

Motoman XRC Controller
DeviceNet (XFB01)
Instruction Manual
for UP/SKX-Series Robots

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Motoman, Incorporated
805 Liberty Lane
West Carrollton, OH 45449
TEL: (937) 847-6200
FAX: (937) 847-6277
24-Hour Service Hotline: (937) 847-3200

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NOTES

SECTION 1

INTRODUCTION

1.1 About this Document

This manual provides instructions for the DeviceNet JARCR-XFB01 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 – JARCR-XFB01 BOARD FOR DEVICENET

Provides detailed instructions to operate the DeviceNet JARCR-XFB01 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 SK16X, XRC Manipulator Manual (P/N 142105-1)
- Motoman SK45X, XRC Manipulator Manual (P/N 142106-1)
- 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-XFB01 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-XFB01 board of the YASNAC XRC system and general operations. 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

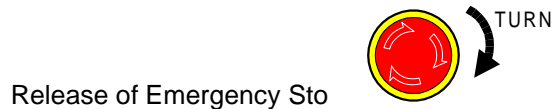
- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.
When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned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



- 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.



- 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.



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

- 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.
- 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.

Malfunction, caused by an incorrect setting, may result in an injury or damage the board.

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


The generated static electricity may damage the IC.

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

Protrusions on the soldered surface may result in an injury.

- Never give any shock to the board.

The shock may damage the board.

 **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

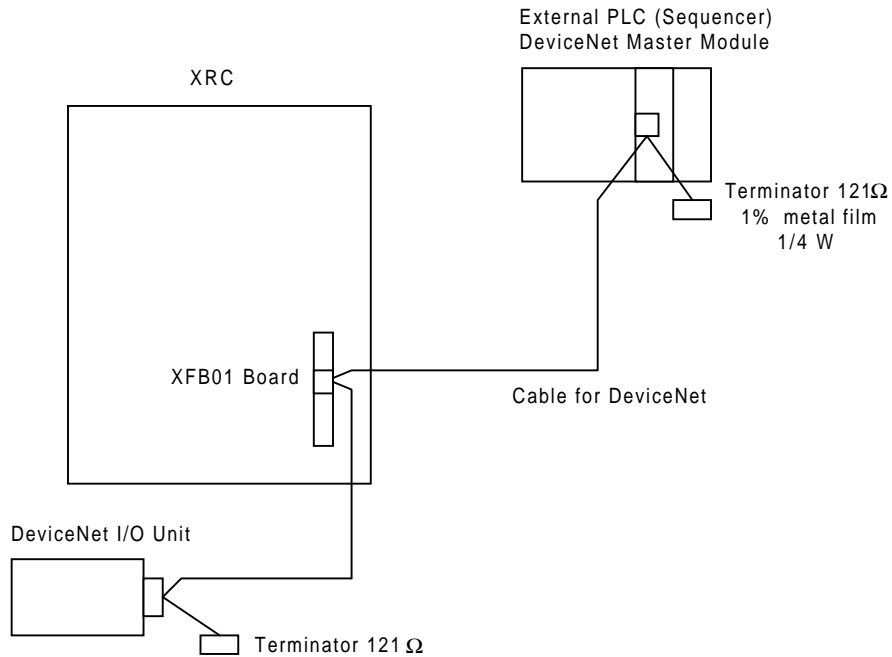
Description of the Operation Procedure

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

This manual gives the instructions for using the JARCR-XFB01 board (hereinafter called the XFB01 board) for the DeviceNet on the XRC. The application of this board allows the data transmission with other devices connected to DeviceNet. Note that the XFB01 board is a dedicated slave board, but does not have a master function.



System Configuration Example



- A cable for DeviceNet and terminators that are to be connected externally are not included with the XFB01 board. (However, the terminal for setting “with terminator” or “without terminator” is provided on the board.)
- When the XFB01 board is connected at the end of a network, connect a terminator externally. Correctly connect the terminators, or communication may not be performed correctly.

