

**Motoman XRC Controller**

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# **X0101 Board Instruction Manual**

Part Number:	145594-1
Release Date:	March 22, 2007
Document Status:	Final

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# ***NOTES***

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# **SECTION 1**

## **INTRODUCTION**

### **1.1 About this Document**

This manual provides instructions for XOI01 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 – XOI01 BOARD INSTRUCTIONS**

Provides detailed instructions to utilize the XOI01 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, UP20, 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***

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# **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-XOI01 BOARD

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

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## 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-XOI01 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.

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## 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”.

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## WARNING

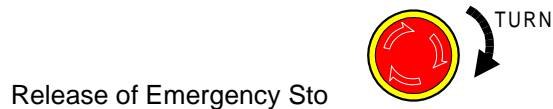
- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.  
When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned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





## 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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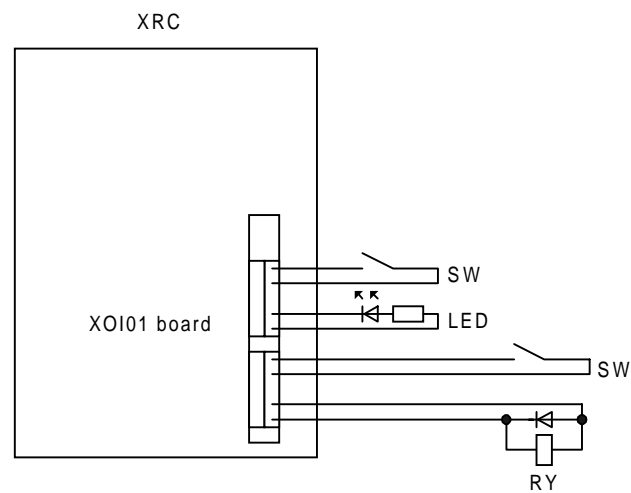


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# 1 Outline

This instruction manual describes the I/O expansion board, the JARCR-XOI01 (hereinafter called the XOI01 board). The XRC includes the JANCD-XIO01 board (hereinafter called the XIO01 board) and the JANCD-XIO02 board (hereinafter called the XIO02 board) for I/O board, inside the JZNC-XIU01 unit as standard equipment. The XOI01 board is designed so that the circuit configuration and the pin arrangement of its I/O are the same as those for the XIO02 board. The XOI01 board can be used to expand the number of I/O points when more XRC I/O points are needed.

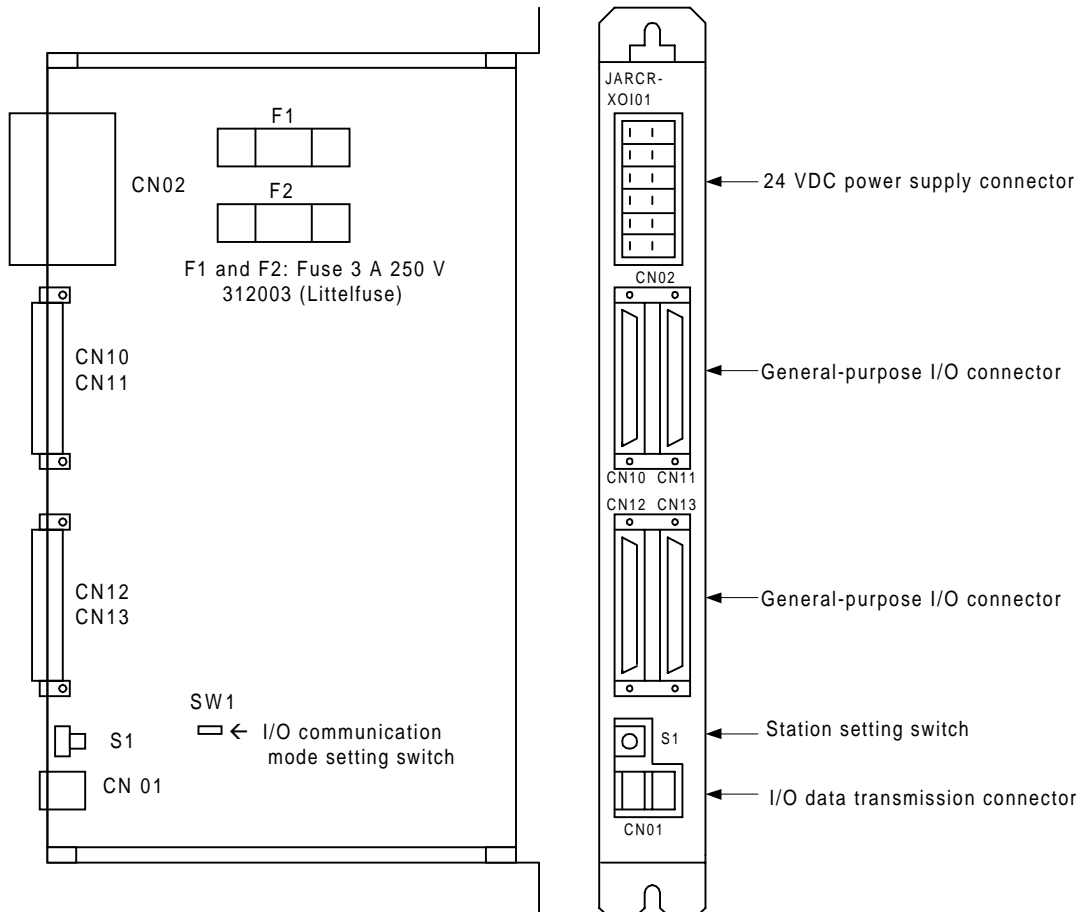
## ■ System Configuration Example





## 2 Hardware Specifications

### 2.1 Board External View

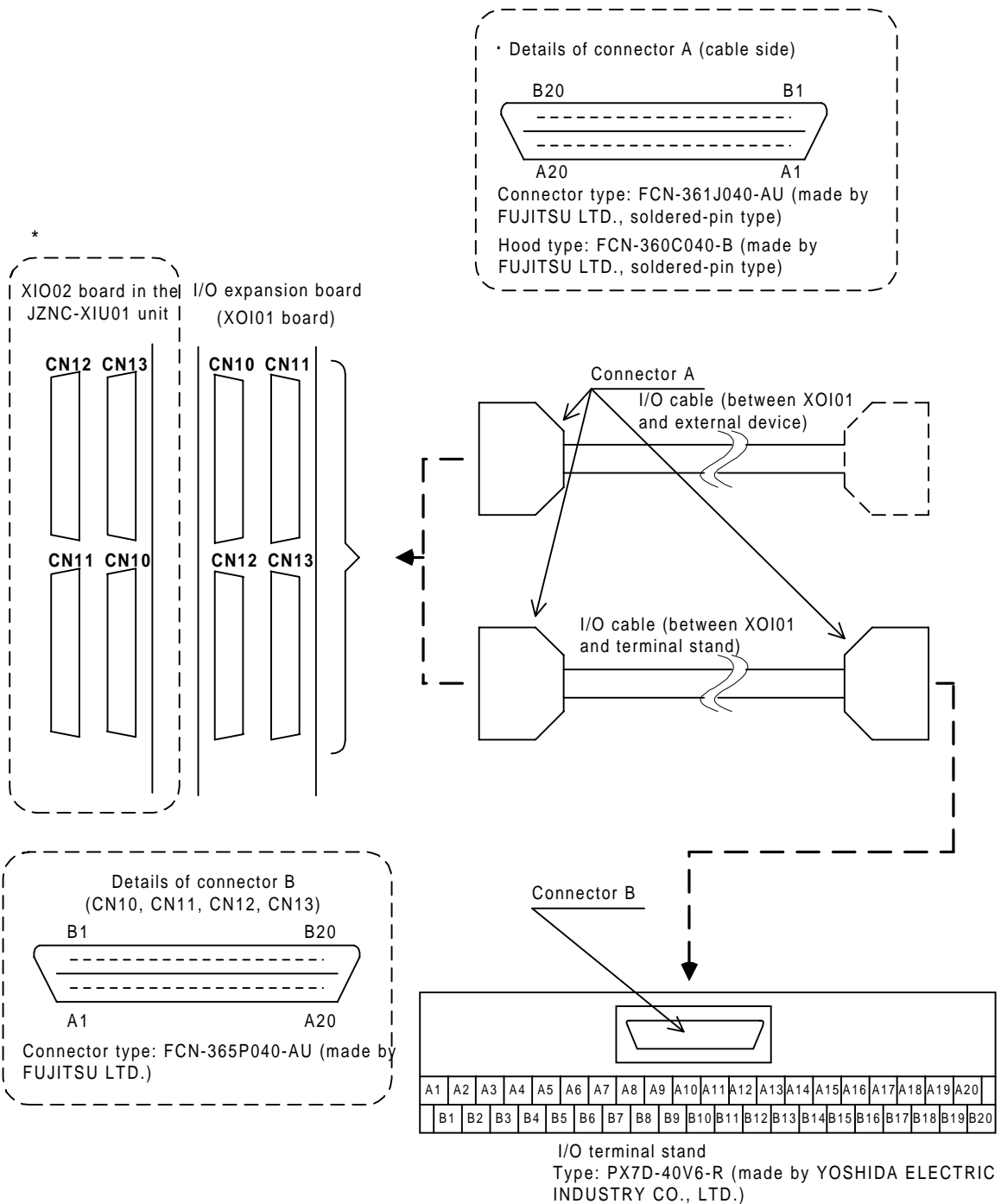


### 2.2 Board Specifications

Items	Specifications
Board mounting position	Optional board mounting space in the XRC
Number of I/O points	Input: 40 points Output: 40 points (transistor output 24 points, relay output 16 points)

