

***XRC 2001 Controller***

***PX2850/PX2750  
Manipulator Manual***

***Part Number 147197-1***

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# **NOTES**



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# **SECTION 1**

## **INTRODUCTION**

The Motoman PX2850/PX2750 paint robot and XRC controller represent state-of-the-art technology in robotics today. The Motoman PX2850/PX2750 has six individual axes: Sweep, Lower arm, Upper arm, Rotate, Bend, and Twist.

The XRC controller coordinates the operation of the PX2850/PX2750 paint robot with external equipment such as spray guns, conveyors, positioning tables, etc. The XRC processes input and output signals, maintains variable data, and performs numeric processing to convert to and from different coordinate systems. Furthermore, it provides main logic functions, servo control, program and constant data memory, and power distribution. Please read this manual thoroughly to familiarize yourself with the many aspects of the PX2850/PX2750 paint robot and XRC controller.

### **1.1 About this Document**

This manual provides system information for PX2850/PX2750 paint robot and XRC controller and contains the following sections:

#### **SECTION 1 – INTRODUCTION**

Provides general information about the structure of this manual, a list of reference documents, and customer service information.

#### **SECTION 2 – SAFETY**

Provides information regarding the safe use and operation of the PX2850/PX2750 paint robot.

#### **SECTION 3 — SET-UP MANUAL**

Provides basic information about the installation, initial operation, and calibration of the PX2850/PX2750 paint robot and XRC controller.

#### **SECTION 4 — PX2850/PX2750 INSTRUCTIONS**

Provides detailed information about the PX2850/PX2750 paint robot, including installation, wiring, specifications, parts lists, and maintenance.

#### **SECTION 5 — XRC INSTRUCTIONS - SUPPLEMENT FOR PX-SERIES**

Provides detailed information about the XRC for PX-series paint robots, including configuration, ladder descriptions, and parts replacement.

#### **SECTION 6 — XRC INSTRUCTIONS—NORTH AMERICAN STANDARD 2001**

Provides detailed information about the NAS XRC 2001 controller, including descriptions, inspections, and parts replacement.

#### **SECTION 7 — XRC INSTRUCTIONS - GENERAL**

Provides general information about the XRC controller, including system set-up, inspections, diagnosis, and configuration, as well as specifications, maintenance, and alarm/error message lists.

#### **SECTION 8 — PX2850/PX2750 ELEMENTARY DIAGRAMS**

Provides detailed information about XRC wiring and system configuration with regard to the PX2850/PX2750 paint robot.

### **1.2 Reference to Other Documentation**

For additional information refer to the following:

- Concurrent I/O Parameters Manual (P/N 142102-1)
- Vendor manuals for system components not manufactured by Motoman.

## **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 (PX2850, etc.)
- Application Type (assembly, handling, etc.)
- Software Version (5.101A, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

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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 the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the PLC. 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, 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 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).



# MOTOMAN SETUP MANUAL

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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-○○○ MANIPULATOR INSTRUCTION MANUAL  
YASNAC XRC INSTRUCTION MANUAL  
YASNAC XRC OPERATOR'S MANUAL  
YASNAC XRC OPERATOR'S MANUAL FOR BEGINNERS

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





## MANDATORY

- This manual explains the various components 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.”



## WARNING

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

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

Emergency Stop Button



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

Injury may result from unintentional or unexpected manipulator motion.

Release of Emergency Stop



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

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

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

Improper or unintended manipulator operation may result in injury.

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

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



## CAUTION

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

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

- Read and understand the Explanation of the Alarm Display in the Setup Manual before operating the manipulator.

## 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.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
Manipulator	Manipulator
Power Cable	Power Cable
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 [ ], e.g., [ENTER].
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture. e.g., page key  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, e.g., [SHIFT]+[COORD].
	Displays	The menu displayed in the programming pendant is denoted with { }, e.g., {JOB}.
Playback Panel	Buttons	Playback panel buttons are enclosed in brackets, e.g., [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.

## Explanation of warning labels

The following warning labels are attached to the manipulator and XRC.  
Fully comply with the precautions on the warning labels.

 <b>WARNING</b>		
<ul style="list-style-type: none"><li>The label described below is attached to the manipulator.</li></ul> <p>Observe the precautions on the warning labels. Failure to observe this caution may result in injury or damage to equipment.</p>		
 <p><b>Do not enter robot work area</b></p>	 <p><b>Moving parts may cause injury</b></p>	
<p>Refer to the manipulator manual for the warning label location.</p>		
<ul style="list-style-type: none"><li>The following warning labels are attached to XRC.</li></ul> <p>Fully comply with the precautions on the warning labels. Failure to observe this warning may result in injury or damage to equipment.</p>		
 <p><b>High Voltage</b> Do not open the door with power ON.</p>	 <p><b>High Voltage</b> Do not open the cover.</p>	 <p><b>May cause electric shock.</b> Ground the earth terminal based on local and national electrical code.</p>





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## About Setup Manual Configuration

Thank you very much for purchasing Yaskawa Electric Mfg. Co., Ltd.'s manipulator . This Setup Manual contains instructions for the safe use of the manipulator, and safe installation and wiring.

This manual is arranged as follows:

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Chapter 1 includes general notes for safe and proper operation of the MOTOMAN.

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Chapter 2 explains how to receive the manipulator and its support equipment.

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Chapter 3 explains XRC installation, location, and setup.

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Chapter 4 explains how to connect the primary power supply and power cables.

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Chapter 5 explains how to turn the power supply on/off.

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Chapter 6 explains the check operation and manipulator handling.

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Chapter 7 explains home position registration and confirmation.

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Chapter 8 lists all the manuals and their relevant uses.

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# 1 Safety

## 1.1 For Your Safety

Robots generally have requirements which are different from other manufacturing equipment, such as larger working areas, high-speed operation, rapid arm movements, etc., which can pose safety hazards.

Read and understand the instruction manuals and related documents, and observe all precautions in order to avoid the risk of injury to personnel and damage to equipment.

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



## MANDATORY

- Teaching maintenance of the robot must conform to:
  - Industrial Safety and Health Law
  - Enforcement Order of Industrial Safety and Health Law
  - Ordinance of Industrial Safety and Health Law

Other related laws are:

  - Occupational Safety and Health Act in USA
  - Factory Act (Gewerbeordnung) in Germany
  - Health and Safety at Work, etc. Act in UK
  - EC Directive 89/392 Machinery and 91/368 EEC

- Prepare
  - SAFETY WORK REGULATIONS

based on concrete policies for safety management complying with related laws.
- Observe the
  - MANIPULATING INDUSTRIAL ROBOTS-SAFETY (ISO 10218)

for safe operation of the robot. (Japan Only) (JIS B 8433)
- Reinforce the
  - SAFETY MANAGEMENT SYSTEM

by designating authorized workers and safety managers, as well as giving continuing safety education.
- Teaching and maintaining the robot are specified as "Hazardous Operations" in the Industrial Safety and Health Law (Japan only).  
Workers employed in these above operations are requested to attend special training offered by YASKAWA.

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## 1.2 Special Training



### MANDATORY

- Persons who teach or inspect the manipulator must undergo required training before using the manipulator.
- For more information on training, inquire at the nearest YASKAWA branch office.

The telephone numbers are listed on the back cover of this manual.

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## 1.3 Motoman Manual List



### MANDATORY

- It is important to have and be familiar with all manuals concerning the MOTOMAN.

You should have the four manuals listed below:

- MOTOMAN SETUP MANUAL
- MOTOMAN-000 INSTRUCTIONS
- YASNAC XRC INSTRUCTIONS
- YASNAC XRC OPERATOR'S MANUAL FOR BEGINNERS
- YASNAC XRC OPERATOR'S MANUAL

Confirm that you have all these manuals on hand.

If any manuals are missing, contact your salesman from YASKAWA's local branch office.  
The relevant telephone numbers are listed on the back cover.

## 1.4 Personnel Safety

The entire manipulator working envelope is potentially dangerous.

All personnel working with the MOTOMAN (safety administration, installation, operation, and maintenance personnel) must always be prepared and "Safety First" minded, to ensure the safety of all personnel.



### CAUTION

- Avoid any dangerous actions in the area where the MOTOMAN is installed.

There is a danger of injury if there is contact with the manipulator or peripheral equipment.

- Please take strict safety precautions by placing signs such as "Flammable," "High Voltage," "Warning," and "Off-limits to Unauthorized Personnel" in necessary areas in the factory.

Failure to observe these cautions may result in fire, electric shock, or injury due to contact with the manipulator and other equipment.

- Strictly observe the following items:

- Always wear approved work clothes (no loose-fitting clothes).
- Do not wear gloves when operating the MOTOMAN.
- Do not allow underwear, shirts, or neckties to hang out from the work clothes.
- Do not wear large jewelry, such as earrings, rings, or pendants.

Always wear protective safety equipment such as helmets, safety shoes (with slip-proof soles), face shields, safety glasses, and gloves as necessary.

Improper clothing may result in injury.

- Unauthorized persons should not approach the manipulator or associated peripheral equipment.

Failure to observe this caution may result in injury due to contact with XRC, playback panel, the workpiece, the positioner, etc.

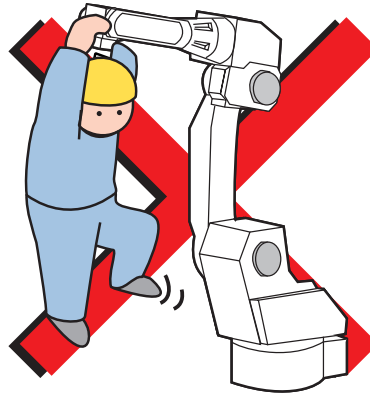




## CAUTION

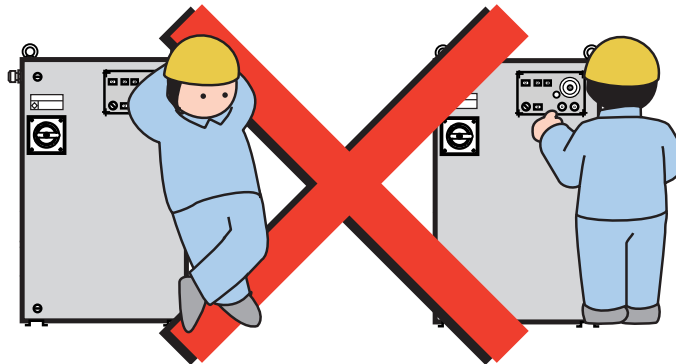
- Never forcibly move the manipulator axes.

Failure to observe this caution may result in injury or equipment damage.



- Never lean on XRC or other controllers, and avoid inadvertently pushing buttons.

Failure to observe this caution may result in injury or damage by unexpected movement of the manipulator.



- Never allow unauthorized personnel to touch the XRC during operation.

Failure to observe this caution may result in injury or damage resulting from unexpected movement of the manipulator.

## 1.5 Motoman Safety

### 1.5.1 Installation and Wiring Safety

Refer to the MOTOMAN-○○○ Instructions manual and XRC Instructions for details on installation and wiring.

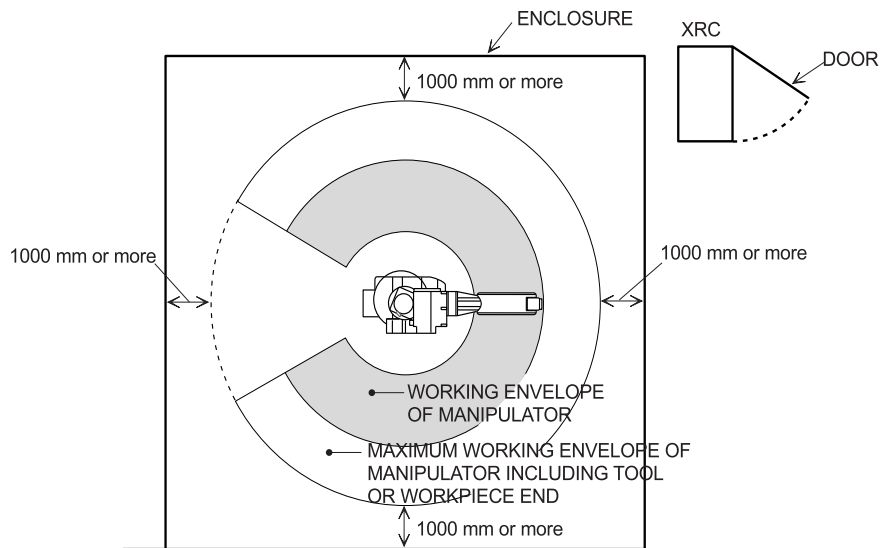
In planning installation, adapt an easy to observe arrangement to ensure safety. Take safety into consideration when planning the installation. Observe the following when installing the manipulator:



## WARNING

- Select an area such as that described below to install the manipulator: Confirm that the area is large enough so that the fully extended manipulator arm with tool will not reach a side wall, safeguards, or the controller.

Failure to observe this caution may result in injury or damage resulting from unexpected movement of the manipulator.



- Perform grounding in accordance with all applicable electrical codes.

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



## CAUTION

- Operation of the crane, sling, or forklift should only be performed by authorized personnel.

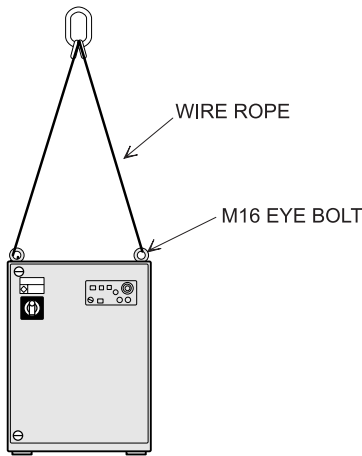
Failure to observe this precaution may result in injury or equipment damage.

MOTOMAN should be lifted with a crane using wire rope threaded through the shipping bolts and jigs and the body should be lifted in an upright posture as described in the manipulator instruction manual.

Failure to observe these precautions may cause the manipulator to turn downward, potentially causing injury or damage to equipment.

- When lifting the XRC, please check the following:

- As a rule, handling of XRC must be performed using a crane with wire rope threaded through attached eyebolts.
- Be sure to use wire that is strong enough to handle the weight of the XRC.



XRC

THE WEIGHT OF XRC (approx.)

XRC equivalent model	Approx. weight (kg)
SV3X,UP6,SK16X	70
SK45X,SK16MX	90
UP130,UP165,UP200,UP130R,SP100X	100

- Be sure the eyebolts are securely fastened.

Failure to observe this caution may result in injury or damage to equipment.

- If storing the manipulator temporarily before installation, be sure to place it on a stable and flat surface and take precautions to prevent unauthorized personnel from touching it.

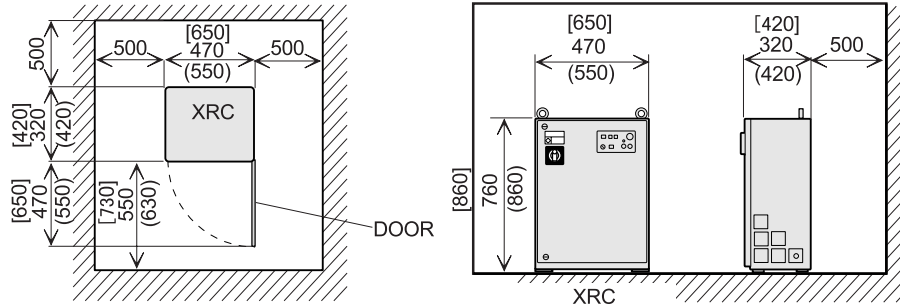
Failure to observe this precaution may result in injury or damage to equipment.



## CAUTION

- Be sure there is sufficient room for maintenance on the manipulator, XRC, and other peripheral equipment.

Failure to observe this precaution could result in injury during maintenance.



Securing (mm) SV3X,UP6,SK16X,  
( )SK16MX,SK45X,  
[ ]UP130,UP165,UP200,UP130R,SP100X

External Dimensions (mm) SV3X,UP6,SK16X  
( )SK16MX,SK45X,  
[ ]UP130,UP165,UP200,UP130R,SP100X

- The manipulator is controlled by the XRC or the welding fixture controller.

To ensure safety, be sure to operate the controller from a location where the manipulator is easily visible.

Operation by unauthorized personnel may result in injury or equipment damage.

- Install the XRC outside the safeguard of the manipulator's safety enclosure.

Failure to observe this precaution may result in injury or damage to equipment resulting from contact with the manipulator.

- Install the manipulator using bolts of the size and type specified for each MOTOMAN in the MOTOMAN INSTRUCTION MANUAL.

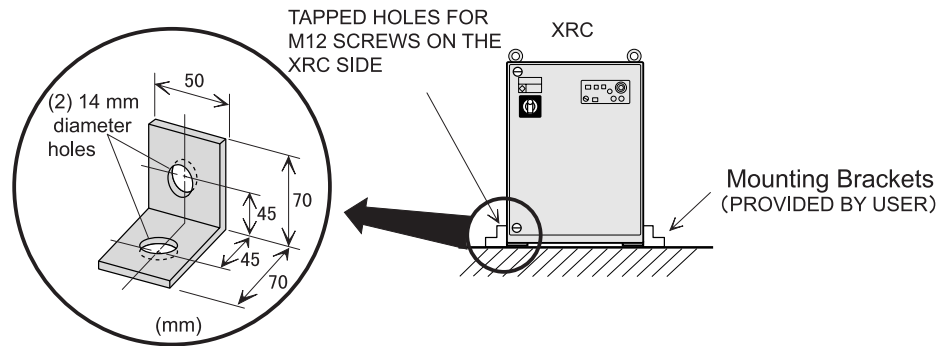
Failure to observe this caution may result in injury or damage to equipment.



## CAUTION

- Secure the position of the XRC after setting up.

Attach the XRC to the floor or rack, etc., using the screw holes on the bottom of the XRC.



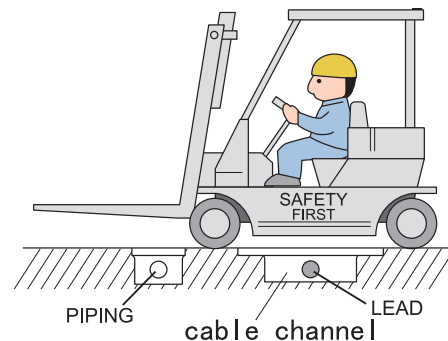
Failure to observe this caution could lead to injury or equipment damage if the XRC should shift or fall.

- Be familiar with the connection diagram before wiring the XRC, and perform the wiring in accordance with the connection diagram.

There is a danger of equipment damage or injury due to miswiring and unexpected movement of the equipment.

- Take precautions when wiring and piping between the XRC, manipulator, and peripheral equipment. Run the piping, wiring, or cables through a pit or use a protective cover, so that they are not stepped on by personnel or run over by the forklift.

Operators and other personnel may stumble on exposed wiring or piping. Cable damage can cause unexpected manipulator motion resulting in injury or property damage.



## 1.5.2 Work Area Safety

Carelessness contributes to serious accidents in the work area. To ensure safety, enforce the following precautions:



### WARNING

- Install an enclosure around the manipulator to prevent any accidental contact with the manipulator while the power is on. Post a warning sign stating "Off-limits During Operation" at the entrance of the enclosure. The gate of the enclosure must be equipped with a safety interlock. Be sure the interlock operates correctly before use.

Failure to observe this caution may result in a serious accident due to contact with the manipulator.



### CAUTION

- Store tools and similar equipment in proper locations outside of the enclosure.

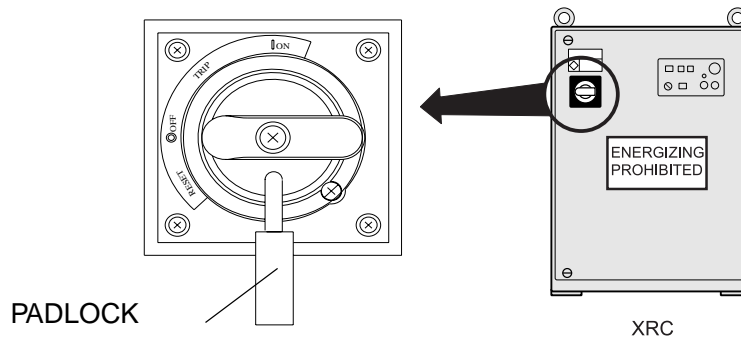
Tools and loose equipment should not be left on the floor around the manipulator, XRC, or welding fixture, etc., as injury or damage to equipment can occur if the manipulator comes in contact with objects or equipment left in the work area.

### 1.5.3 Operation Safety



## WARNING

- When attaching a tool such as the welding torch to the manipulator, be sure the power supply of the XRC and the tool is off, lock the switch, and display a warning sign.



Turning the power on during tool installation may cause electric shock or injury due to unexpected movement of the manipulator.

- Never exceed the rated capacity of the manipulator (capacity can be found in the specifications section of the manipulator manual).

Failure to observe this caution may result in injury or damage to equipment.

- Teach jobs from outside the manipulator's work area whenever possible.

- When teaching within the working envelope of the manipulator, please observe the following:

- Always view the manipulator from the front.
- Follow the predetermined operating procedure.
- Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.

Failure to observe these precautions may result in injury due to unexpected manipulator motion.

 **WARNING**

- Before operating the manipulator, confirm that the emergency stop circuit is functioning by pressing the emergency stop button on the playback panel and programming pendant, and confirm that the servo lamp is turned off.

If the manipulator cannot be stopped in the event of an emergency, there is a risk of injury or damage to equipment.

- Always press Teach Lock before starting to teach.

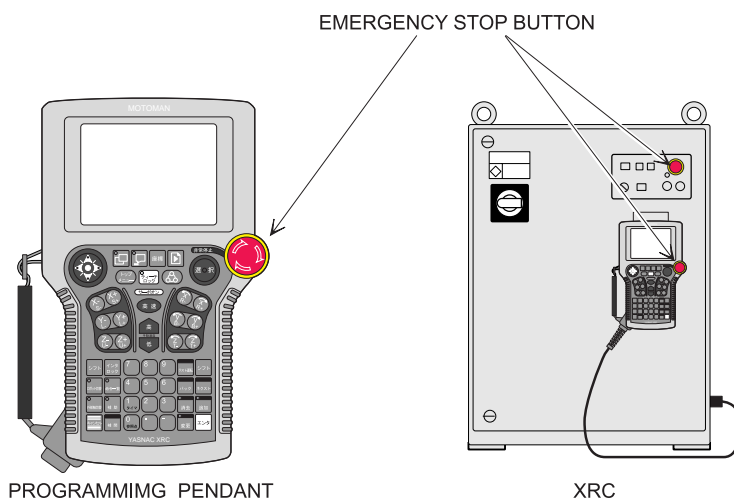
Failure to observe this precaution may result in injury due to unauthorized personnel operating the manipulator from the playback panel.

- Prior to operation, be sure there are no personnel in the manipulator's working envelope. The following operations should always be performed from a safe location.

- Turning on the XRC power supply
- Moving the manipulator using the programming pendant
- The check operation
- Automatic operation

Failure to observe this caution may result in injury from contact with the manipulator.

Press the emergency stop button immediately in the event any problems occur. The emergency stop button is on the upper right side of the playback panel on the controller and on the right side of the programming pendant.







## CAUTION

- Inspect all equipment before turning on power to the controller. Correct problems before operating.

- Check for problems in manipulator motion
- Check for damage to insulation and sheathing of cables.

- Always return the programming pendant to the hook on the front of the controller after use.

The programming pendant can be damaged if it is left on the floor or in the manipulator work area.



## MANDATORY

- Persons operating or inspecting the manipulator should be trained as required by applicable laws and company policies.

(Refer to the 1.2 Special Training)

## 1.6 Notes for Moving and Transferring the MOTOMAN

When moving or transferring the Motoman, observe the following safety precautions:



### CAUTION

- Attach the instructions to the controller cabinet so that all users have access to necessary manuals. See Section 1.3 for a complete list of manuals.

If any manuals are missing, contact your Yaskawa representative.

- If the warning labels on the manipulator and YASNAC XRC are illegible, clean the labels so that they can be read clearly. Note that some local laws may prohibit equipment operation if safety labels are not in place.

Contact your YASKAWA representative if you require new warning labels.

- When the MOTOMAN is transferred, it is recommended to check with Yaskawa Engineering Co. which is listed on back cover of this manual.

Incorrect installation or wiring may result in personal injury and property damage.



### PROHIBITED

- Never modify the manipulator or XRC.

Failure to observe this precaution could result in injury or damage resulting from fire, power failure, or operation error.

## 1.7 Notes on MOTOMAN Disposal



### CAUTION

- When disposing of the MOTOMAN, follow the applicable national/local laws and regulations.
- Anchor the manipulator well, even when temporarily storing it before disposal.

Failure to observe this precaution may result in injury due to the manipulator falling down.



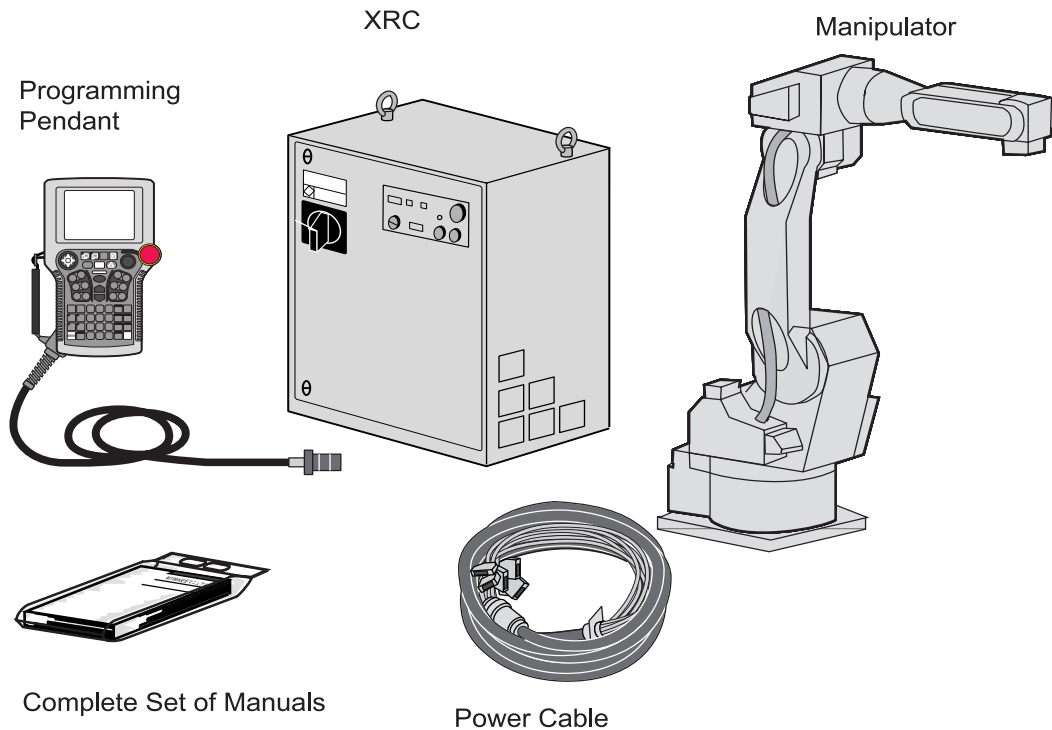
## 2 Product Confirmation

### 2.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

Standard delivery includes the following five items (Information for the content of optional goods is given separately):

- Manipulator
- XRC
- Programming Pendant
- Power Cable (Between Manipulator and XRC)
- Complete Set of Manuals



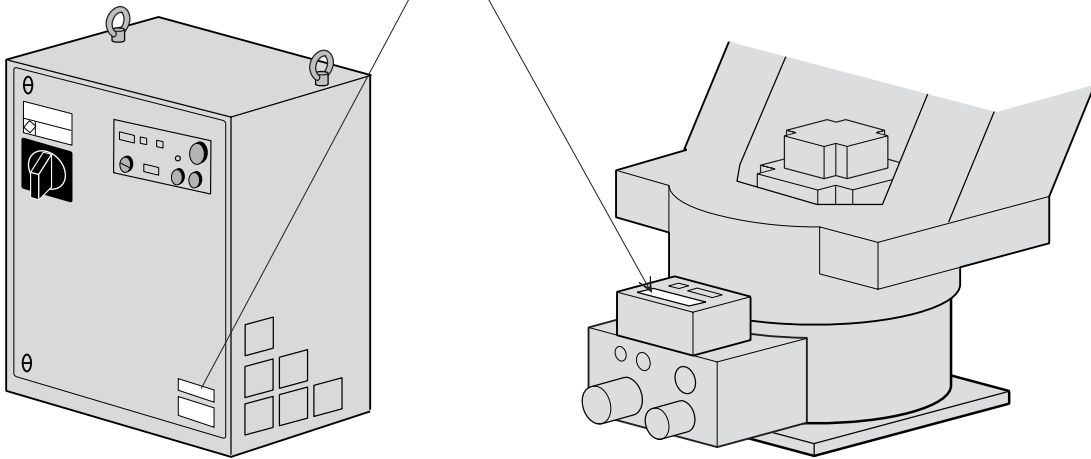
## 2.2 Order Number Confirmation

Confirm that the order number pasted on the manipulator and XRC match.  
The order number plates are affixed to the figure below.

Example

Only connect the MOTOMAN to the  
YASNAC MRC which has same order  
number.

ORDER NO. S78796-1



## 3 Installation

### 3.1 Handling Procedure



#### CAUTION

- Crane, sling, and forklift operations must be performed only by authorized personnel.

Failure to observe this caution may result in injury or damage.

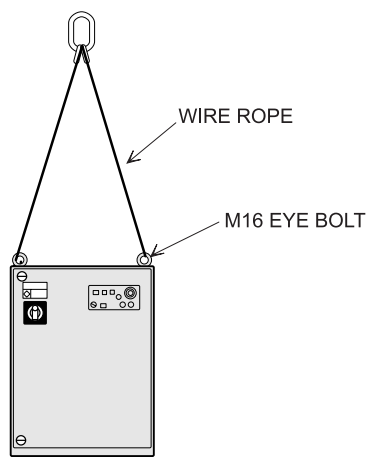
- Avoid jarring, dropping, or hitting the controller during handling.

Excessive vibration or impacting the XRC may adversely affect the performance of the XRC.

#### 3.1.1 Using a Crane to Move the Controller

Check the following before handling the XRC:

- Confirm the weight of the controller before handling, and use a wire rope with a rating that is greater than the weight of the controller.
- Install eyebolts for handling and make sure they are securely fastened before hoisting.



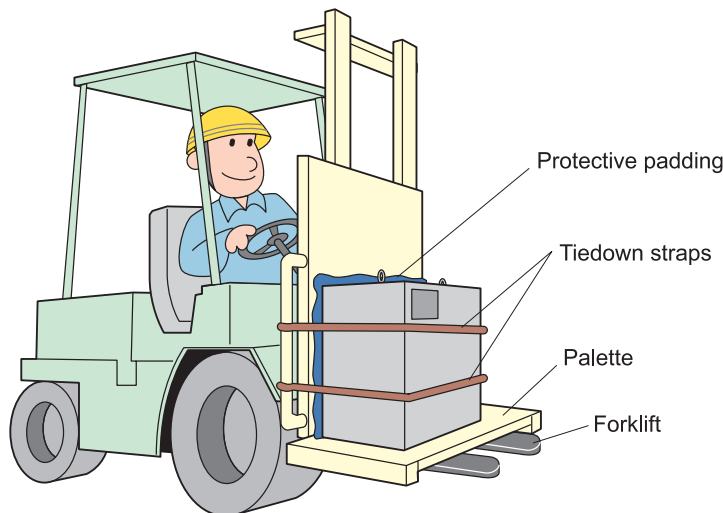
THE WEIGHT OF YASNAC XRC (approx.)

XRC equivalent model	Approx. weight (kg)
SV3X,UP6, SK16X	70
SK16MX,SK45X	90
UP130,UP165, UP200,UP130R, SP100X	100

### 3.1.2 Using a Forklift to Move the Controller

Observe the following precautions when using a forklift to handle the controller:

- Confirm that there is a safe work environment and that the XRC can be transported safely to the installation site.
- Inform people along the forklift route that equipment is being moved in their area.
- Secure the controller so it cannot shift or fall during handling.
- Transport the controller at the lowest possible height.
- Avoid jarring, dropping, or hitting the controller during handling.



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## 3.2 Place of Installation

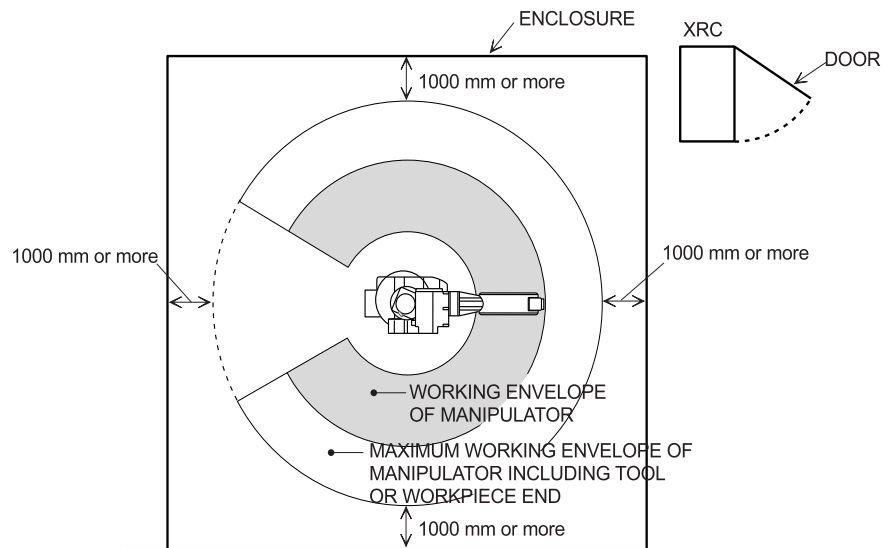
The conditions listed below must be met before installing the XRC:

- Ambient temperature must be 0 to 45° C (32 to 113°F) during operation and -10 to 60°C (14 to 140°F) during transportation and maintenance.
- Humidity must be low with no condensation (under 20%RH).
- It must be a place with little dirt, dust, or water.
- No flammable or corrosive liquids or gases, etc. in the area.
- Little jarring or potential for striking of the XRC (under 0.5 oscillation).
- No large electric noise source (such as a TIG welding device, etc.) nearby.
- No potential for collision with moving equipment such as forklifts.

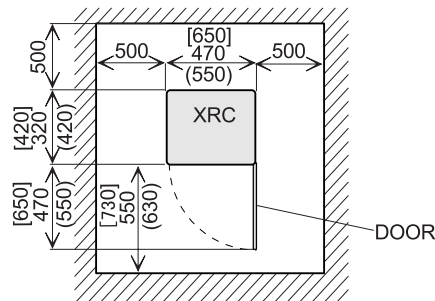


## 3.3 Location

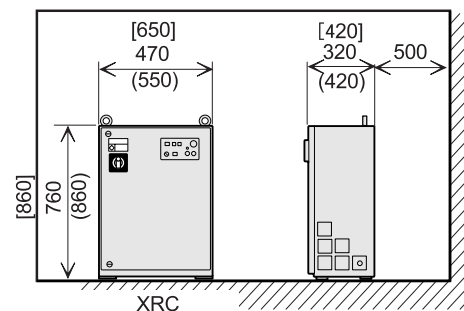
- Install the XRC outside of the working envelope of the manipulator (outside of the enclosure)



- Install the controller in a location from which the manipulator is easily visible.
- Install the controller in a location from which you can easily inspect it when the door is open.