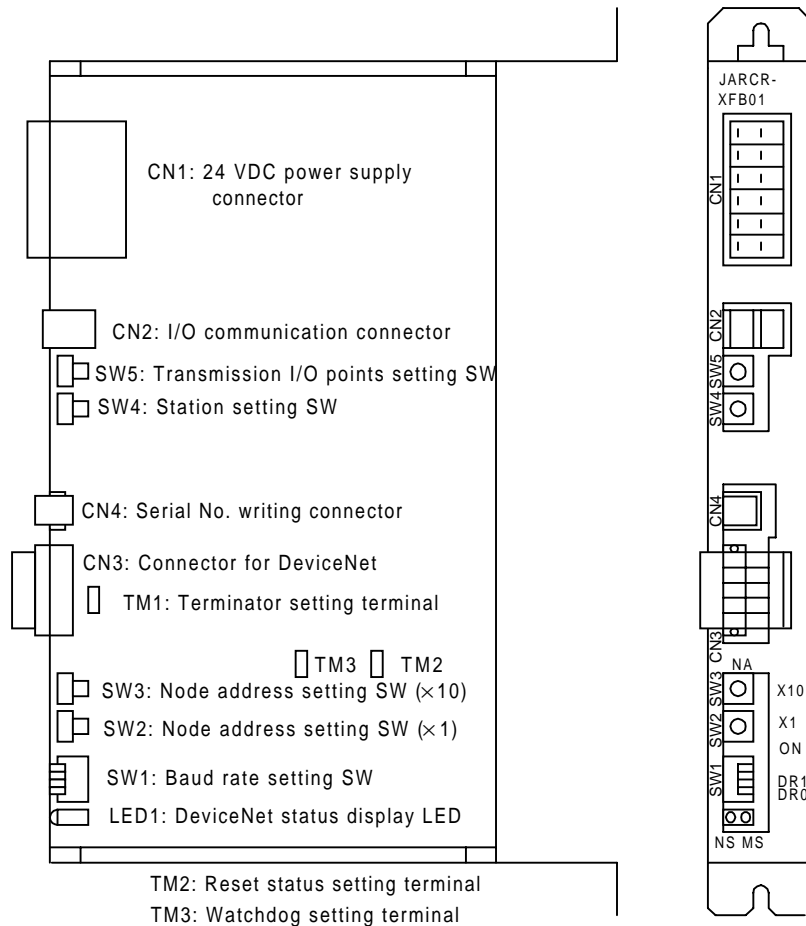


DeviceNet is a registered trade mark of ODVA (Open DeviceNet Vendor Association).



2 Hardware Specifications

2.1 Board External View



2.2 Board Specifications

Items	Specifications
Interface to the external device	DeviceNet
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			
Connecting form	Multi-drop, T-branch (1:N communication)			
Transmission speed	Selectable among 500/250/125 Kbps			
Transmission media	Dedicated 5 cables (2 cables for signals, 2 cables for power supply, 1 shielded line) Or 3 cables (the cables for power supply to be prepared separately) Use a DeviceNet cable such as DCA1-5C10 (made by OMRON).			
Communication distance	Transmission speed	Network max. distance	Branch line length	Total length of branch lines
	500 Kbps	100m and less	6m and less	39m and less
	250 Kbps	250m and less	6m and less	78m and less
	125 Kbps	500m and less	6m and less	156m and less
Power supply voltage for communication	24 VDC (supplied through the connector CN3 for connecting DeviceNet)			

2.4 Connector

CN3 (Connector for DeviceNet)

Terminal No.	Signal Name	Explanation
1 (black)	V-	0 ₂₄ V power supply line connecting terminal
2 (blue)	CAN_L	DeviceNet signal line connecting terminal
3 (transparent)	Shield	Shielded line connecting terminal
4 (blue)	CAN_H	DeviceNet signal line connecting terminal
5 (red)	V+	+24V power supply line connecting terminal

The color mentioned in () indicates the color of the DeviceNet cable to be connected when using a DeviceNet cable.

3 Setting the Functions

3.1 Function Setting Switches

The switches to set the functions of the XFB01 board are explained. Make the proper settings following the instructions. For details of setting, refer to Section 3.2.

SW1: Sets a transmission baud rate of DeviceNet (DR0 or DR1).

The transmission baud rate can be selected among the following three rates.

- 125 Kbps
- 250 Kbps
- 500 Kbps

SW2 and SW3: Sets the of DeviceNet.

The node address setting range is 1 to 63.

SW4: Sets the station number for the XFB01 board on the XRC.

The setting range of station number is 1 (ST#01) to E (ST#14). F (ST#15) is normally used by the XIO01 board. Do not set for the others.

SW5: Sets the number of transmission I/O points.

(Set value of SW5) × 8 is the actual number of I/O points. The SW5 setting range is “1” to “E”.
(Max. 112 points)

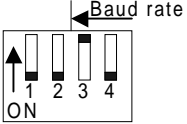

Set the number of points to be transferred to the sequencer side.



<Example>

When the SW2 is set to “E”, the number of I/O points are as follows.