## 2.3 General-purpose I/O Connectors

The general-purpose I/O connectors are same as those used for the XIO02 board. The circuit configuration and the pin arrangement are designed so that each of the connectors CN10 to CN13 of the XOI01 board corresponds to those of the XIO02 board.



\*The arrangement of CN10, CN11, CN12 and CN13 is different for the XOI01 board and the XIO02 board in the JZNC-XIU01 unit.



## 3 Setting the Functions

### 3.1 Function Setting Switches

The section explains the switches that set the functions of the XIOI01 board. Make the proper settings following the instructions. For details of the settings, refer to page 3-2.

**S1:** Sets the stations for the XIOI01 board on the XRC.

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

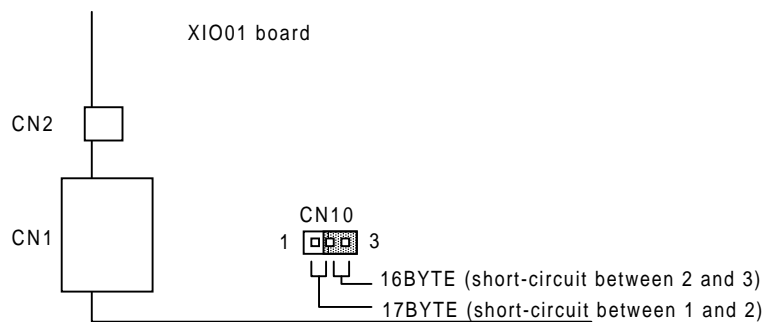
Do not set S1 to 0 because no station is allocated to 0. Also, do not set S1 to F (ST#15) since F is reserved for the XIO01 (or XIO02) board.

**SW1:** Sets the communication mode.


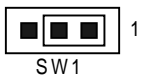
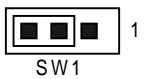
This switch changes the communication mode between 16 bytes and 17 bytes.

The default setting is 16 bytes.

If the number of I/O points on the XIOI01 board does not appear on the Programming Pendant, check if the communication cable or power cable is connected correctly, referring to the I/O module setting in "5 I/O Signal Allocation." When the cables are correctly connected, the SW1 of the XIO01 board in the JZNC-XIU01 unit may be set to 17 bytes. Reset the SW1 to 17 bytes.



## 3.2 Switch Setting Methods

Switches	Setting Method
<p>S1</p> <p>Station setting</p>	 <p>Sets the stations. The relation between the switch setting and the station is shown below. Turn the arrow to the number corresponding to the desired station. (Use a flat-tipped screwdriver.)</p> <p>0: Cannot be set    8: ST#08 1: ST#01            9: ST#09 2: ST#02            A: ST#10 <b>3: ST#03</b>            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 (used by XIO01 (XIO02) board)</p> <p>The number after ST# is the station number displayed on the programming panel of the XRC when setting I/O modules. The default setting is ST#03.</p>
<p>SW1</p> <p>Setting of the I/O communication mode</p>	 <p>Short-circuit between 1 and 2: 17-byte mode 16 bytes/17 bytes</p>  <p>Short-circuit between 3 and 2: 16-byte mode (Default setting) 16 bytes/17 bytes</p> <p>Sets the I/O communication mode. The position of the SW1 jumper pin determines whether the mode is set to 16-bytes or 17-bytes.</p>

**NOTE**

Do not set S1 to 0 or F. Do not set more than one board to one ST#. Improper setting may prevent the I/O module from being recognized correctly.

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## 4 Mounting the XOI01 Board

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### 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.

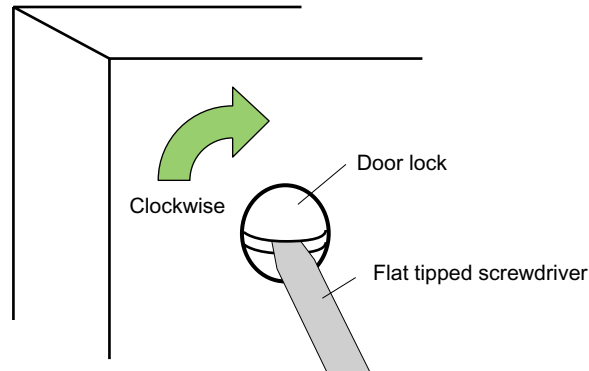
- Never give any shock to the board.

The shock may damage the board.

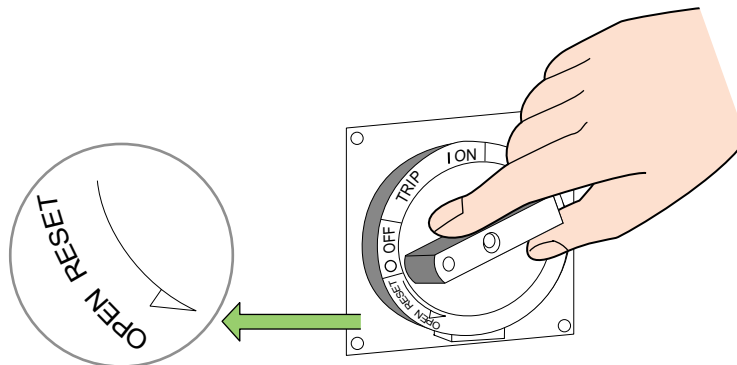
## 4.1 Opening Front Door of the XRC

Mount the XOI01 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 XOI01 Board

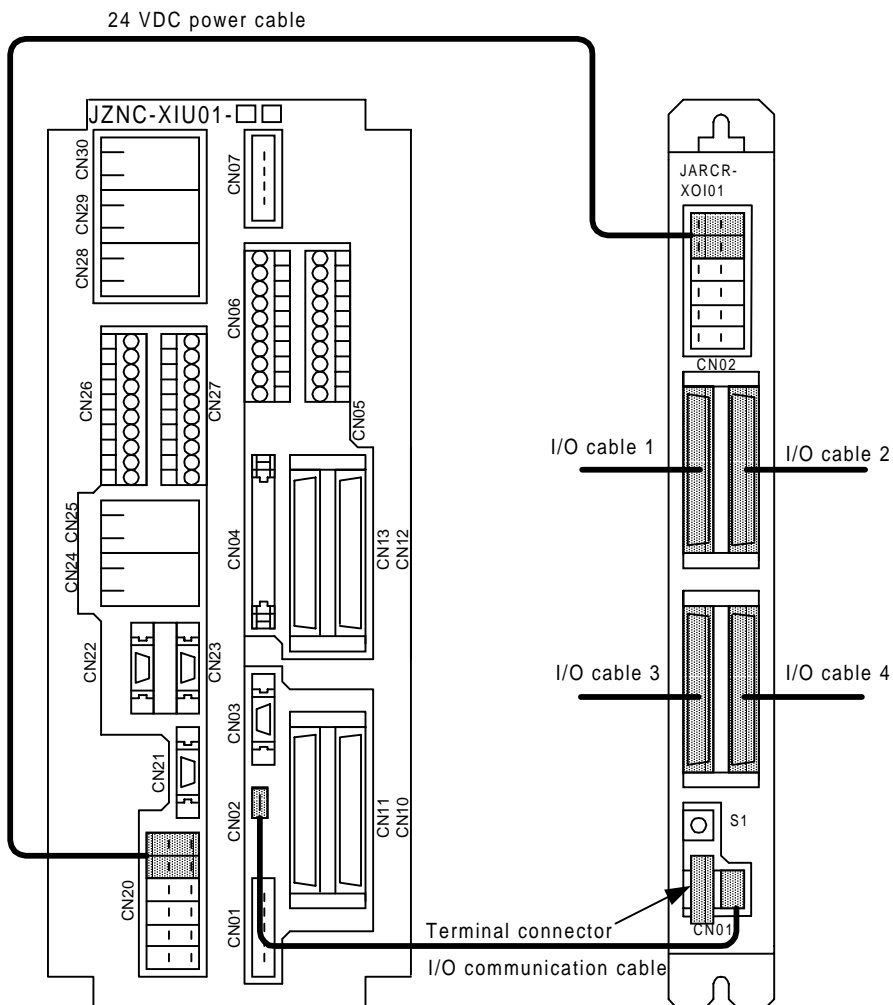
1. Be sure that the settings of switches on the board are correct.
2. For the switch settings, refer to “3 Setting the Functions”.

