functions”.

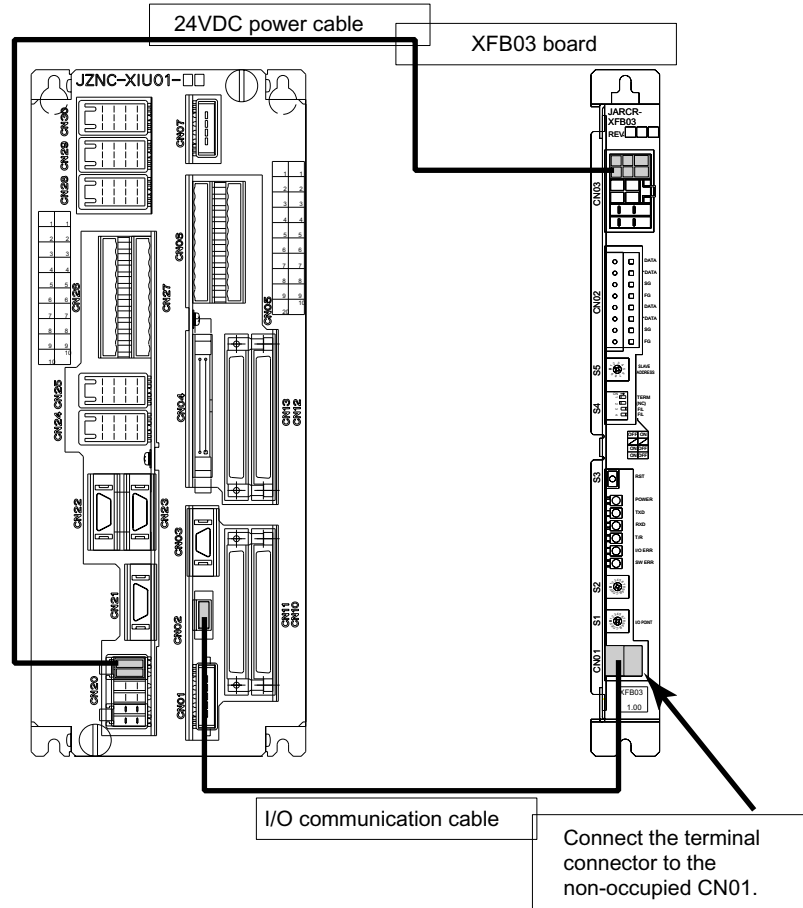
4.3 Connecting Transmission Cable

1. Connect one end of the transmission cable to the CN02 (terminal stand for transmission cable connection).
2. Connect the other end of the cable to a device used to communicate with the M-NET. For details on connection, refer to "2 Hardware Specifications".

4.4 Mounting the XFB03 Board on the XRC

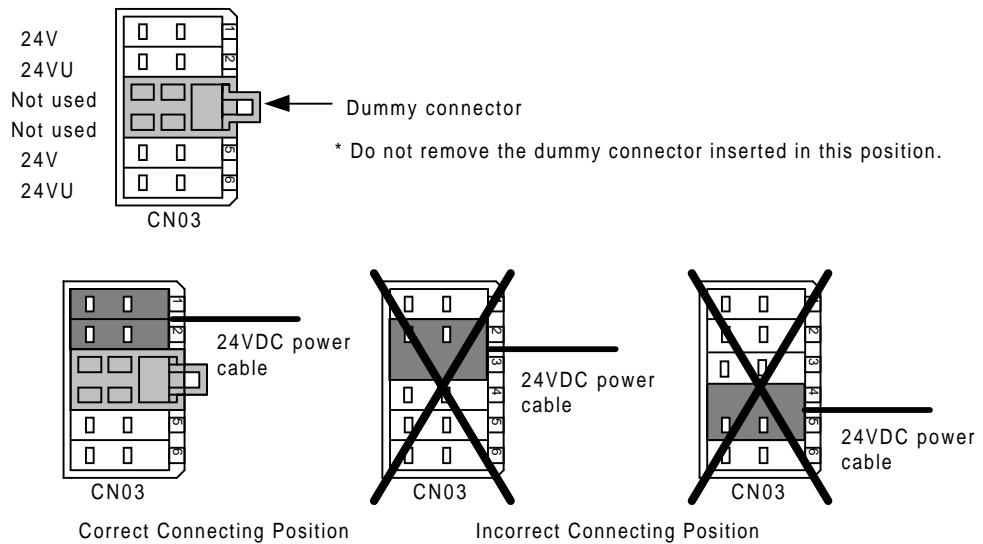
Fix the XFB03 board on the XRC with the board fixing screws securely tightened.