- Input: 112 points
- Output: 112 points

3.2 Setting Switches

Switches	Setting Method																											
<p>SW1</p> <p>Baud rate setting</p>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Sets the baud rate of DeviceNet. <input type="checkbox"/> shows the default setting.</p> </div> </div> <p>SW1-1: Not used ON: Not used <input type="checkbox"/> OFF: Not used</p> <p>SW1-2: Not used ON: Not used <input type="checkbox"/> OFF: Not used</p> <p>SW1-3: Baud rate setting (DR1) <input type="checkbox"/> ON: OFF: 0</p> <p>SW1-4: Baud rate setting (DR0) ON: <input type="checkbox"/> OFF: 0</p> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>SW1-3</th> <th>SW1-4</th> <th>Baud rate</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>: 125 Kbps</td> </tr> <tr> <td>0</td> <td>1</td> <td>: 250 Kbps</td> </tr> <tr> <td>1</td> <td>0</td> <td>: 500 Kbps</td> </tr> <tr> <td>1</td> <td>1</td> <td>: Not used</td> </tr> </tbody> </table> <p>Use the same value as the DeviceNet master baud rate setting. Otherwise, DeviceNet communication cannot be established.</p>	SW1-3	SW1-4	Baud rate	0	0	: 125 Kbps	0	1	: 250 Kbps	1	0	: 500 Kbps	1	1	: Not used												
SW1-3	SW1-4	Baud rate																										
0	0	: 125 Kbps																										
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1	0	: 500 Kbps																										
1	1	: Not used																										
<p>SW2 (× 1 setting) SW3 (× 10 setting) Node address setting</p>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Sets the node address of DeviceNet. The following shows the relation between the setting of the switch and the actual number of I/O points. Turn the arrow to the number corresponding to the desired node address. (Use a precision flat-tipped screwdriver.) <Example></p> </div> </div> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>SW3</th> <th>SW2</th> <th>Node address</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>: 0</td> </tr> <tr> <td>0</td> <td>1</td> <td>: 1</td> </tr> <tr> <td>0</td> <td>2</td> <td>: 2</td> </tr> <tr> <td>0</td> <td>4</td> <td>: 4</td> </tr> <tr> <td>0</td> <td>8</td> <td>: 8</td> </tr> <tr> <td>1</td> <td>6</td> <td>: 16</td> </tr> <tr> <td>3</td> <td>2</td> <td>: 32</td> </tr> <tr> <td>6</td> <td>3</td> <td>: 63</td> </tr> </tbody> </table> <p>When the node address is set to a value exceeding 64, DeviceNet communication cannot be established. Select a node address in the range from 0 to 63 that does not overlap with that of another device.</p>	SW3	SW2	Node address	0	0	: 0	0	1	: 1	0	2	: 2	0	4	: 4	0	8	: 8	1	6	: 16	3	2	: 32	6	3	: 63
SW3	SW2	Node address																										
0	0	: 0																										
0	1	: 1																										
0	2	: 2																										
0	4	: 4																										
0	8	: 8																										
1	6	: 16																										
3	2	: 32																										
6	3	: 63																										

Switches	Setting Method																
SW4 Station setting	 <p>Sets the station number. The following shows the relation between the switch setting and the station number. Turn the arrow to the number corresponding to the desired station. (Use a precision flat-tipped screwdriver.)</p> <table border="0"> <tr> <td>0: ST#01</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: ST#15</td> </tr> </table> <p>The number after ST# is the station number displayed on the programming panel of the XRC when setting I/O modules.</p>	0: ST#01	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: ST#15
0: ST#01	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: ST#15																
SW5 Number of transmission I/O points setting	 <p>Sets the number of I/O points to be transferred. The following shows the relation between the switch setting and the number of I/O points. Turn the arrow to the number corresponding to the desired number of I/O points. (Use a precision flat-tipped screwdriver.)</p> <table border="0"> <tr> <td>0: 0 [8]</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: 112 [120]</td> </tr> </table> <p>The value in [] indicates the number of I/O points reserved for the XFB01 board inside the XRC. (This includes the area for board status).</p>	0: 0 [8]	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: 112 [120]
0: 0 [8]	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: 112 [120]																



Since F in the SW4 station setting is typically used already, do not use the F setting. Be sure not to set more than one board to the same ST#.

3.3 Function Setting Terminals

The terminals used to set functions of the XFB01 board are explained with descriptions of each function. Following the instructions, be sure to correctly set the terminals. Normally, the default settings are valid.

TM1: Sets the terminator (121 Ω).

Set to “without terminator” and connect a terminator externally.

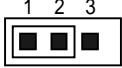
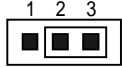
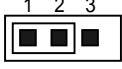
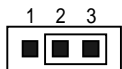
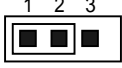
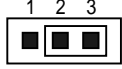
TM2: Sets the reset status.

Never set to “Reset ON”, because this is used only for maintenance.

TM3: Sets the watchdog.

Never set to “Watchdog disabled”, because this is used only for maintenance.