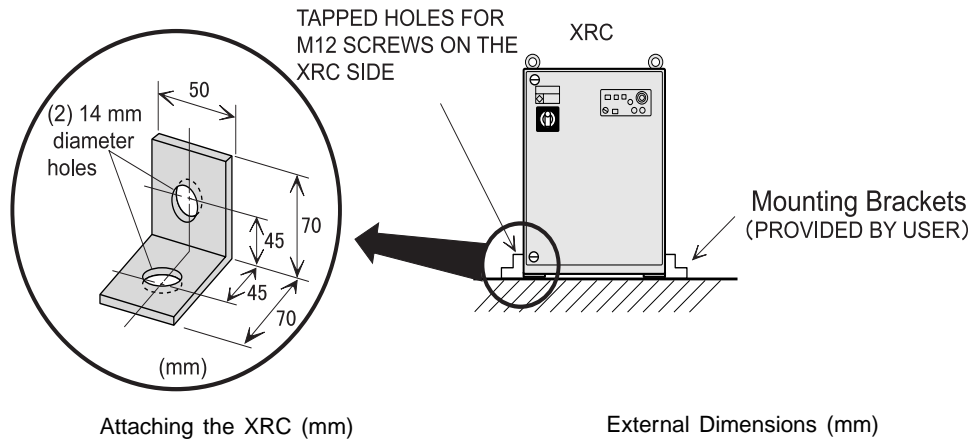


- Install the controller at least 500mm from the nearest wall to allow maintenance access. Shows the external dimensions.



## 3.4 Mounting the Controller

Attach the controller to the floor using user-supplied brackets made according to the specifications shown below.



Refer to the Instruction Manual for information on installation of the manipulator.

---

## 4 Connection



### WARNING

- The system must be grounded.

Failure to ground equipment may result in injury from fire or electric shock.

- Before grounding the system, turn off the power supply and lock the main power switch.

Failure to observe this caution may result in injury and electric shock.

- Do not touch any board inside the controller for five minutes after turning off the power supply.

Capacitors inside the controller store electricity after power is turned off. Exercise caution whenever handling circuit boards. Failure to observe this caution may cause electrical shock.

- Power cannot be turned on unless the door is closed. Interlocks prevent power from being turned on.

Failure to observe this caution may result in fire and electric shock.

- Any occurrence during wiring while the XRC is in the emergency stop mode is the user's responsibility. Do an operation check once the wiring is completed.

Failure to observe this caution could lead to injury or mechanical failure.



## CAUTION

- Wiring must be performed only by authorized personnel.

Incorrect wiring may cause fire and electric shock.

- Perform wiring in accordance with the rated capacity as specified in the Instructions.

Incorrect wiring may cause fire or mechanical breakdown.

- Be sure the power circuit screws are securely tightened.

Loose power circuit wires can cause fire and electric shock.

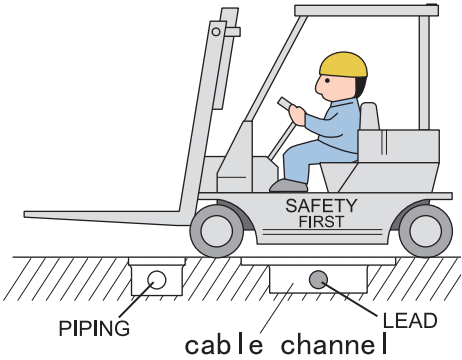
- Do not handle the circuit board directly by hand.

The IC board may malfunction due to static electricity.

---

## 4.1 Notes on Cable Junctions

- The cables that connect the controller to peripheral equipment are low voltage circuits. Keep controller signal cables away from the primary power circuit. High voltage power lines should not be run in parallel to controller signal cables. If running parallel cables is unavoidable, use metal ducts or conduit to isolate electrical signal interference. If cables must be crossed, run the power cables perpendicular across the signal cables.
- Confirm the connector and cable numbers to prevent misconnection and equipment damage. One connects the manipulator and XRC. Another connects the XRC and peripheral equipment. A wrong connection can cause damage to electronic equipment.
- Clear the area of all unauthorized personnel while making cable connections. Place all cables in a covered cable channel in the floor.

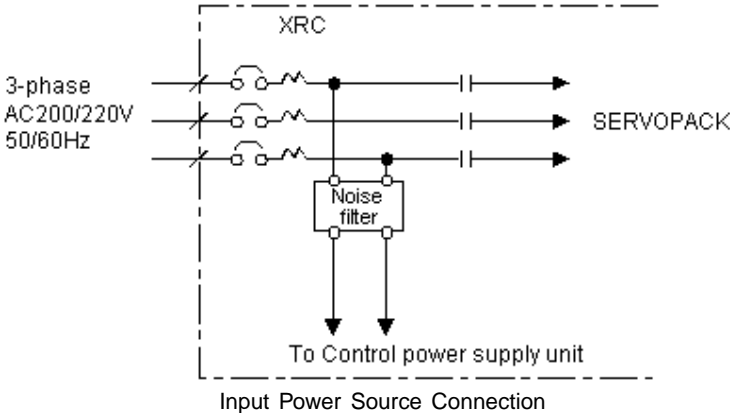


XRC Cable Junction Diagram

## 4.2 Power Supply

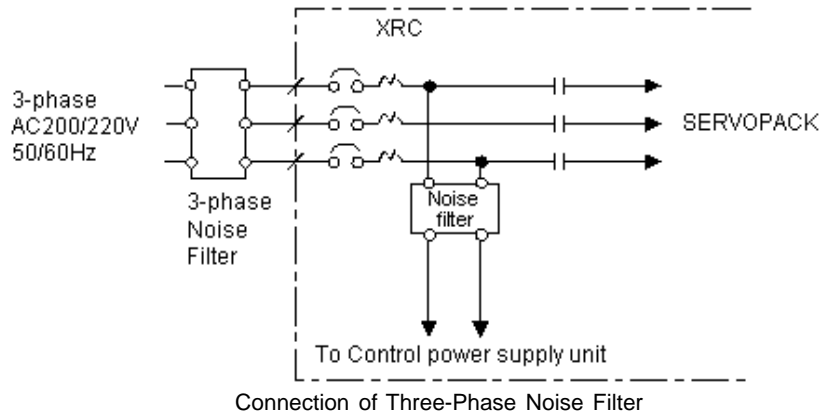
### 4.2.1 Three-Phase Power Supply

The three-phase power supply consists of AC200/220V(+10/-15%) and 50/60Hz(+2Hz/-2Hz). The power failure processing circuit operates when there is a temporary power frequency black out or drop in voltage, and the servo power turns off. Connect the power supply to a stable power source that is not prone to power fluctuations.



### 4.2.2 Noise Filter Installation

Insert the three-phase noise filter if you hear noise coming from the power source. Seal up each cable opening so that dust does not enter.



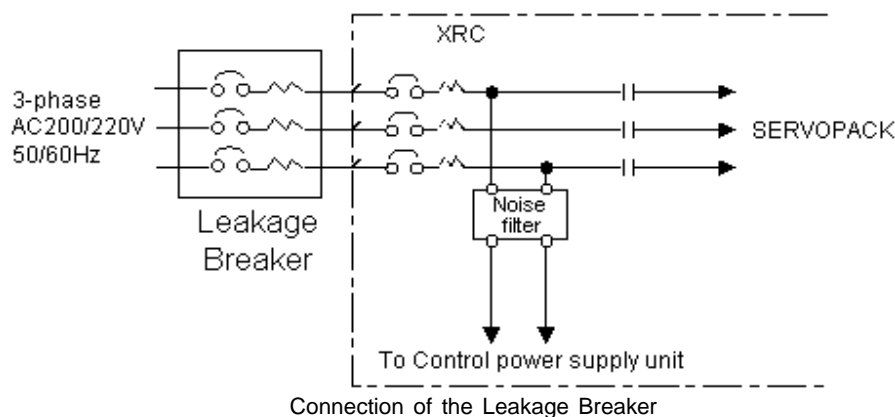
### 4.2.3 Leakage Breaker Installation

When connecting the leakage breaker to the controller power supply wiring, use a leakage breaker which can handle high frequencies. Leakage breakers which cannot handle high frequencies may malfunction.

Example of High Frequency Leakage Breakers

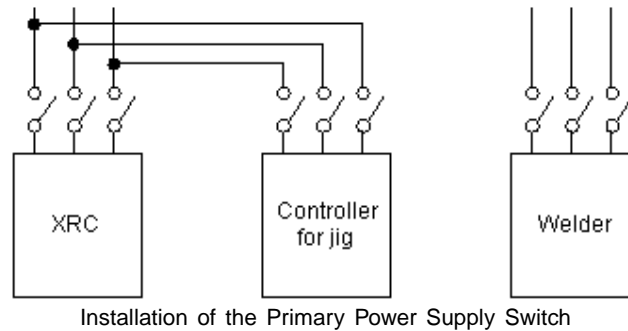
Maker	Model
Mitsubishi Electric Co., Ltd.	NV series (manufactured since 1988)
Fuji Electric Co., Ltd.	EG or SG Series (manufactured since 1984)

Even with a leakage breaker installed, there is still a possibility of some high frequency current leakage (small capacity 60-80 mA or large capacity 80-200 mA) from the XRC inverter. This current leakage presents no safety risks.



## 4.2.4 Primary Power Supply Switch Installation

Install the primary power supply switch as shown.



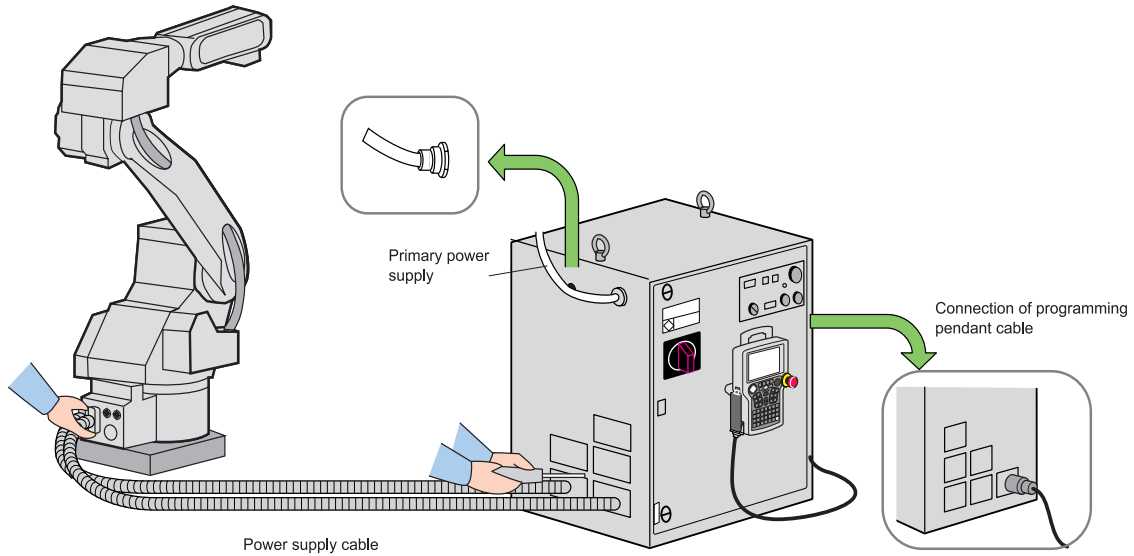
Cable Sizes and Switch Capacities

Manipulator	Voltage source capacity (kVA)	Cable size (size of terminal) (In case of Cabtyre cable (four wicks)) mm <sup>2</sup>	Switch capacity (A)
SV3X	1	2.0 (M5)	10
UP6	2	3.5 (M5)	15
SK16X	2	3.5 (M5)	15
SK16MX, SK45X	5	5.5 (M5)	30
UP130,UP165, UP200	7.5	5.5(M5)	40
UP130R	10	5.5(M5)	40
SP100X	11	5.5(M5)	40

The maximum load value (payload, operation speed, and frequency, etc.) is displayed. However, the voltage source capacity is different depending on work conditions. Inquire at the nearest branch office listed on the back cover for information when selecting the transformer.

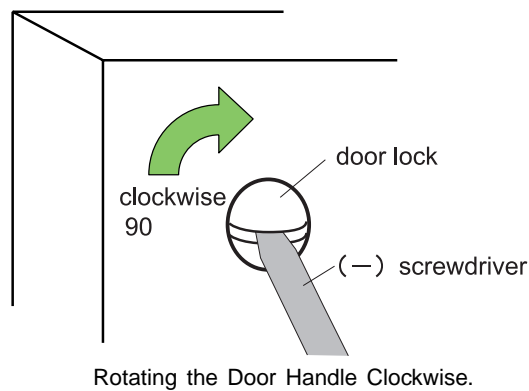
## 4.3 Connection Methods

A connection diagram for the manipulator, controller power cable, primary power cable and programming pendant is shown below.



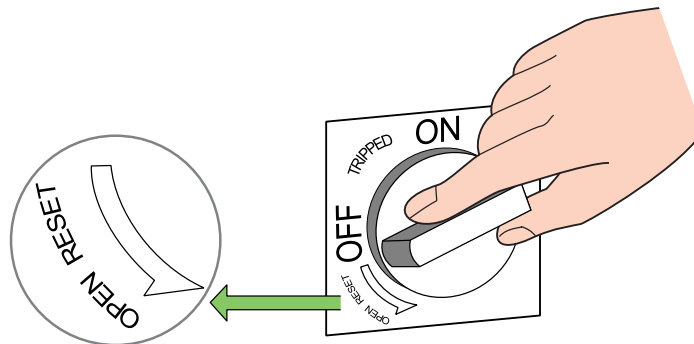
### 4.3.1 Connecting the Primary Power Supply

1. Open the front door of the XRC.
  - (1) Insert the door handle in the door lock on the front of XRC (two places), and rotate it 90 degrees clockwise.



- (2) Rotate the main switch to the "OPEN RESET" position and open the door gently.

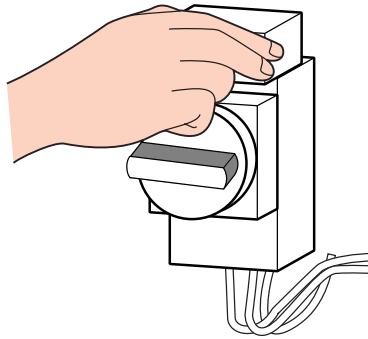




Rotating the main switch to the OPEN RESET position.

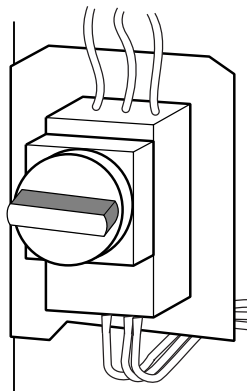
2. Confirm that the main power supply is OFF.
3. Make a hole in the plate and run the primary power supply cable through it. It is located on the top or on the left side of the XRC.  
Attach the plate and cable firmly so that it won't shift or slide out of place.

- (1) Pull off the top cover of the switch which is on the upper left side of the XRC.



Pulling Off the Cover

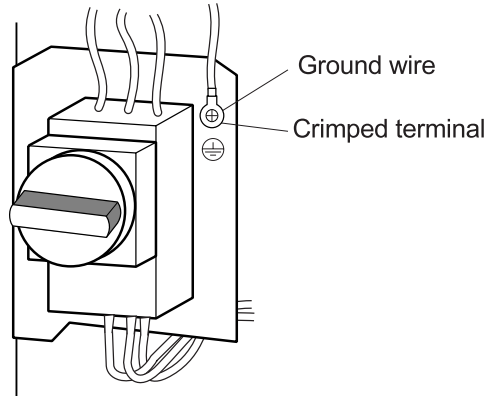
- (2) Connect the primary power supply cable.



Connection to the Terminal

(3) Connect a ground wire to reduce noise and prevent current leakage.

- 1) Connect the ground wire to the ground terminal (screw) of the switch which is on the upper left side of XRC.

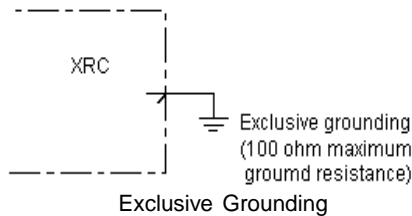


Connection of the Ground Wire

- 2) Perform grounding in accordance with all relevant local and national electrical codes. Grounding wire must be 8.0 mm<sup>2</sup> or larger.

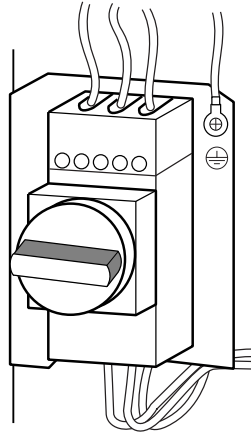


The customer must prepare the ground wire.



- Don't connect the grounding wire with the wires for the electric power source, the welder, etc.
- Ground in accordance with all relevant governmental regulations when using metallic ducts, metallic conduits, and wiring hedges to construct the cable.

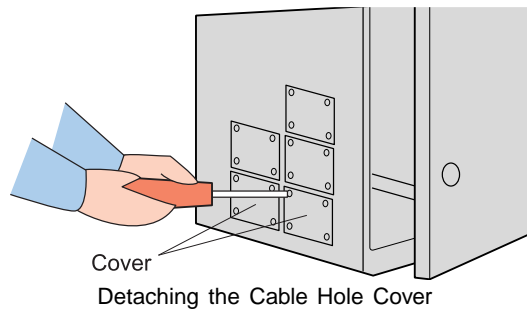
- (4) Install the cover.



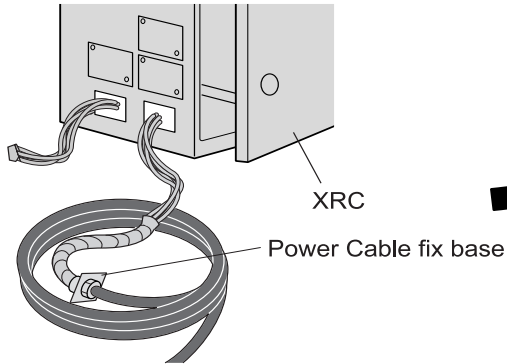
Install the Switch Cover

## 4.3.2 Connecting the Power Supply

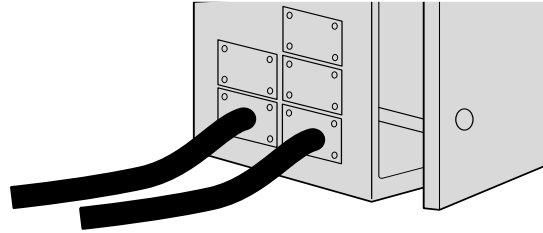
1. Remove the cover from the left side of the controller cabinet.



2. Remove the package, and take out the cable. Once you have run the cables through the cable holes on each side of XRC, tighten the screws.



Cables Passed Through the Holes  
in the Side of the XRC

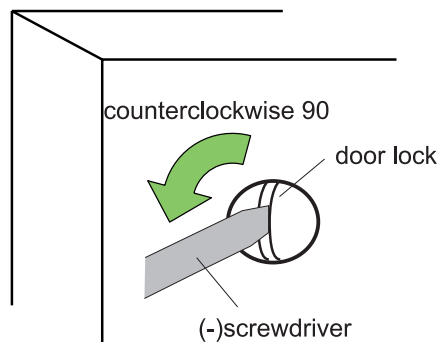


Tightening the Screws for the Cable



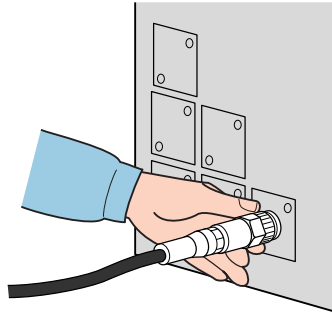
For more information on connecting the power cables, please refer to the Instruction Manual which corresponds to the particular XRC model.

3. Connect the manipulator to the XRC.  
Check the shape and size of the cable connector, the key fitting, and the position of the pins of the manipulator. Push the cable connector into the manipulator side connector firmly, and tighten securely.
4. Close the XRC door.
  - (1) Close the door gently.
  - (2) Rotate the door handle counterclockwise 90 degrees.



### 4.3.3 Connecting the Programming Pendant

Connect the programming pendant cable to the connector on the left side of the controller cabinet.



Connecting the Programming Pendant

The manipulator, XRC, and the programming pendant connections are now complete.



## 5 Turning on the Power Supply



### WARNING

- Confirm that nobody is present in the working envelope of the manipulator when turning on XRC power supply.

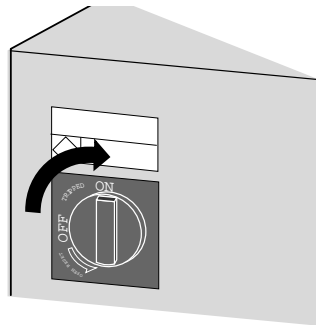
Failure to observe this caution could result in injury caused by accidental contact with the manipulator.

Push the emergency stop button immediately if any problems occur.

The emergency stop button is located on the upper right side of XRC playback panel and on the right side of the programming pendant.

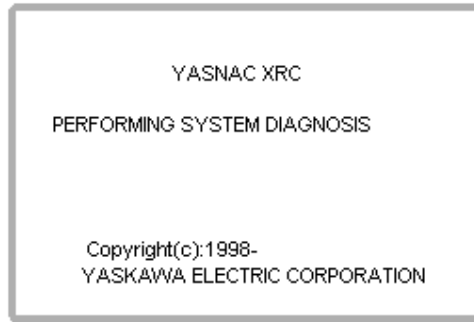
### 5.1 Turning on the Main Power Supply

The main power supply is turned on when the main power supply switch on the front of the XRC is turned to the "ON" position, and the initial diagnosis and the current position begin.



#### 5.1.1 Startup Diagnostics

The startup diagnostics are performed when the XRC main power is turned on, and the startup display is shown on the programming pendant screen.



### 5.1.2 When Startup Diagnostics are Complete

When the power is turned off, the XRC saves all condition data, including:

- Mode of operation
- Cycle
- Called job (active job if the XRC is in the play mode; edit job if the XRC is in the teach mode) and the cursor position in the job.

---

## 5.2 Turning on the Servo Power

### 5.2.1 During Play Mode

The worker's safety is secure if the safety plug is turned on.

1. When the safety guard is closed, press [SERVO ON READY] on the playback panel to turn on the servo power supply. This button lights.



**NOTE** When the safety guard is open, the servo power supply cannot be turned on.

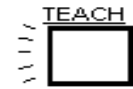


## 5.2.2 During Teach Mode

1. Press [SERVO ON READY] on the playback panel to turn on the servo power supply. The button will light when the servo power is turned on.



2. Press [TEACH LOCK] to enter the teach mode.

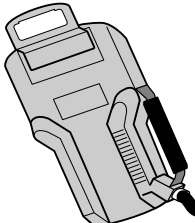


3. The servo power is turned on and [SERVO ON READY] on the playback panel lights when the operator grips the deadman switch.

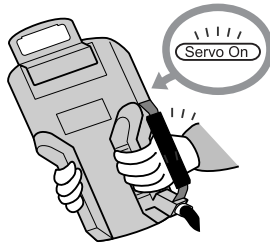


**SUPPLEMENT** Servo Power ON/OFF --- Deadman Switch


When the operator squeezes the deadman switch, the servo power turns ON. However, if the operator squeezes the switch until a "click" is heard, the servo power will turn OFF.



Release -> OFF



Squeeze -> ON



Squeeze Tightly -> OFF

**NOTE** When using the playback panel, programming pendant, or external signal to perform emergency stop, the servo power on operation from the deadman switch is cancelled. When turning the power back on, follow the previously listed instructions.

## 5.3 Turning the Power Off

### 5.3.1 Turning the Servo Power Off (Emergency Stop)

The manipulator cannot be operated when the emergency stop button is pressed and the servo power supply is turned off.

Turning the Servo Power Off

- Pressing the emergency stop button on either the programming pendant or the playback box will turn off servo power.
- The brake operates once the servo power supply is turned off, and the manipulator can no longer operate.
- The emergency stop mode can be operated at any time.



Programming Pendant

EMERGENCY STOP

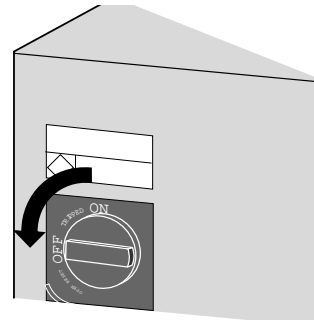


Playback Panel

### 5.3.2 Turning the Main Power Off

After turning off the servo power, turn off the main power.

When the main power switch on the front of XRC is turned off, the main power is cut off.



---

## 6 Test of Program Operation



### WARNING

- Press the emergency stop button on the playback panel and the programming pendant before operating the manipulator. Confirm that the servo on lamp is turned off.

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency.

- Set the teach lock before starting to teach.

Injury can occur if unauthorized personnel operate the playback panel during operation.

- Observe the following when teaching in the working envelope:

- View the manipulator from the front at all times.
- Follow the predetermined operating procedure.
- Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.

Improper or unintentional manipulator movement can result in injury.

- Ensure no persons are present in the manipulator work area before:

- Turning on the power supply to XRC
- Moving the manipulator using the programming pendant
- Doing a check operation
- Performing automatic operation

Persons who enter the manipulator's work area while the manipulator is in operation may be injured if they come in contact with the manipulator.

Push the emergency stop button immediately if any problems occur.

The emergency stop button is located on the upper right of the playback panel of the XRC and on the right side of the programming pendant.



## CAUTION

- Inspect the system before teaching jobs. If problems are found, correct them before resuming operation. Specifically check for:

- Problems in manipulator motion
- Damage to cables

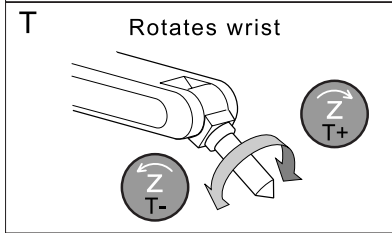
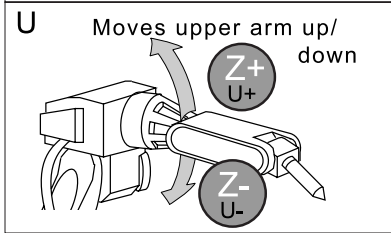
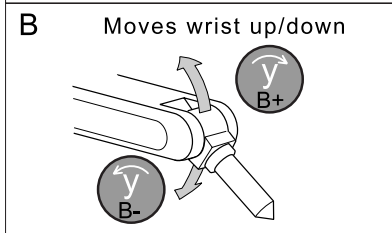
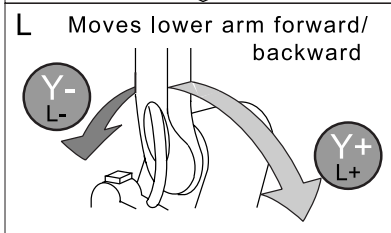
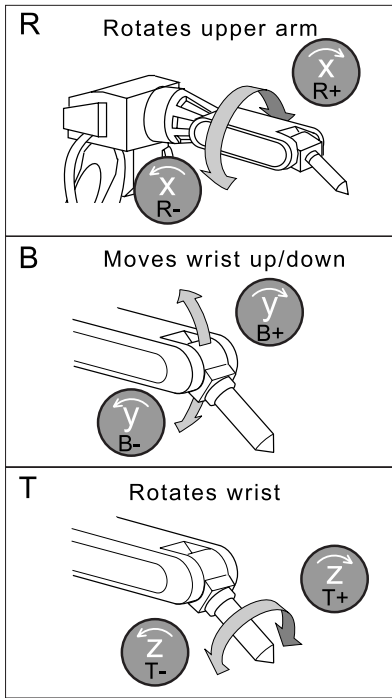
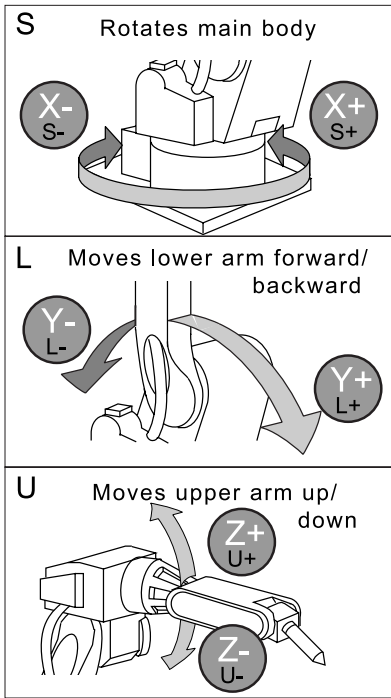
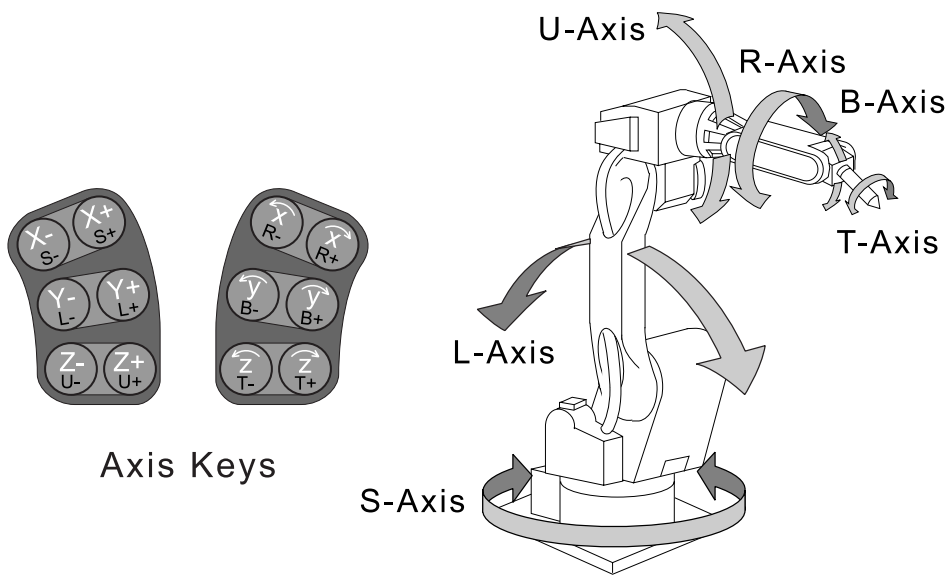
- Always return the programming pendant to its specified position after use.

The programming pendant can be damaged if it is left in the manipulator work area or on the floor.

# 6.1 Movement of the Axes

Move each axis of the manipulator by pressing the axis keys on the programming pendant. This figure illustrates each axis of motion in the joint coordinate system.

**NOTE** Be sure to remove all items from the area before moving the manipulator. Refer to the Instruction Manual for the appropriate position of the fixture.





---

## 7 Home Position Confirmation

---



### WARNING

- Press each emergency stop button on the playback panel and the programming pendant before operating the manipulator. Be sure the servo on lamp is turned off.

There is a danger of injury and equipment damage if the manipulator cannot be stopped in the event of an emergency.

- Set the teach lock before starting to teach.

There is a danger of injury when unauthorized personnel operate the playback panel during operation.

- Strictly observe the following when teaching in the working envelope:

- View the manipulator from the front at all times.
- Follow the predetermined operating procedure.
- Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.
- Ensure that you have a safe place to retreat in the event of an emergency.

Improper or unintentional manipulator operation can result in injury.

- Prior to performing the following operations, be sure that there is no one within the working envelope of the manipulator, and be sure that you are in a safe area from which to operate:

- When turning on the power supply to the XRC
- When moving the manipulator using the programming pendant
- When doing a check operation
- When performing automatic operation

Injury may result from contact with the manipulator if anyone carelessly enters the working envelope of the manipulator.

Push the emergency stop button at once if any problems occur.

The emergency stop button is located on the upper right of the playback panel of the XRC and on the right side of the programming pendant.



## CAUTION

- Perform the following inspection procedures before starting to teach. If problems are found, repair them immediately and be sure all necessary processing has been performed:

- Check for problems in manipulator movement.
- Check for damage to insulation and sheathing of external wires.

- Return the programming pendant to its specified position after use.

If the programming pendant is left carelessly on the floor, manipulator, or positioner etc. the manipulator or a tool could collide with it during manipulator movement, possibly causing injury and equipment damage.



## 7.1 Home Position Confirmation

It is necessary to register the home position (each axis has a position of 0 pulse) correctly so that the manipulator will work accurately.

The home position for the UP6 is shown.



Other manipulator models have different positions. Always consult the documentation for the correct manipulator model.

### 7.1.1 Operating Procedure

#### Operation

Select {ROBOT} ➔ Select {CURRENT POSITION}<sup>\*1</sup>

#### Explanation

<sup>\*1</sup> The position display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>CUR POS</b>		<b>RI</b>	
COORDINATE: PULSE		TOOL:00	
R1:S	-18402		
L	45714		
U	-28450		
R	-287		
B	8090		
T	-461		

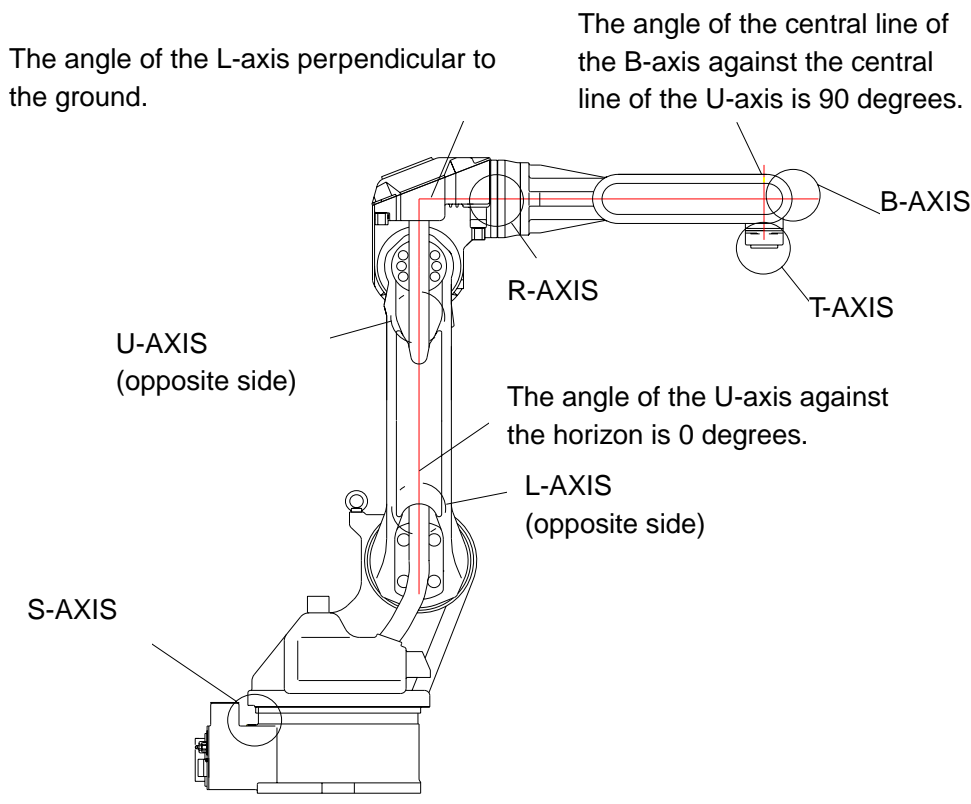
#### Operation

Press the AXIS KEY ➔ Press {E. STOP}<sup>\*2</sup>

#### Explanation

<sup>\*1</sup> Move each manipulator axis using the programming pendant axis key. Adjust each axis to the position of 0 pulse. Make sure the manipulator servo power supply is off and that the axis home position calibration is accurate.

DATA	EDIT	DISPLAY	UTILITY
CUR POS		R1	
COORDINATE: PULSE		TOOL:00	
R1:S	0		
L	0		
U	0		
R	0		
B	0		
T	0		



Home positions for the UP6

Confirm whether the home position calibration mark (of each axis of the manipulator) are accurately matched with each other.  
 The home position is correctly registered if home position mark for each axis is matched accurately.

**NOTE** Contact Customer Service if you encounter any problems performing home position calibration.

---

## 8 Final Notes

Refer to the manuals listed below for additional information in work involving robot operations such as teaching and playback.

- Operator's Manual For Beginners  
Operating procedures are clarified for beginning users.  
The operations are explained carefully in order.
- Operator's Manual  
Composed of several sections, each corresponding to operation of the system.  
Work involving setting and diagnosis of the controller, alarm explanations, setting of the home position, etc.
- MOTOMAN-\*\*\*\*\* Instruction manual  
Covers manipulator topics
- INFORM Manual  
Covers the INFORM robot programming language
- Concurrent I/O and Parameter Manual  
Covers concurrent I/O and parameters



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# MOTOMAN SETUP MANUAL

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YASKAWA ELECTRIC CORPORATION

YASKAWA

Specifications are subject to change without notice  
for ongoing product modifications and improvements.