4.5 Connecting Each Cable



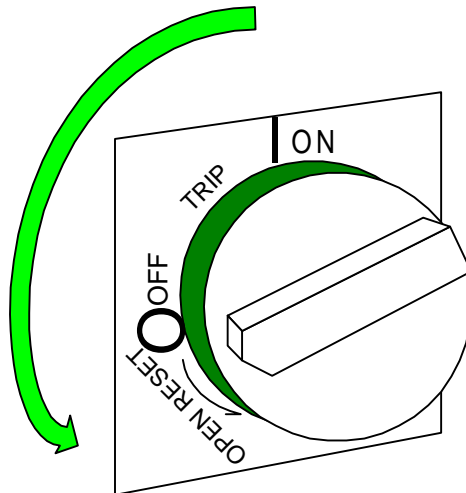
NOTE

A dummy connector is inserted into the CN03 of the 24VDC power supply connector on the XFB03 board. Do not remove this connector because it is inserted to prevent incorrect cable connections.

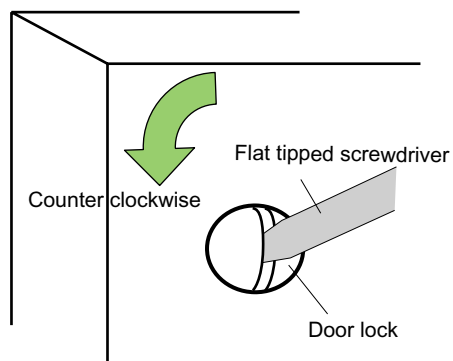


4.6 Closing the Front Door of the XRC

1. Turn the main switch handle, which is now in the OFF position, to the "OPEN RESET" position, and then slowly close the door.



2. Turn the two door locks counterclockwise for 90°.



5 I/O Signal Allocation

5.1 I/O Module Setting

In order to use a XFB03 board on the XRC, perform the I/O module setting in the following manner.

Make sure that the power supply to the XRC is OFF. Then, mount the XFB03 board, for which all of its switches have been set, inside the XRC. For the board mounting method, refer to “4. Mounting the XFB03 Board”.



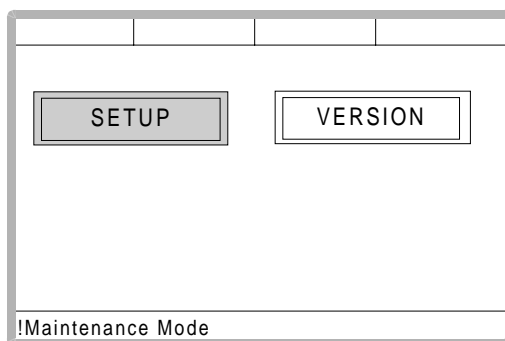
Add an I/O module in the management mode.
In the operation mode and the editing mode, the settings are for reference only.

Operation

Turn ON the power supply, pressing [TOP MENU] ➔ Set the mode to the “MANAGEMENT MODE” ➔ Select {SYSTEM} from the top menu *1 ➔ Select {SETUP}*2 ➔ Select {I/O MODULE}*3 ➔ Confirm the status of the mounted I/O module *4 ➔ Press [ENTER]*5 ➔ Press [ENTER]*6 ➔ Select “YES” *7

Explanation

*1 The system display appears.





The following should be taken into consideration when reading the display. For the XFB03 board, as the number of I/O points reserved for the board status exists other than the number of transmission I/O points set at S1, the number of I/O points shown on the display is the number calculated by “the set value of S1 + 1 (for the board status)”.

<Example>

When the S1 is set to “5”, it is understood that 48 ((5+1) × 8) I/O points are reserved for the I/O board.

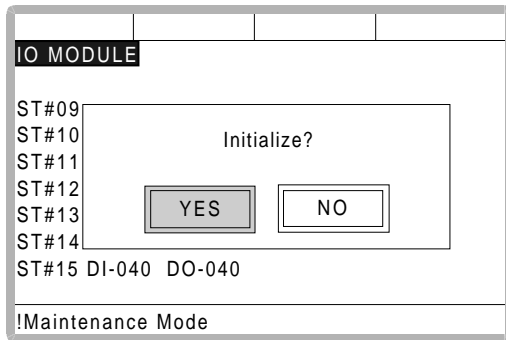
Accordingly, “DI-048 DO-048” is displayed.

The relationship between the set value of S1 and the I/O module display is shown below.

S1	Display
1	DI-016 DO-016
2	DI-024 DO-024
3	DI-032 DO-032
4	DI-040 DO-040
5	DI-048 DO-048
6	DI-056 DO-056
7	DI-064 DO-064
8	DI-072 DO-072
9	DI-080 DO-080
A	DI-088 DO-088
B	DI-096 DO-096
C	DI-104 DO-104
D	DI-112 DO-112
E	DI-120 DO-120

Confirm that the display of each slot (ST#) corresponds to the actual mounted status of the I/O module.

- *6 The confirmation dialog box appears.