## 4.3 Mounting the XOI01 Board on the XRC

1. Be sure that the main power supply is OFF.
2. Fix the XOI01 board on the XRC with the board fixing screws securely tightened.

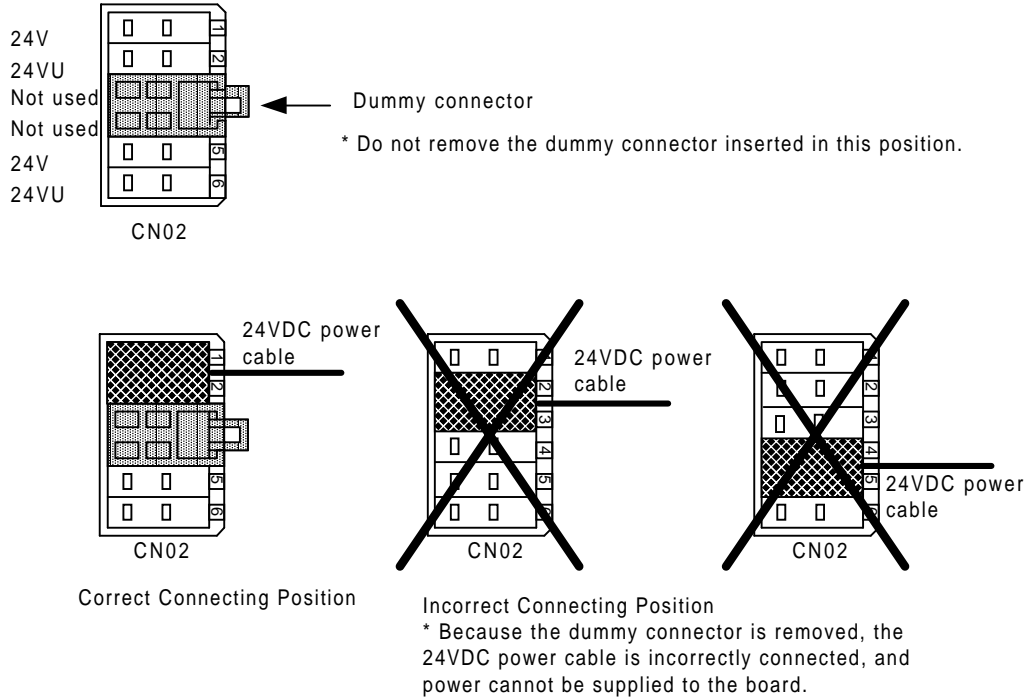
## 4.4 Connecting Each Cable

1. Connect the 24 VDC power supply cable to the CN02 on the XOI01 board.
2. Connect the I/O communication cable to the CN01 on the XOI01 board. Disconnect the terminal connector from CN02 on the JZNC-XIU01 unit, and connect it to the non-occupied CN01 on the XOI01 board.
3. Connect the I/O cables to CN10 through CN13 on the XOI01 board.



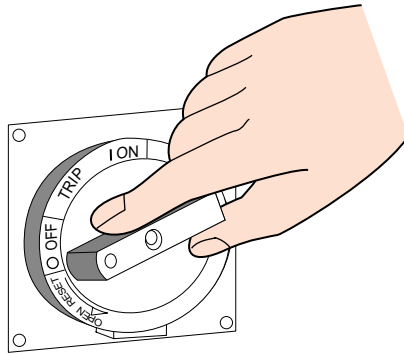
**NOTE**

A dummy connector is inserted into the CN02 of the 24VDC power supply connector on the XOI01 board. Do not remove this connector because it is inserted to prevent incorrect cable connections. Removing this connector may result in incorrect connection of the 24VDC power cable to the CN02. This prevents power from being supplied normally to the board, and the board may not start up.

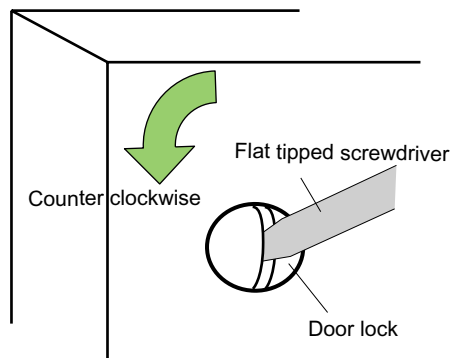


## 4.5 Closing the Front Door of the XRC

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°.





# 5 I/O Signal Allocation

## 5.1 I/O Module Setting

In order to use a XOI01 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 XOI01 board, for which all of its switches have been set, inside the XRC. For the board mounting method, refer to “4. Mounting the XOI01 board”.



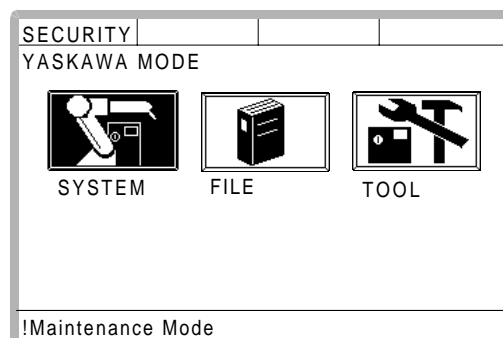
Add an I/O module in the management mode.  
In the operation mode and the editing mode, the settings are for reference only.

### Operation

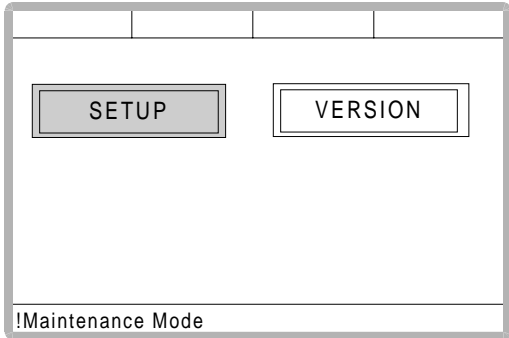
Turn ON the power supply, pressing [TOP MENU] → Set the mode to the “MANAGEMENT MODE” → Select {SYSTEM} from the top menu <sup>\*1</sup> → Select {SETUP} <sup>\*2</sup> → Select {I/O MODULE} <sup>\*3</sup> → Confirm the status of the mounted I/O module <sup>\*4</sup> → Press [ENTER] → Press [ENTER] →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

### Explanation

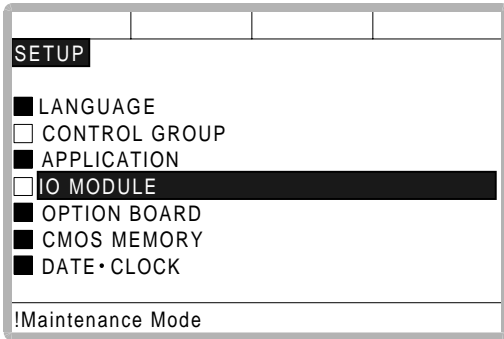
- <sup>\*1</sup> When the top menu appears, change the security mode to the “MAINTENANCE MODE”. Then select {SYSTEM}.



- \*2 Move the cursor to {SETUP} in the system display and press [SELECT].

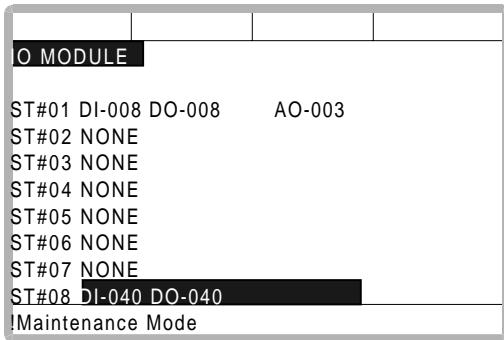


- \*3 Select the {I/O MODULE} in the setup display.