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© Printed in Japan August 1999 98-12

# MOTOMAN-PX2850/-PX2750 INSTRUCTIONS

**YR-PX2850-B10**

**YR-PX2850-B20**

**YR-PX2750-B30**

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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.



YASKAWA

MANUAL NO. HW0480633





## MANDATORY

- **This manual describes the specifications, precautions for operation and required items for maintenance or inspections, for proper application of the MOTOMAN-PX2850/-PX2750. Read this manual carefully and be sure to understand its contents before handling the MOTOMAN.**
- **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.**
- **Refer to XRC Operator's Manual for the operation methods.**



## 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 MOTOMAN.

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".

## 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

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# 1 Safety Precautions

1. Respect the law, local regulations, and safety codes for connecting the painting robot.
2. Specify the working regulations and the person in charge for the following operations:
  - a) Turning the power to the robot ON/OFF, and RUN/STOP operations To avoid any faulty operation, take measures such as putting up a notice to remind operators of procedures and precautions explained in the instruction manual.
  - b) Warning sign or signal to inform operator of the the robot operation status Starting an operation while someone is in the manipulator's working envelope or while someone is doing maintenance checks or repairs may cause a serious accident. When on standby, the manipulator can be moved by an external signal.  
To avoid these accidents caused by a lack of information, put up a board or indicator lamp to show the robot operation status.
  - c) Action to be taken in case of a failure or an accident  
Appoint a person to be contacted and the action to be taken in case of a failure or an accident.
  - d) Safety standards and the supervisor for safe operation  
Appoint a supervisor for the safe operation of the manipulator and establish the working regulations.
  - e) Appoint a person to be in charge of teaching, maintenance and inspections and provide training or lectures on safety and the actions to be taken in case of an emergency.



## WARNING

Install the MOTOMAN-PX2850/-PX2750 in a location that meets the requirements of Area Classification 'Division I' prescribed in FM Approval Standard.



## WARNING

- **Take the following measures when teaching, correcting, inspecting, or adjusting the manipulator when the motor power supply is ON:**

- (a) Appoint a personnel to stay beside the emergency stop button of the XRC. And perform the operations holding the programming pendant with the emergency stop button.
- (b) Before the operation, verify the correct robot motion and that the emergency stop works.

- **Observe the following precautions during an automatic operation:**

- (c) Do not enter inside the safeguards during operation.
- (d) Confirm the following before starting the operation:
  - No person is inside the manipulator working envelope
  - No obstacles such as unnecessary workpieces and tools are inside the manipulator working envelope
  - The manipulator is in its standby position
- (e) When any abnormality occurs, immediately press the emergency stop button to stop the manipulator.
- (f) Before entering inside the manipulator working envelope, be sure to stop the manipulator and turn OFF the main power supply to the XRC.

- **Brake release (Option)**

A braking system is provided on each axis of the manipulator to hold the arm in its position when a failure or fault occurs. When the brake is activated, the manipulator cannot be moved manually even if the power is OFF. To change the posture of the manipulator after a failure or fault, the brake can be released by the operation from the controller. When the brake is released with the manipulator's power OFF, each axis falls down because of the arm weight. While two or more people are holding the arm in position before releasing the brake, change the posture of the manipulator within the minimum motion range.

Use the brake release function only when absolutely necessary.



## PROHIBITED

Any modification of the MOTOMAN-PX2850, and the following is strictly prohibited:

1. Explosion-proof devices and system installation
2. Safeguards and the safety devices mounted on these safeguards
3. Emergency stop button, and other safety devices
4. Robot control system such as the XRC robot controller, the manipulator drive section and the power transmission section

## 2 Features

The MOTOMAN-PX2850/-PX2750 are designed for easy-handling and to consider safety first in operation.

### 2.1 Methods of Protection

The MOTOMAN-PX2850/-PX2750 are evaluated as Type X Purged for use in ClassI, Division 1, Groups A, B, C and D indoor hazardous (classified), and appear in the Factory Mutual (FM) Research Approval Guide. They have the construction of protection as follows:

**Method of Protection;**

- **The pressurized explosion-proof method** prevents explosive gas from entering the manipulator by supplying a protective gas, such as clean air or an inert gas, to keep the internal air pressure constant.
- **The Intrinsic-safety explosion-proof method** prevents explosive gas from igniting by electric spark and heat.



#### WARNING

Install the MOTOMAN-PX2850/PX2750 in a location that meets the requirements of Area Classification 'Division 1' prescribed in FM Approval Standard.

### 2.2 Teaching

The target positions, the motion speed, and the ON/OFF timing of the spray can be taught with the programming pendant while moving the manipulator, which shortens the time required for teaching. And, the data can be corrected at any time.

Because the teaching function and the correction function are integrated, the operations such as forward/reverse run, position modification, addition/deletion of points can be performed during teaching. And the management function, which manages the parameter settings, enables you to monitor the actual status during teaching. The on-screen guidance and the interactive system on the pull-down menus lead the operator through the operation procedures.

- (1) Large-capacity backup as a standard feature

The large-capacity drive for PC cards is provided as a standard feature of backup unit and enables data to be transmitted easily.



## CAUTION

Be sure to save the backup data for the controller, such as the data for jobs and constants, on a PC card. If not, the necessary data for the manipulator may be lost if an internal memory fault occurs in the controller.

- (2) High reliability
  - a) The built-in microcomputer continuously checks the I/O data and the manipulator motion to ensure high-reliability.
  - b) Can detect power supply faults and software faults with its self-diagnosis functions.
- (3) When an error such as an operation error or a controller fault occurs, the alarm code and message are displayed, and the date and time of the error occurrence with its explanation are stored in the alarm history to help you take a quick, corrective action.



## 3 Installation

### 3.1 Requirements

Prepare the power supply, the air supply, and the grounding according to the following specifications.

Table. 1 Specifications

No.	Item	Specifications	Remarks
1	Power supply	3-phase 200/220 VAC ( $\pm 10\%$ ) 50/60 Hz ( $\pm 2$ Hz) 5 kVA (at peak)	
2	Air supply Spray ON/OFF Gun-tilt switching Pressurized explosion-proof enclosure	Required pressure: 0.35 MPa to 0.65 MPa (3.5 kgf/cm <sup>2</sup> to 6.5 kgf/cm <sup>2</sup> ) Capacity: For turning the spray ON/OFF: 30NI/min For switching the tilt of the gun: 30 NI/min For the pressurized explosion-proof 30 NI/min usually 250 NI/min when purging Dryness: Freezing at -18 °C	Prepare the liquified air for the spray gun separately. Use dry air for the pressurized explosion-proof enclosure.
3	Grounding	Grounding resistance: 100 ohm or less (Non I.S. GND) 10 ohm or less (I.S. GND)	For the robot controller



### CAUTION

Use dry air for the pressurized explosion-proof enclosure. Moisture in the air supply may damage the electronic parts.

## 3.2 Installation Site

This section describes the conditions of the installation site for the robot system. Only devices that are approved as explosion-proof can be installed in hazardous locations. Refer to the local regulations and safety codes for the definition of a hazardous location. Install the controller and control panels in a location free from water drops, dust, and dirt.

Table. 2 Installation Site

System Components	Hazardous Location (Inside Painting Booth)	Non-hazardous Location (Outside Painting Booth)	Ambient Temperature	Maximum Ambient Humidity
Manipulator (explosion-proof)	○	-	0 to 45 °C	80 %RH
Controller (not explosion-proof)	×	○	0 to 45 °C	90 %RH
Pneumatic unit (not explosion-proof)	×	○	0 to 45 °C	85 %RH
Programming pendant (not explosion-proof)	×	○	0 to 40 °C	85 %RH
Programming pendant (explosion-proof) (Option)	○	○	0 to 40 °C	85 %RH
Conveyer speed detector (not explosion-proof)	×	○	0 to 50 °C	90 %RH
Conveyer speed detector (explosion-proof)	○	-	0 to 50 °C	90 %RH
Conveyer switch (explosion-proof)	○	-	0 to 50 °C	90 %RH
Workpiece supplier (explosion-proof)	○	○	0 to 50 °C	85 %RH
Control panel for workpiece supplier (not explosion-proof)	×	○	0 to 45 °C	90 %RH
Safety devices Box for emergency stop switches Safety plugs Limit switches Flashing light Indicator lamps Photoelectric switches	Selected according to the requirements of the customer. Refer to the appropriate instruction manual provided separately.  × : Not acceptable ○ : Acceptable			



## WARNING

Devices that are not explosion-proof must not be installed in hazardous locations. Failure to observe this warning may result in a fire.

## 4 Handling and Installation

Read “MOTOMAN Setup Manual” thoroughly before handling and installing the MOTOMAN system, and then carry out the operation safely observing the following precautions.

- 1) Signs indicating prohibitions such as, “The lighting of fires is prohibited”
- 2) Clean working place that is clearly defined and free of obstacles
- 3) Appointment of personnel in charge
- 4) Company working regulations for safe operation

### 4.1 Preparation

Before installing the MOTOMAN, do the following:

- 1) Confirm the installation layout and the dimensions of each device to ensure the transportation route and the installation space.
- 2) Check if the transportation route can support the weight of each device. If necessary, reinforce the route.
- 3) To lift the manipulator, use the appropriate machinery such as a forklift.

### 4.2 Receiving and Handling

- 1) When the package arrives, check the contents.  
Are the items and quantities in accordance with your order sheet ?  
Was any damage incurred during shipment ?
- 2) Use a forklift, a pallet truck to carry the manipulator. Take measures to prevent the manipulator from falling down.
- 3) Some devices such as the controller are mounted on casters, so be careful when handling them.



#### CAUTION

- **Confirm that the manipulator and the XRC have the same order number. Special care must be taken when more than one manipulator is to be installed.**

If the numbers do not match, manipulators may not perform as expected and cause injury or damage.

## 4.3 Installation of MOTOMAN



### WARNING

- **Install safeguards.**

Failure to observe this warning may result in injury or damage.

- **Install the manipulator in a location where the fully extended arm and tool will not reach the wall, safeguards, and the XRC.**

Failure to observe this warning may result in injury or damage.

- **Do not turn ON the power before the manipulator is firmly anchored.**

The manipulator may turn over, and cause injury or damage.

- **Lifting the manipulator**

The manipulator must be lifted only by qualified and authorized personnel. The manipulator weighs approximately 570 kg . Use a wire, belt, or chain block strong enough to support the weight.

Carefully check the length and the tension of the wire and belt to maintain the equilibrium of the manipulator while lifting.

<Lifting method>

Attach the eyebolts in two locations on the turning section of the S-axis and in one location on the top of the U-arm of the manipulator. Slowly lift the manipulator to form the posture shown in " Fig. 1 Lifting ". using wire or a belt threaded through the eyebolts. Use the eyebolt on the top of the U-arm for adjusting the posture of the manipulator and the two eyebolts on the S-axis for lifting.

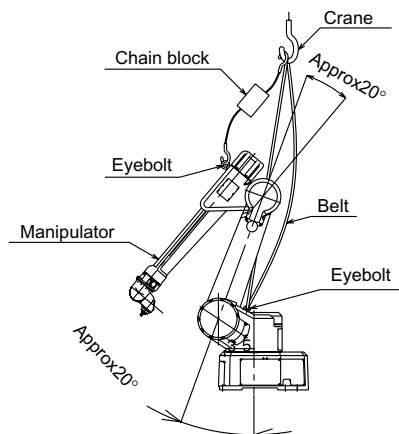


Fig. 1 Lifting

When the manipulator is lifted to the desired height, adjust the posture of the manipulator by adjusting the length of the chain block and then install the manipulator.



## CAUTION

- **Do not install or operate a manipulator that is damaged or lacking parts.**

Failure to observe this caution may result in injury or damage.

- **Do not install the painting gun and the gun brackets until the manipulator is firmly anchored. Any contact to the unstable manipulator may cause injury or damage.**
- **Be sure to remove the shipping jigs before turning ON the power supply.**

Failure to observe this caution may result in damage to the driving parts.

### 4.3.1 Safeguard Installation

To ensure safe, be sure to install safeguards. They prevent unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance (ISO 10218).

#### Responsibility for Safeguarding

The user of a manipulator or robot system shall ensure that safeguards are provided and used in accordance with Section 6, 7, and 8 of this standard. The means and degree of safeguarding, including any redundancies, shall correspond directly to the type and level of hazard presented by the robot system consistent with the robot application. Safeguarding may include but not be limited to safeguarding devices, barriers, interlock barriers, perimeter guarding, awareness barriers, and awareness signals.

### 4.3.2 Installation of Manipulator

The manipulator should be firmly mounted on a base or foundation strong enough to support the manipulator and jigs, and withstand repulsion forces during acceleration and deceleration. During installation, if the flatness is not right, the manipulator shape may change and its functional ability may be compromised. The flatness for installation must be kept at 0.5 mm or less. Mount the manipulator base in either of the following ways: " 4.3.3 When the Manipulator and Mounting Fixture are Installed on a Common Base " and " 4.3.4 When the Manipulator is Mounted Directly on the Floor ".

Table. 3 Maximum Repulsion Forces of the the PX2850/PX2750

Horizontal rotating maximum torque (S-axis moving direction)	16000N • m (1600kgf• m)
Vertical rotating maximum torque (L- and U-axis moving direction)	41700N • m (4170kgf• m)

### 4.3.3 When the Manipulator and Mounting Fixture are Installed on a Common Base

The common installation base should be rugged and durable to prevent shifting of the manipulator or the mounting fixture. It is recommended that the thickness of the common installation base is 40 mm or more, the anchor bolt is M16 or more.

There are four mounting holes in the manipulator base. Affix the manipulator securely with hexagon socket head bolts M16 (70 mm long recommended). Tighten the bolts securely so that they will not work loose during operation. See " Fig. 2 Mounting on the Common Installation Base "for the method. The flatness for the manipulator installation face must be 0.5 mm or less.

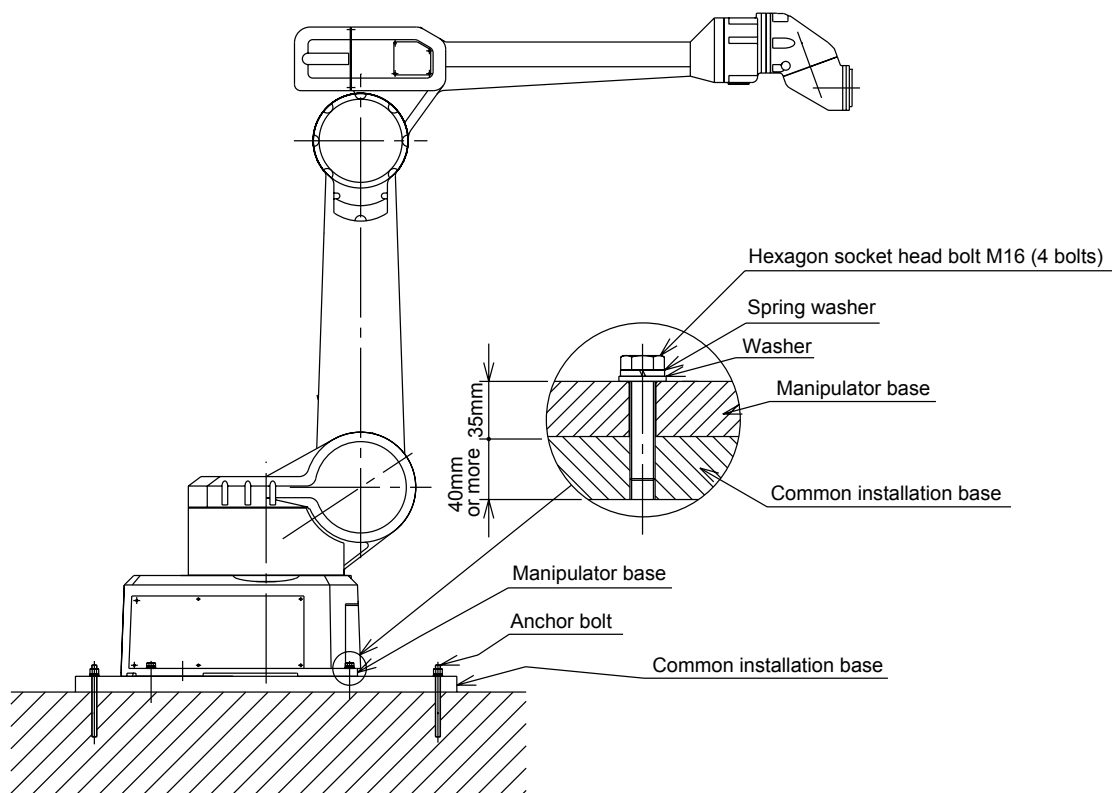


Fig. 2 Mounting on the Common Installation Base

### 4.3.4 When the Manipulator is Mounted Directly on the Floor

The floor should be strong enough to support the manipulator. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the manipulator. As a rough standard, when there is a concrete thickness (floor) of 150 mm or more, the manipulator base can be fixed directly on the floor with M16 anchor bolts. Make the floor surface even and repair all the cracks. A non-concrete floor or a concrete floor less than 150 mm thick is insufficient to install the manipulator directly.

## 4.3 Installation of MOTOMAN

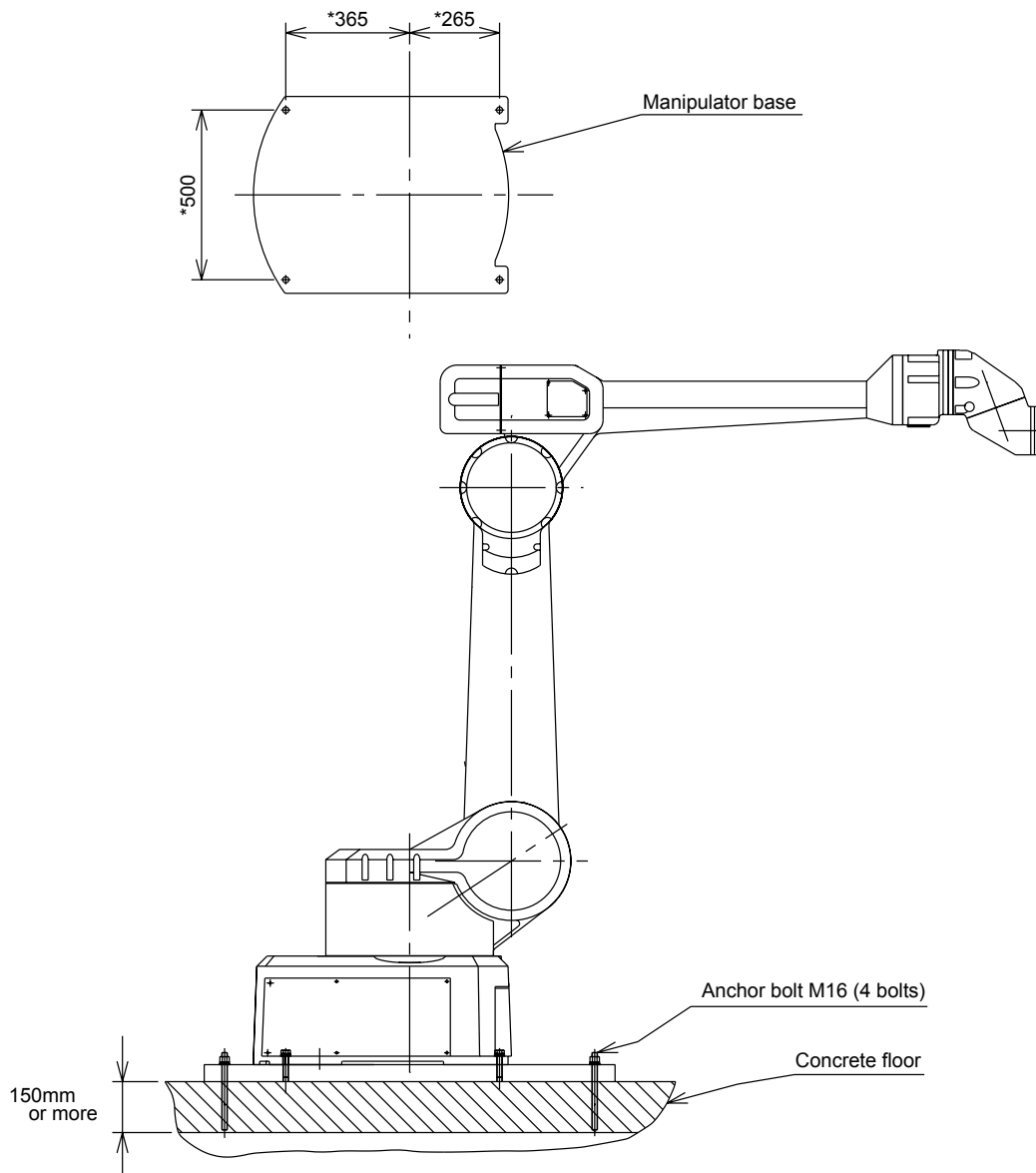


Fig. 3 Direct Mounting on the Floor

### 4.3.5 Location

Install the manipulator in a location that has the following environmental conditions:

- Ambient operating temperature: 0 to +45 °C
- 20 to 80 %RH (no moisture, non-condensation)
- Free from dust, dirt, oil mist, and water drop
- Free from excessive impact or vibration (less than  $4.9 \text{ m/s}^2$  (0.5 G))
- Free from large electrical noise (TIG welder, etc.)
- The flatness for installation is 0.5 mm or less.



### 4.3.6 Controller and Programming Pendant

- The controller and the programming pendant are not explosion-proof ( the explosion-proof programming pendant is available as an option). Never install the controller and the programming pendant that are not explosion-proof in a hazardous location.
- Keep a minimum space of 60 cm around the controller for maintenance. When the sufficient space is not available, provide equipment for maintenance such as a drawing-out system.
- An exhaust fan is provided on the back of the controller. Keep enough space behind the controller so that air can be exhausted properly.
- Do not install the controller and programming pendant close to any noise source such as the power supply for other devices.
- Install the controller in a location where the optimum atmosphere, temperature, and humidity are assured and provide protection against water drops or thinner. If necessary, install a control room to supply clean and temperature-controlled air.

### 4.3.7 Safety Devices

The standard safety devices are listed below. Refer to the instructions for connecting safety devices required for your system application.

Install each device considering each function.

- Emergency stop switches
- Safety plugs
- Limit switches
- Flashing lights
- Indicator lamps
- Photoelectric intrusion detecting switches

## 5 Connection

### 5.1 Wiring



#### WARNING

- **Ground resistance must be 100  $\Omega$  or less. (Non I.S. GND)  
10  $\Omega$  or less. (I.S. GND)**

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

- Before wiring, make sure to turn the primary power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)

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



#### CAUTION

- **Wiring must be performed by authorized or certified personnel.**

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

- **Do not cover the power cable between the manipulator and the XRC with a highly adiabatic material, and separate the cable from the other cables.**

The heat radiating from the cable will be trapped, and the accumulated heat may cause burns and injury.

#### 5.1.1 Grounding

Follow the local regulations for ground line size. A line of 5.5 mm<sup>2</sup> or more is recommended.



- Do not use this line in common with other ground lines or grounding electrodes for other electric power, motor power, welding devices, etc.
- When metal ducts, metallic conduits, or distributing racks are used for cable laying, ground in accordance with Electric Equipment Technical Standards.

The grounding methods differ depending on the system application. Refer to the connection instructions that are provided separately.

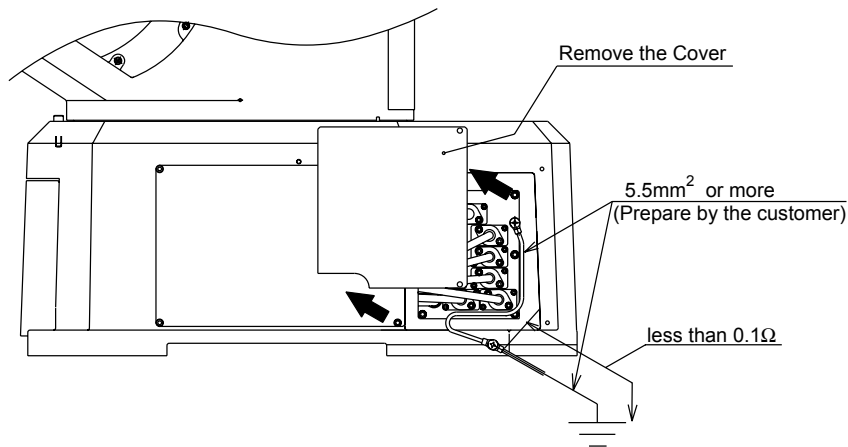


Fig. 4 Grounding Method

## 5.2 Cable Connection

### 5.2.1 Connection to the Manipulator

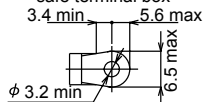
Before connecting the cables to the manipulator, verify the connectors named 1BC-1, -2, -3, -4, -5, -6, -7 and 2BC-1, -2, -3, -4, -5, -6 on both cables and manipulator. Then connect each connector of cables to same-named connector of Manipulator. Fix the plate of cables 6 bolts M6 (4 bolts 12mm long and 2 bolts 20mm long recommended) with spring washers and washers. The air hose for the pressure switch, the intrinsically safe cable, and the crimped terminals should be prepared by the customer.

Notes.

- 1) Intrinsically Safe Cable
  1. Cable Type: CVV-SB (or CW-S), 1.25mm 2Core
  2. Cable Connection

Intrinsically Safe terminal box		Controller (XRC)
307	↔	P1
308	↔	N1
309	↔	P2
310	↔	N2

- 2) Crimped Terminals  
For connecting the intrinsically safe cable to the intrinsically safe terminal box



- 3) Crimped Terminals  
For connecting the intrinsically safe cable to the controller internal contact barrier

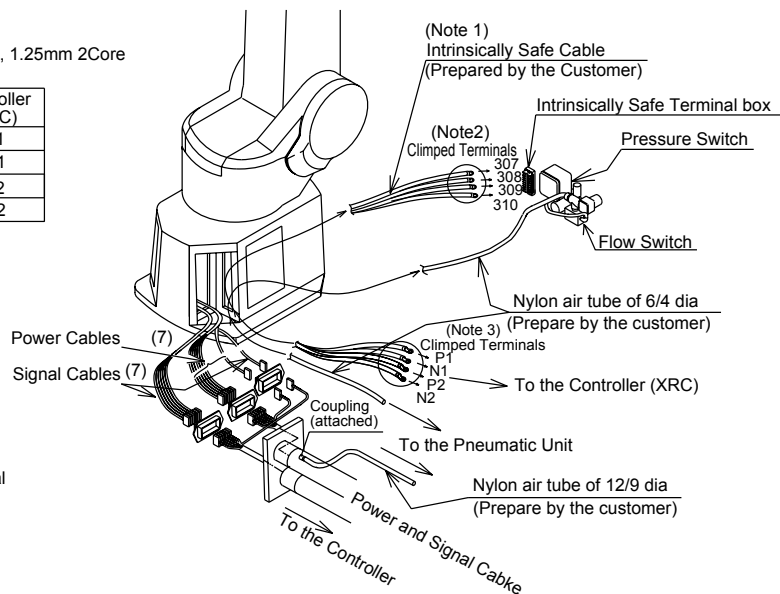
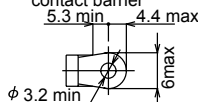


Fig. 5 Manipulator Internal Cable Connection

## 5.2 Cable Connection

## 5.2.2 Connection to the XRC

Remove the cover on the XRC side. Pass the signal cable for detection (1BC) and power cable (2BC) through the opening for the cables, and then fasten bolts on the opening. Connect the 1BC cable to the boards. Be sure to verify the numbers on both cables and board connectors before connecting, and to fasten the bolts on connectors to prevent cables from loosening. Connect the 2BC cable to the terminals inside the XRC. Be sure to verify the numbers on both the cable and board connectors before connecting.

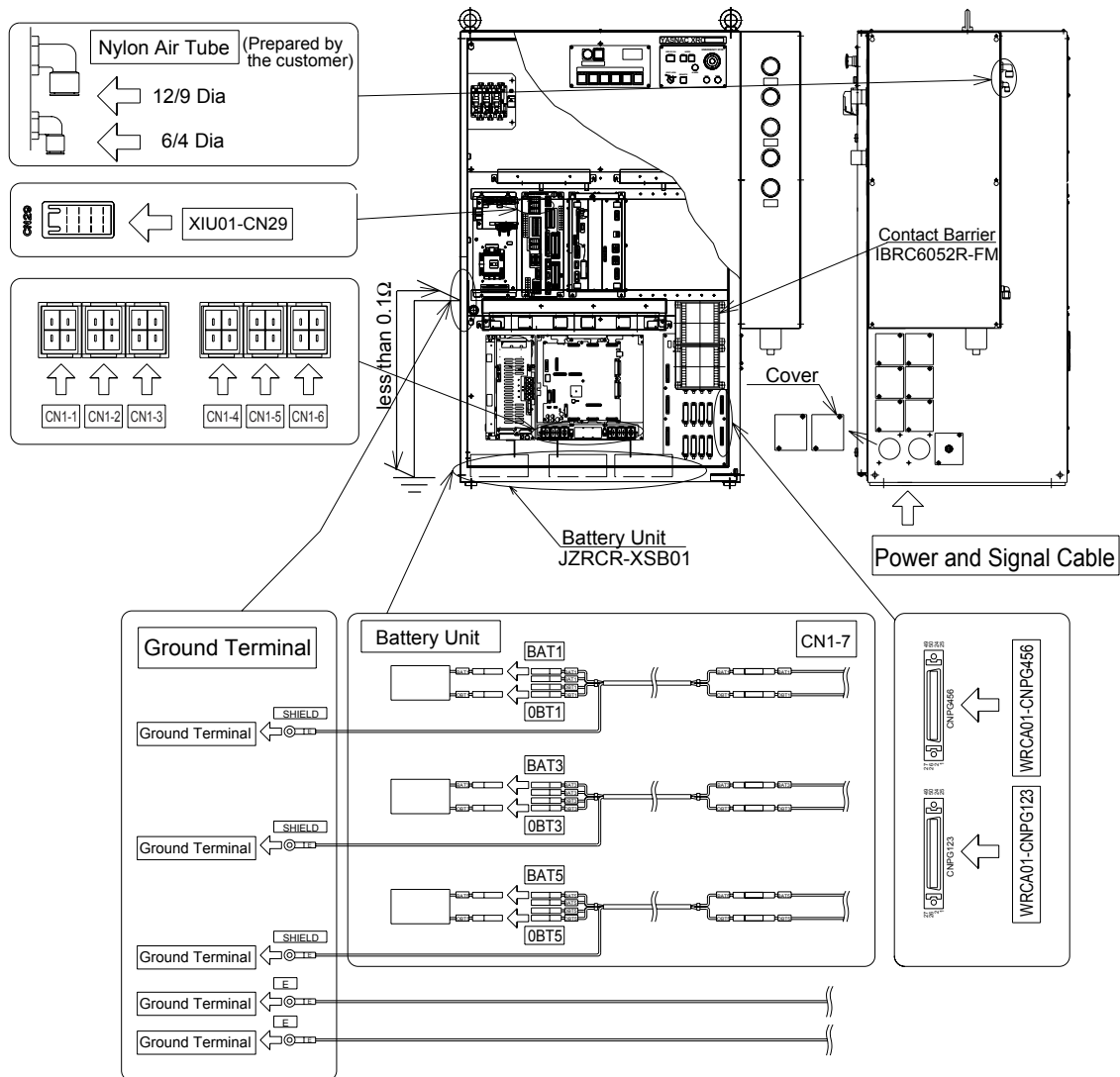


Fig. 6 Connection to the XRC

### 5.2.3 Power Cable Construction Method Example

The construction example is shown as follows.

#### ■ Metal Pipe Construction

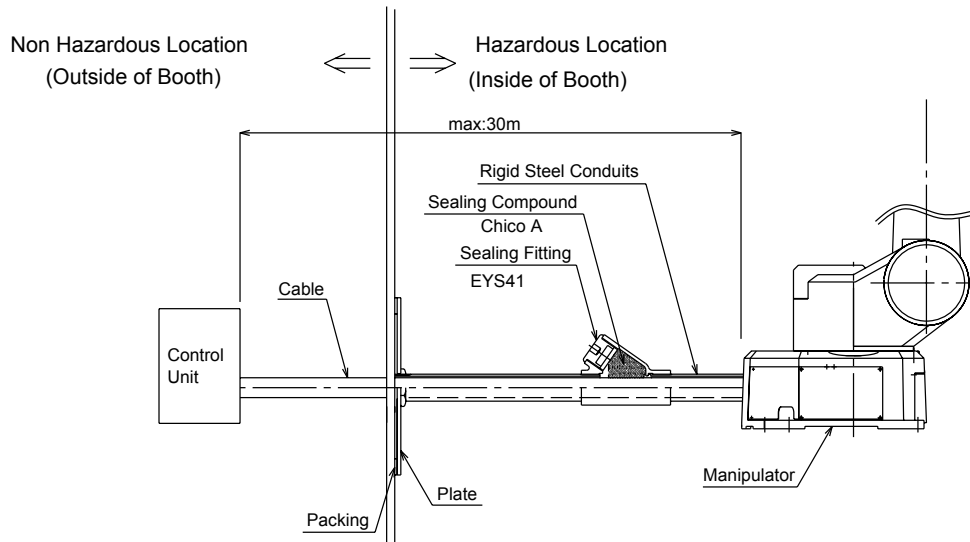


Fig. 7 Metal Pipe Construction example

#### NOTE

- Construct the signal cable and the peripheral device coupling cable as mentioned above.
- The metal pipe must have enough strength.
- For the explosion-proof approved parts, use neither sealing fitting nor sealing compound other than the above-mentioned model. (Manufacturer: Cooper Industrial Inc, or equivalent)

### 5.3 Internal Wiring

#### 5.2.4 The Cables & Air-tubing Connection(procedure)

Cables and tubes necessary for construction are tables below.

The customer needs to prepare the power supply cable, the grounding cable, the cables for the optional equipment, and the air tube.

Use.	Connection to.	Type.
Power source cable.	Power source to/ from Controller.	CVV-3.5SQ-4C
Intrinsically-safe signal line Cable.	Manipulator to/ from Controller.	CVV-1.25SQ-2Cx2
Cable for the Conveyor-speed detection device.	To/from Controller.	CVV-SB-1.25SQ-3C
Cable for optional equipment.	To/from Controller.	CVV-SB-1.25SQ
Air tube for pressurized explosion-proofness.	Manipulator to/ from pneumatics unit	φ12/9, φ6/4 nylon tube(each lline)
Air tube for air supply	Air supply source to/ from pneumatics unit	φ12/9 nylon tube

### 5.3 Internal Wiring

Figs.8(a),(b) and (c) show the internal wiring.