3.4 Setting Terminals

Terminals	Setting Method
TM1 Terminator setting	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 1 and 2: With terminator</p> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 2 and 3: Without terminator (default setting)</p> </div> </div> <p>Use a terminator provided by a junction tap or externally installed resistor, because this is used only for maintenance. <u>Set it to "Without terminator" even if the XFB01 board is connected at the end of DeviceNet.</u></p> </div>
TM2 Reset status setting	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 1 and 2: Reset OFF (default setting)</p> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 2 and 3: Reset ON</p> </div> </div> <p><u>Be sure to set TM2 to "Reset OFF".</u> Never set to "Reset ON", because this is used only for maintenance.</p> </div>
TM3 Watchdog setting	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 1 and 2: Watchdog disabled</p> </div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Short-circuit between 2 and 3: Watchdog enabled (default setting)</p> </div> </div> <p><u>Be sure to set TM3 to "Watchdog enabled".</u> Never set to "Watchdog disabled", because this is used only for maintenance.</p> </div>

3.5 Comparison with JANCD-MFB01 Board

The following compares SWs and TMs between the DeviceNet MFB01 board for the MRC and the XFB01 board.

Setting	JARCR-XFB01	JANCD-MFB01
Transmission baud rate	SW1	Piggy back board S1
Node address	SW2 and SW3	Piggy back board S1
Station	SW4	Set by the JARCR-XEB01
Number of transmission I/O points	SW5	SW2
Terminator	TM1	None
Reset	TM2	None
Watchdog	TM3	None
Piggy back board setting	None	S1

4 Mounting the JARCR-XFB01 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.

Malfunction, caused by an incorrect setting, may result in an injury or damage the board.

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

The generated static electricity may damage the IC.

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

Protrusions on the soldered surface may result in an injury.

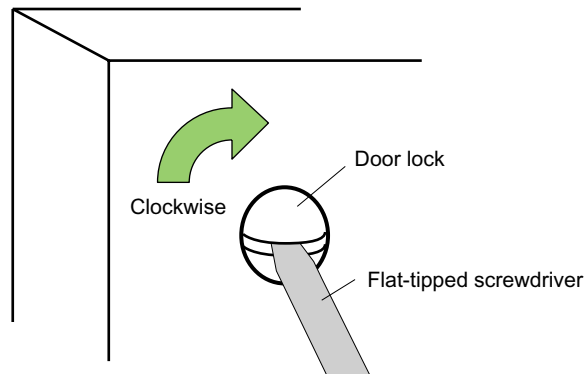
- Never give any shock to the board.

The shock may damage the board.

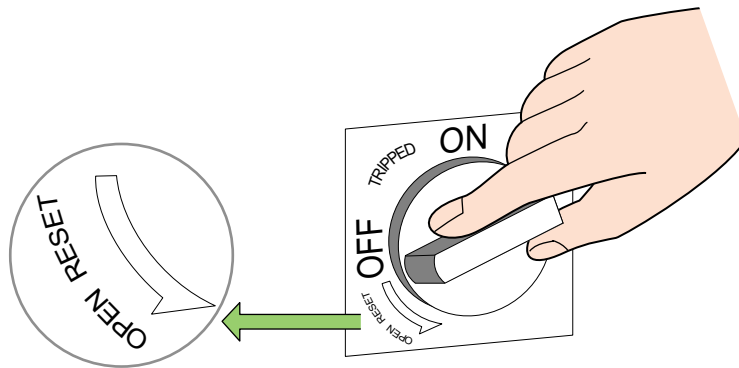
4.1 Opening the Front Door of the XRC

Mount the XFB01 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 XFB01 Board