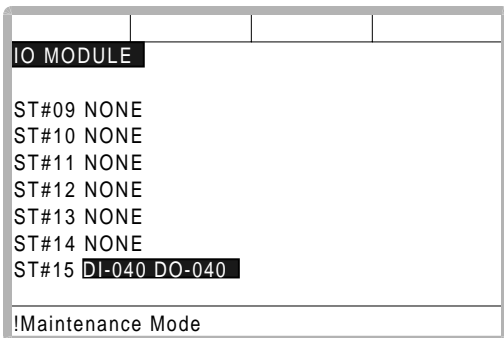


The items marked with n cannot be used.

- \*4 The current mounted status of the I/O modules appears as in the following example.

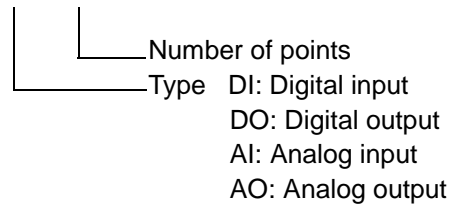


Press [ENTER] to display the module mounted status for the rest of the stations.



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

DI - 016



In the example shown on the display, the configuration of boards are as follows. Both "ST#08" and "ST#15" show "DI-040 DO-040", because the numbers of I/O points on the XOI01 board and the XIO01 (XIO02) are the same; DI-040 DO-040.

ST#01: JANCD-XEW01 board (digital input 8 points, digital output 8 points, analog output 3 points)

Switch S1: Set to 1 (this value becomes the ST#.)

ST#08: XOI01 board (digital input 40 points, digital output 40 points)

Switch S1: Set to 8 (this value becomes the ST#.)

ST#15: XIO01 (XIO02) board (digital input 40 points, digital output 40 points)

This board is fixed to ST#15.



If the display does not indicate the actual mounted status, recheck the cable connection and the switch setting.

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

- Improper I/O communication settings

The setting of SW1 on the XOI01 board and CN10 on the XIO01 board are not the same. When these settings are different, the XRC cannot recognize the board.

The default setting of the XOI01 board is 16-byte mode.

When the XIO01 board is set to 17-bytes, reset the XOI01 board to 17-bytes.

- Improper or overlapped station settings

One optional board can be selected for each station. Check if SW1 is not used for a board by changing the S1 setting. S1 cannot be set to 0, because no station is allocated to 0.

(S1: F (ST#15) is only for the XIO01 (XIO02) board. Do not select it for other boards.)

- Non-applicable system software versions

Old system software versions are not applicable for the XOI01 board. With old system software versions, even with the correct settings, the number of I/O points for the XOI01 board does not appear. Check the system software version number, and change to software applicable for the board. Use system software version X1.80A (xx)-00 or later.

- Improper connection of the 24VDC power cable and the I/O communication cable

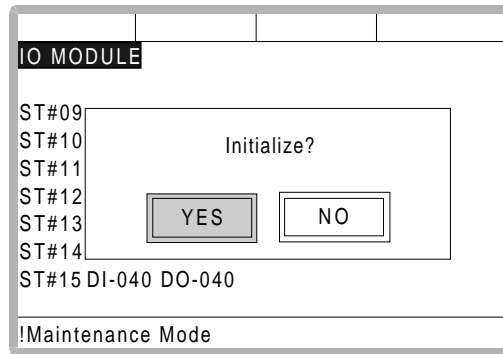
The 24VDC cable and the I/O communication cable may not be connected properly.

Recheck the cable connection referring to "4.4 Connecting Each Cable." Improper connection of the 24VDC power cable to the CN02 may prevent the board from starting up.

- I/O module failure

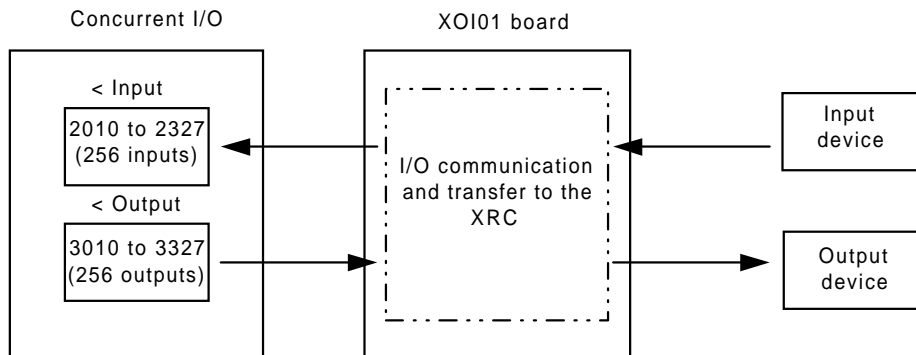
When the above causes do not apply, and the display still does not correspond to the actual mounted status, failure of an I/O module is suspected. Contact your YASKAWA representative.

- \*5 The confirmation dialog box appears. When the mounted status of an I/O module is correct, select "YES". The I/O module setting is updated, and an I/O module is added.



## 5.2 I/O Data

The data to be transferred from the XOI01 board to the inside of the XRC is of 40 input points (5 bytes) and 40 output points (5 bytes). The I/O data of the XOI01 board is allocated to external I/O signals of concurrent I/O.



When only a XOI01 board is mounted as an optional I/O board, the concurrent I/O allocation of each board is as follows.

(2010 to 2057 and 3010 to 3057 are used for standard I/O of the XRC.)

Input	Output
2060 to 2067: CN12	3060 to 3067: CN12
2070 to 2077: CN12, 13	3070 to 3077: CN12, 13
2080 to 2087: CN13	3080 to 3087: CN13
2090 to 2097: CN10	3090 to 3097: CN10
2100 to 2107: CN11	3100 to 3107: CN11

## 6 I/O Circuits

### NOTE

- When an internal power supply is used for the I/O power supply, the allocation to the 24 VDC internal power supply of the XRC is approximately 1 A. If the total current consumption of the I/O circuits including that of other I/O boards (such as the XIO02 board) exceeds 1 A, use an external power supply.
- When an external power supply is used for the I/O power supply and the total current consumption of the I/O circuits exceeds 2 A, use a 24 VDC external power supply. However, do not use the 24 VDC power supply from CN10 and CN11 for the 24 VDC power supply used at the relay output contact.
- The I/O circuits of the XOI01 board are exclusive-use for 24 VDC. Connecting a power supply other than 24 VDC causes damages to the circuits and malfunction.

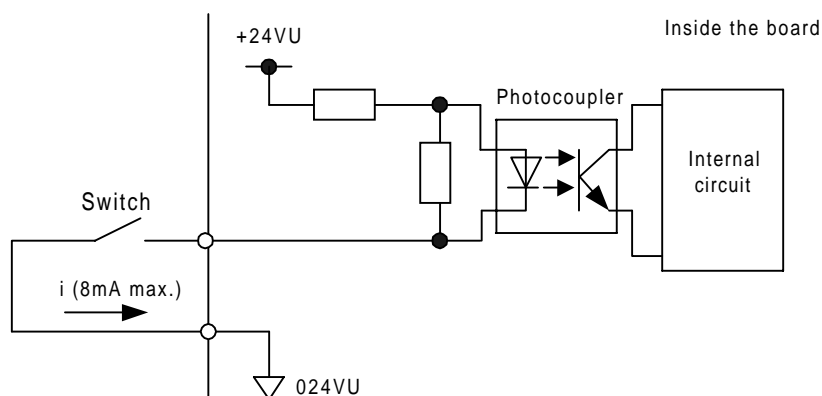
### 6.1 Input Circuit

The input circuit has 40-points, and all for input circuit 1.

#### 6.1.1 Input Circuit 1 (CN10 to CN13)

Circuit structure	Input circuit with photocoupler insulation
Current (max.)	8 mA per one point
Common	+ 24V common

Connection example



## 6.2 Output Circuits

The output circuit has 40 points from CN10 through CN13. Two types of circuits are provided: transistor output (24 points) and relay output (16 points). When the contact life of a relay should be considered because of frequent ON/OFF switching, the transistor output can be used to control a relay mounted on an easily accessible position or a non-contact relay SSR (solid state relay).