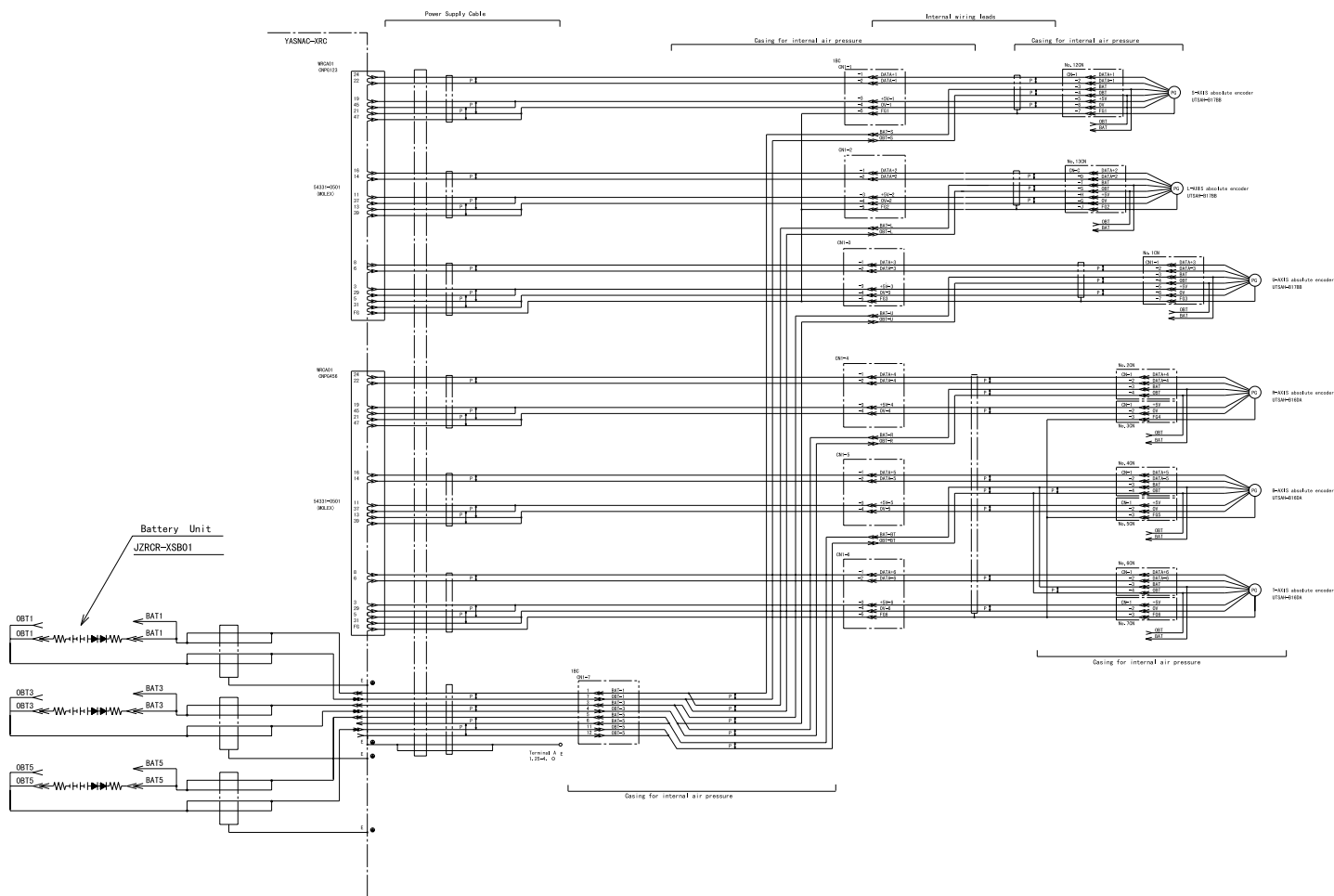


Fig. 8(a) Internal Cable Connection

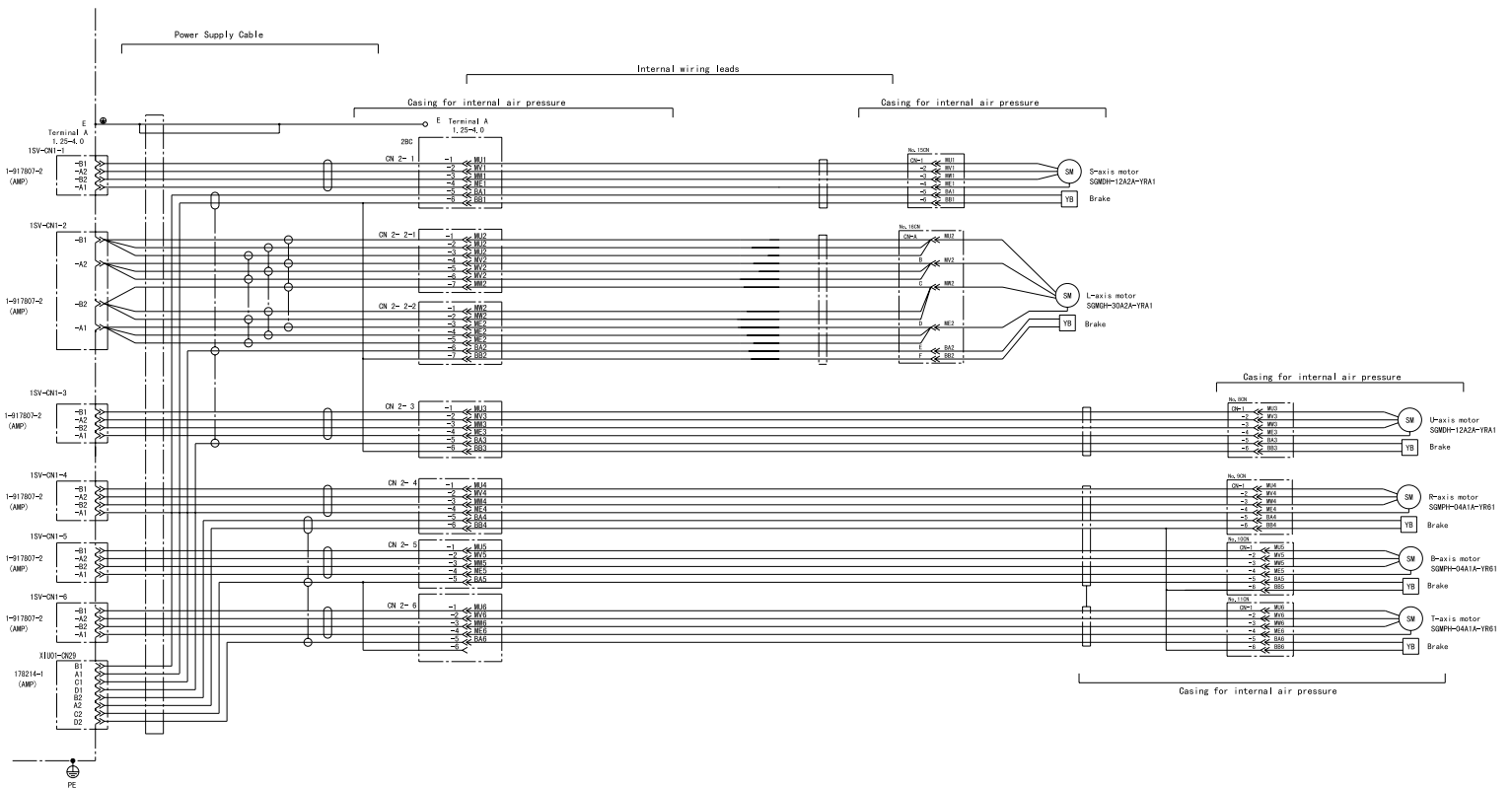


Fig. 8(b) Internal Cable Connection



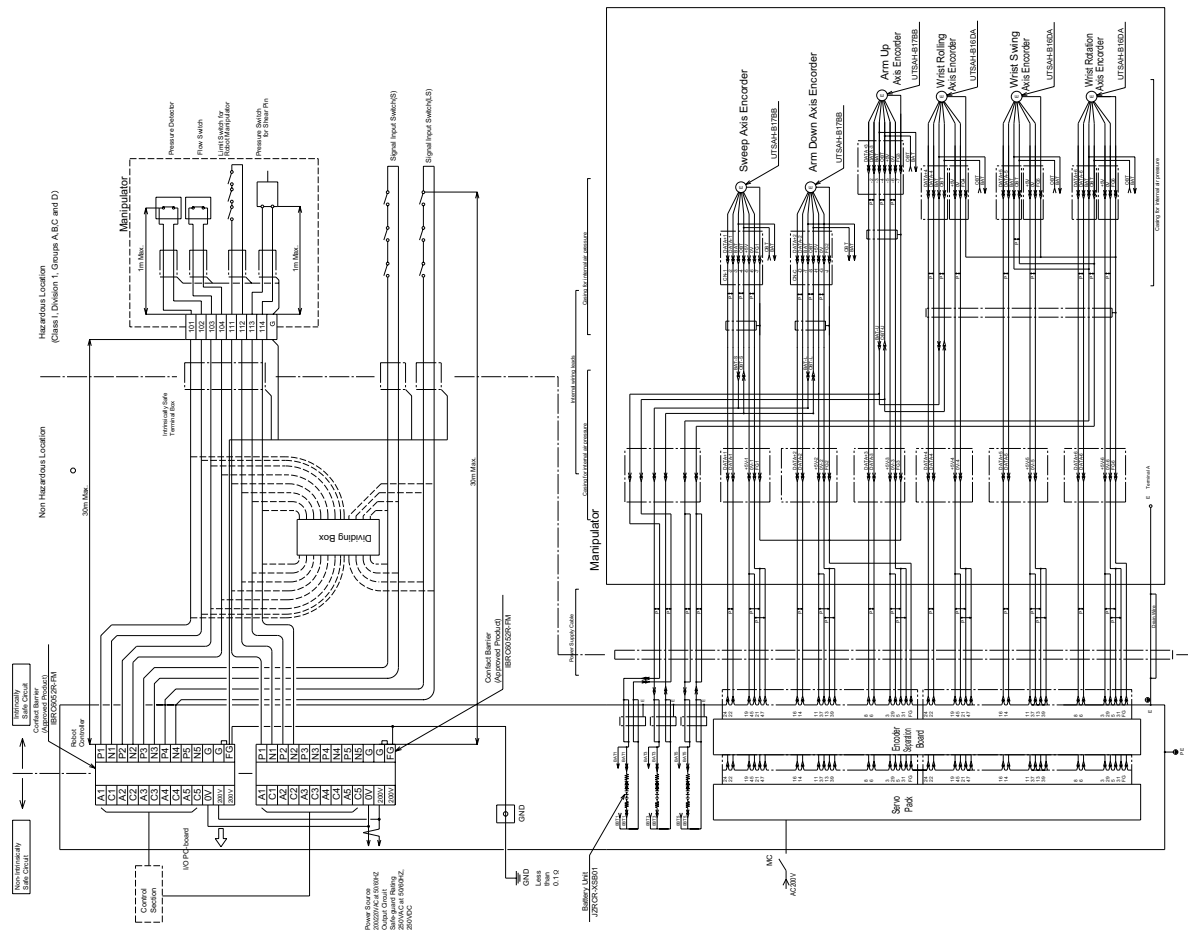


Fig.8(c) Intrinsically Safe Circuit Diagram

## 6 System Configuration

" Fig. 9 System Configuration "shows the system configuration of the the MOTOMAN-PX2850/PX2750.

### 6.1 Manipulator

The explosion-proof manipulator can be installed in hazardous locations such as in the painting booth. For painting, a spray gun is mounted on the end of the wrist with special fixtures. " Fig. 10 Dimensions and Working Envelopes " shows the dimensions and the working envelopes of the PX2850/PX2750. The manipulator is driven by the servo motor in vertically articulated operation mode with 6 degrees of freedom on the manipulator base. The motion of the manipulator is made by 6 axes:

The three main axes are used for positioning the spray gun: the S-axis which turns the arm, the L-axis which moves the arm left and right, and the U-axis which moves the arm up and down.

The three wrist axes are used for changing the direction of the spray gun: the R-, B-, and T-axes.

The working envelope shown in " Fig. 10 Dimensions and Working Envelopes " is that of the wrist axis center point P that is made by the combination of the motions of the three main axes.



### WARNING

When taking safety precautions, consider the working envelope of the manipulator shown in " Fig. 10 Dimensions and Working Envelopes ".

## 6.1 Manipulator

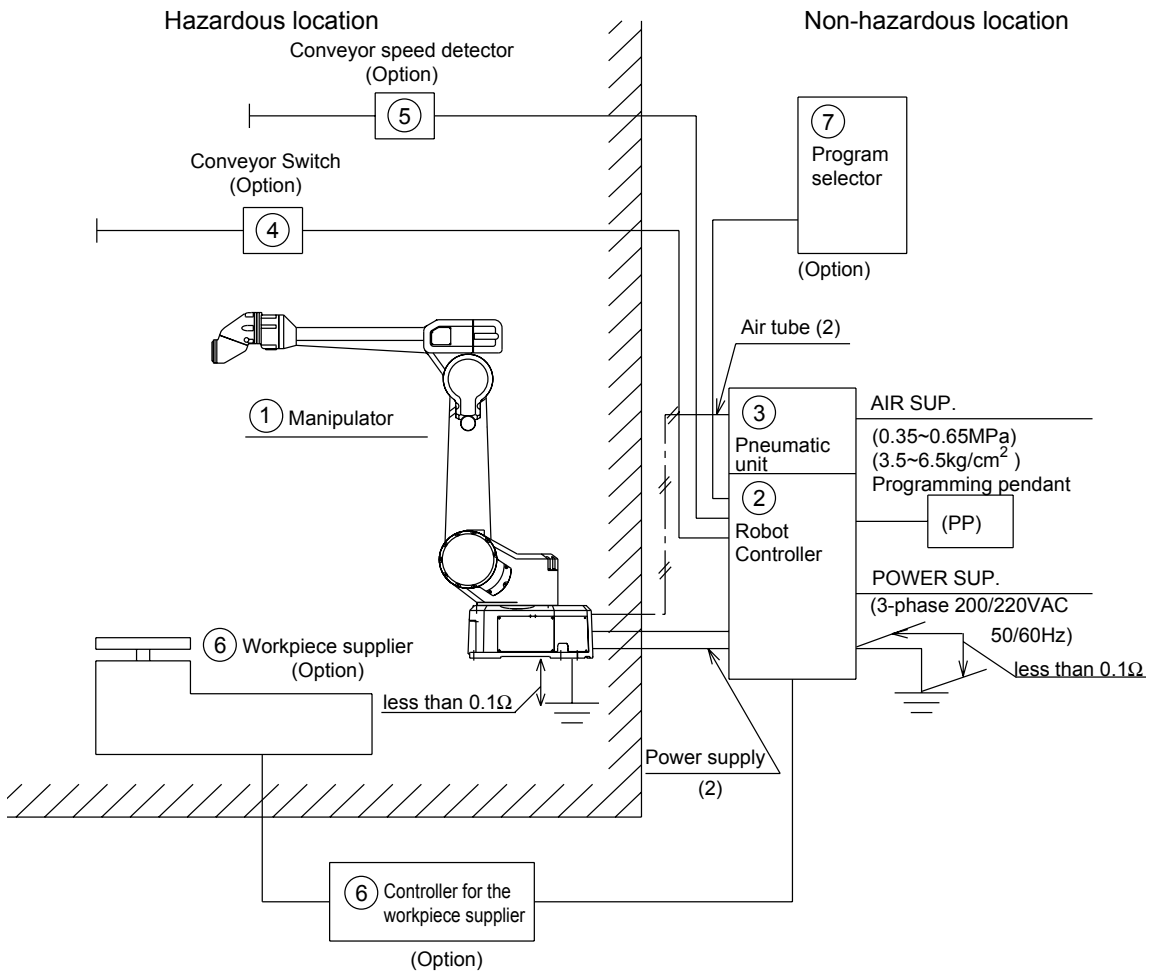
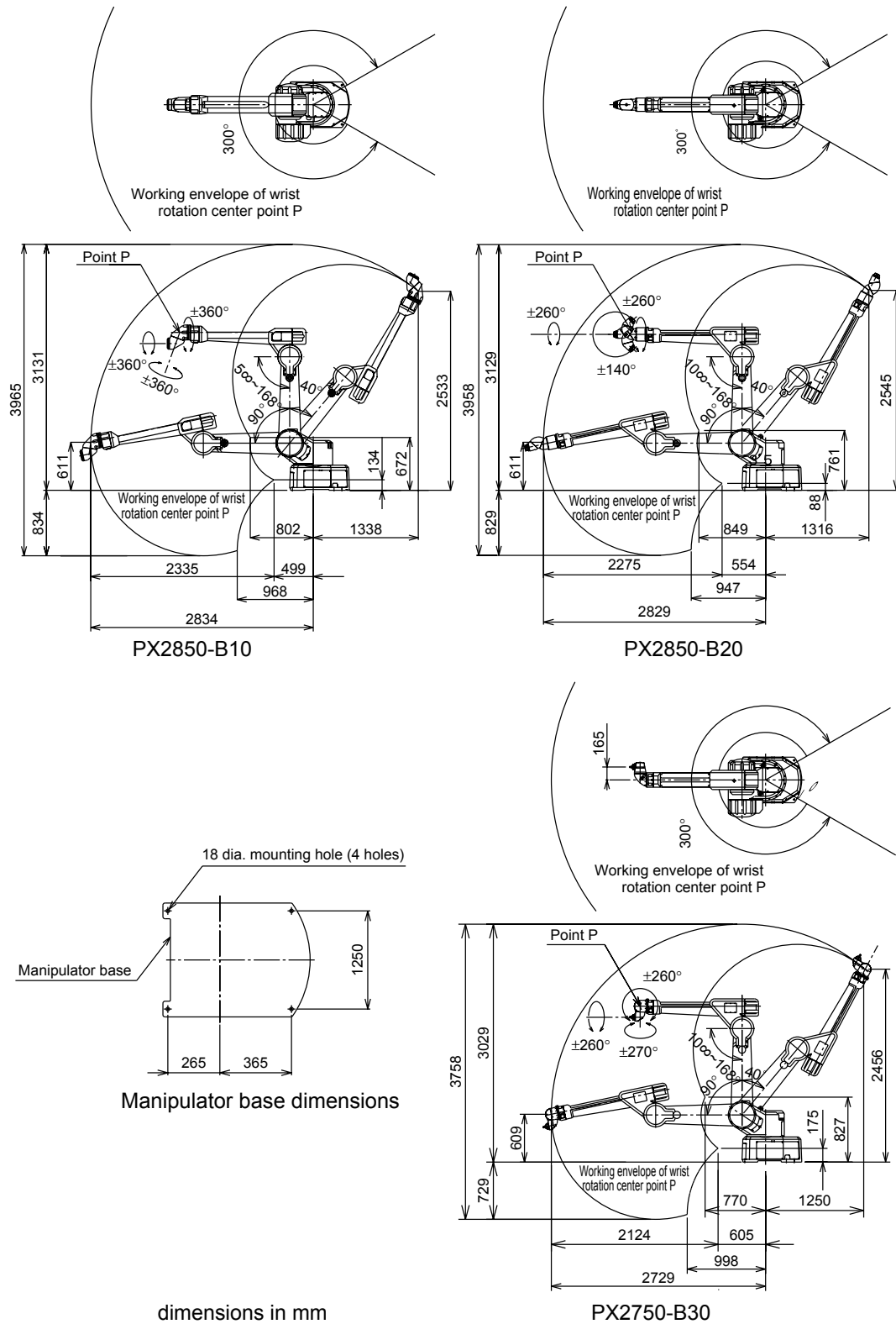


Fig. 9 System Configuration



dimensions in mm

Fig. 10 Dimensions and Working Envelopes

## 6.2 Robot Controller

The robot controller has a built-in microcomputer that controls all motion of the robot by saving motion signals when teaching and sending these signals to the manipulator. The power unit that supplies power to the manipulator is also built into the robot controller.



### WARNING

The power supply of the robot controller is 200/220 VAC. Be sure to turn OFF the primary power supply of the controller before starting maintenance. Failure to observe this warning may result in electric shock.

## 6.3 Pneumatic Unit

The pneumatic unit supplies protective air or gas to the manipulator to prevent explosive gas from entering the manipulator. Usually, the unit is attached to the side of the robot controller. The circuit diagram and dimensions of the unit are shown in " Fig. 11 Pneumatic Unit Air Circuit " and " Fig. 12 Pneumatic Unit External View ". Set the air pressure so that the pressure shown on the pressure gauge of each pressure reducing valve will be within the pressure ranges shown in " Fig. 11 Pneumatic Unit Air Circuit ".



### CAUTION

The pneumatic unit is used to provide a pressurized explosion-proof barrier for the manipulator. Because the barrier is only ensured when the air supply is within the recommended pressure range, a lower air pressure will reduce the barrier's efficiency, and a higher air pressure will damage the pneumatic unit. Be sure to keep the air pressure within the specified range.

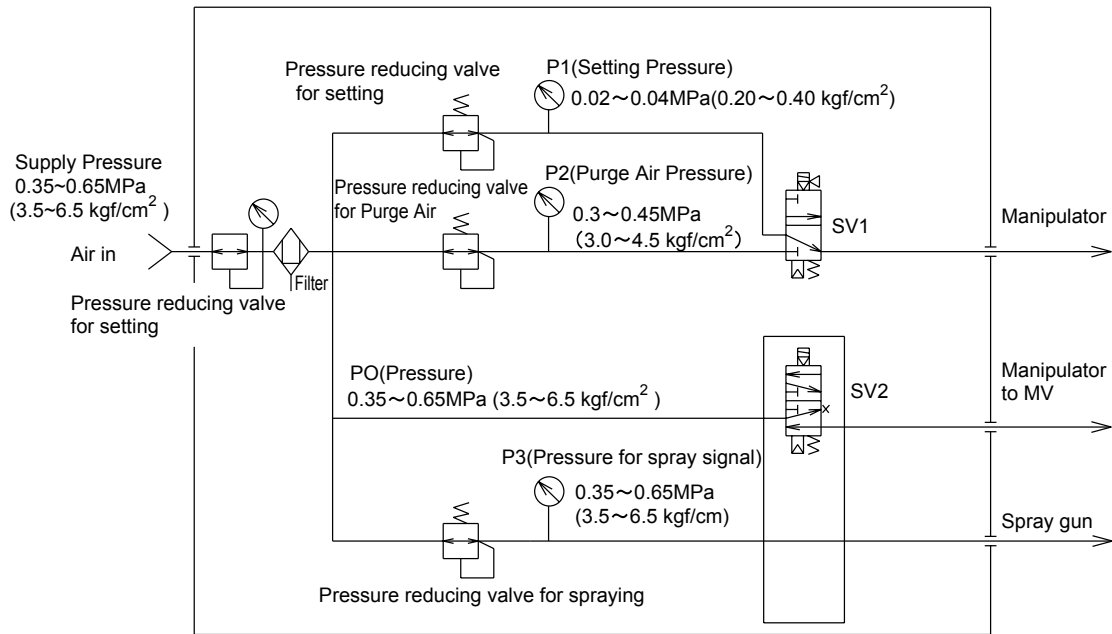


Fig. 11 Pneumatic Unit Air Circuit



**CAUTION**

Manufacturer is requested to strictly observe that the supply air is between 0.35 MPa to 0.65 MPa. The pressurized explosion-proof will not operate properly without the required amount of air pressure, if air pressure is low. If increase the air pressure, the pneumatics equipment for the pressurized explosion-proof system will be caused for equipment damage.

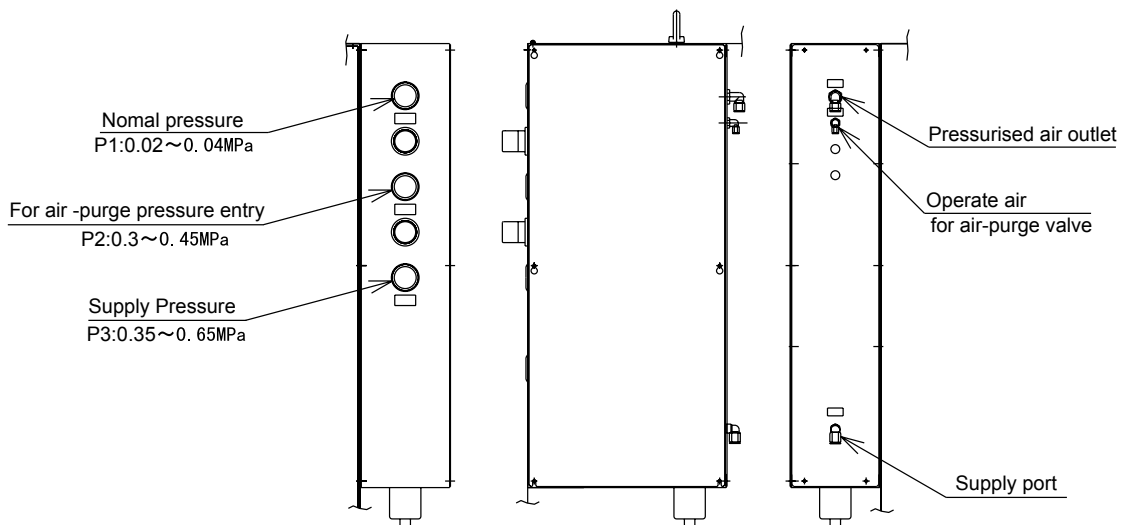


Fig. 12 Pneumatic Unit External View

## **6.4** O-ring in the Wrist

Periodically replace the O-rings in the wrist. Contact your Yaskawa representative to replace the rings. When the wrist is cleaned 2 or 3 times a week with the recovered thinner, the O-rings may become deformed, which causes malfunctions. Contact your Yaskawa representative for more information about the O-ring made of special material (option).

# 7 Basic Specifications

## 7.1 Basic Specifications

Table. 4 PX2850 Basic Specifications <sup>\*1</sup>

Item	Type	MOTOMAN-PX2850-B10	MOTOMAN-PX2850-B20
Operation Mode		Vertically Articulated	
Degree of Freedom		6	
Payload		10 kg	
Repetitive Positioning Accuracy <sup>*2</sup>		± 0.5 mm	
Motion Range	S-axis (turning)	± 150°	
	L-axis (lower arm)	+ 90°, - 40°	
	U-axis (upper arm)	+ 118°, - 175°	+ 118°, - 170°
	R-axis (Wrist roll)	± 360°	± 260°
	B-axis (Wrist yaw/pitch)	± 360°	± 140°
	T-axis (Wrist twist)	± 360°	± 260°
Maximum Speed		2 m/s	
Allowable Moment	R-axis	30.4N•m(3.1 kgf•m)	34.1N•m(3.5 kgf•m)
	B-axis	19.6N•m(2.0 kgf•m)	34.1N•m(3.5 kgf•m)
	T-axis	9.8N•m(1.0 kgf•m)	
Allowable Moment of Inertia (GD <sup>2</sup> /4)	R-axis	0.97 kg•m <sup>2</sup>	1.21 kg•m <sup>2</sup>
	B-axis	0.4 kg•m <sup>2</sup>	1.21 kg•m <sup>2</sup>
	T-axis	0.1 kg•m <sup>2</sup>	
Mass		570 kg	
Ambient Conditions	Temperature	0 to + 45 °C	
	Humidity	20 to 80 %RH (non-condensing)	
	Vibration	4.9 m/s <sup>2</sup> (0.5 G) or less	
	Others	Free from excessive electrical noise	
Power Capacity		5 kVA	

<sup>\*1</sup> SI units are used in the table. Gravitational units are also described in parentheses.

<sup>\*1</sup> Conformed to ISO9283.



## 7.1 Basic Specifications

Table. 5 PX2750 Basic Specifications \*1

Item	Type	MOTOMAN-PX2750-B30
Operation Mode		Vertically Articulated
Degree of Freedom		6
Payload		10 kg
Repetitive Positioning Accuracy*2		± 0.5 mm
Motion Range	S-axis (turning)	± 150°
	L-axis (lower arm)	+ 90°, - 40°
	U-axis (upper arm)	+ 118°, - 170°
	R-axis (wrist pitch)	± 260°
	B-axis(wrist yaw/ roll)	± 270°
	T-axis (wrist twist)	± 260°
Maximum Speed		2 m/s
Allowable Moment	R-axis	30.4N•m(3.1 kgf•m)
	B-axis	19.6N•m(2.0 kgf•m)
	T-axis	9.8N•m(1.0 kgf•m)
Allowable Moment of Inertia (GD <sup>2</sup> /4)	R-axis	0.97 kg•m <sup>2</sup>
	B-axis	0.4 kg•m <sup>2</sup>
	T-axis	0.1 kg•m <sup>2</sup>
Mass		560 kg
Ambient Conditions	Temperature	0 to + 45 °C
	Humidity	20 to 80 %RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> (0.5 G) or less
	Others	Free from excessive electrical noise
Power Capacity		5 kVA

\*1 SI units are used in the table. Gravitational units are also described in parentheses.

\*1 Conformed to ISO9283.

## 7.2 Wrist Flange

The wrist flange dimensions are shown in " Fig. 13 Wrist Flange (for PX2850-B10) " to " Fig. 15 Wrist Flange (for PX2750-B30) ". Fitting depth of inside fittings must be 3mm or less (PX2850-B10) and 6mm or less (PX2850-B20, PX2750-B30).

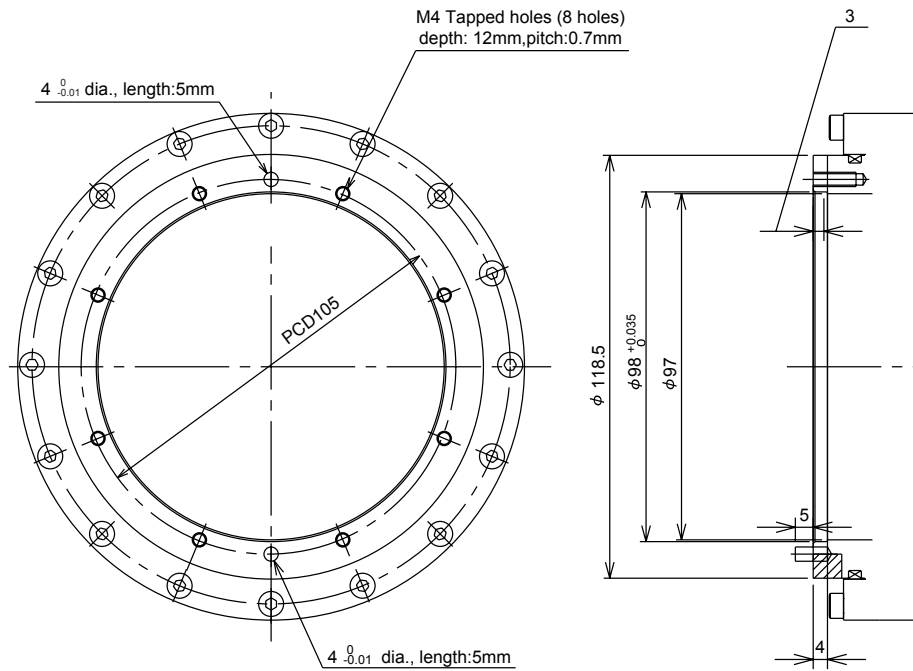


Fig. 13 Wrist Flange (for PX2850-B10)

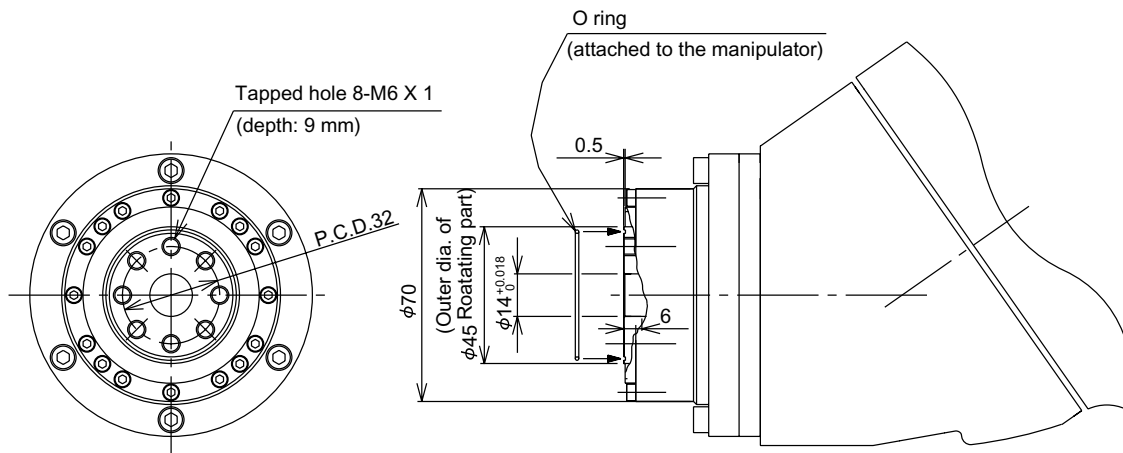


Fig. 14 Wrist Flange (for PX2850-B20)

## 7.2 Wrist Flange

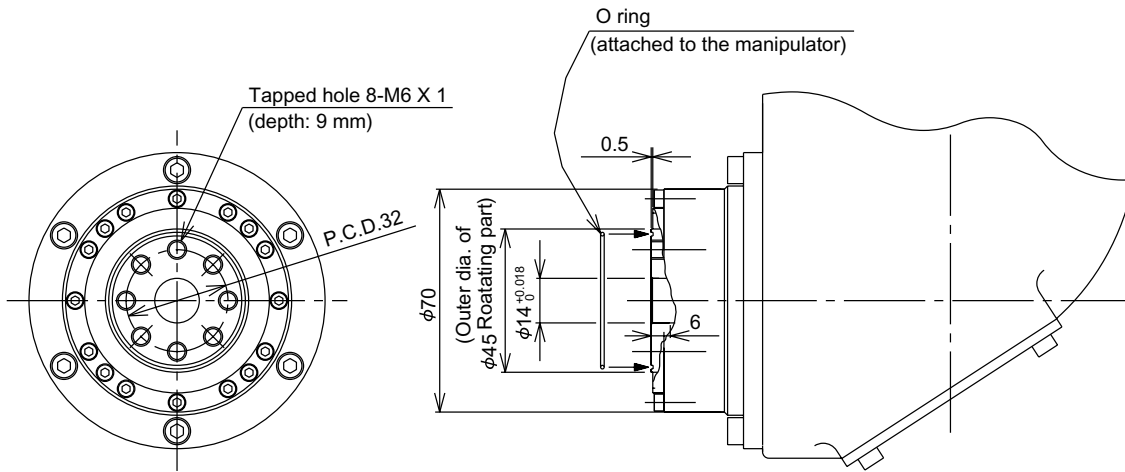


Fig. 15 Wrist Flange (for PX2750-B30)

## 7.3 System Application

The device required for the system application can be mounted on the horizontal arm. Observe the following restrictions.

- Maximum allowable load: 20 kg
- Mounting position: Refer to " Fig. 16 Device Mounting Position ".

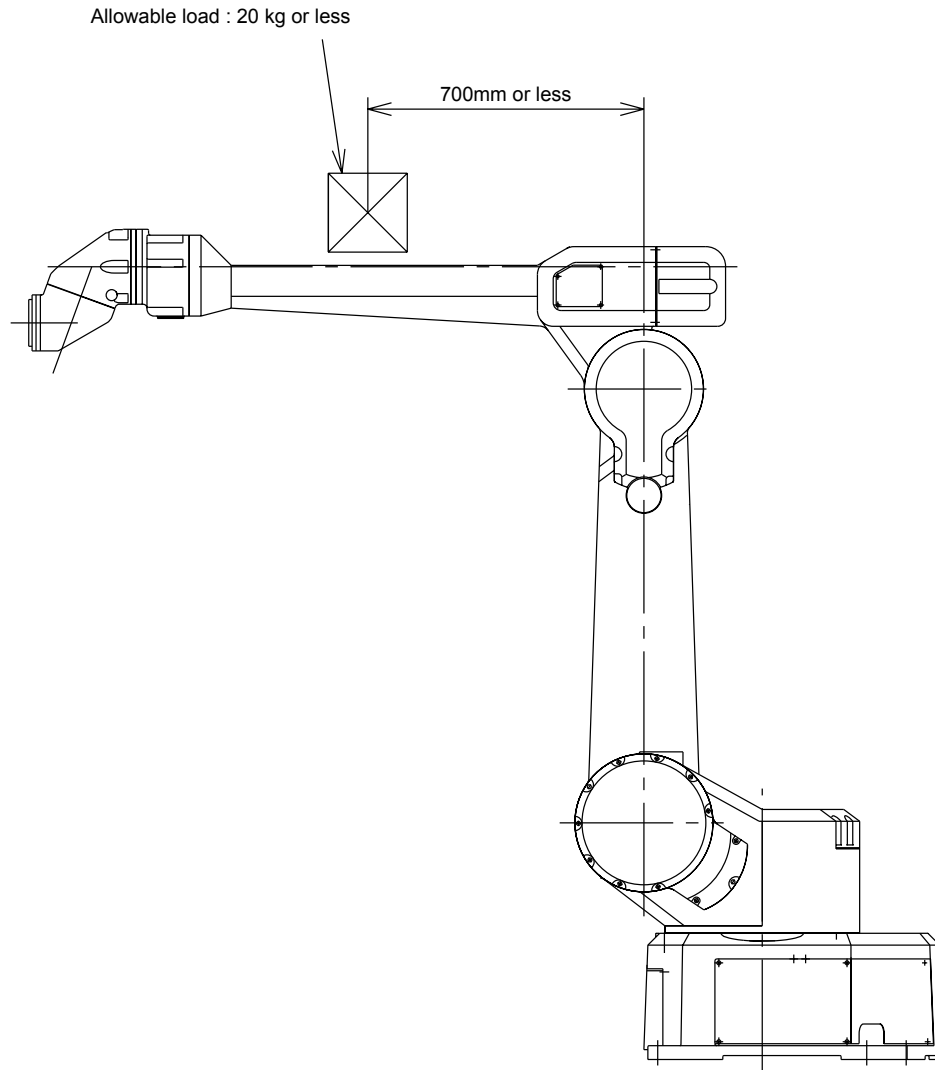


Fig. 16 Device Mounting Position

## 8 Frequent Inspections

### 8.1 Frequent Inspections

The painting robot is a precision device using advanced technology. It is important to frequently inspect the robot and remove any dried paint. Conduct the daily and weekly inspections listed in " Table. 6 Frequent Inspections " to ensure the long life of the robot and its performance.