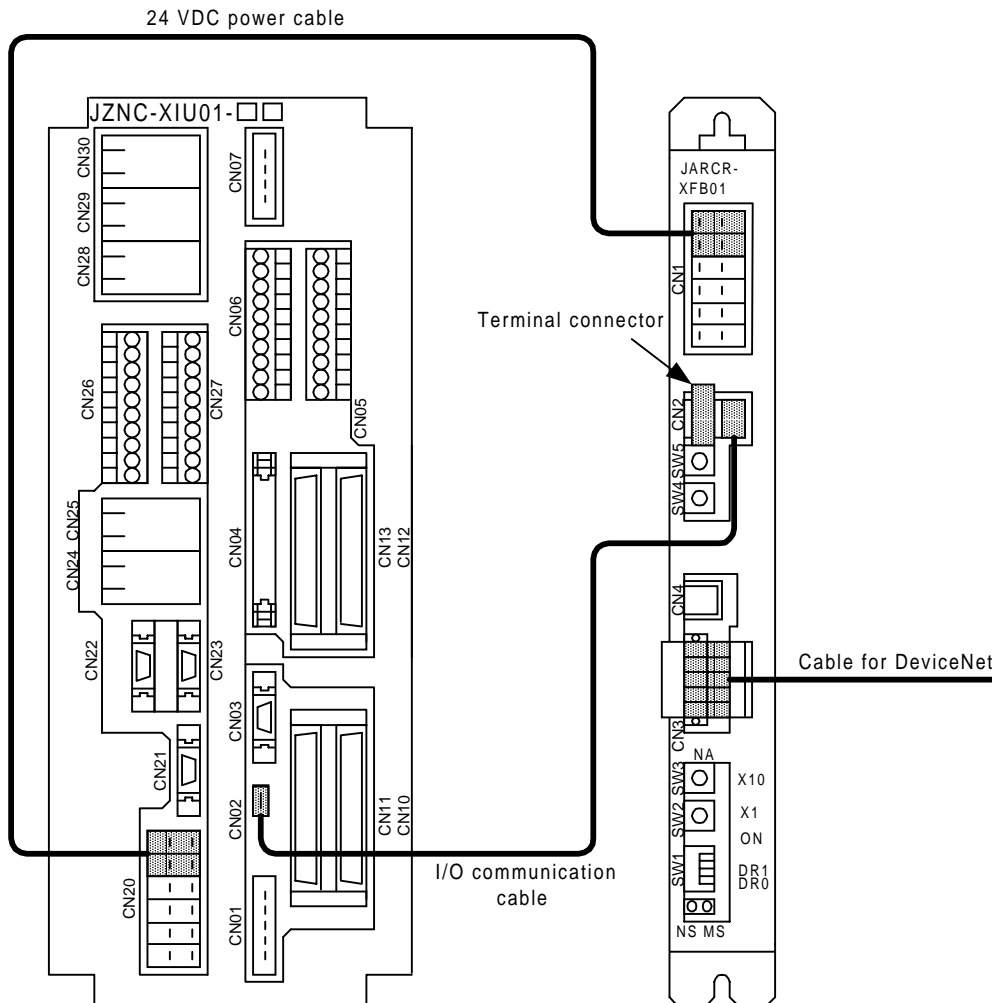
1. Be sure that the main power supply is turned OFF.
2. Be sure that the settings of switches on the board are correct.
3. For the switch settings, refer to Chapter 3 “Setting the Functions”.

4.3 Mounting the XFB01 Board on the XRC

Fix the XFB01 board on the XRC with the board fixing screws securely tightened.

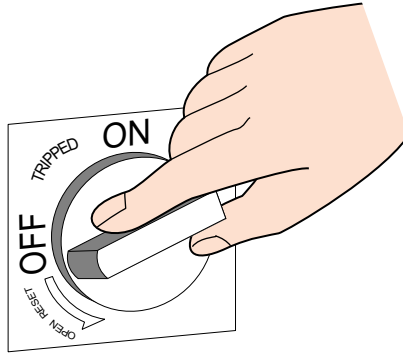
4.4 Connecting Each Cable

1. Connect the 24 VDC power cable to the CN1.
2. Connect the I/O communication cable to the CN2. Connect the terminal connector connected to the CN02 of the JZNC-XIU01 unit to the non-occupied CN2 on the XFB01 board.
3. Connect the cable for DeviceNet to CN3. (The color of the connected cable should be the same as the color of the connector and frame seal on the CN3.)



4.5 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°.

4.5 Closing the Front Door of the XRC

5 Allocating I/O Signals

5.1 I/O Module Setting

In order to use the XFB01 board on the XRC, the system configuration should be set in the following manner.

Make sure that the power supply to the XRC is OFF. Then, mount the XFB01 board, for which all of its switches have been set, inside the XRC. For the board mounting method, refer to “4 Mounting the XFB01 Board”.



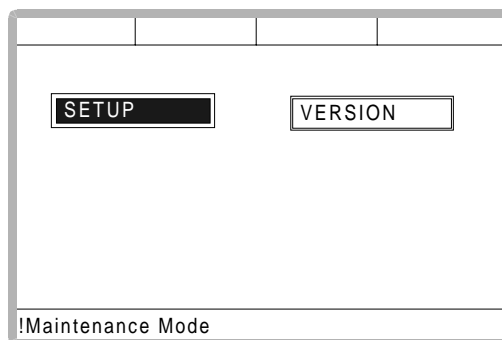
Add an I/O module in the management mode.
In the operation mode and the editing mode, the settings are for reference only.