### NOTE

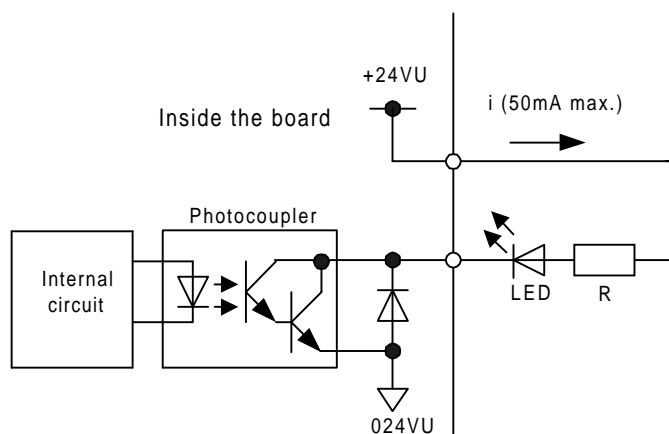
When connecting an induction load to the output circuit, connect a fly-wheel diode in parallel to the induction load, to suppress the surge voltage. Not using a fly-wheel diode may damage the output circuit.

When connecting a load with a large inrush current such as a lamp, connect a current limiting resistance in series to the load, so that the output current does not exceed its maximum value. Exceeding the maximum output current value may damage the output circuit.

### 6.2.1 Output Circuit 1 CN12 and CN13 (Transistor Output)

Circuit structure	Transistor open-collector output
Output current (max.)	50 mA per one point
Common	+24 V common

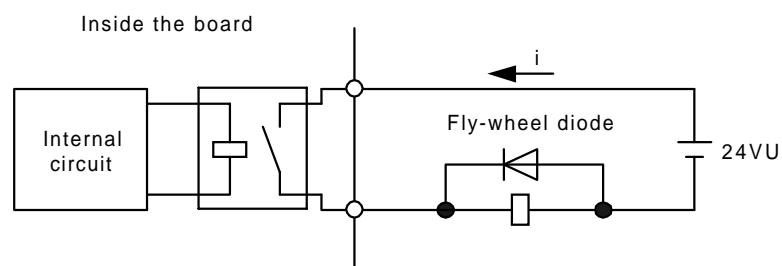
Connection example



## 6.2.2 Output Circuit 2 CN10 and CN11 (Relay Output)

Circuit structure	Relay contact output (only DC load can be connected)
Output current (max.)	0.5 A per point
Common	None (determined according to the external connection)
Contact resistance	30m $\Omega$ or less
Min. applicable load for contact	0.1 VDC, 0.1 mA
Relay life	Electrical life: 300,000 times (with induction load 24 VDC, 0.5 A) Mechanical life: 20,000,000 times

### Connection example



## 6.3 Connection Example

The following are allocation examples when the XOI01 board is added to the XRC: arc-welding, handling, and general-purpose applications; and spot-welding applications.

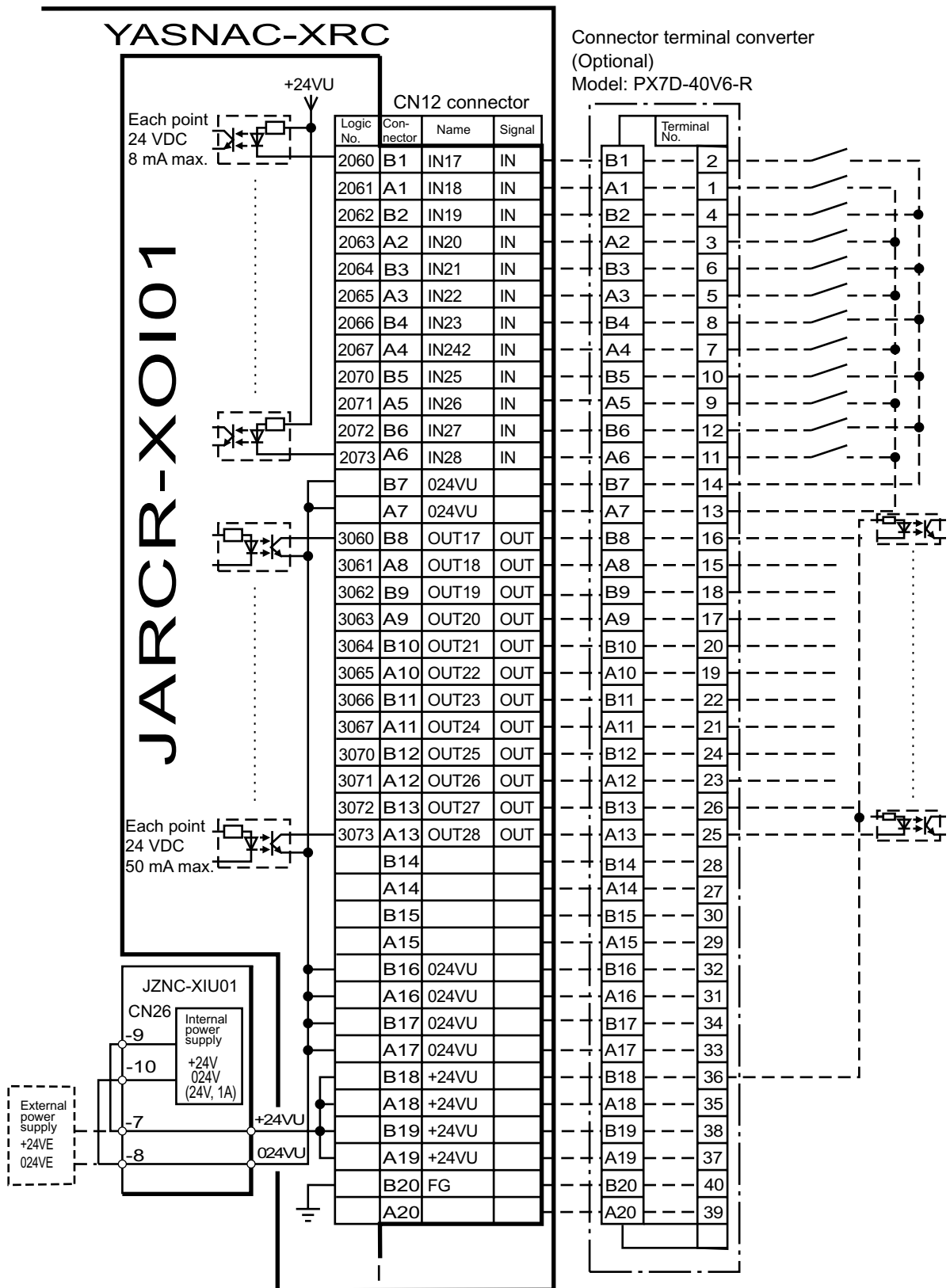
These examples are applied when only one XOI01 board is used as an optional I/O board.

When any other optional I/O boards are added, the XOI01 board allocation will be changed depending on the I/O board allocation.

### 6.3.1 Arc Welding, Handling, and General-Purpose Applications



CN12 General-purpose I/O  
(for arc welding, handling, and general-purpose applications)