Table. 6 Frequent Inspections







	No.	Items to be Inspected	Inspection	Daily	Weekly	Remarks
Manipulator	1	Motion	Smooth tuning, horizontal, and vertical motions of each arm. The robot's standby position does not change.	○		 WARNING Do not enter the robot working envelope.
	2	Noise and vibration during operation	No abnormal noise and vibration during robot operation.	○		 WARNING Do not enter the robot working envelope.
	3	Tubes	No severe wear and tear on paint and air supply tubes.	○	○	 CAUTION Use a pair of protective glasses to protect your eyes against paint or thinner that is being removed.
	4	Air leakage	No excessive air leakage from the fitting of the motor case.	○	○	 CAUTION Make sure that the air tube is firmly inserted in the joint. Accidental disconnection of the air tube may cause injury.
	5	Dried paint	Remove the dried paint on the robot.	○	○	Replace the sheet.  WARNING When removing the paint with a tool, be careful not to damage the robot.
Pneumatic Unit	1	Water drained from the air filter			○	No need for the automatic system
	2	Pressure set value	The pressure of the pressure reducing valve is within the specified range	○		

Table. 6 Frequent Inspections

	No.	Items to be Inspected	Inspection	Daily	Weekly	Remarks
Safety Devices	1	Operation of emergency stop button and safety plug. Dried paint	1. The manipulator stops immediately when the emergency stop button is pressed.	○		 CAUTION Inspect the robot while it is in its standby position and not in motion.
			2. The manipulator stops immediately when the safety plug is pulled out.	○		
			3. Remove the dried paint on the emergency stop button and the safety plug.	○		
	2	Operation of the photoelectric intrusion detecting switch Dried paint	1. The manipulator stops when the photoelectric switch is turned OFF.	○		
			2. Remove the dried paint on the light beam detector.	○		
	3	Operation of limit switch. Dried paint	1. Normal operation of the limit switch	○	○	
2. Remove the dried paint on the limit switch.			○	○		
Options	1	Operation of the gun tilt switching	The gun tilt changes correctly when air is supplied.	○	○	
	2	Operation of the shear pin system	1. The manipulator stops immediately when the shear pin is sheared.	○	○	
			2. The test valve is closed and the tube is not broken.	○	○	

## 8.2 Daily Inspections

Inspect the robot daily to ensure its high performance and early detection of any abnormalities.

### 8.2.1 Manipulator

#### ■ Visual inspection

Before turning ON the power to the manipulator, check if any abnormality can be found on the manipulator. Remove the jacket if it is attached.

#### ■ Dried paint, dust, and dirt

Remove any dried paint on the manipulator and other devices.

Replace the vinyl sheet if any.

Replace the jacket if it is dirty.



### WARNING

When using a tool to remove the paint, be careful not to damage the manipulator.



### CAUTION

Paint stuck on the manipulator rotating parts prevents them from turning normally and smoothly. Periodically remove the paint on the manipulator.

A cloth that is soaked in paint thinner can be used for cleaning the inside of the wrist, because an anti-thinner enclosure is provided. But, be careful not to remove the original coat of paint on the manipulator.

#### ■ Tubes

Check for wear and tear on the air supply tubes and the paint supply tubes connected to the motor on each axis. Also, make sure that the tubes are not bent from the weight of the vinyl sheet or the robot cover.

### ■ Air leakage

Check for excessive air leakage from the tubes, the couplings, and the joint fittings of the motor on each axis when the air is supplied in the manipulator to form the explosion-proof barrier.

The actual amount of air leakage is not important if a fault in the internal air pressure does not occur. However, if internal air pressure faults occur frequently, check if the pressure of the air source and the pressure setting of the pressure reducing valve are correct and if excessive air is leaking.

### ■ Noise and vibration during operation

Check if the manipulator standby posture does not change when turning ON the power supply. Also, check for abnormal noise or vibration during operation.



## WARNING

Never enter inside the safeguards and the manipulator working envelope after turning ON the power supply.

## 8.2.2 Pneumatic Unit

### ■ Drained water from air filter

Empty the water drained from the air filter on the pneumatic unit.

Where the automatic drainage system is provided, check the water level.

### ■ Pressure

Before moving the manipulator, check if the gauges of the pressure reducing valves on the pneumatic unit show the pressure to be within the specified range.

## 8.2.3 Safety Devices

### ■ Emergency stop button and safety plug

Before operating the manipulator, check the following to make sure that the emergency stop button and the safety plug operate correctly:

The manipulator stops immediately when the emergency stop button is pressed.

The manipulator stops immediately when the safety plug is pulled out.

Inspect the manipulator while it is in the standby posture and not in motion with the power supply turned ON. Repeated sudden stops while the manipulator is in motion will damage the braking system.

Remove any paint on the emergency stop button and the safety plug.



**■ Photoelectric intrusion detecting switch**

Make sure that the photoelectric intrusion detecting switch operates correctly.

Remove any dried paint on the light beam receiving section on the switch.

When the air is purging, check the air for purging.

**■ Limit switch**

Make sure that the limit switches for positioning workpieces, starting the robot, and return the robot to home operate correctly.

Remove any dried paint that may obstruct the robot motion.

**8.2.4 Options****■ Gun tilt switching**

Check if the gun changes its tilt smoothly when compressed air is supplied.

If excessive shock is applied on both ends, reduce the pressure supplied to the actuator.

**■ Shear pin**

Disconnect the air supply tube, and check if the shear pin breaks immediately to shut off the power supply to the manipulator.

Also, make sure that the air tube is not bent or crushed.

## 9 Maintenance and Inspection



### WARNING

- **Before maintenance or inspection, be sure to turn the main power supply OFF, and put up a warning sign such as “DO NOT TURN THE POWER ON”.**

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



### CAUTION

- **Maintenance and inspection must be performed by the specified personnel.**

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

- **For disassembly or repair, contact your Yaskawa representative.**
- **Do not disconnect the motor, and do not release the brake.**

Unexpected arm motion may cause injury or damage to the equipment.

- **Be sure to connect the battery board before disconnecting the connectors for detection at maintenance and inspection.**

Failure to observe this caution may result in loss of home position data.

### 9.1 Inspection Schedule

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation. Inspection intervals are displayed in the levels shown in " Table. 7 Inspection Schedule ". Conduct periodical inspections according to the inspection schedule in " Table. 7 Inspection Schedule ". In " Table. 7 Inspection Schedule ", the inspection items are classified into three types of operation: operations which can be performed by personnel authorized of the user, operations which can be performed by personnel being trained, and operations which can be performed by service company personnel. Only specified personnel are to do inspection work.

## 9.1 Inspection Schedule



The inspection interval must be based on the servo power supply ON time.

Table. 7 Inspection Schedule

Maintenance and Inspection	Item	Schedule					Operation	Inspection charge		
		1000H cycle	6000H cycle	12000H cycle	24000H	36000H		Specified personnel	License	Service company
Inspection, replacement, and grease replenishment/ replacement of speed reducers and gears (*1) Refer to 9.2.	Gear inside the wrist		○ Replenish grease				Replace the gear if any abnormality is found. Use Alvania EP grease 2.		○	○
			○ Adjustment gear							
	Harmonic drive speed reducer		○ Replenish grease (Every 7500H)				Replace the speed reducer if any abnormality is found. Use Harmonic grease 4B-No.2.		○	○
	RV speed reducer		○ Replenish grease	○ Replace grease			Replace the speed reducer if any abnormality is found. Use Molywhite RE No. 00 grease.		○	○
	R-, B-, and T-axes speed reducer made by Alpha Getriebebau GmbH			○ Replacement of lubricating oil (Every 15000H)			Contact your Yaskawa representative.		○	○
Tightening of bolts	Tighten the bolts that loosed from vibration and an excessively swinging load.	○						○	○	○
Inspection of wrist	Hose (PX2850-B10)		○ Replacement of hose (3000H)					○	○	○
	O-ring		○				Replace if any abnormality is found. Contact your Yaskawa representative.		○	○
	Presence check of abnormality		○					○	○	○
Inspection of air sealing parts for internal pressure	Inspection of the packing of the motor case		○				Replace the packings if excessive wear is found.		○	○
	Inspection of the packing of the box		○						○	○

Table. 7 Inspection Schedule

Maintenance and Inspection	Item	Schedule					Operation	Inspection charge		
		1000H cycle	6000H cycle	12000H cycle	24000H	36000H		Specified personnel	Licence	Service company
Replacement of pneumatic unit filter	Replace the pneumatic unit filter.		○					○	○	
	Check the operation of the solenoid valve.		○					○	○	
	Check the operation of the pressure reducing valve.		○					○	○	
Inspection of explosion-proof devices	Check the operation of the pressure switch.		○					○	○	
	Check the operation of the master valve.		○					○	○	
	Check the operation of the explosion-proof enclosure.		○					○	○	
Inspection of internal cables(*2)	Check the conduction. Check for the wears on the protective spring.			○ Inspect	○ Replace (*3)		Swinging the lead wire, check the conduction of the main connector and the intermediate connector of the box. Check for the wears on the protective spring.	○	○	
Motor connector	Check if the connectors are securely inserted.	○					Insert the connector securely if it is loose.	○	○	
Overhaul					○	Contact your Yaskawa representative.			○	

- \*1** : When replenishing or replacing the grease, be careful not to let any grease into the motor. Grease in the motor may cause motor failure. When any grease enters in the motor, contact your Yaskawa representative.
- \*2** :When checking the conduction with multimeter, connect the battery to "BAT" and "0BT" of connectors on the motor side for each axis, and then remove connectors on detector side for each axis from the motor. Otherwise, the home position data may be lost.
- \*3** :Replace the internal cables of S-, L-, U-, R-, B-, and T-axes at 24,000H inspection.

## 9.2 Maintenance for Manipulator

### 9.2.1 Grease Replenishment/Replacement

" Fig. 17 Locations of Components " shows the location of the components of the manipulator. Replenish or replace the grease for the following:

- 1) Gears on the wrist and the end of the U-arm
- 2) Harmonic Drive speed reducers for the U- and T-axes
- 3) RV speed reducers for the S- and L-axes
- 4) Cross roller bearing for the S-axis

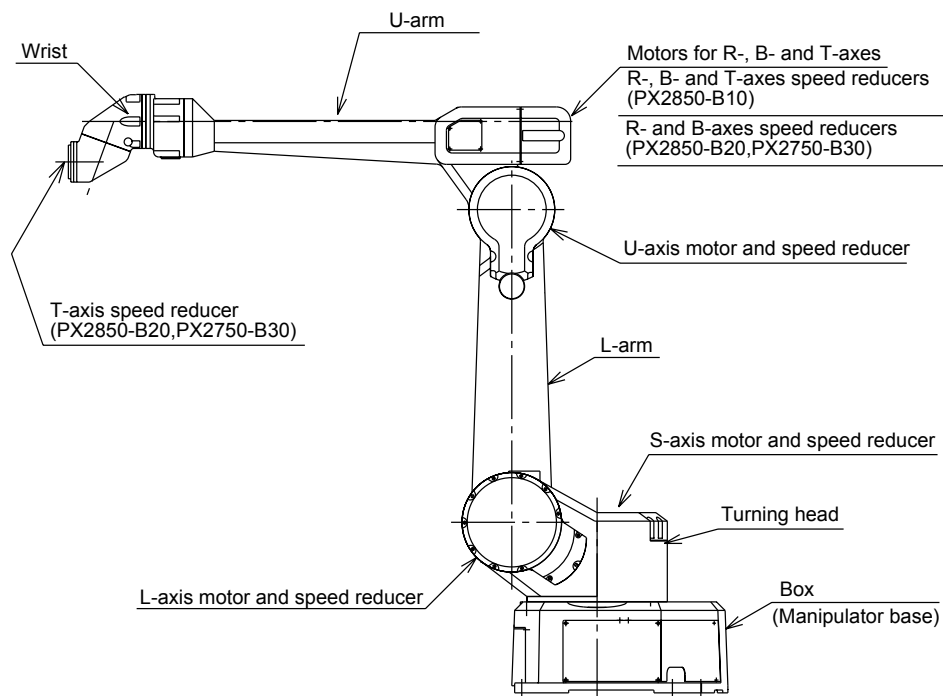


Fig. 17 Locations of Components

## ■ Gears

Remove the cover and the plug. Inject Alvania EP grease 2 by using a grease gun to the gear teeth. See " Fig. 18 Injecting Grease at wrist and End of U-arm (for PX2850-B10) " to " Fig. 20 Injecting Grease at Wrist and End of U-arm (for PX2750-B30) ".

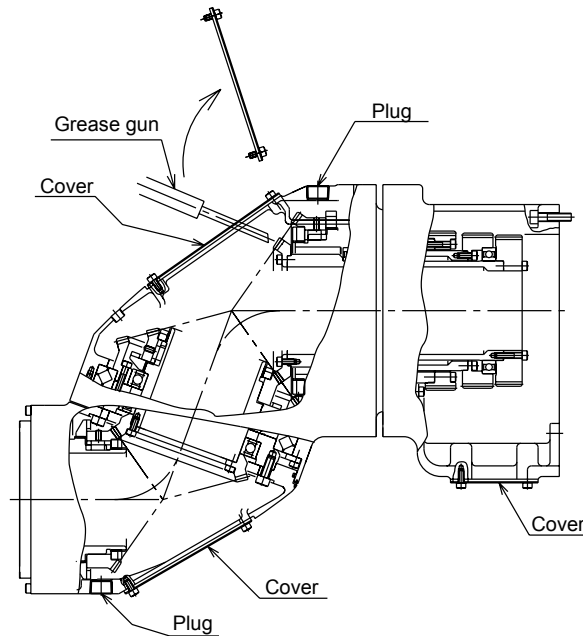


Fig. 18 Injecting Grease at wrist and End of U-arm (for PX2850-B10)

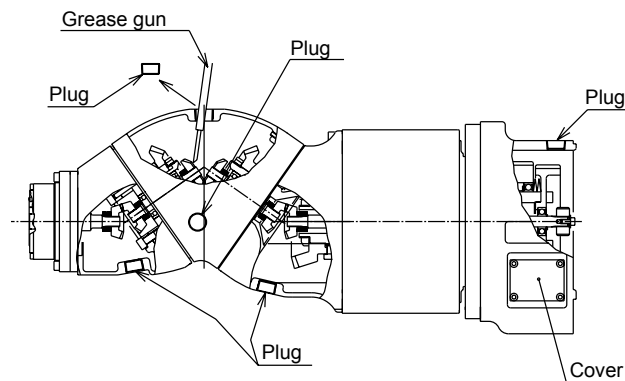


Fig. 19 Injecting Grease at Wrist and End of U-arm (for PX2850-B20)

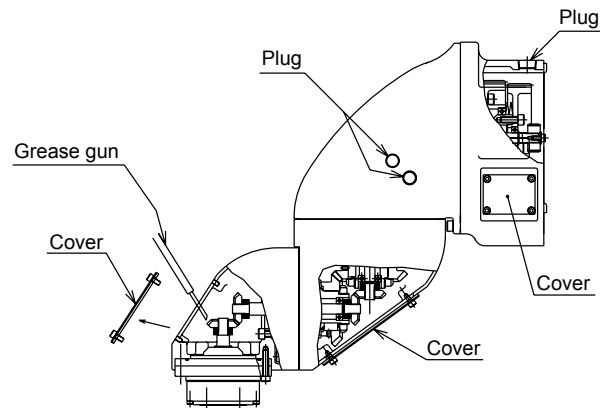


Fig. 20 Injecting Grease at Wrist and End of U-arm (for PX2750-B30)

### ■ Harmonic Drive speed reducer

For the U-Axis Harmonic Drive speed reducer, the customer is responsible for replenishing the grease. But for the T-Axis speed reducer (PX2850-B20, PX2750-B30), contact your Yaskawa representative.

#### Grease Replenishment

Refer to " Fig. 21 U-axis Harmonic Drive Speed Reducer ".

1. Remove the plug in the Uo air flow.



The grease is not exhausted from the Uo air flow. Do not inject excessive grease.

2. Remove the plug 1/8 from the Ui grease inlet, and install the G nipple A-PT1/8 to inject grease.

<p>Grease type: Harmonic grease 4B No.2          Amount of grease: 90 cc          (180 cc for 1st supply)</p>
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3. Reinstall the plugs on the Ui grease inlet and the Uo air outlet. Apply Three Bond 1104 on screwed part.

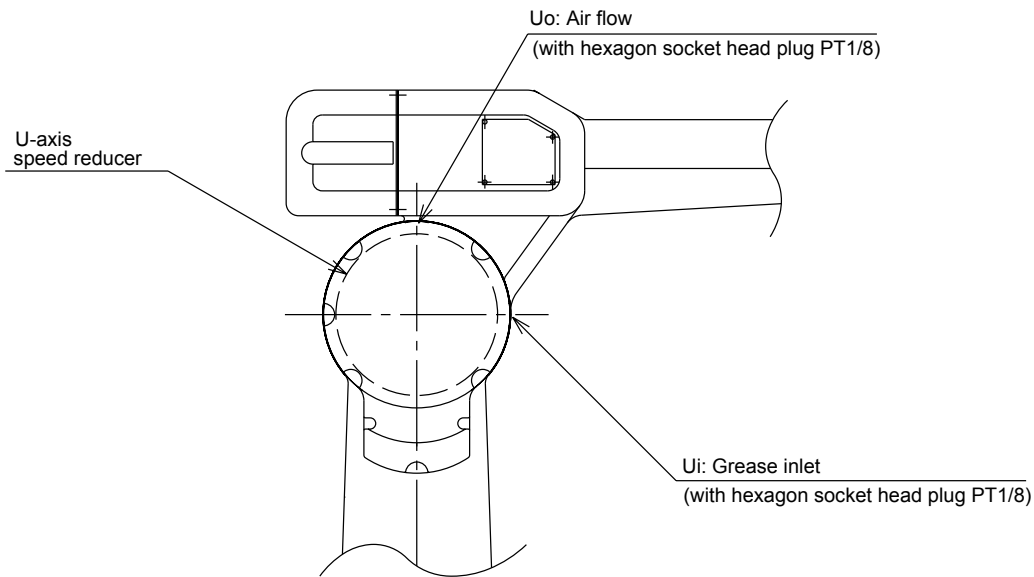


Fig. 21 U-axis Harmonic Drive Speed Reducer

## ■ RV speed reducer

### Grease Replenishment

Refer to " Fig. 22 S-axis RV Speed Reducer " and " Fig. 23 L-axis RV Speed Reducer ".

1. Remove the plug in the So (Lo) grease exhaust port. Remove the cover on the L-axis motor side.



- If grease is added without removing the plug, the internal pressure will be higher and may damage it. It is absolutely necessary to remove the plug.
- When injecting grease into the L-axis speed reducer, grease may come out from the air flow on the motor base. Remove the cover on the motor side to check if excessive grease is coming out. If there is any grease, wipe it off.

2. Inject grease into the Si (Li) grease inlet. Before injecting grease in the Li port, remove the plug on Li and install a G nipple A-PT1/8.

Grease type: Molywhite RE No. 00  
 Amount of grease: 800 cc for S-axis; 700 cc for L-axis  
 (For 1st supply: 1500 cc for S-axis, 1400 cc for L-axis)

3. Move the S-axis (L-axis) for a few minutes to discharge the excessive grease.
4. Wipe the So (Lo) exhaust port with a cloth and reinstall plugs in So (Li and Lo) exhaust port. Apply Three Bond 1104 on screwed parts. Reinstall the cover on the L-axis motor side.



## Grease Replacement

Refer to " Fig. 22 S-axis RV Speed Reducer " and " Fig. 23 L-axis RV Speed Reducer ".

1. Remove the plug in the So (Lo) grease exhaust port. Remove the cover on the L-axis motor side.

### NOTE

- If grease is added without removing the plug, the internal pressure will be higher and may damage it. It is absolutely necessary to remove the plug.
- When injecting grease into the L-axis speed reducer, grease may come out from the air flow on the motor base. Remove the cover on the motor side to check if excessive grease is coming out. If there is any grease, wipe it off.

2. Inject grease into the Si (Li) grease inlet. Before injecting grease in the Li port, remove the plug on Li and install a G nipple A-PT1/8.

Grease type: Molywhite RE No. 00  
Amount of grease: 2000 cc for S-axis; 2300 cc for L-axis

3. The grease replacement is complete when new grease appears in the So (Lo) exhaust port. The new grease can be distinguished from the old grease by color.
4. Move the S-axis (L-axis) for a few minutes to discharge the excessive grease.
5. Wipe the So (Lo) exhaust port with a cloth and reinstall the plugs in the So (Li and Lo) exhaust port. Apply Three Bond 1104 on screwed parts.  
Reinstall the cover on the L-axis motor side.

### NOTE

If the plug is installed when the grease is being exhausted, the grease will go inside the motor and may damage it. Reinstall the plug after the excessive grease is completely discharged.

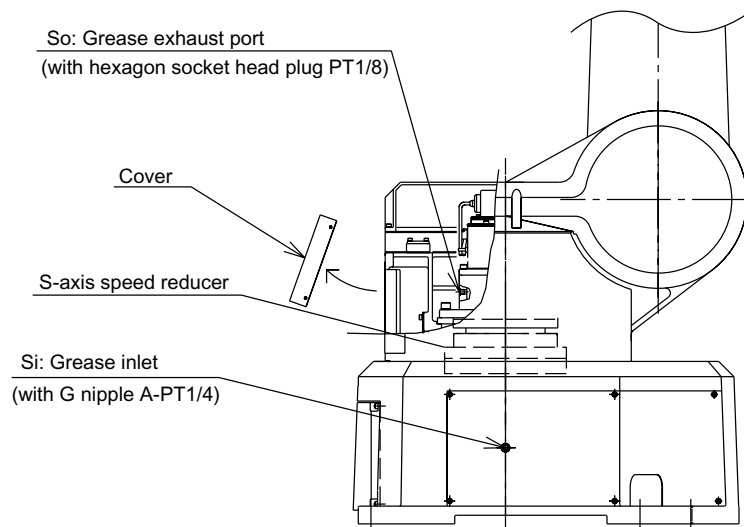


Fig. 22 S-axis RV Speed Reducer

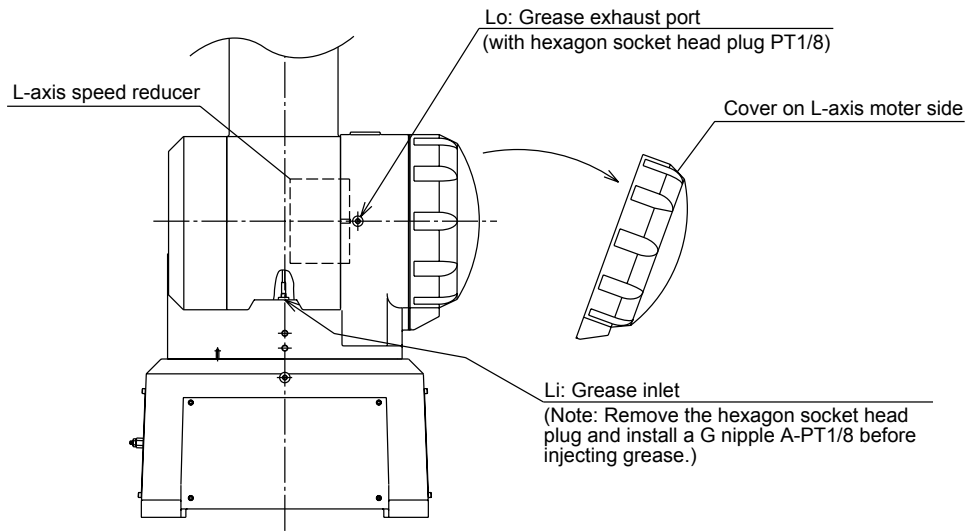


Fig. 23 L-axis RV Speed Reducer

■ Cross roller bearing

Inject grease into the Sc grease inlet. Refer to " Fig. 24 S-axis Cross Roller Bearing " .

Grease type: Molywhite Alvania EP grease 2  
Amount of grease: Approx. 100cc

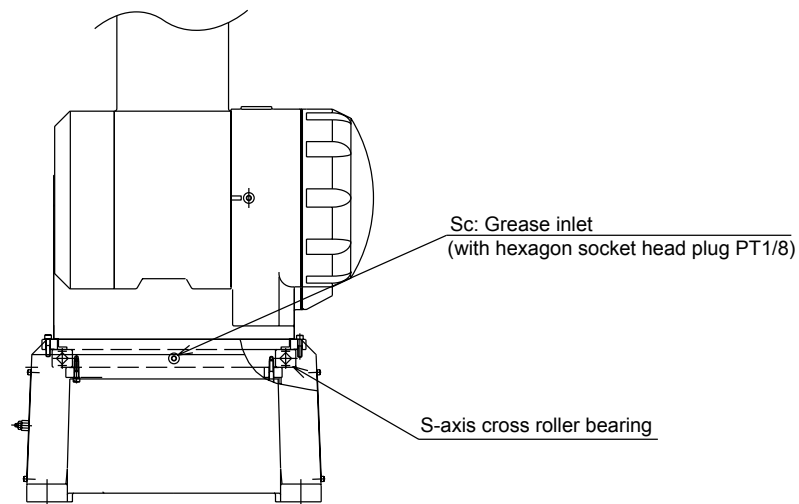


Fig. 24 S-axis Cross Roller Bearing

## 9.2.2 Lubricating Oil Replacement for R- and B-axes Speed Reducers

Contact your Yaskawa representative because motors and drive shafts for the R- and B-axes need to be removed to replace the lubricating oil.

- Recommended lubricating oil: Renolin PG220 made by Fuchs Lubricants Co. Viscosity = ISO VG200

## 9.2.3 Tightening Bolts

Tighten the bolts shown in " Fig. 25 Manipulator Base Box and Bearing Fixing Bolts " to " Fig. 29 Terminal Box in Manipulator Base Box ".

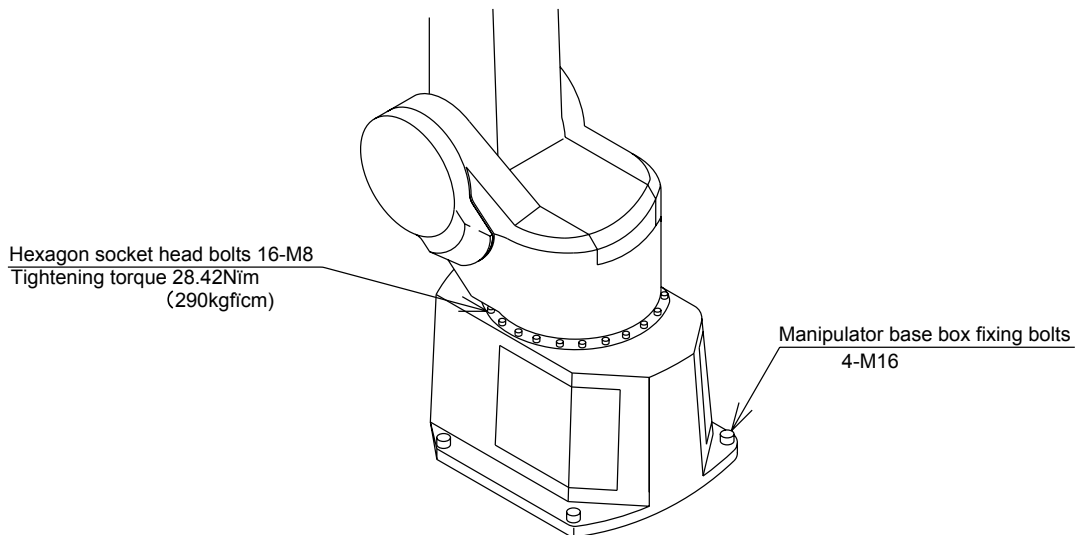


Fig. 25 Manipulator Base Box and Bearing Fixing Bolts

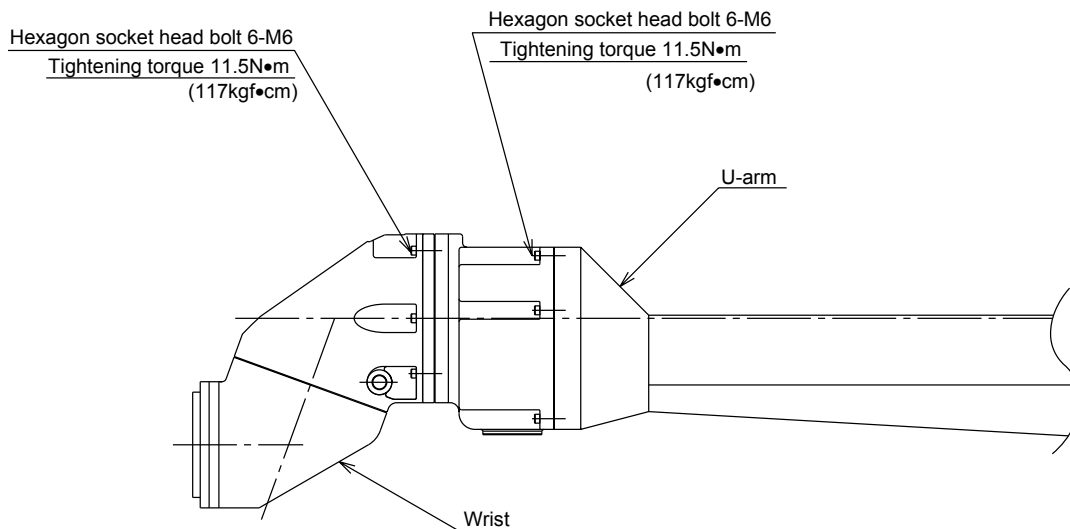


Fig. 26 Wrist Fixing Bolts (for PX2850-B10)

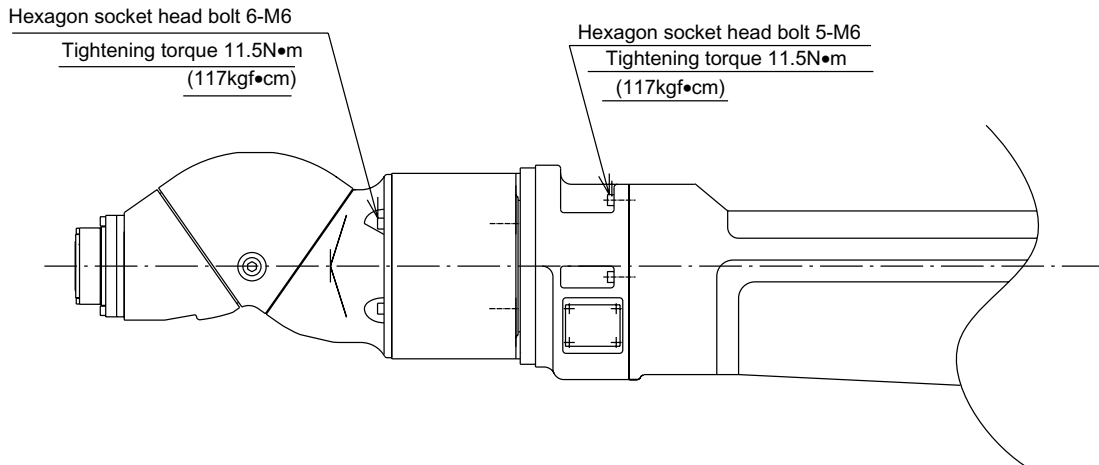


Fig. 27 Wrist Fixing Bolts (for PX2850-B20)

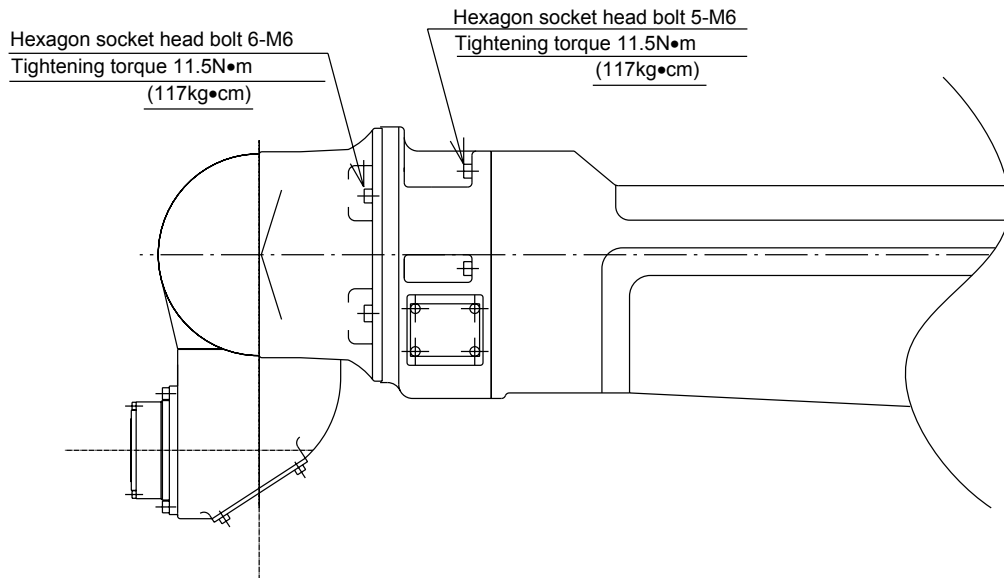


Fig. 28 Wrist Fixing Bolts (for PX2750-B30)

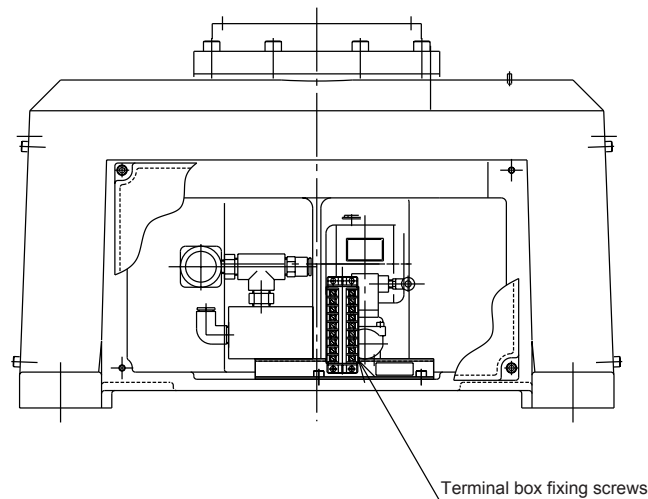


Fig. 29 Terminal Box in Manipulator Base Box

### 9.2.4 Wrist Speed Reducer and Bearing

Check if the three wrist axes move smoothly or not. If the wrist does not move smoothly, contact your Yaskawa representative. Removing and disassembling the wrist to find the faulty axis will be needed for repair or replacement of the bearing, the speed reducer, or the sealing compounds.