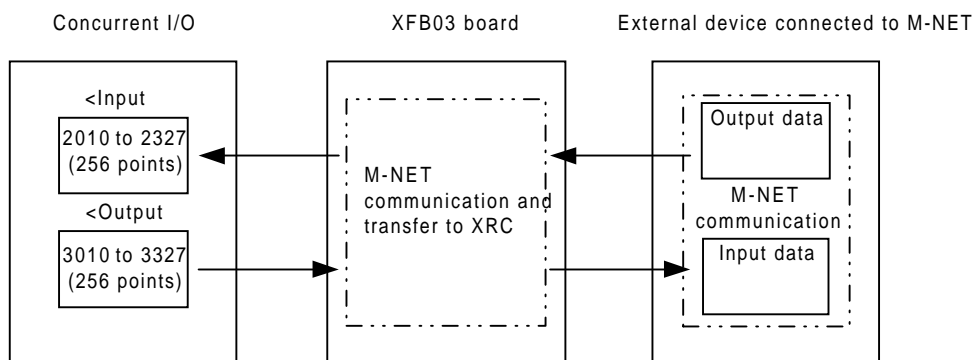


- *7 The system parameters are automatically set according to the current mounted status of the hardware. The procedures to add I/O modules are completed.

5.2 Transmitting Data

The data to be transferred from the XFB03 board to inside of the XRC is not only the I/O data from the external device connected to the M-NET, but also the status of the XFB03 board. Therefore, inside the XRC, 8 points (1 byte) for both input and output are reserved for the status of the XFB03 board beside the area for the digital data. However, the output area can not be used.

The transmission data from the XFB03 board is allocated to the external I/O signals of concurrent I/O.



When only a XFB03 board (input: 40 points, output: 40 points) is mounted as option, the concurrent I/O allocation of each board is as follows. (2010 to 2057 are used for the standard I/O of the XRC).

Board	Input	Output
XFB03	2060 to 2067 board status ^{*1}	3060 to 3067 cannot be used
	2070 to 2077 input data (1)	3070 to 3077 output data (1)
	2080 to 2087 input data (2)	3080 to 3087 output data (2)
	2090 to 2097 input data (3)	3090 to 3097 output data (3)
	2100 to 2107 input data (4)	3100 to 3107 output data (4)
	2110 to 2117 input data (5)	3110 to 3117 output data (5)

***1** Explanation of Board Status 2060 to 2067

2060	Reserved	Cannot be used
2061	Status of insulation power supply for communication	Normal: 0 Error: 1
2062	Switch setting status	Normal: 0 Error: 1
2063	Communication status	Normal: 0 Error: 1
2064	Reserved	Cannot be used
2065	CPU operation status	Normal: 0 Error: 1
2066	Reserved	Cannot be used
2067	Reserved	Cannot be used

[XFB03 Board Status]

The status of the XFB03 board (the first 8 points of the allocation area) is indicated as follows. The value “xx” of the allocated input signals in the table indicates the first number of the XFB03 board allocation number. In the table on the previous page, where the allocation numbers were 2060 to 2607, 06 would be “XX”.

Signal	Contents	
2xx0	Reserved	Do not use since it is reserved for system.
2xx1	Status of insulation power supply for communication	Indicates DC/DC converter output status on the XFB03 board. Normal: 0 Error: 1
2xx2	Switch setting status	Indicates the setting status of switches on the XFB03 board. Normal: 0 Error: 1
2xx3	Communication status	Indicates the communication status of M-NET. Normal: 0 Error: 1
2xx4	Reserved	Do not use since it is reserved for system.
2xx5	CPU operation status	Indicates the CPU operation status of the XFB03 board. Normal: 0 Error: 1
2xx6	Reserved	Do not use since it is reserved for system.
2xx7	Reserved	Do not use since it is reserved for system.

6 Error Indication

6.1 LED Indicators

The operation status and/or error occurrence is displayed by LEDs on the XFB03 board. The LED indicator and its contents are explained below.

LED	Indication	Meanings	Classification
LED1 (TXD)	Green BLINK	<ul style="list-style-type: none"> Data are sent. 	For monitoring
LED2 (RXD)	Green BLINK	<ul style="list-style-type: none"> Data are received. 	
LED3 (T/R)	Green ON	<ul style="list-style-type: none"> The operation mode is set to "Normal mode". 	
LED6 (POWER)	OFF	<ul style="list-style-type: none"> The insulation power supply (DC/DC converter) malfunctions. An error occurs in CPU processing. 	
LED4 (I/O ERR)	Red ON	<ul style="list-style-type: none"> The number of transmission data does not corresponds to the setting of master station. An error occurs during transmission. 	Error display
LED5 (SW ERR)	Red ON	<ul style="list-style-type: none"> Incorrect switch setting 	

6.2 Corrective Actions

The corrective actions when a LED is lit or unlit at error occurrence are explained in the following list.

Error Contents	LED		Corrective Actions
Transmission error	LED 4 (I/O ERR)	ON	<ul style="list-style-type: none">• Verify if the setting of the master station is the same as the setting of XFB03 board.• Verify the transmission cable connection.• Turn ON the control power supply again.
Incorrect switch setting	LED 5 (SW ERR)	ON	<ul style="list-style-type: none">• Verify the switch settings on the board again.
Insulation power supply error	LED 6 (POWER)	OFF	<ul style="list-style-type: none">• Replace the XFB03 board.
CPU processing error	LED 6 (POWER)	OFF	<ul style="list-style-type: none">• Replace the XFB03 board.• Turn ON the control power supply again.

YASNAC XRC OPTIONS INSTRUCTIONS

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YASKAWA

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