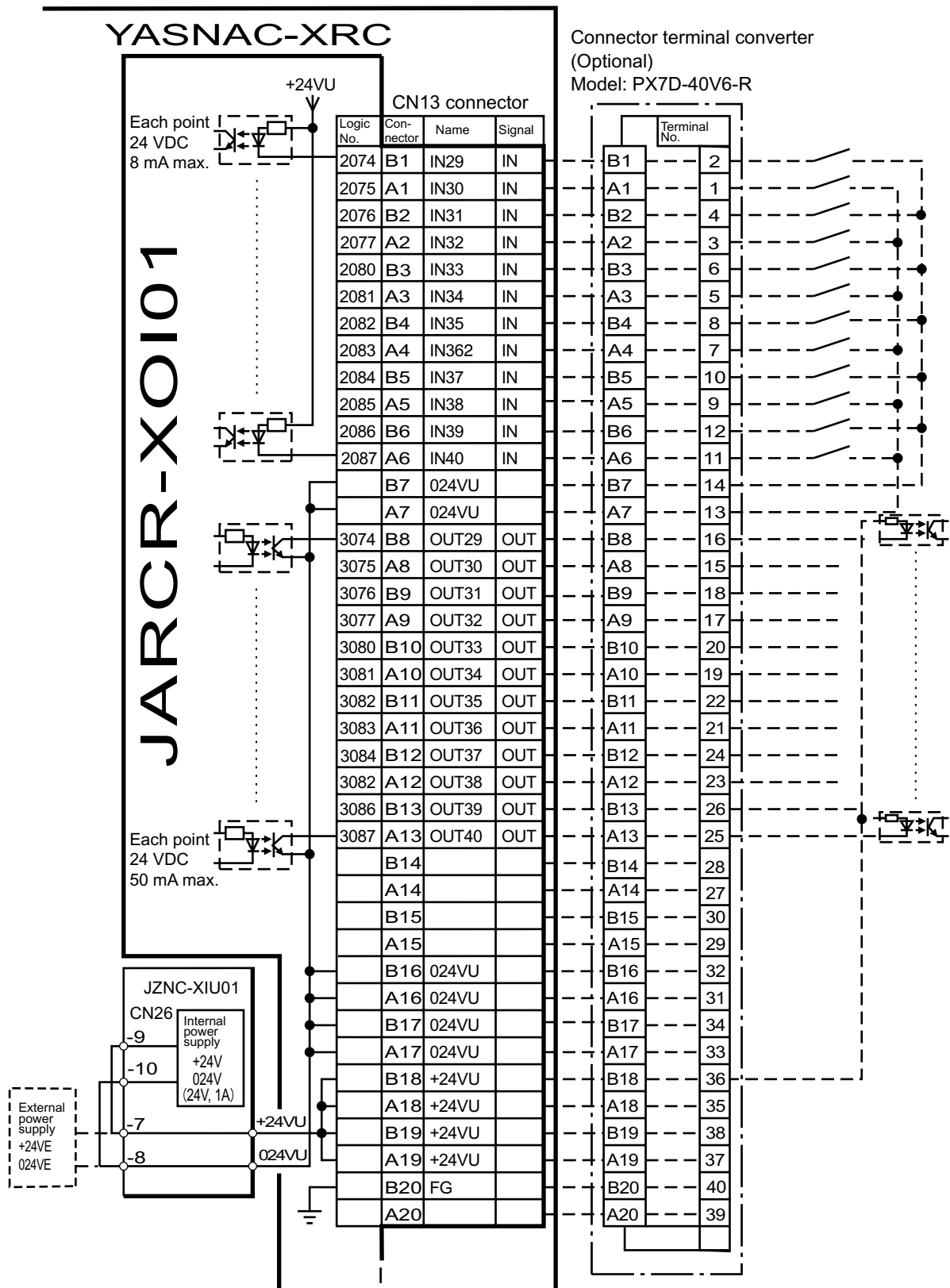


\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

6.3 Connection Example

CN13 General-purpose I/O

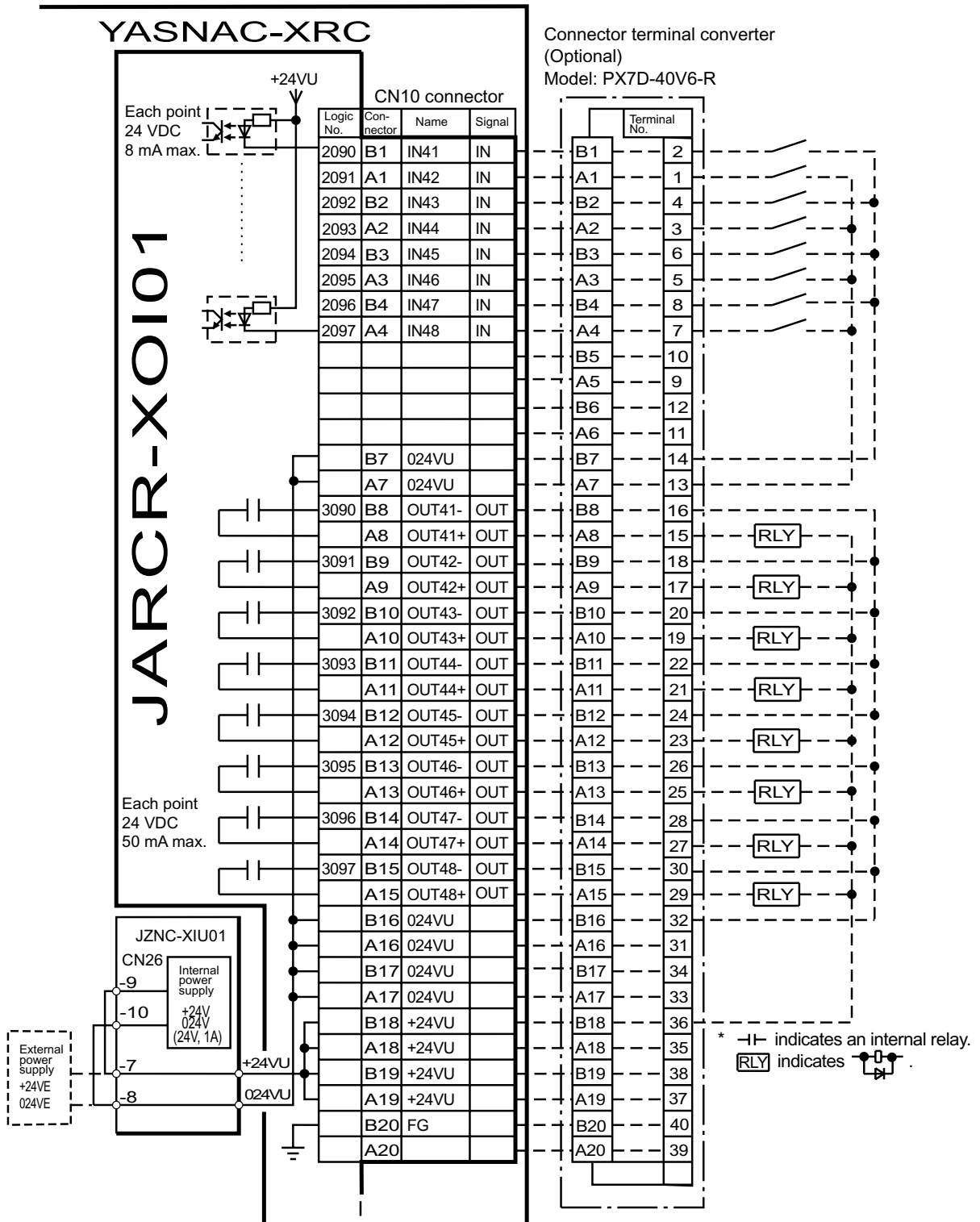
(for arc welding, handling, and general-purpose applications)



\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

CN10 General-purpose I/O

(for arc welding, handling, and general-purpose applications)