#### CAUTION

To remove the wrist from the U-arm, firmly hold the wrist and remove the fixing bolt. If not, the wrist may fall down when the fixing bolt is removed.

### 9.2.5 Air Sealings for Internal Air Pressure

#### ■ Packing on the motor case

##### (a) S-, L-, and U-axes

Remove the mounting bolts on the motor case and check the packing where the case is mounted.

Remove the cover for the cable inlet in the motor case, and check the packing where the cover is attached. Excessive oil in the air that is used for the internal air pressure can damage the packing, which result in air leakage. Replace the packing if air leakage is found.

Refer to " Fig. 30 S- and L-axes Motor Packings "to " Fig. 32 R-, B-, and T-axes Motor Packings " for more information on the packing of each axis motor.

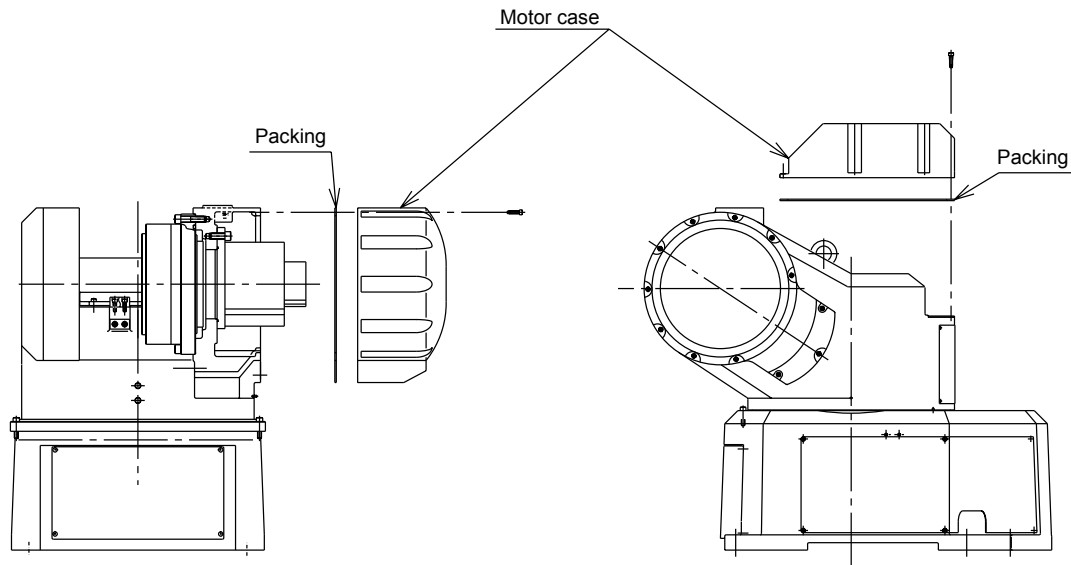


Fig. 30 S- and L-axes Motor Packings

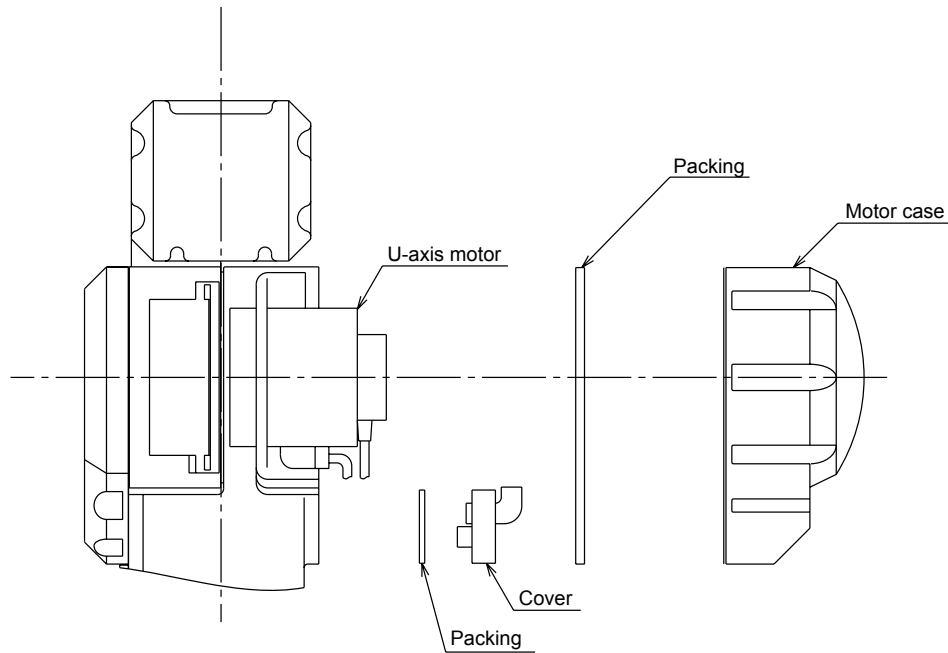


Fig. 31 U-axis Motor Packing

(b) R-, B-, and T-axes

The packing is provided on the joint fitting between the back of the U-arm and the motor case. Remove the mounting bolts to check for wear and tear on the packing. Refer to " Fig. 32 R-, B-, and T-axes Motor Packings ".

## 9.2 Maintenance for Manipulator

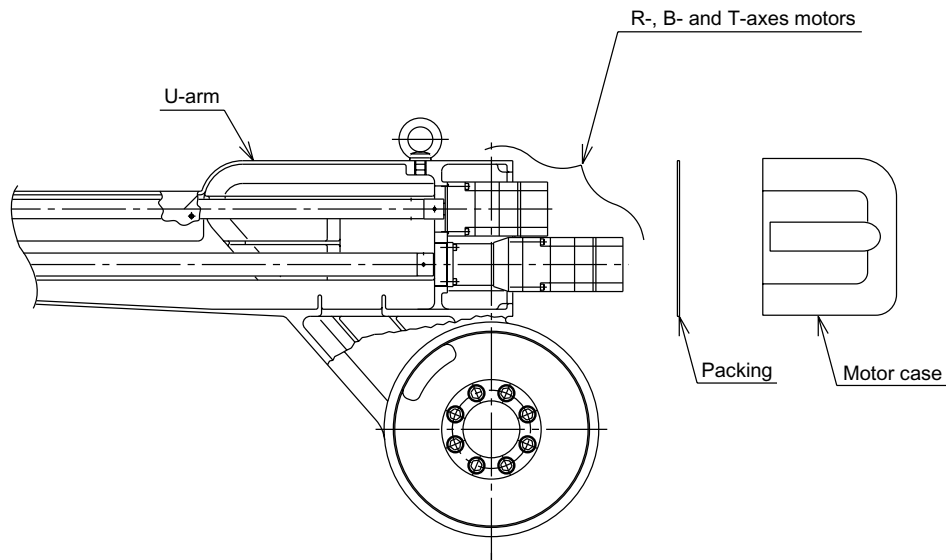


Fig. 32 R-, B-, and T-axes Motor Packings

### ■ Manipulator Base Box Cover Packings

Remove the two covers on the back side of the manipulator base box, and check the rubber packing. Refer to " Fig. 33 Manipulator Base Box Rubber Packings ".

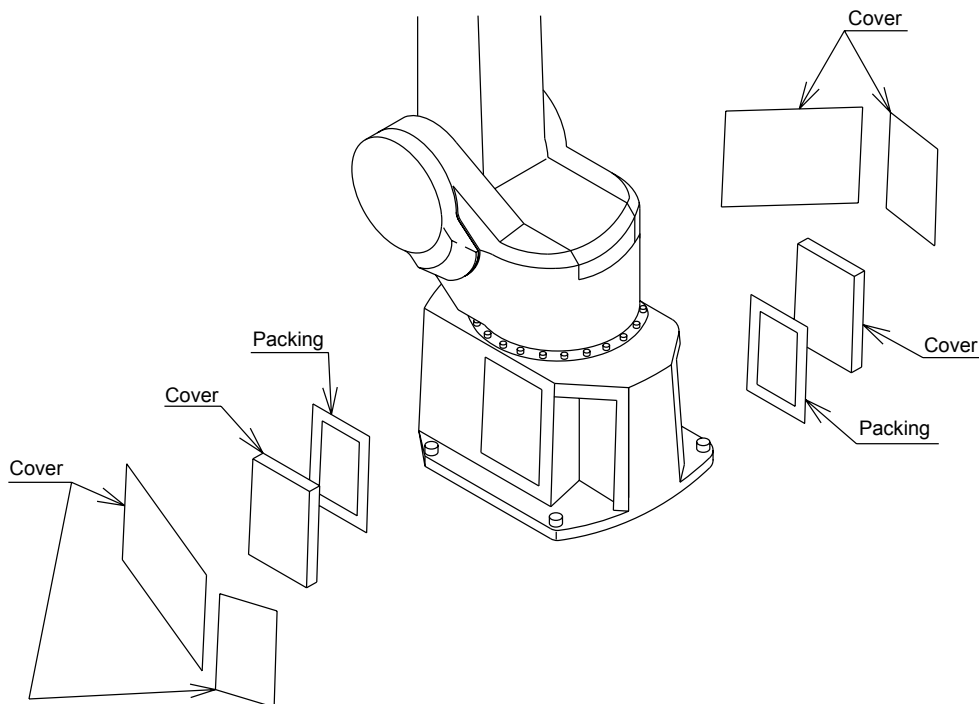


Fig. 33 Manipulator Base Box Rubber Packings

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## 9.3 Maintenance and Inspection of the Pneumatic Unit

### 9.3.1 Solenoid Valve

Check if the air purge starts a few seconds after turning ON the power to the XRC and if it ends approximately 11 minutes later.

### 9.3.2 Pressure Reducing Valve

Measure the air pressure for the pneumatic unit with a pressure gauge. Remove the test plug or the relief valve on the pneumatic unit and connect the gauge. The air pressure must always be from 0.02 MPa (0.2 kg/cm<sup>2</sup>) to 0.04 MPa (0.4 kg/cm<sup>2</sup>) under normal conditions, and from 0.3 MPa (3.0 kg/cm<sup>2</sup>) to 0.45 MPa (4.5 kg/cm<sup>2</sup>) when purging.

---

## 9.4 Inspection of Explosion-proof Devices

### 9.4.1 Pressure Switch

Remove the front cover of the pneumatic unit box and check the conduction of the pressure switch. The pressure switch must be ON when the air is being supplied and OFF when the air is not being supplied.



### CAUTION

- **Be sure to turn OFF the power to the XRC before inspecting the pressure switch.**
- **Do not touch the pressure setting dial on the pressure switch during an inspection. Changing the setting prevents the correct pressure from being detected.**

### 9.4.2 Master Valve

While the air is being supplied from the pneumatic unit, check if the air purge starts a few seconds after the power to the XRC is turned ON. Also, check if the air goes out of the two air outlets for the master valve during the air purge.



### **9.4.3** Pressurized Explosion-proof Barrier

While the air is being supplied from the pneumatic unit, check if the air purge starts a few seconds after the power to the XRC is turned ON and if it ends approximately 11 minutes later.

Also, check the following:

- (a) The alarm "AIR PRESSURE ERROR" occurs immediately after the air supply from the pneumatic unit is stopped and the power supply to the XRC is turned ON.
- (b) The alarm "AIR PRESSURE ERROR" occurs when the air supply from the pneumatic unit is stopped during air purging.

# 10 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the MOTOMAN-PX2850/-PX2750. The spare parts list is shown below.

Product performance can not be guaranteed when using spare parts from any company other than Yaskawa. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts
- Rank B: Parts for which replacement may be necessary as a result of frequent operation
- Rank C: Drive units



To replace parts in Rank B or Rank C, contact your Yaskawa representative.

Table. 8 Spare Parts for PX2850-B10

Rank	Part No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Sealing compound	DB-1600	Diabond Industries Co., Ltd.	200 ml	-	For packing
A	2	Sealant	1104	Three Bond Co., Ltd.	200g	1	For plug seal
A	3	Grease	Alvania EP grease 2	Showa Oil Co., Ltd.	16 kg	-	For the S-axis cross roller bearing and the bevel gear in wrist
A	4	Grease	Molywhite RE No. 00	Yaskawa Electric Corporation	16 kg	-	For RV speed reducer
A	5	Grease	Harmonic grease 4B-No. 2	Harmonic Drive Systems Co., Ltd.	2.5 kg	-	For Harmonic Drive speed reducer
A	6	Lubricating oil	Renolin PG220	Fuchs Lubricants Co.	10 l	-	Alpha Getriebebau speed reducer
A	7	Hose unit	HW0170109-A	Yaskawa Electric Corporation			List part internal organs hose and edge stationary parts
A	8	S-axis speed reducer	HW9482862-A	Yaskawa Electric Corporation	1	1	
B	9	L-axis speed reducer	HW9381465-A	Yaskawa Electric Corporation	1	1	
B	10	U-axis speed reducer	HW9482864-A	Yaskawa Electric Corporation	1	1	
B	11	R-, B-, and T-axes speed reducers	HW9482863-A	Yaskawa Electric Corporation	1	3	
B	12	Gear unit	HW9271053-B	Yaskawa Electric Corporation	1	1	
B	13	Wrist unit	HW9171870-B	Yaskawa Electric Corporation	1	1	

Table. 8 Spare Parts for PX2850-B10

B	14	T-axis gear unit	HW9371207-B	Yaskawa Electric Corporation	1	1	
C	15	AC servomotos for S- and U-axes	HW0380187-A	Yaskawa Electric Corporation	1	2	
C	16	AC servomotos for L-axis	HW0380188-A	Yaskawa Electric Corporation	1	1	
C	17	AC servomotos for R-, B-, and T-axes	HW0380189-A	Yaskawa Electric Corporation	1	3	
C	18	Switch unit	HW0370243-A	Yaskawa Electric Corporation	1	1	Pressure switch
C	19	Internal cable	HW0270145-A	Yaskawa Electric Corporation	1	1	For S- and L-axis
C	20	Internal cable	HW0370144-A	Yaskawa Electric Corporation	1	1	For U-axis
C	21	Internal cable	HW0270231-A	Yaskawa Electric Corporation	1	1	For R-, B-, and T-axis
C	22	Internal cable	HW0470122-A	Yaskawa Electric Corporation	1	1	Battery Cable

Table. 9 Spare Parts for PX2850-B20

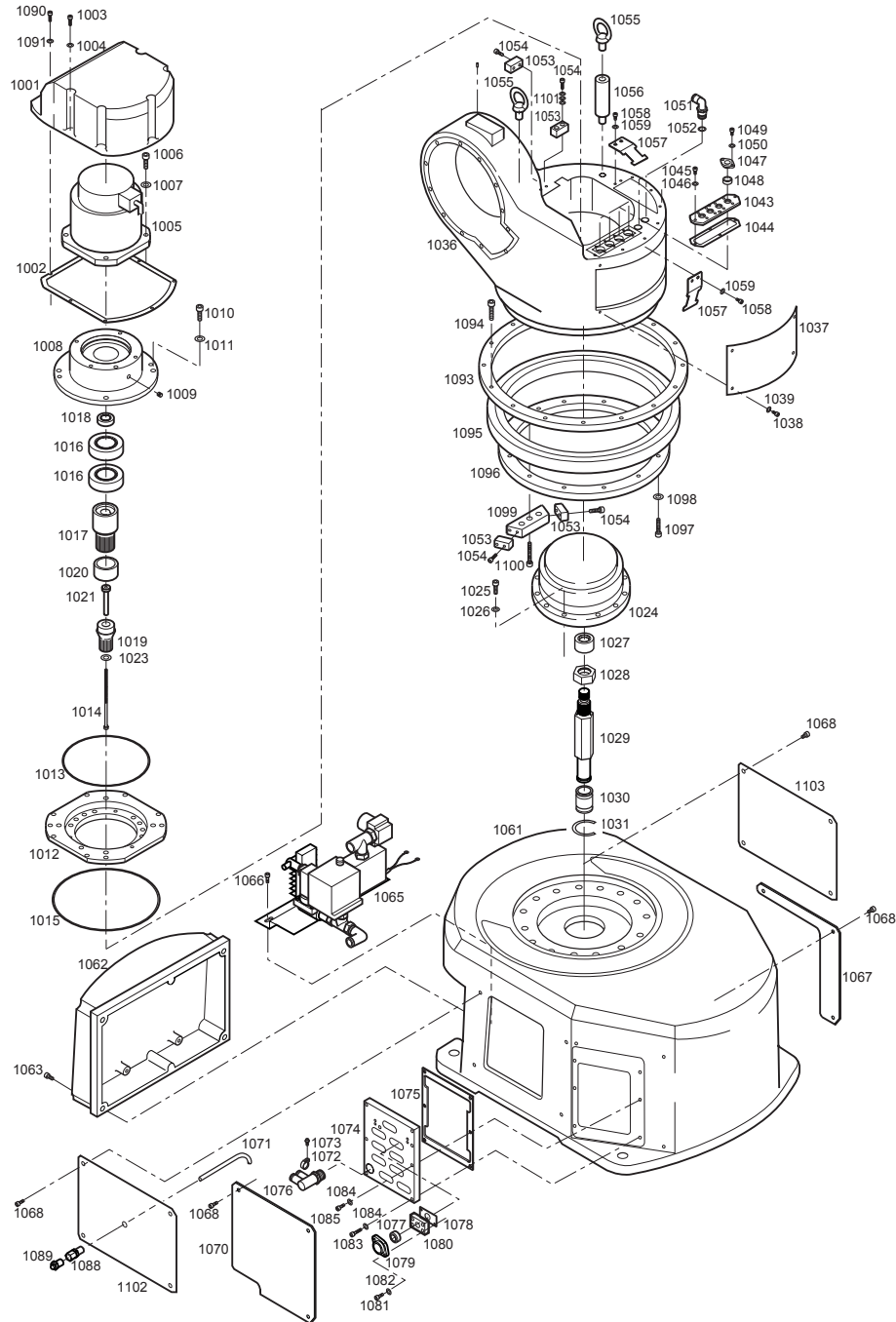
Rank	Part No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Sealing compound	DB-1600	Diabond Industries Co., Ltd.	200 ml	-	For packing
A	2	Sealant	1104	Three Bond Co., Ltd.	200g	1	For plug seal
A	3	Grease	Alvania EP grease 2	Showa Oil Co., Ltd.	16 kg	-	For the S-axis cross roller bearing and the bevel gear in wrist
A	4	Grease	Molywhite RE No. 00	Yaskawa Electric Corporation	16 kg	-	For RV speed reducer
A	5	Grease	Harmonic grease 4B-No. 2	Harmonic Drive Systems Co., Ltd.	2.5 kg	-	For Harmonic Drive speed reducer
A	6	Lubricating oil	Renolin PG220	Fuchs Lubricants Co.	10 l	-	Alpha Getriebbau speed reducer
A	7	S-axis speed reducer	HW9482862-A	Yaskawa Electric Corporation	1	1	
B	8	L-axis speed reducer	HW9381465-A	Yaskawa Electric Corporation	1	1	
B	9	U-axis speed reducer	HW9482864-A	Yaskawa Electric Corporation	1	1	
B	10	R-,and B-axes speed reducers	HW9482863-A	Yaskawa Electric Corporation	1	2	
B	11	T-axis speed reducers	HW0480040-A	Yaskawa Electric Corporation	1	1	
B	12	Gear unit	HW9271286-B	Yaskawa Electric Corporation	1	1	
B	13	Wrist unit	HW9171735-B	Yaskawa Electric Corporation	1	1	
C	14	AC servomotos for S- and U-axes	HW0380187-A	Yaskawa Electric Corporation	1	2	
C	15	AC servomotos for L-axis	HW0380188-A	Yaskawa Electric Corporation	1	1	
C	16	AC servomotos for R-, B-, and T-axes	HW0380189-A	Yaskawa Electric Corporation	1	3	
C	17	Switch unit	HW0370243-A	Yaskawa Electric Corporation	1	1	Pressure switch
C	18	Internal cable	HW0270145-A	Yaskawa Electric Corporation	1	1	For S- and L-axis
C	19	Internal cable	HW0370144-A	Yaskawa Electric Corporation	1	1	For U-axis
C	20	Internal cable	HW0270231-A	Yaskawa Electric Corporation	1	1	For R-, B-, and T-axis
C	21	Internal cable	HW0470122-A	Yaskawa Electric Corporation	1	1	Battery Cable

Table. 10 Spare Parts for PX2750-B30

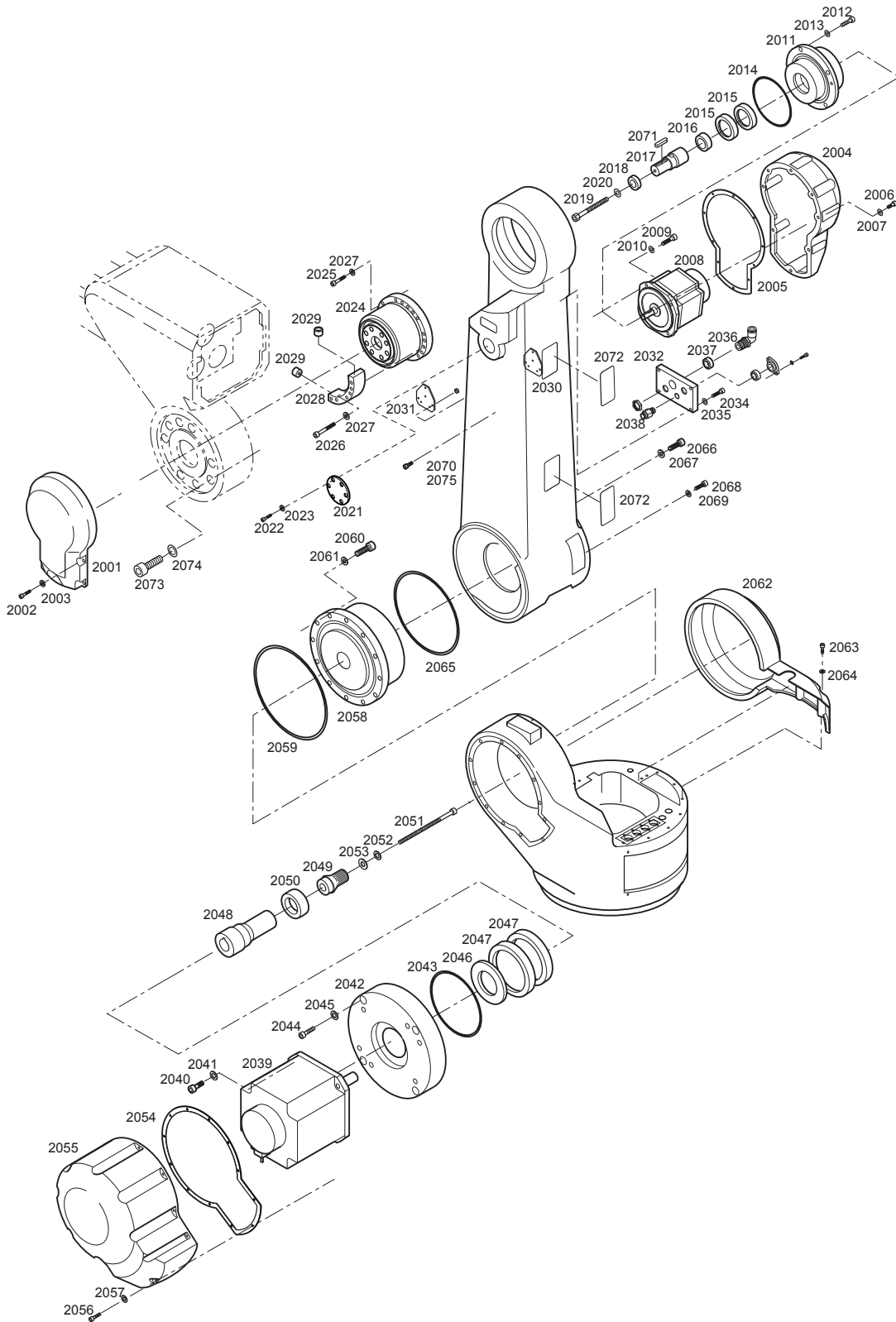
Rank	Part No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Sealing compound	DB-1600	Diabond Industries Co., Ltd.	200 ml	-	For packing
A	2	Sealant	1104	Three Bond Co., Ltd.	200g	1	For plug seal
A	3	Grease	Alvania EP grease 2	Showa Oil Co., Ltd.	16 kg	-	For the S-axis cross roller bearing and the bevel gear in wrist
A	4	Grease	Molywhite RE No. 00	Yaskawa Electric Corporation	16 kg	-	For RV speed reducer
A	5	Grease	Harmonic grease 4B-No. 2	Harmonic Drive Systems Co., Ltd.	2.5 kg	-	For Harmonic Drive speed reducer
A	6	Lubricating oil	Renolin PG220	Fuchs Lubricants Co.	10 l	-	Alpha Getriebebau speed reducer
A	7	S-axis speed reducer	HW9482862-A	Yaskawa Electric Corporation	1	1	
B	8	L-axis speed reducer	HW9381465-A	Yaskawa Electric Corporation	1	1	
B	9	U-axis speed reducer	HW9482864-A	Yaskawa Electric Corporation	1	1	
B	10	R-, and B-axes speed reducers	HW9482863-A	Yaskawa Electric Corporation	1	2	
B	11	T-axes speed reducers	HW0480040-A	Yaskawa Electric Corporation	1	1	
B	12	Gear unit	HW9271289-B	Yaskawa Electric Corporation	1	1	
B	13	Wrist unit	HW9171288-D	Yaskawa Electric Corporation	1	1	
C	14	AC servomotos for S- and U-axes	HW0380187-A	Yaskawa Electric Corporation	1	2	
C	15	AC servomotos for L-axis	HW0380188-A	Yaskawa Electric Corporation	1	1	
C	16	AC servomotos for R-, B-, and T-axes	HW0380189-A	Yaskawa Electric Corporation	1	3	
C	17	Switch unit	HW0370243-A	Yaskawa Electric Corporation	1	1	Pressure switch
C	18	Internal cable	HW0270145-A	Yaskawa Electric Corporation	1	1	For S- and L-axis
C	19	Internal cable	HW0270144-A	Yaskawa Electric Corporation	1	1	For U-axis
C	20	Internal cable	HW0270231-A	Yaskawa Electric Corporation	1	1	For R-, B-, and T-axis
C	21	Internal cable	HW0470122-A	Yaskawa Electric Corporation	1	1	Battery Cable

# 11 Parts List

## 11.1 Parts List(PX2750-B30)

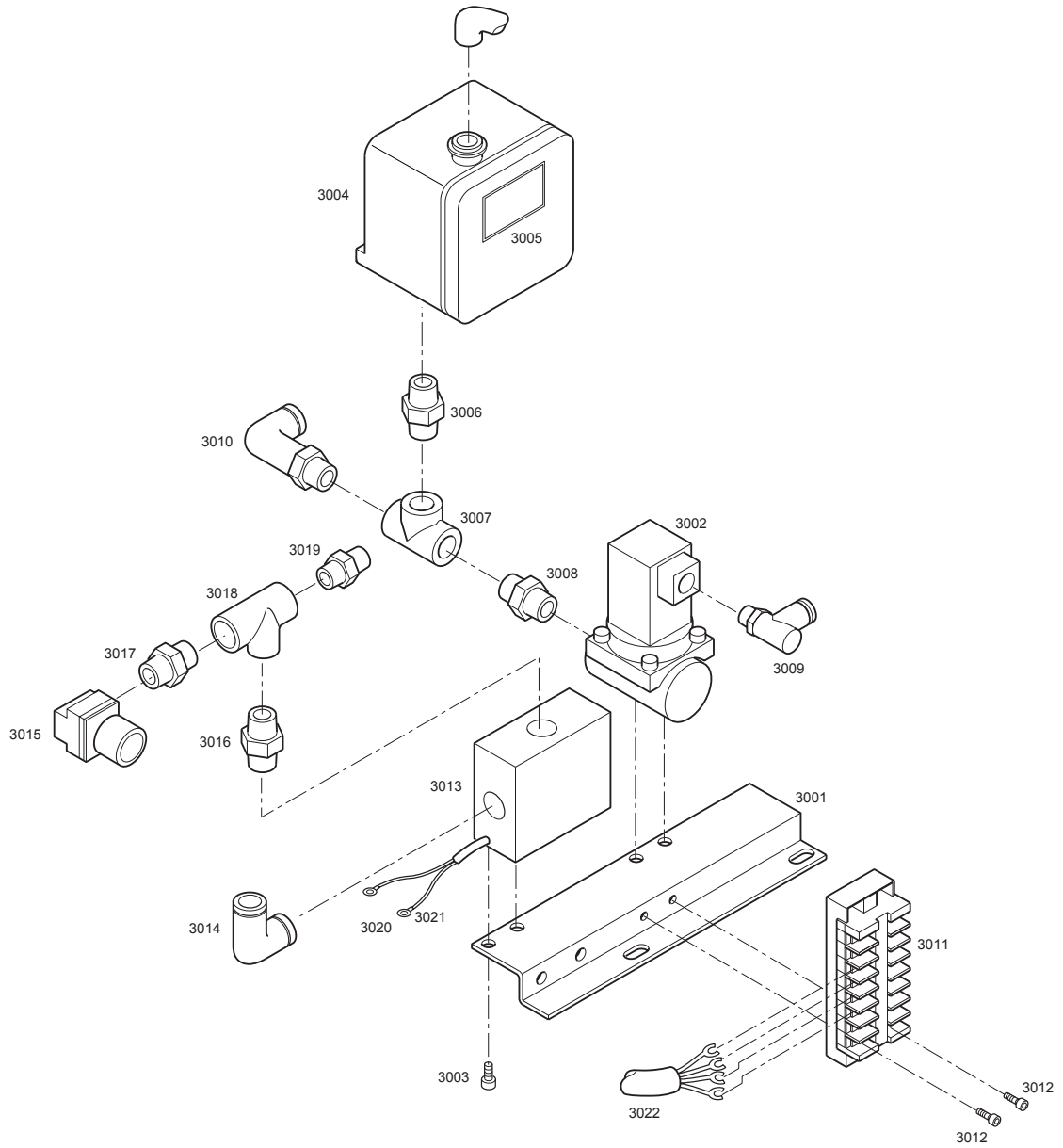


No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
1001	HW0200092-1	Cover	1	1060			
1002	HW0400638-1	Packing	1	1061	HW9101045-1	Box	1
1003	M6 × 20	Socket screw	5	1062	HW9201046-1	Cover	1
1004	2H-6	Spring washer	5	1063	M6 × 10	Socket screw	4
1005	SGMDH-12A2A-YRA1	Motor	1	1064			
1006	M8 × 25	Socket screw	4	1065	HW0370243-A	Switch unit	1
1007	2H-8	Spring washer	4	1066	M6 × 10	Bolt	2
1008	HW0300362-1	Frange	1	1067	HW0400886-2	Cover	1
1009	PT1/8	Plug	1	1068	M6 × 10	Socket screw	14
1010	M12 × 35	Socket screw	4	1069			
1011	2H-12	Spring washer	4	1070	HW0400886-1	Cover	1
1012	HW9302732-1	Frange	1	1071	TP-6-0.3	Tube	1
1013	AS568-172	O-ring	1	1072	T50R	Insulock' tie	1
1014	M6 × 100	Bolt	1	1073	M5 × 10	APS bolt	1
1015	AS568-274	O-ring	1	1074	HW0300628-1	Cover	1
1016	Y507212.5	Oil seal	2	1075	HW9406056-1	Packing	1
1017	HW0400429-A	Shaft	1	1076	KQVD10-04S	Joint	1
1018	HW0400470-1	Coller	1	1077	HW9406055-4	Packing	1
1019	HW0300199-1	Gear	1	1078	HW0400420-1	Packing	1
1020	HW9481343-A	Shaft	1	1079	HW9406054-1	Holder	1
1021	HW0400243-1	Bolt	1	1080	HW0400424-1	Frange	1
1022				1081	M5 × 12	Socket screw	18
1023	M6	Washer	1	1082	2H-5	Spring washer	18
1024	HW9482862	Reduction gear	1	1083	M6 × 25	Socket screw	4
1025	M10 × 70	Bolt	12	1084	2H-6	Spring washer	8
1026	2H-10	Spring washer	12	1085	M6 × 20	Bolt	2
1027	PT3/8	Plug	1	1086			
1028	M16	Nut	1	1087			
1029	HW9302740-1	Jig(1)	1	1088	SLE-062V	Union	2
1030	HW9406057-1	Jig(2)	1	1089	A-PT1/4	G nipple	1
1031	STW-15	C stopper	1	1090	M6 × 20	Bolt	2
1032				1091	2H-6	Spring washer	2
1033				1092			
1034				1093	HW9302733-1	Holder(A)	1
1035				1094	M8 × 35	Bolt	16
1036	HW0100034	Base	1	1095	HW9482861-E	Bearing	1
1037	HW9406052-1	Cover	1	1096	HW9302734-1	Holder(B)	1
1038	M6 × 10	Socket screw	4	1097	M8 × 35	Bolt	14
1039	2H-6	Spring washer	4	1098	2H-8	Spring washer	14
1040				1099	HW9302735-1	Stopper	1
1041				1100	M8 × 50	Bolt	3
1042				1101	M6	Washer	3
1043	HW0400422-1	Frange	1	1102	HW0400885-1	Cover	1
1044	HW0400442-1	Packing	1	1103	HW0400885-2	Cover	1
1045	M4 × 25	Socket screw	4				
1046	2H-4	Spring washer	4				
1047	HW9406054-1	Holder	4				
1048	HW9406055-4	Packing	4				
1049	M5 × 25	Socket screw	4				
1050	2H-5	Spring washer	4				
1051	KQLE10-00	Joint	2				
1052	SW-16	Packing	2				
1053	HW9406050-1	Block	4				
1054	M6 × 20	Socket screw	8				
1055	M16	l bolt	2				
1056	HW9406114-1	Bolt	1				
1057	HW9406053-1	Clamp	2				
1058	M6 × 10	Socket screw	4				
1059	2H-6	Spring washer	4				