Operation

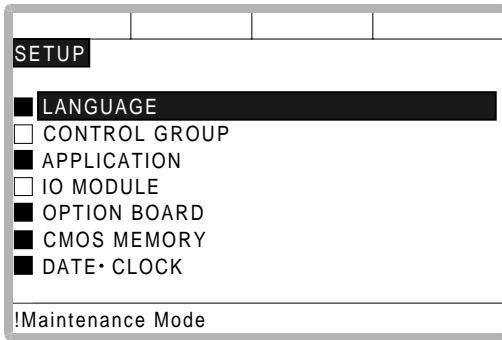
Turn ON the power supply, pressing [TOP MENU] ➔ Select {SYSTEM} from the top menu^{*1} ➔ Select {SETUP}^{*2} ➔ Select {I/O MODULE} ^{*3} ➔ Confirm the status of the mounted I/O module^{*4} ➔ Press [ENTER]^{*5} ➔ Press [ENTER]^{*6} ➔ Select “YES” ^{*7}

Explanation

^{*1} The system display appears.

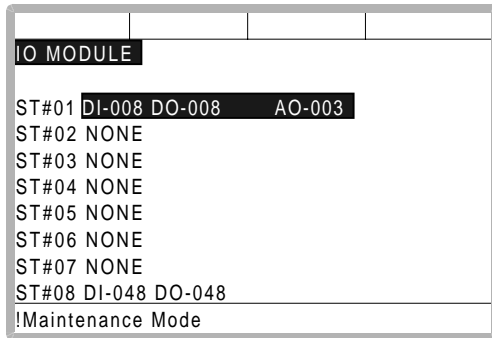


*2 The setup display appears.



The items marked with ■ cannot be used.

*3 The current mounted status of the I/O modules appear as in the following example.

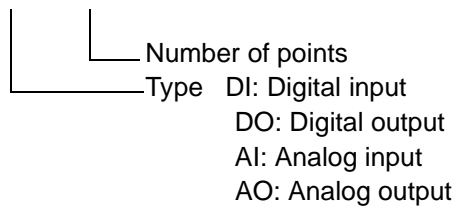


JANCD-XEW01 S1:(1)

JANCD-XFB01 SW2:(5)

*4 Confirm that each station (ST#) indicates the actual mounted status of the I/O module.

DI - 016



*5 The mounted status of the I/O module for the rest of the stations (ST#) appear. Confirm that they correspond to the actual mounted status.



If the display does not correspond to the actual mounted status, recheck the actual mounted status.

If the mounted status is correct (but the display does not correspond), the following causes are suspected.

- Improper I/O communication setting

The XFB01 board is limited to 16-byte mode. If the short pin CN10 of the board is set to 17-byte mode, the XRC cannot correctly recognize the board. Reset it to 16-byte mode.

- Improper or overlapped station setting

A single optional board can be selected for each station. Check if SW4 is not used for a board other than the XFB01 board, by changing the SW4 setting. (SW4: F (ST#15) is only for the XIO01 (XIO02) board. Do not select it for other boards.)

- I/O module failure

If the display does not correspond to the actual mounted status even after having corrected the above two settings, a failure of an I/O module is suspected. Contact your YASKAWA representative.

IO MODULE	
ST#09	NONE
ST#10	NONE
ST#11	NONE
ST#12	NONE
ST#13	NONE
ST#14	NONE
ST#15	DI-040 DO-040
!Maintenance Mode	

JANCD-XIO01, 02



The following should be taken into consideration when reading the display.

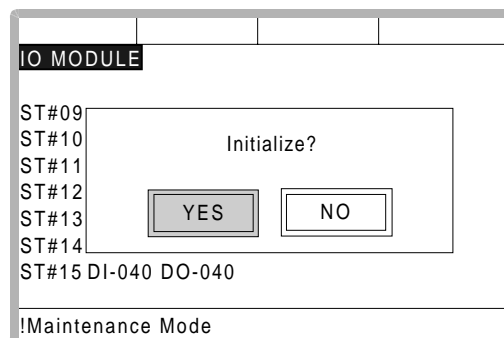
For the XFB01 board, as the number of I/O points reserved for the board status exists other than the number of transmission I/O points set at SW5, the number of I/O points shown on the display is the number calculated by “the set value of SW5 + 1 (for the board status).”

<Example>

When SW5 is set to "5", it is recognized as the I/O board with 48 points ((5+1) × 8).
 Confirm that each station displays correctly the actual mounted status of the I/O module.

SW5	Display
0	DI-008 DO-008
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, F	DI-120 DO-120

*6 The confirmation dialog box appears.