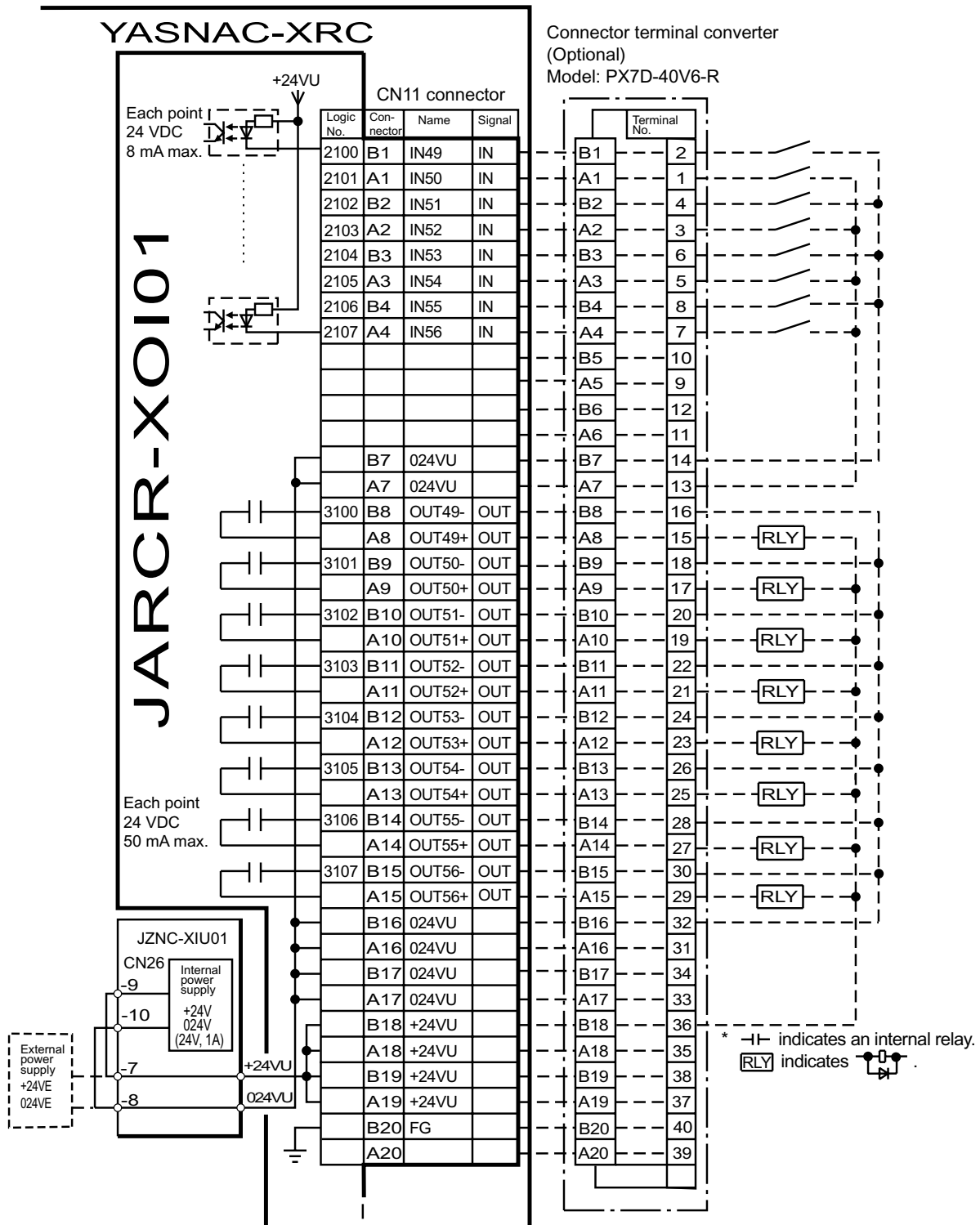


\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

6.3 Connection Example

CN11 General-purpose I/O

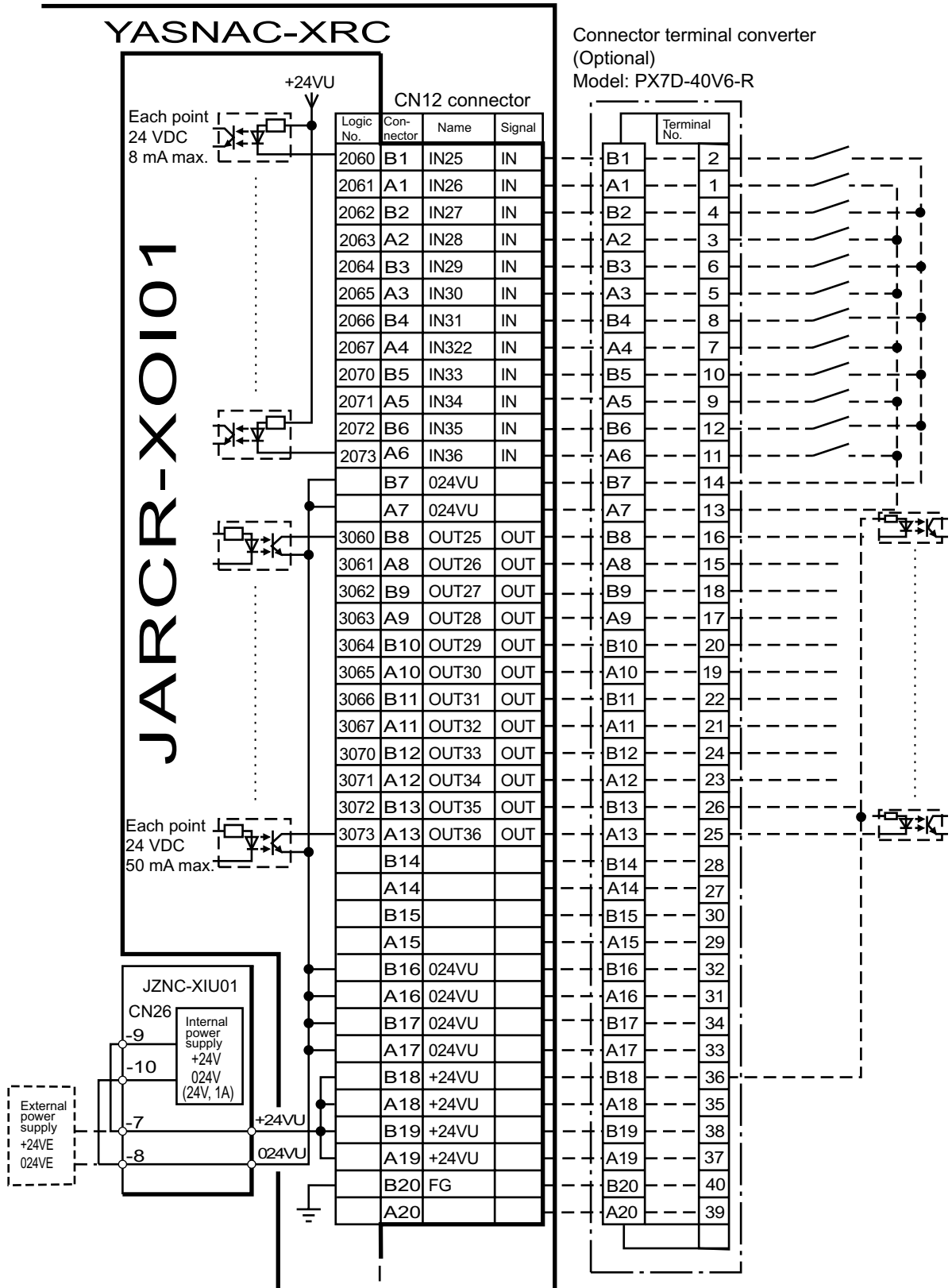
(for arc welding, handling, and general-purpose applications)



\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

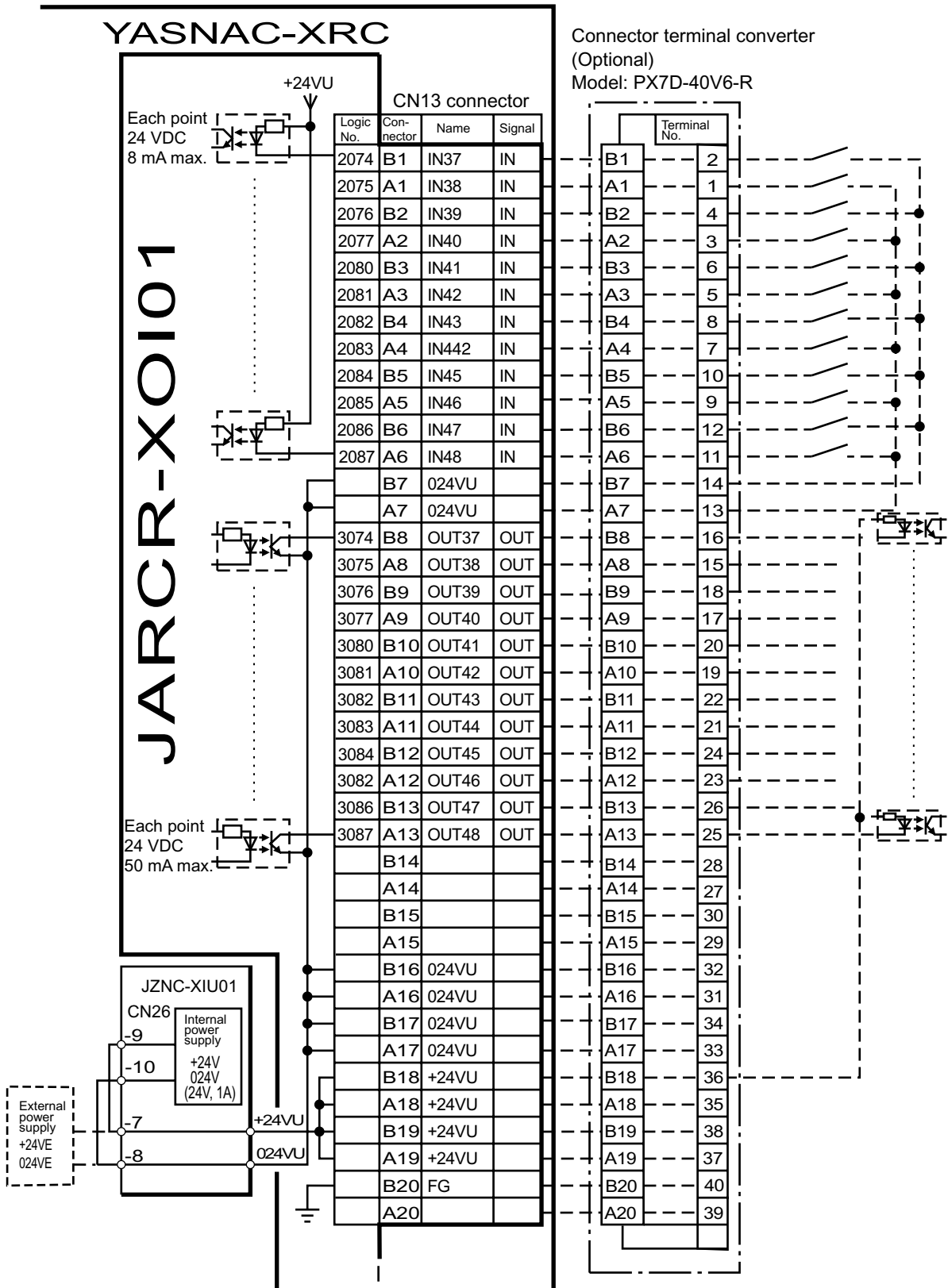
### 6.3.2 Spot Welding

CN12 General-purpose I/O (for spot welding)