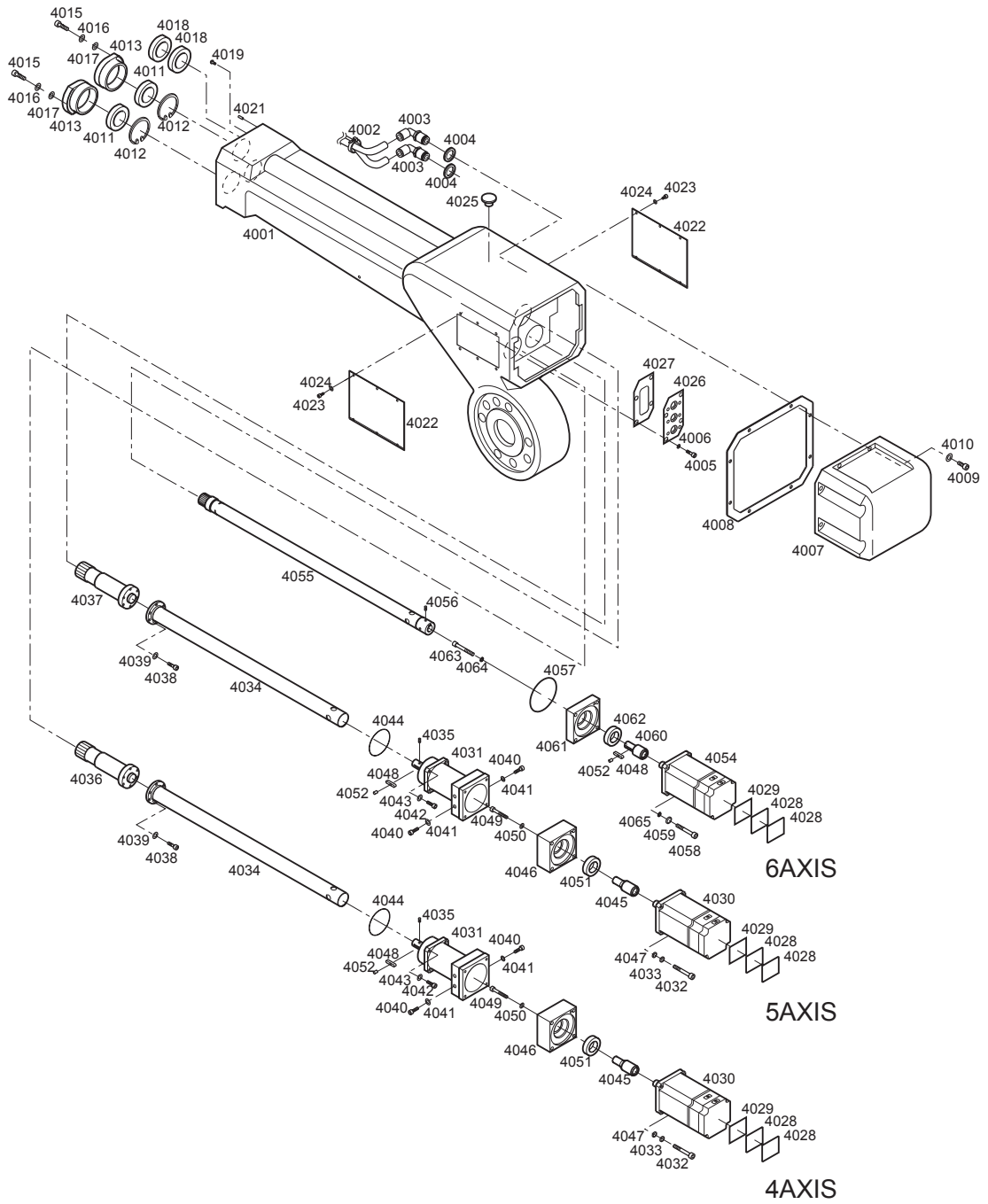


No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
2001	HW9201018-1	Cover	1	2060	M12 × 50	Socket screw	16
2002	M6 × 20	Socket screw	3	2061	2H-12	Spring washer	16
2003	2H-6	Spring washer	3	2062	HW9201044-1	Cover	1
2004	HW0200094-1	Cover	1	2063	M6 × 20	Bolt	2
2005	HW9302786-1	Packing	1	2064	2H-6	Spring washer	2
2006	M6 × 20	Socket screw	10	2065	HW9406015-1	O ring	1
2007	2H-6	Spring washer	10	2066	M16 × 60	Socket screw	6
2008	SGMDH-12A2A-YRA1	Motor	1	2067	2H-16	Spring washer	6
2009	M8 × 25	Socket screw	4	2068	M10 × 50	Socket screw	18
2010	2H-8	Spring washer	4	2069	2H-10	Spring washer	18
2011	HW0300367	Frange	1	2070	HW0100036-1	Arm	1
2012	M12 × 35	Socket screw	4	2071	KES8-35	Key	1
2013	2H-12	Spring washer	4	2072	HW9406135-1	Cover	4
2014	AS568-172	O ring	1	2073	M16 × 45	Bolt	8
2015	Y355212.5	Oil seal	2	2074	2H-16	Spring washer	8
2016	HW0400470-1	Coller	1	2075	HW9100845-1	Arm	1
2017	HW0300368-1	Shaft	1				
2018	HW0400471-1	Washer	1				
2019	M6 × 80	Socket screw	1				
2020	2H-6	Spring washer	1				
2021	HW0400739	Plate	1				
2022	M16 × 45	Socket screw	8				
2023	2H-16	Spring washer	8				
2024	HW9482864-A	Reduction gear	1				
2025	M12 × 45	Socket screw	6				
2026	M12 × 70	Socket screw	4				
2027	2H-12	Spring washerr	10				
2028	HW9302787-1	Stopper	1				
2029	HW9406016	Gum plate	2				
2030	HW0400483-1	Plate	1				
2031	HW0400483-2	Plate	1				
2032	HW9302679-1	Cover	1				
2033							
2034	M6 × 25	Socket screw	4				
2035	2H-6	Spring washer	4				
2036	KQLE10-00	Joint	1				
2037	SW-16	Packing	1				
2038	KQH10-02S	H union	1				
2039	SGMGH-30A2A-YRA1	Motor	1				
2040	M12 × 35	Socket screw	4				
2041	2H-12	Spring washer	4				
2042	HW0300363-1	Frange	1				
2043	AS568-168	O ring	1				
2044	M12 × 50	Socket screw	4				
2045	2H-12	Spring washer	4				
2046	HW0400738-1	Coller	1				
2047	Y507212.5	Oil seal	2				
2048	HW0300360-1	Shaft	1				
2049	HW9482318-A	Gear	1				
2050	HW9481343-A	Shaft	1				
2051	M8 × 150	Bolt	1				
2052	2H-8	Spring washer	1				
2053	M8	Washer	1				
2054	HW9302730-1	Packing	1				
2055	HW0200093-1	Cover	1				
2056	M6 × 20	Socket screw	10				
2057	2H-6	Spring washer	10				
2058	HW9381465-A	Reduction gear	1				
2059	G270	O ring	1				

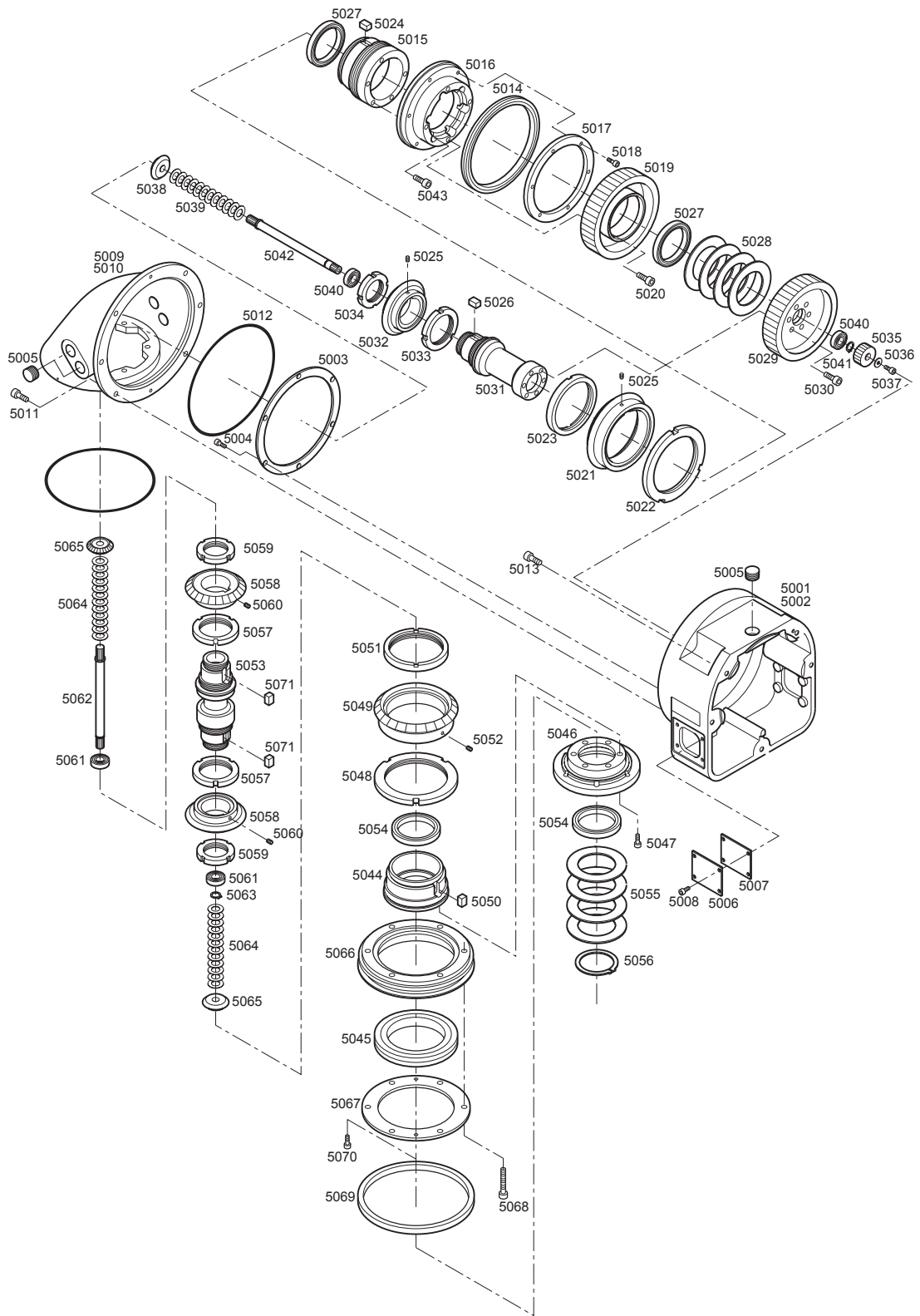


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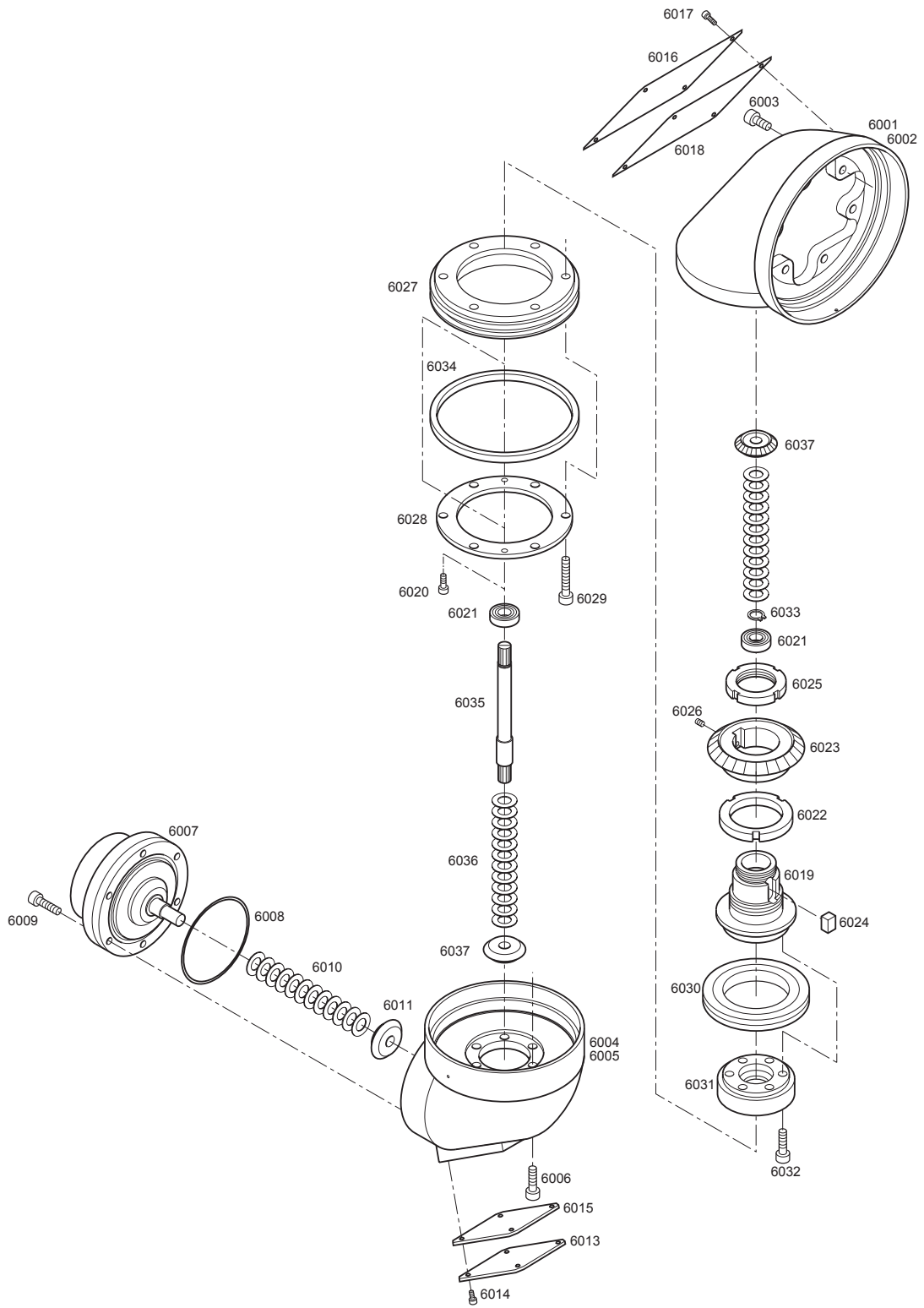
No.	DWG No.	Name	Pcs
3001	HW9302757-3	Plate	1
3002	VXA2260-04	Solenoid	1
3003	M5 × 10	Socket screw	1
3004	DG-50U	Switch	1
3005	NJ2139-1	NP	1
3006	PT1/4	Nipple	1
3007	PT1/4	Tees	1
3008	1/2 × 1/4	Nipple	1
3009	KQL06-01S	Joint	1
3010	KQH10-02S	Half union	1
3011	BD8-MB11	Terminal plate	1
3012	M4 × 12	Head machine screws with washer	2
3013	M-200-A31	Switch	1
3014	KQL10-03S	Union	1
3015	AP100-02-X201	Pressure regula- tion	1
3016	PT3/8	Nipple	1
3017	3/8 x 1/4	Nipple	1
3018	PT3/8	Tees	1
3019	KQH10-03S	Half union	1
3020	A terminal 0.5-3	Terminal	2
3021	Marker tube	Marker tube	2
3022	HW0370344-A	Cable assembly	1



No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
4001	HW9101009-1	Arm	1	4057	CO-0544A	O ring	1
4002	T50R	Insulock' tie	1	4058	M5 × 40	Socket screw	4
4003	KQLE10-00	Joint	2	4059	2H-5	Spring washer	4
4004	SW-36	Packing	2				
4005	M5 × 25	Bolt	8				
4006	2H-5	Spring washer	8				
4007	HW9201020-1	Cover	1				
4008	HW9302785-1	Packing	1				
4009	M6 × 20	Socket screw	8				
4010	2H-6	Spring washer	8				
4011	6907ZZ	Bearing	2				
4012	RTW-55	C stopper	2				
4013	HW9302682-1	Holder	2				
4014							
4015	M6 × 25	Socket screw	4				
4016	2H-6	Spring washer	4				
4017	M6	Washer	4				
4018	6906ZZ	Bearing	2				
4019	M4 × 8	Pan head screw	2				
4020							
4021	4MM × 10	Pin	2				
4022	HW9405702-1	Cover	2				
4023	M4 × 8	Socket screw	12				
4024	2H-4	Spring washer	12				
4025	HW9406176-1	Stopper	1				
4026	HW0400588-1	Packing	1				
4027	HW0400587-1	Frange	1				
4028	HW9482404-1	Seat	6				
4029	HW9482408-1	Seat	3				
4030	SGMPH-04A1A-YR61	Motor	2				
4031	HW9482863-A	Reduction gear	2				
4032	M5 × 55	Socket Screw	8				
4033	2H-5	Spring washer	8				
4034	HW9302724-B	Rod	2				
4035	M4 × 8	H set screw	2				
4036	HW9302714-1	Gear	1				
4037	HW9302715-1	Gear	1				
4038	M4 × 16	Socket screw	12				
4039	2H-4	Spring washer	12				
4040	M4 × 16	Bolt	4				
4041	2H-4	Spring washer	4				
4042	M5 × 16	Socket screw	8				
4043	2H-5	Spring washer	8				
4044	HW9406015-2	O ring	1				
4045	HW0400440-2	Shaft	2				
4046	HW0400439-2	Frange	2				
4047	M5	Washer	8				
4048	HW0400326-1	Key process	3				
4049	M5 × 55	Socket screw	2				
4050	2H-5	Spring washer	2				
4051	AD22327	Oil seal	2				
4052	M6 × 8	Screw	3				
4053							
4054	SGMPH-04A1A-YR61	Motor	1				
4055	HW9302725-A	Rod	1				
4056	M4 × 8	H set screw	1				



No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
5001	HW9201013-1	Gear case	1	5061	6900ZZ	Bearing	2
5002	HW9201014-1	Gear case	1	5062	HW9302700-1	Jig	1
5003	HW9406047-1	Holder	1	5063	STW-10	C stopper	1
5004	M4 × 12	Socket screw	6	5064	BD-19B	Spring	30
5005	PT3/8	Plug	4	5065	HW9302808-1	Gear	2
5006	HW9406067-1	Cover	2	5066	HW9302701-1	Frange	1
5007	HW9406068-1	Packing	2	5067	HW9406031-1	Holder	1
5008	M4 × 8	Socket screw	8	5068	M6 × 35	Socket screw	6
5009	HW9101007-2	Case	1	5069	X428	X ring	1
5010	HW9101006-1	Case	1	5070	M4 × 12	Socket screw	2
5011	M6 × 16	Socket screw	6	5071	HW0401105-1	Key	2
5012	S145	O ring	1				
5013	M6 × 25	Socket screw	5				
5014	RA11008CUUCCO	Bearing	1				
5015	HW9302707-2	Jig	1				
5016	HW9302709-2	Frange	1				
5017	HW9406033-1	Holder(1)	1				
5018	M4 × 12	Socket screw	6				
5019	HW9302703-2	Gear	1				
5020	M6 × 16	Socket screw	8				
5021	HW9302705-1	Gear	1				
5022	HW9406034-1	Nut	1				
5023	HW9406035-1	Nut	1				
5024	HW9406106-1	Key	1				
5025	M4 × 6	H set screw	2				
5026	HW0401105-1	Key	1				
5027	6809ZZ	Bearing	2				
5028	BD-72A	Spring	5				
5029	HW9302702-2	Gear	1				
5030	M6 × 16	Socket screw	10				
5031	HW9302706-2	Jig	1				
5032	HW9302704-1	Gear	1				
5033	HW9406030-1	Nut	1				
5034	AN06	B nut	1				
5035	HW9406065-1	Gear	1				
5036	HW9406096-1	Coller	1				
5037	M4 × 8	Socket screw	1				
5038	HW9302808-1	Gear	1				
5039	BD-19B	Spring	15				
5040	6900ZZ	Bearing	2				
5041	STW-10	C stopper	1				
5042	HW9302708-1	Jig	1				
5043	M6 × 16	Socket screw	8				
5044	HW9302688-2	Jig	1				
5045	HW9482861-C	Bearing	1				
5046	HW9302698-2	Frange	1				
5047	M6 × 12	Socket screw	12				
5048	HW9406034-1	Nut	1				
5049	HW9302705-1	Gear	1				
5050	HW9406106-1	Key	1				
5051	HW9406035-1	Nut	1				
5052	M4 × 6	H set screw	1				
5053	HW9302699-1	Jig	1				
5054	6809ZZ	Bearing	2				
5055	BD-72A	Spring	5				
5056	STW-45	C stopper	1				
5057	HW9406030-1	Nut	2				
5058	HW9302704-1	Gear	2				
5059	AN06	B nut	2				
5060	M4 × 6	H set screw	2				

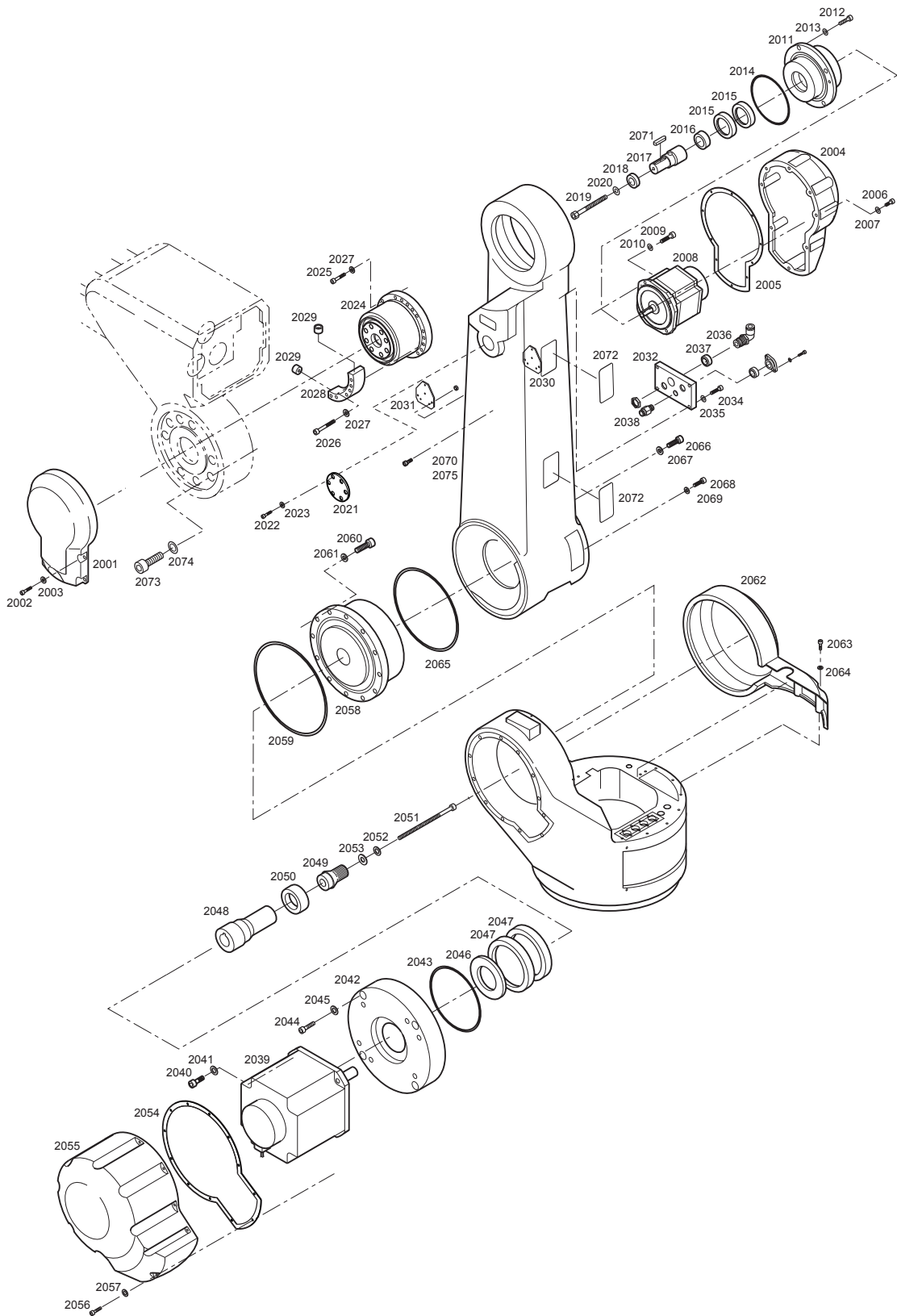




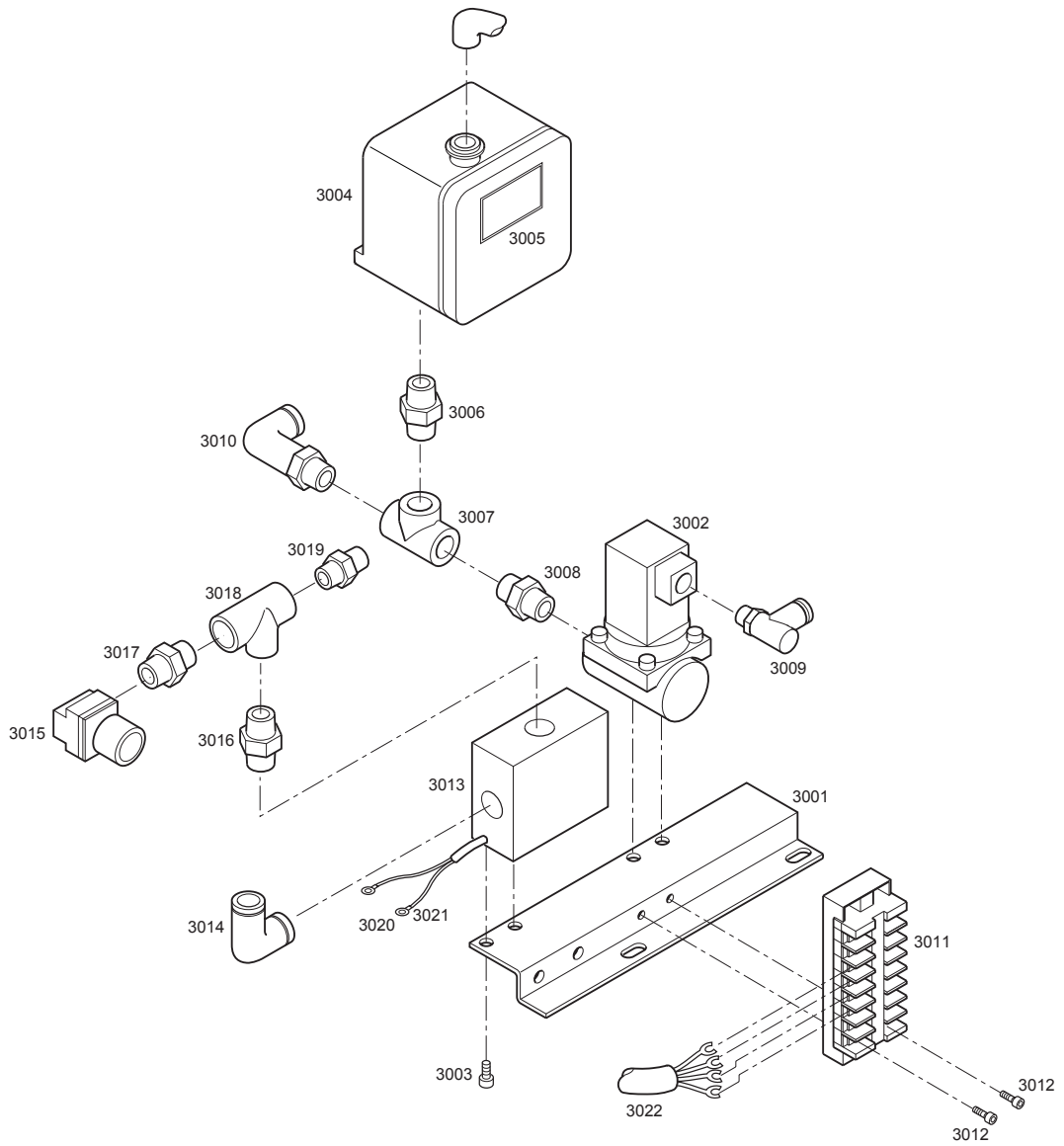
No.	DWG No.	Name	Pcs
6001	HW9101014-2	Case	1
6002	HW9101012-1	Case	1
6003	M6 × 16	Socket screw	6
6004	HW9101015-2	Case	1
6005	HW9101013-1	Case	1
6006	M6 × 16	Socket screw	8
6007	HW0480040-A	Reduction gear	1
6008	S67	O ring	1
6009	M5 × 25	Socket screw	6
6010	BD-19B	Spring	15
6011	HW9302808-1	Gear	1
6012			
6013	HW9406166-1	Cover	1
6014	M4 × 8	Socket screw	4
6015	HW9406101-1	Packing	1
6016	HW9306102-1	Cover	1
6017	M4 × 8	Socket screw	4
6018	HW9406103-1	Packing	1
6019	HW9302750-2	Jig	1
6020	M4 × 12	Socket screw	2
6021	6900ZZ	Bearing	2
6022	HW9406030-1	Nut	1
6023	HW9302704-1	Gear	1
6024	HW0401105-1	Key	1
6025	AN06	B nut	1
6026	M4 × 6	H set screw	1
6027	HW9302752-1	Frange	1
6028	HW9406085-1	Holder	1
6029	M6 × 30	Socket screw	6
6030	RB5013UUCC0	Bearing	1
6031	HW0300587-1	Frange	1
6032	M6 × 20	Socket screw	8
6033	STW-10	C stopper	1
6034	X345	X ring	1
6035	HW9302753-1	Jig	1
6036	BD-19B	Spring	30
6037	HW9302808-1	Gear	2



No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
1001	HW0200092-1	Cover	1	1061	HW9101045-1	Box	1
1002	HW0400638-1	Packing	1	1062	HW9201046-1	Cover	1
1003	M6 × 20	Socket screw	5	1063	M6 × 10	Socket screw	4
1004	2H-6	Spring washer	5	1064			
1005	SGMDH-12A2A-YRA1	Motor	1	1065	HW0370243-A	Switch unit	1
1006	M8 × 25	Socket screw	4	1066	M6 × 10	Bolt	2
1007	2H-8	Spring washer	4	1067	HW0400886-2	Cover	1
1008	HW0300362-1	Frange	1	1068	M6 × 10	Socket screw	14
1009	PT1/8	Plug	1	1069			
1010	M12 × 35	Socket screw	4	1070	HW0400886-1	Cover	1
1011	2H-12	Spring washer	4	1071	TP-6-0.3	Tube	1
1012	HW9302732-1	Frange	1	1072	T50R	Insulock' tie	1
1013	AS568-172	O-ring	1	1073	M5 × 10	APS bolt	1
1014	M6 × 100	Bolt	1	1074	HW0300628-1	Cover	1
1015	AS568-274	O-ring	1	1075	HW9406056-1	Packing	1
1016	Y507212.5	Oil seal	2	1076	KQVD10-04S	Joint	1
1017	HW0400429-1	Shaft	1	1077	HW9406055-4	Packing	1
1018	HW0400470-1	Coller	1	1078	HW0400420-1	Packing	1
1019	HW0300199-1	Gear	1	1079	HW9406054-1	Holder	1
1020	HW9481343-A	Shaft	1	1080	HW0400420-1	Frange	1
1021	HW0400243-1	Bolt	1	1081	M5 × 12	Socket screw	18
1022				1082	2H-5	Spring washer	18
1023	M6	Washer	1	1083	M6 × 25	Socket screw	4
1024	HW9482862	Reduction gear	1	1084	2H-6	Spring washer	8
1025	M10 × 70	Bolt	12	1085	M6 × 20	Bolt	2
1026	2H-10	Spring washer	12	1086			
1027	PT3/8	Plug	1	1087			
1028	M16	Nut	1	1088	SLE-062V	Union	2
1029	HW9302740-1	Jig(1)	1	1089	A-PT1/4	G nipple	1
1030	HW9406057-1	Jig(2)	1	1090	M6 × 20	Bolt	2
1031	STW-15	C stopper	1	1091	2H-6	Spring washer	2
1032				1092			
1033				1093	HW9302733-1	Holder(A)	1
1034				1094	M8 × 35	Bolt	16
1035				1095	HW9482861-E	Bearing	1
1036	HW0100034	Base	1	1096	HW9302734-1	Holder(B)	1
1037	HW9406052-1	Cover	1	1097	M8 × 35	Bolt	14
1038	M6 × 10	Socket screw	4	1098	2H-8	Spring washer	14
1039	2H-6	Spring washer	4	1099	HW9302735-1	Stopper	1
1040				1100	M8 × 50	Bolt	3
1041				1101	M6	Washer	3
1042				1102	HW0400885-1	Cover	1
1043	HW0400422-1	Frange	1	1103	HW0400885-2	Cover	1
1044	HW0400442-1	Packing	1				
1045	M4 × 25	Socket screw	4				
1046	2H-4	Spring washer	4				
1047	HW9406054-1	Holder	4				
1048	HW9406055-4	Packing	4				
1049	M5 × 12	Socket screw	4				
1050	2H-5	Spring washer	4				
1051	KQLE10-00	Joint	2				
1052	SW-16	Packing	2				
1053	HW9406050-1	Block	4				
1054	M6 × 20	Socket screw	8				
1055	M16	I bolt	2				
1056	HW9406114-1	Bolt	1				
1057	HW9406053-1	Clamp	2				
1058	M6 × 10	Socket screw	4				
1059	2H-6	Spring washer	4				
1060							

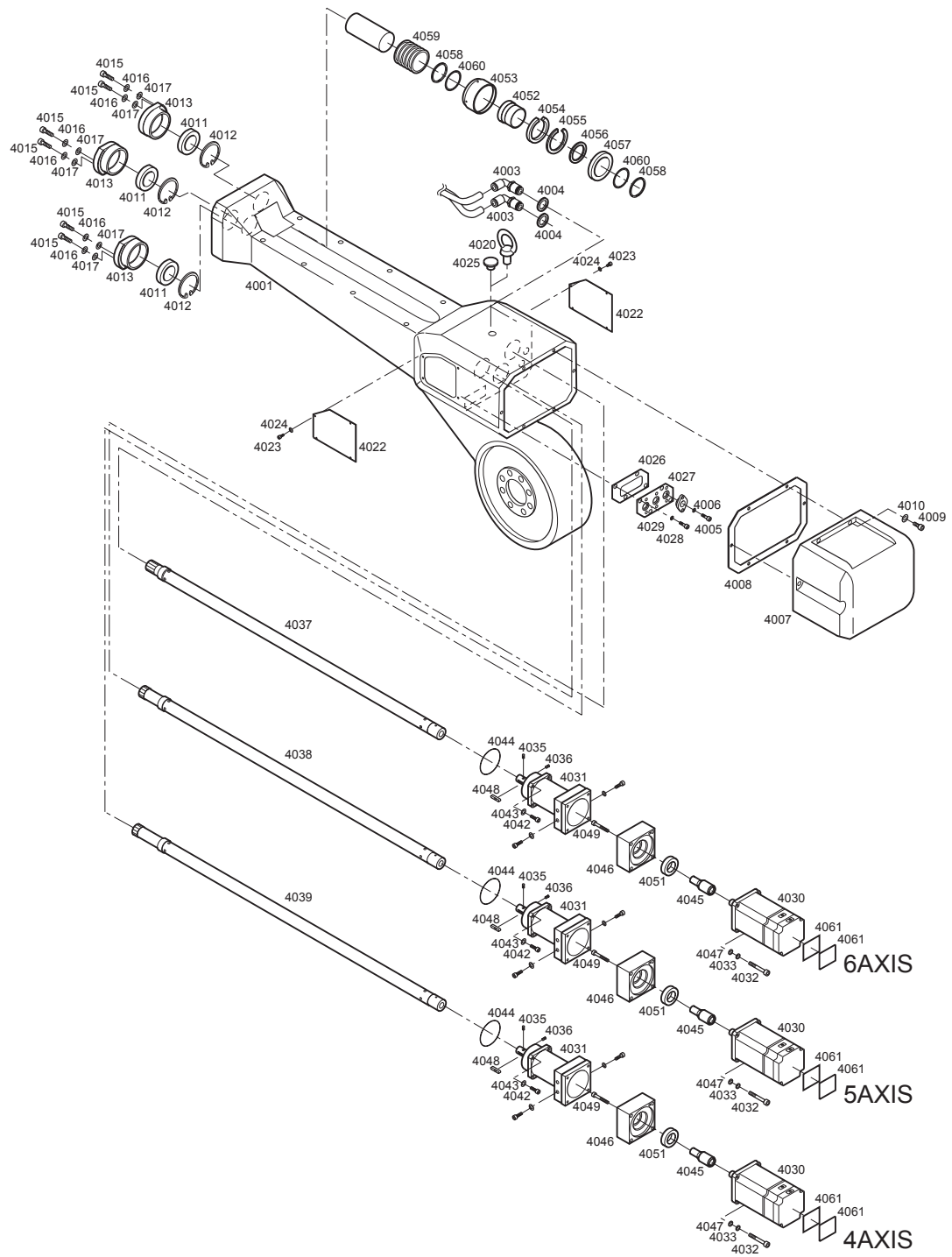


No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
2001	HW9201018-1	Cover	1	2061	2H-12	Spring washer	16
2002	M6 × 20	Socket screw	3	2062	HW9201044-1	Cover	1
2003	2H-6	Spring washer	3	2063	M6 × 20	Bolt	2
2004	HW0200094-1	Cover	1	2064	2H-6	Spring washer	2
2005	HW9302786-1	Packing	1	2065	HW9406015-1	O ring	1
2006	M6 × 20	Socket screw	10	2066	M16 × 60	Socket screw	6
2007	2H-6	Spring washer	10	2067	2H-16	Spring washer	6
2008	SGMDH-12A2A-YRA1	Motor	1	2068	M10 × 50	Socket screw	18
2009	M8 × 25	Socket screw	4	2069	2H-10	Spring washer	18
2010	2H-8	Spring washer	4	2070	HW9100809-1	Arm	1
2011	HW0300367	Frange	1	2071	KES8-35	Key	1
2012	M12 × 35	Socket screw	4	2072	HW9406135-1	Cover	4
2013	2H-12	Spring washer	4	2073	M16 × 45	Bolt	8
2014	AS568-172	O ring	1	2074	2H-16	Spring washer	8
2015	Y355212.5	Oil seal	2	2075	HW9100845-1	Arm	1
2016	HW0400470-1	Coller	1				
2017	HW0300368-1	Shaft	1				
2018	HW0400471-1	Washer	1				
2019	M6 × 80	Socket screw	1				
2020	2H-6	Spring washer	1				
2021	HW0400739	Plate	1				
2022	M16 × 45	Socket screw	8				
2023	2H-16	Spring washer	8				
2024	HW9482864-A	Reduction gear	1				
2025	M12 × 45	Socket screw	6				
2026	M12 × 70	Socket screw	4				
2027	2H-12	Spring washerr	10				
2028	HW9302787-1	Stopper	1				
2029	HW9406016	Gum plate	2				
2030	HW0400483-1	Plate	1				
2031	HW0400483-3	Plate	1				
2032	HW9302679-1	Cover	1				
2033							
2034	M6 × 25	Socket screw	4				
2035	2H-6	Spring washer	4				
2036	KQLE10-00	Joint	1				
2037	SW-16	Packing	1				
2038	KQH10-02S	H union	1				
2039	SGMGH-30A2A-YRA1	Motor	1				
2040	M12 × 35	Socket screw	4				
2041	2H-12	Spring washer	4				
2042	HW0300362-1	Frange	1				
2043	AS568-168	O ring	1				
2044	M12 × 50	Socket screw	4				
2045	2H-12	Spring washer	4				
2046	HW0400738-1	Coller	1				
2047	Y507212.5	Oil seal	2				
2048	HW0300360-1	Shaft	1				
2049	HW9482318-A	Gear	1				
2050	HW9481343-A	Shaft	1				
2051	M8 × 150	Bolt	1				
2052	2H-8	Spring washer	1				
2053	M8	Washer	1				
2054	HW9302730-1	Packing	1				
2055	HW0200093-1	Cover	1				
2056	M6 × 20	Socket screw	10				
2057	2H-6	Spring washer	10				
2058	HW9381465-A	Reduction gear	1				
2059	G270	O ring	1				
2060	M12 × 50	Socket screw	16				