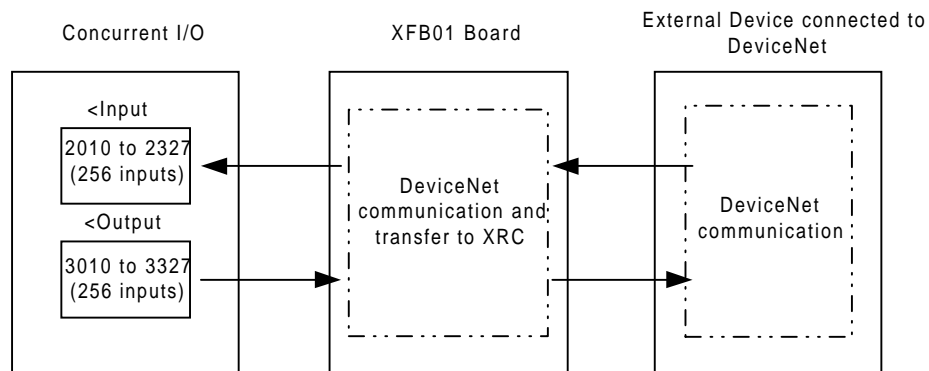
*7 The system parameters are automatically set according to the current mounted status of the hardware.
 The procedures to add I/O module are completed.

5.2 Transmission Data

The data to be transferred from the XFB01 board to the inside of the XRC is not only the I/O data from the external devices connected to the DeviceNet, but also the status of the XFB01 board.

Therefore, inside the XRC, 8 points (1 byte) for both input and output are reserved for the status of the XFB01 board beside the area for the digital data. However, the output area cannot be used.

The transmission data from the XFB01 board are allocated to the external I/O signals of concurrent I/O.



5.2 Transmission Data

When only a XFB01 (SW5: 5 Input: 40 points, Output: 40 points) is mounted as an optional I/O board, the concurrent I/O allocation of each board is as follows.
(2010 to 2057 are used for standard I/O of the XRC.)

Board	Input	Output
JARCR-XFB01	2060 to 2067 board status ^{*1}	3060 to 3067 can not 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	Watchdog	Count from 0 to 7
2061		
2062		
2063	Not used	Always 0
2064	Not used	Always 1
2065	Not used	Always 0
2066	DeviceNet communication	Normal: 0 Error: 1
2067	Board operation status	Normal: 0 Error: 1

[XFB01 Board Status]

The status of the JARCR-XFB01 board (the first 8 points of the allocation area) is indicated as follows.

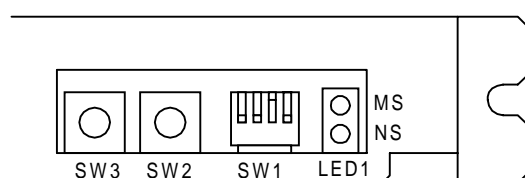
The value “xx” of the allocated input signals in the table indicates the first numbers of the XFB01 board allocation number. In the table on the previous page, where the allocation numbers were 2060 to 2067, 06 would be “xx”.

Signal	Contents
2xx0 to 2xx2	Watchdog counter. This bit changes in this order: 0, 1, 2, 3, 4, 5, 6, 7, 0, (approximately every 32 ms.)
2xx3	Not used Always set to 0.
2xx4	Not used Always set to 1.
2xx5	Not used Always set to 0.
2xx6	Indicates the DeviceNet status. Normal: 0 Error: 1
2xx7	Indicates the operation status of the XFB01 board. Normal: 0 Error: 1

6 Error Indication

6.1 LED Indicators

On the XFB01 board, the board status display LED and the DeviceNet status display LED are provided. They are indicated with MS (module status) and NS (network status) respectively. In startup after the power is turned ON, MS and NS lamps light up in green and red alternately for LED test and then in green. If MS and NS lamps do not light up in green after a specified time with the power ON, the communication is not being performed correctly.



6.1.1 MS Lamp

The MS lamp indicates the XFB01 board status.

LED	Status	Indications and Corrective Actions
MS unlit	Power loss	<ul style="list-style-type: none"> • Check the connection of the power supply to CN1 of XFB01 board.
MS lit in green	Module in normal state	-
MS blinks in red	Communication error with the XRC	<ul style="list-style-type: none"> • Check the connection of the I/O communication cable to CN2 on the XFB01 board.
MS lit in red	Error in module	ROM/RAM check error or watchdog time-out error occurs. <ul style="list-style-type: none"> • Turn the XRC main power supply from OFF to ON. • Replace the XFB01 board.

6.1.2 NS Lamp

The NS lamp indicates the status of DeviceNet.