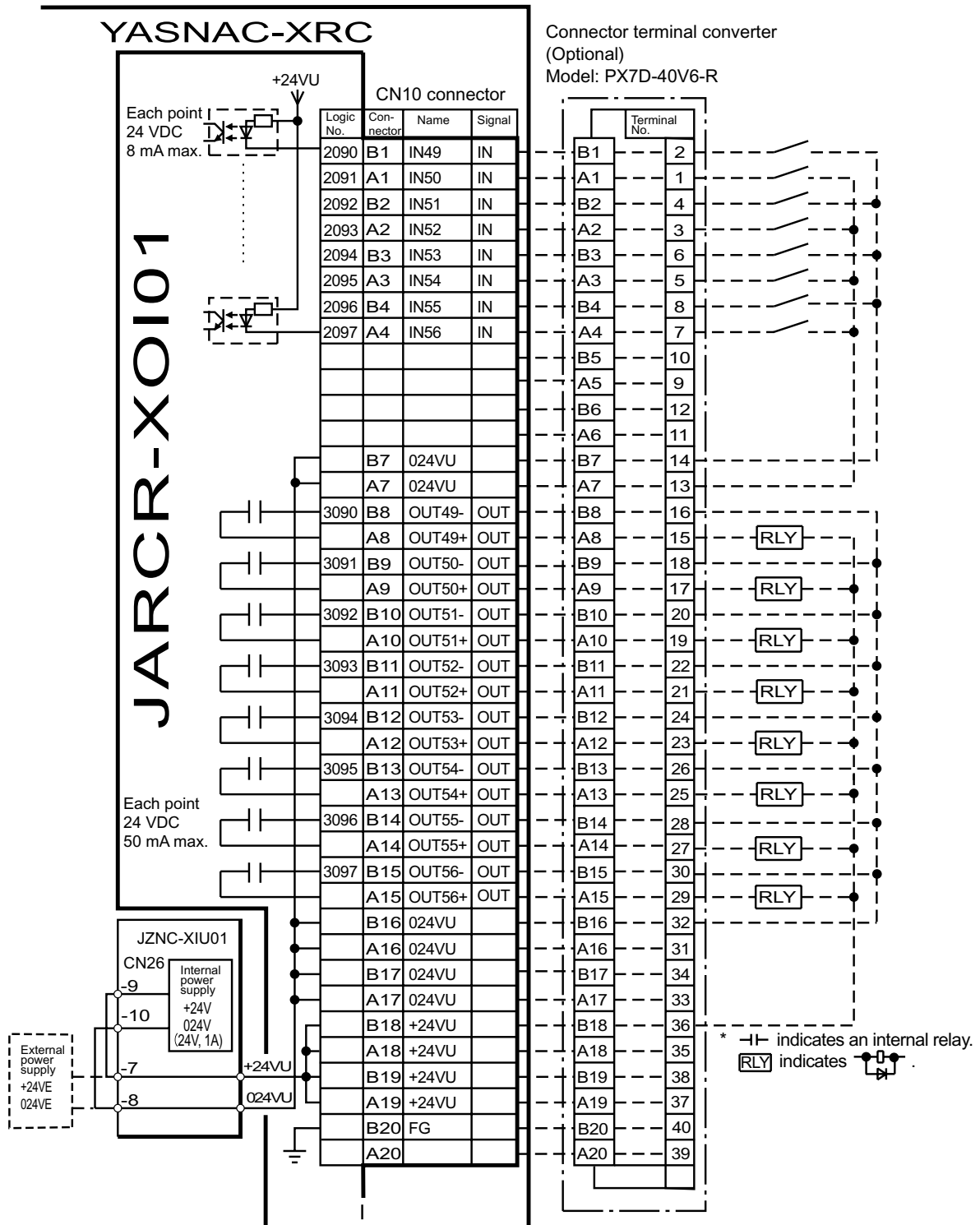
\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

CN13 General-purpose I/O (for spot welding)



\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

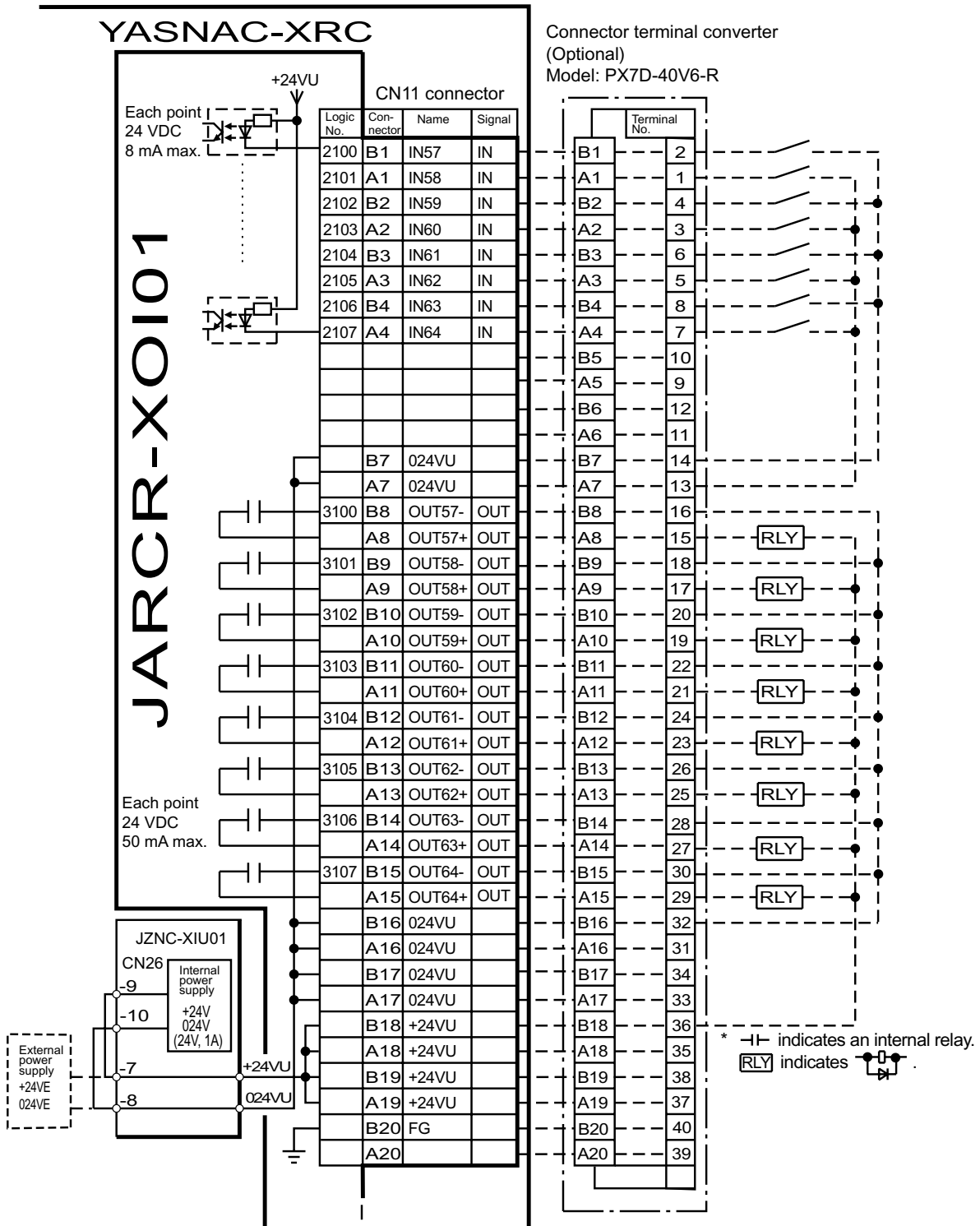
CN10 General-purpose I/O (for spot welding)



\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.

6.3 Connection Example

CN11 General-purpose I/O (for spot welding)



\* Remove the jumper pin between CN26-9 and -7 and between CN-10 and -8 on the JZNC-XIU01 when an external power supply is used.





# YASNAC XRC OPTIONS INSTRUCTIONS

FOR JARCR-XOI01 BOARD

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MANUAL NO. HW9482777   
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