LED	Status	Indications and Corrective Actions
NS unlit	In offline status	<p>XFB01 board power supply failure, communication power supply failure, or DeviceNet line failure occurs.</p> <ul style="list-style-type: none"> • Check the connection of the power supply to CN1 of the XFB01 board. • Check the wiring and connection of the DeviceNet cable and connector. • Check the voltage and connection of the communication power supply. • Check the transmission speed of each device. • Check the resistance value (121 Ω) of the mounted terminator and its mounted status. • Check the operation status of the DeviceNet master device.
NS blinks in green	Communication is not established.	<p>In online status, but communication is not established.</p> <ul style="list-style-type: none"> • Check the wiring and connection of the DeviceNet cable and connector. • Check the voltage and connection of the communication power supply. • Check the transmission speed of each device. • Check the resistance value (121 Ω) of the mounted terminator and its mounted status. • Check the operation status of the DeviceNet master device. • Check if the number of I/O points for the connected master corresponds to the number of I/O allocated points.
NS lit in green	Communication in normal status	Communication is established in online.

LED	Status	Indications and Corrective Actions
NS blinks in red	Time-out error	<p>A time-out error occurs between the XRC and the connected device.</p> <ul style="list-style-type: none"> • Check the wiring and connection of the DeviceNet cable and connector. • Check the voltage and connection of the communication power supply. • Check the transmission speed of each device. • Check the resistance value (121 Ω) of the mounted terminator and its mounted status. • Check the operation status of the DeviceNet master device. • Check if the number of I/O points for the connected master corresponds to the number of I/O allocated points.
NS lit in red	Communication fatal fault	<p>A node address is overlapped, or a bus OFF is detected on the network.</p> <ul style="list-style-type: none"> • Reset the node address so that the node address is not overlapped. • Check the wiring and connection of the DeviceNet cable and connector. • Check the voltage and connection of the communication power supply. • Check the transmission speed of each device. • Check the resistance value (121 Ω) of the mounted terminator and its mounted status. • Check the transmission distance. • Check if there is no noise generating factor. • Replace the XFB01 board.

YASNAC XRC OPTIONS INSTRUCTIONS

FOR JARCR-XFB01 BOARD

TOKYO OFFICE

New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo 105-6891, Japan
Phone 81-3-5402-4511 Fax 81-3-5402-4580

MOTOMAN INC. HEADQUARTERS

805 Liberty Lane West Carrollton, OH 45449, U.S.A.
Phone 1-937-847-6200 Fax 1-937-847-6277

MOTOMAN INC. TROY FACILITY

1050 S. Dorset, Troy, OH 45373, U.S.A.
Phone 1-937-440-2600 Fax 1-937-440-2626

YASKAWA MOTOMAN CANADA LTD.

2280 ARGENTIA ROAD, MISSISSAUGA, ONTARIO, L5N 6H8, CANADA.
Phone 1-905-813-5901 Fax 1-905-813-5911

YASKAWA ELECTRIC EUROPE GmbH

Am Kronberger Hang 2, 65824 Schwalbach, Germany.
Phone 49-6196-569-300 Fax 49-6196-888-301

Motoman Robotics AB

Box 504 S38525 Torsås, Sweden
Phone 46-486-48800 Fax 46-486-41410

Motoman Robotec GmbH

Kammerfeldstraße 1, 85391 Allershausen, Germany
Phone 49-8166-900 Fax 49-8166-9039

YASKAWA ELECTRIC KOREA CORPORATION

Kipa Bldg #1201, 35-4 Youido-dong, Yeongdungpo-Ku, Seoul 150-010, Korea
Phone 82-2-784-7844 Fax 82-2-784-8495

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, Singapore
Phone 65-282-3003 Fax 65-289-3003

YATEC ENGINEERING CORPORATION

Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone 886-2-2563-0010 Fax 886-2-2567-4677

BEIJING OFFICE

Room No. 301 Office Building of Beijing International Club, 21 Jianguomenwai Avenue, Beijing 100020, China
Phone 86-10-6532-1850 Fax 86-10-6532-1851

SHANGHAI OFFICE

27 Hui He Road Shanghai 200437 China
Phone 86-21-6553-6600 Fax 86-21-6531-4242

YASKAWA JASON (HK) COMPANY LIMITED

Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong
Phone 852-2803-2385 Fax 852-2547-5773

TAIPEI OFFICE

Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone 886-2-2563-0010 Fax 886-2-2567-4677

BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO.,LTD.

30 Xue Yuan Road, Haidian, Beijing P.R. China Post Code: 100083
Phone 86-10-6233-2782 Fax 86-10-6232-1536

SHOUGANG MOTOMAN ROBOT CO., LTD.

7, Yongchang-North Street, Beijing Economic Technological Investment & Development Area,
Beijing 100076, P.R. China
Phone 86-10-6788-0551 Fax 86-10-6788-2878



YASKAWA ELECTRIC CORPORATION

YASKAWA

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