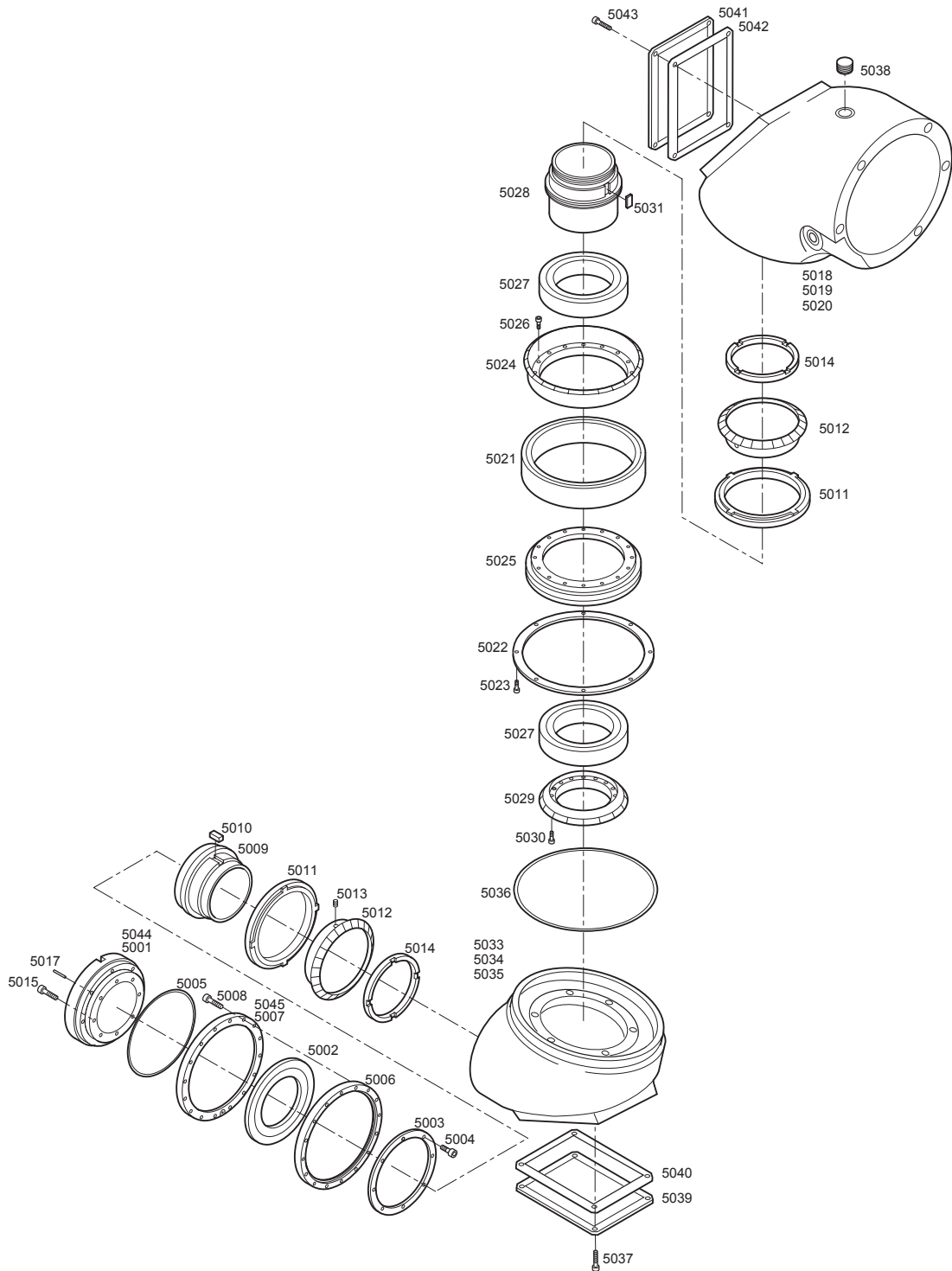
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No.	DWG No.	Name	Pcs
3001	HW9302757-3	Plate	1
3002	VXA2260-04	Solenoid	1
3003	M5 x 10	Socket screw	1
3004	DG-50U	Switch	1
3005	NJ2139-1	NP	1
3006	PT1/4	Nipple	1
3007	PT1/4	Tees	1
3008	1/2 x 1/4	Nipple	1
3009	KQL06-01S	Joint	1
3010	KQH10-02S	Half union	1
3011	BD8-MB11	Terminal plate	1
3012	M4 x 12	Head machine screws with washer	2
3013	M-200-A31	Switch	1
3014	KQL10-03S	Union	1
3015	AP100-02-X201	Pressure regulation	1
3016	PT3/8	Nipple	1
3017	3/8 x 1/4	Nipple	1
3018	PT3/8	Tees	1
3019	KQH10-03S	Half union	1
3020	A terminal 0.5-3	Terminal	2
3021	Marker tube	Marker tube	2
3022	HW0370344-A	Cable assembly	1

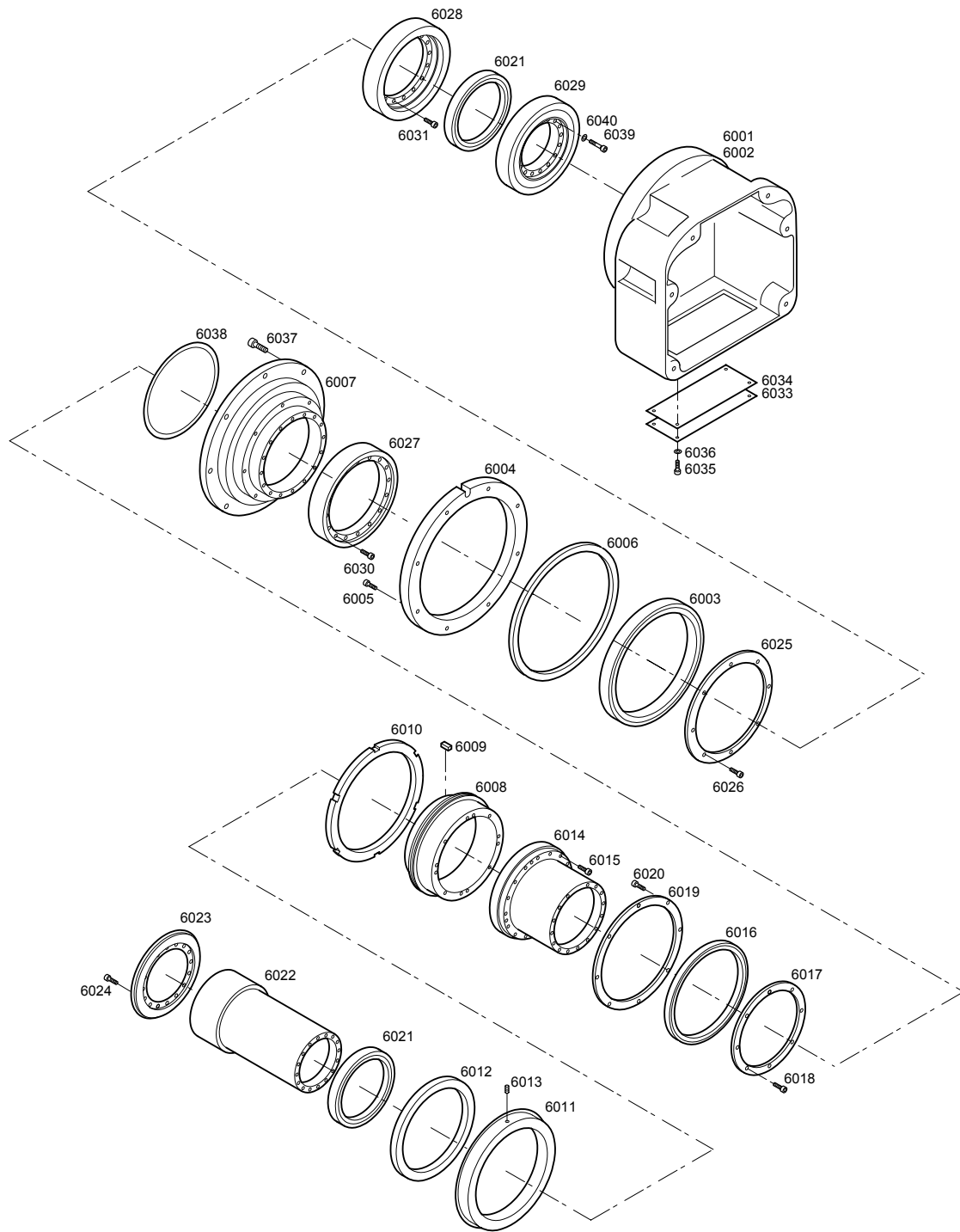




No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
4001	HW9101056-1	Arm	1	4061	HW9482404-A	Seat	6
4002							
4003	KQLE10-00	Joint	2				
4004	SW-16	Packing	2				
4005	M5 × 12	Socket screw	6				
4006	2H-5	Spring washer	6				
4007	HW9201057-1	Case(Motor4)	1				
4008	HW9302774-1	Packing	1				
4009	M6 × 20	Socket screw	6				
4010	2H-6	Spring washer	6				
4011	6907ZZ	Bearing	3				
4012	RTW-55	C stopper	3				
4013	HW9302682-1	Holder	3				
4014							
4015	M6 × 25	Socket screw	6				
4016	2H-6	Spring washer	6				
4017	M6	Washer	6				
4018			2				
4019							
4020	M6	I Bolt	1				
4021							
4022	HW9406526-1	Cover	2				
4023	M4 × 10	Socket screw	8				
4024	2H-4	Spring washer	8				
4025	HW9406176-1	Stopper	1				
4026	HW0400588-1	Packing	1				
4027	HW0400587-1	Frage	1				
4028	M5X25	Socket screw	4				
4029	2H-5	Washer	4				
4030	SGMPH-04A1A-YR61	Motor	3				
4031	HW9482863-A	Reduction gear	3				
4032	M5 × 45	Socket Screw	12				
4033	2H-5	Spring washer	12				
4034							
4035	M4 × 8	H set screw	3				
4036	M6 × 8	H set screw	3				
4037	HW9302981-F	Pipe	3				
4038	HW9302981-E	Pipe	1				
4039	HW9302981-D	Pipe	1				
4040							
4041							
4042	M5 × 16	Socket screw	12				
4043	2H-5	Spring washer	12				
4044	HW9406015-1	O ring	3				
4045	HW0400440-1	Shaft	3				
4046	HW0400439-1	Frage	3				
4047	M5	Washer	12				
4048	HW0400326-1	Key process	3				
4049	M5 × 45	Socket screw	3				
4050							
4051	AD22327	Oil seal	3				
4052	HW0401021-1	Shaft	1				
4053	HW0400248-1	Housing	1				
4054	6811DDU	Bearing	1				
4055	AR72	C stopper	1				
4056	WR55	C stopper	1				
4057	GJ3055KO	Oil seal	1				
4058	ISTW-50	C stopper	2				
4059	NFL-50	Hose	1				
4060	S48	O ring	2				

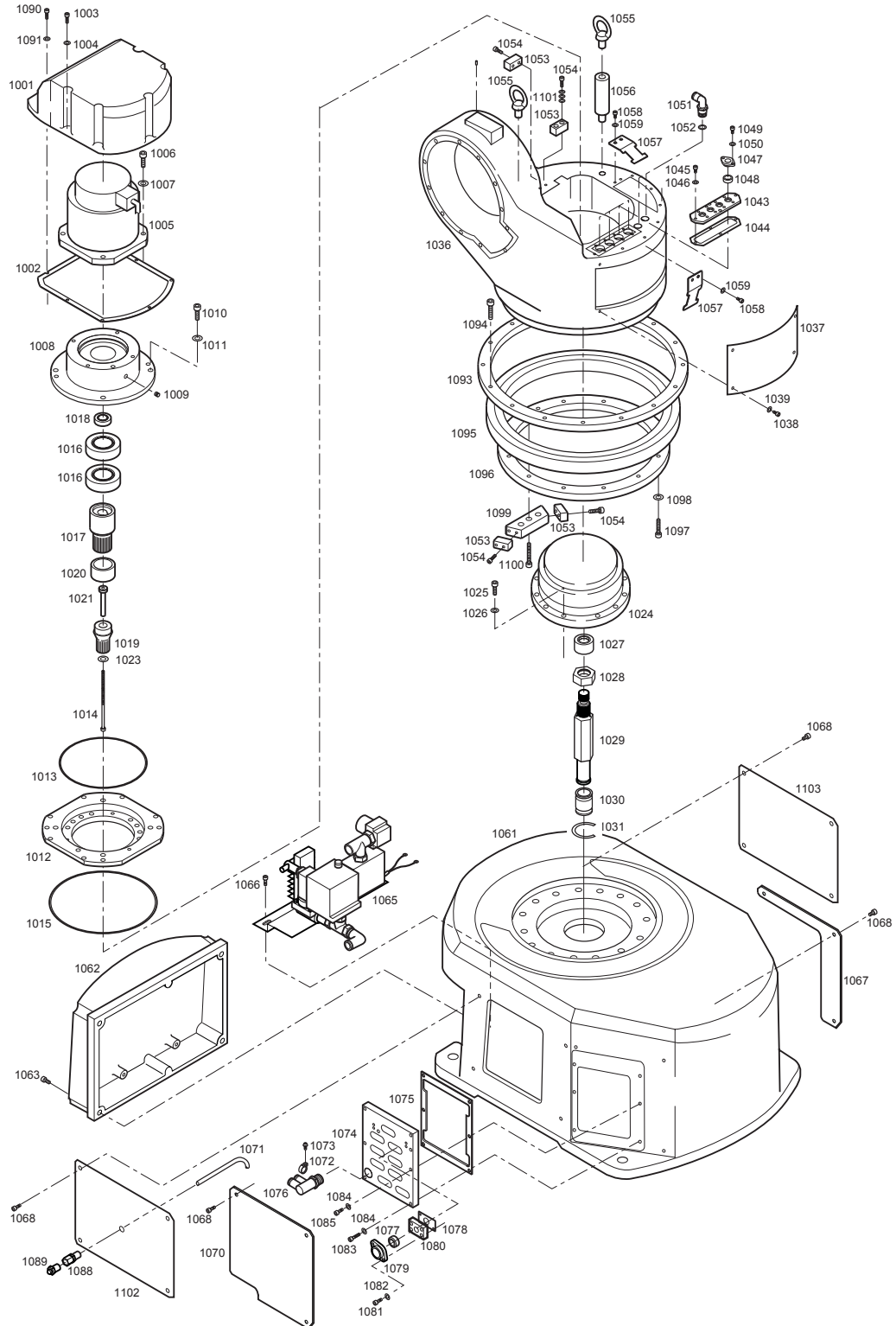


No.	DWG No.	Name	Pcs
5001	HW0400445-1	Frange	1
5002	HW9406544-2	Bearing	1
5003	HW9406545-1	Stopper(3)	1
5004	M4 × 16	Socket screw	8
5005	HW9302993-4	X ring	1
5006	HW9303008-1	Frange	1
5007	HW0400446-1	Stopper(7)	1
5008	M4 × 25	Socket screw	8
5009	HW0300454-2	Jig(63)	1
5010	HW9406541-2	Key	1
5011	HW9406535-1	Nut(4)	2
5012	HW9302992-1	Gear(B62)	2
5013	M4 × 8	H set screw	2
5014	HW9406536-1	Nut(3)	2
5015	M4 × 20	Socket screw	16
5016			
5017	4MM×10	Pin	2
5018	HW9101057-1	Case(1)	1
5019	HW9101058-1	Case(1)	1
5020	HW0400443-1	Case(1)	1
5021	HW9406531-3	Bearing	1
5022	HW0400512-1	Stopper(4)	1
5023	M4 × 10	Socket screw	8
5024	HW9302988-2	Gear(B52)	1
5025	HW9302989-2	Jig(53)	1
5026	M4 × 20	Bolt	16
5027	RB13015UU	Bearing	2
5028	HW9302990-2	Jig(62)	1
5029	HW0300455-2	Gear(B63)	1
5030	M4 × 10	Socket screw	16
5031	HW9406106-2	Key	1
5032			
5033	HW9101059-1	Case(2)	1
5034	HW9101060-1	Case(2)	1
5035	HW0400444-1	Case(2)	1
5036	X166	X ring	1
5037	M4 × 10	Socket screw	4
5038	PT3/8	Plug	4
5039	HW9406537-1	Cover(1)	1
5040	HW9406538-1	Packing(1)	1
5041	HW9406539-1	Cover(2)	1
5042	HW9406540-1	Packing(2)	1
5043	M4 × 10	Socket screw	4
5044	HW9303007-2	Frange	1
5045	HW9303009-1	Frange	1

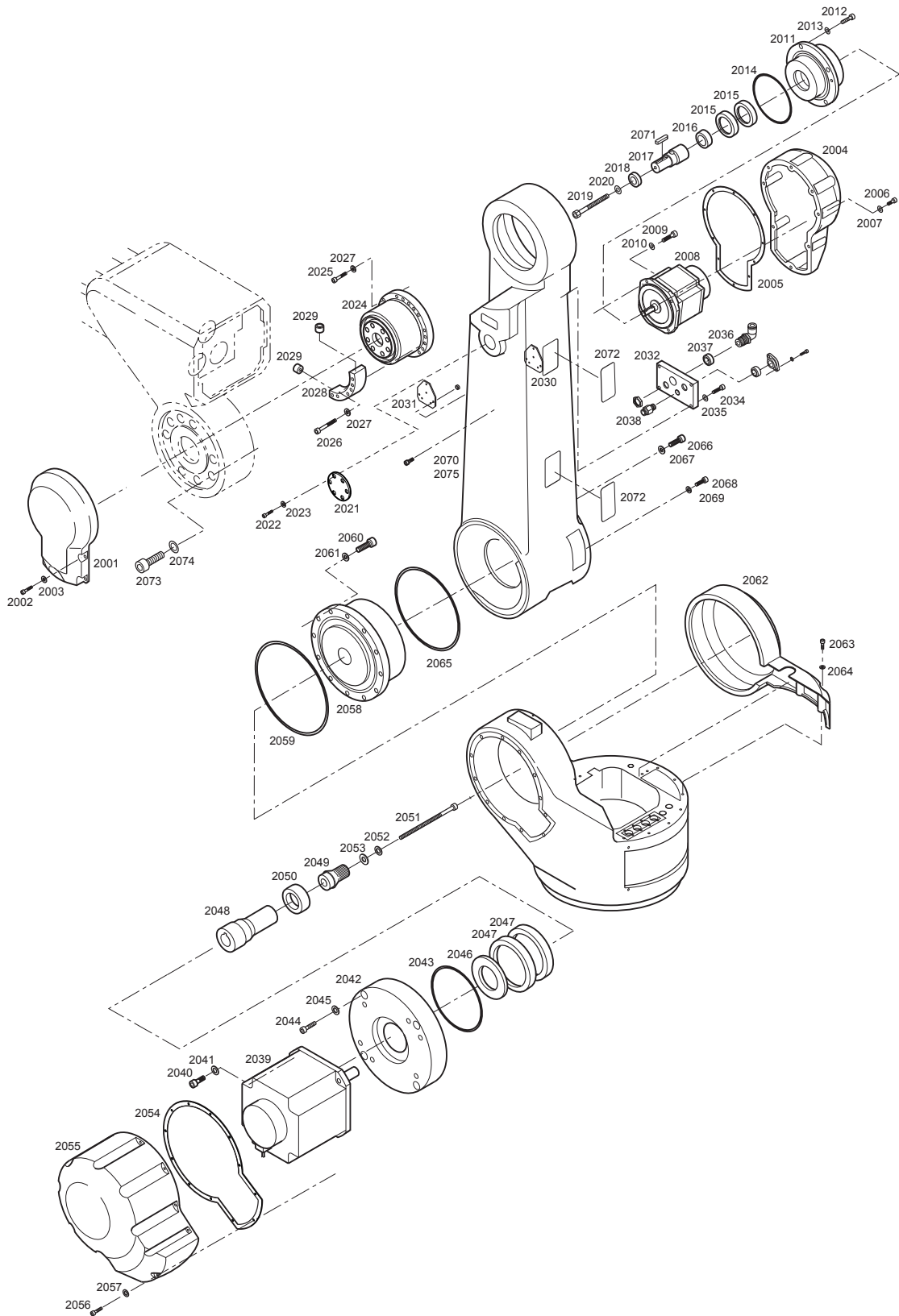


No.	DWG No.	Name	Pcs
6001	HW0200030-1	Gear Case	1
6002	HW0200031-1	Gear Case	1
6003	RB13015UU	Bearing	1
6004	HW0400447-1	Stopper(6)	1
6005	M4 × 16	Socket screw	8
6006	HW9302993-10	X ring	1
6007	HW0400448-1	Jig(4)	1
6008	HW9302998-2	Jig(52)	1
6009	HW9406106-2	Key	1
6010	HW9406542-1	Nut(2)	1
6011	HW9302999-1	Gear(B51)	1
6012	HW9406543-1	Nut(1)	1
6013	M4 × 8	H set screw	1
6014	HW9303000-2	Jig(51)	1
6015	M4 × 20	Socket screw	12
6016	RA11008CUUCCO	Bearing	1
6017	HW9406545-1	Stopper(3)	1
6018	M4 × 10	Socket screw	8
6019	HW9406546-1	Stopper(2)	1
6020	M4 × 10	Socket screw	8
6021	6815ZZ	Bearing	2
6022	HW9303001-2	Jig(61)	1
6023	HW9303002-2	Gear(B61)	1
6024	M4 × 10	Socket screw	16
6025	HW9406547-1	Stopper(1)	1
6026	M4 × 10	Socket screw	8
6027	HW9303003-2	Gear(S42)	1
6028	HW9303004-2	Gear(S52)	1
6029	HW9303005-2	Gear(S62)	1
6030	M4 × 20	Socket screw	16
6031	M4 × 10	Socket screw	16
6032			
6033	HW9406548-1	Cover(3)	1
6034	HW9406549-1	Packing(3)	1
6035	M4 × 10	Socket screw	4
6036	2H-4	Coned disc spring	4
6037	M6 × 25	Socket screw	6
6038	AS568-163	O ring	1
6039	M4 × 20	Socket screw	8
6040	2H-4	Coned disc spring	16
6041	HW9302996-1	Stopper(6)	1
6042	HW9302997-2	Stopper(6)	1

# 11.3 Parts List(PX2850-B20)

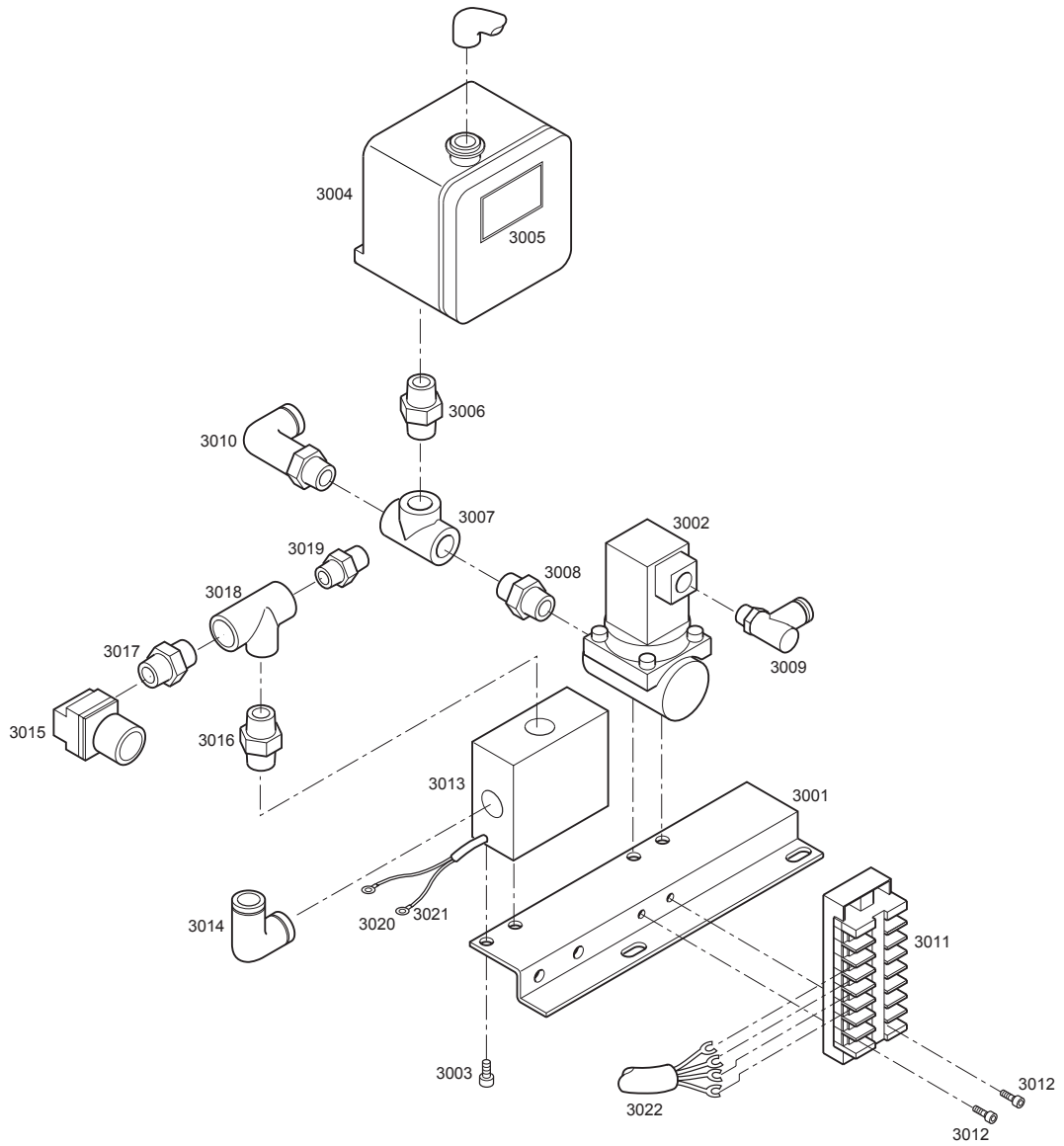


No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
1001	HW0200092-1	Cover	1	1061	HW9101045-1	Box	1
1002	HW0400638-1	Packing	1	1062	HW9201046-1	Cover	1
1003	M6 × 20	Socket screw	5	1063	M6 × 10	Socket screw	4
1004	2H-6	Spring washer	5	1064			
1005	SGMDH-12A2A-YRA1	Motor	1	1065	HW0370243-A	Switch unit	1
1006	M8 × 25	Socket screw	4	1066	M6 × 10	Bolt	2
1007	2H-8	Spring washer	4	1067	HW0400886-2	Cover	1
1008	HW0300362-1	Frange	1	1068	M6 × 10	Socket screw	14
1009	PT1/8	Plug	1	1069			
1010	M12 × 35	Socket screw	4	1070	HW0400886-1	Cover	1
1011	2H-12	Spring washer	4	1071	TP-6-0.3	Tube	1
1012	HW9302732-1	Frange	1	1072	T50R	Insulock' tie	1
1013	AS568-172	O-ring	1	1073	M5 × 10	APS bolt	1
1014	M6 × 100	Bolt	1	1074	HW0300628-1	Cover	1
1015	AS568-274	O-ring	1	1075	HW9406056-1	Packing	1
1016	Y507212.5	Oil seal	2	1076	KQVD10-04S	Joint	1
1017	HW0400429-1	Shaft	1	1077	HW9406055-4	Packing	1
1018	HW0400470-1	Coller	1	1078	HW0400420-1	Packing	1
1019	HW0300199-1	Gear	1	1079	HW9406054-1	Holder	1
1020	HW9481343-A	Shaft	1	1080	HW0400420-1	Frange	1
1021	HW0400243-1	Bolt	1	1081	M5 × 12	Socket screw	18
1022				1082	2H-5	Spring washer	18
1023	M6	Washer	1	1083	M6 × 25	Socket screw	4
1024	HW9482862	Reduction gear	1	1084	2H-6	Spring washer	8
1025	M10 × 70	Bolt	12	1085	M6 × 20	Bolt	2
1026	2H-10	Spring washer	12	1086			
1027	PT3/8	Plug	1	1087			
1028	M16	Nut	1	1088	SLE-062V	Union	2
1029	HW9302740-1	Jig(1)	1	1089	A-PT1/4	G nipple	1
1030	HW9406057-1	Jig(2)	1	1090	M6 × 20	Bolt	2
1031	STW-15	C stopper	1	1091	2H-6	Spring washer	2
1032				1092			
1033				1093	HW9302733-1	Holder(A)	1
1034				1094	M8 × 35	Bolt	16
1035				1095	HW9482861-E	Bearing	1
1036	HW0100034	Base	1	1096	HW9302734-1	Holder(B)	1
1037	HW9406052-1	Cover	1	1097	M8 × 35	Bolt	14
1038	M6 × 10	Socket screw	4	1098	2H-8	Spring washer	14
1039	2H-6	Spring washer	4	1099	HW9302735-1	Stopper	1
1040				1100	M8 × 50	Bolt	3
1041				1101	M6	Washer	3
1042				1102	HW0400885-1	Cover	1
1043	HW0400422-1	Frange	1	1103	HW0400885-2	Cover	1
1044	HW0400442-1	Packing	1				
1045	M4 × 25	Socket screw	4				
1046	2H-4	Spring washer	4				
1047	HW9406054-1	Holder	4				
1048	HW9406055-4	Packing	4				
1049	M5 × 12	Socket screw	4				
1050	2H-5	Spring washer	4				
1051	KQLE10-00	Joint	2				
1052	SW-16	Packing	2				
1053	HW9406050-1	Block	4				
1054	M6 × 20	Socket screw	8				
1055	M16	I bolt	2				
1056	HW9406114-1	Bolt	1				
1057	HW9406053-1	Clamp	2				
1058	M6 × 10	Socket screw	4				
1059	2H-6	Spring washer	4				
1060							

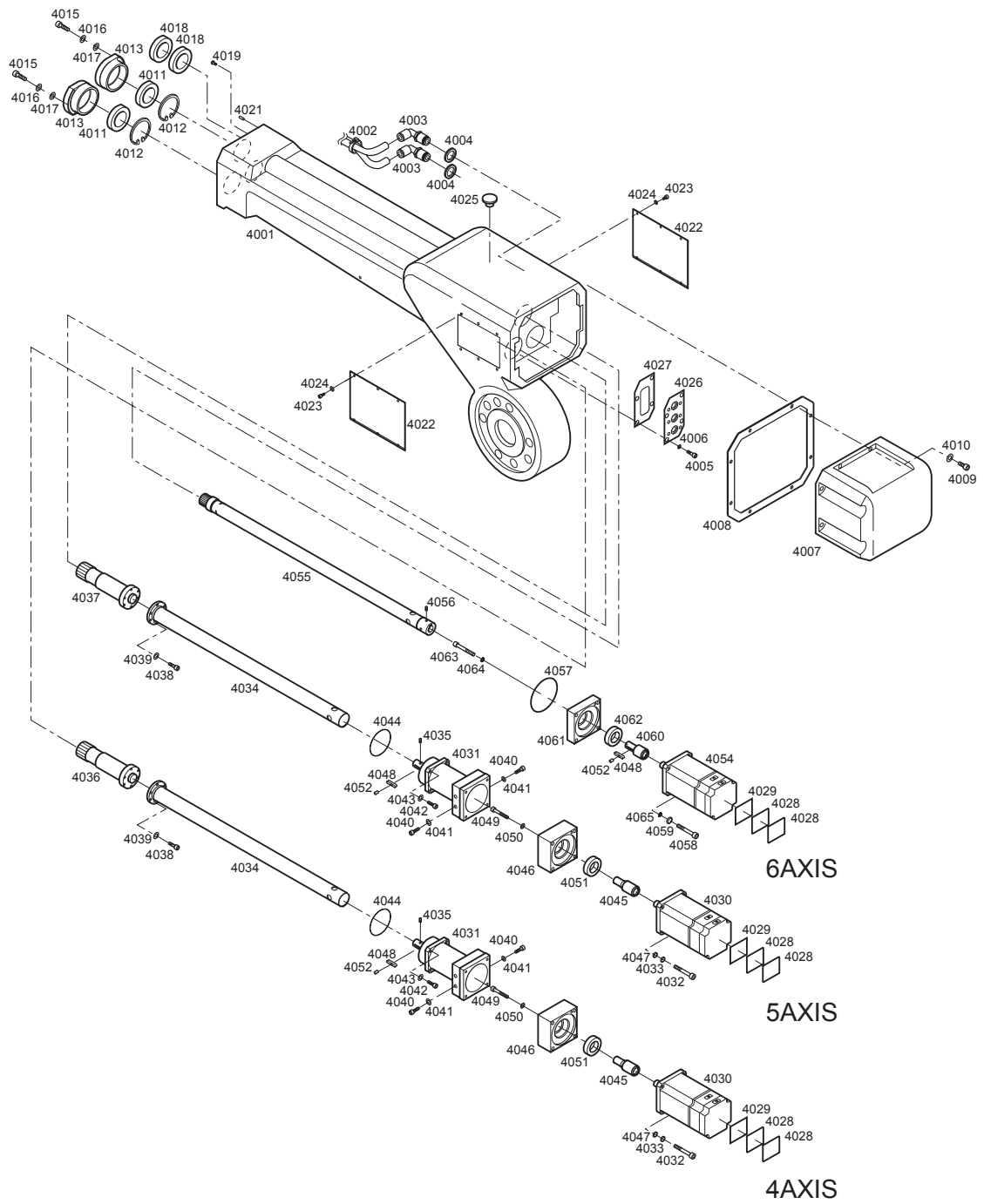




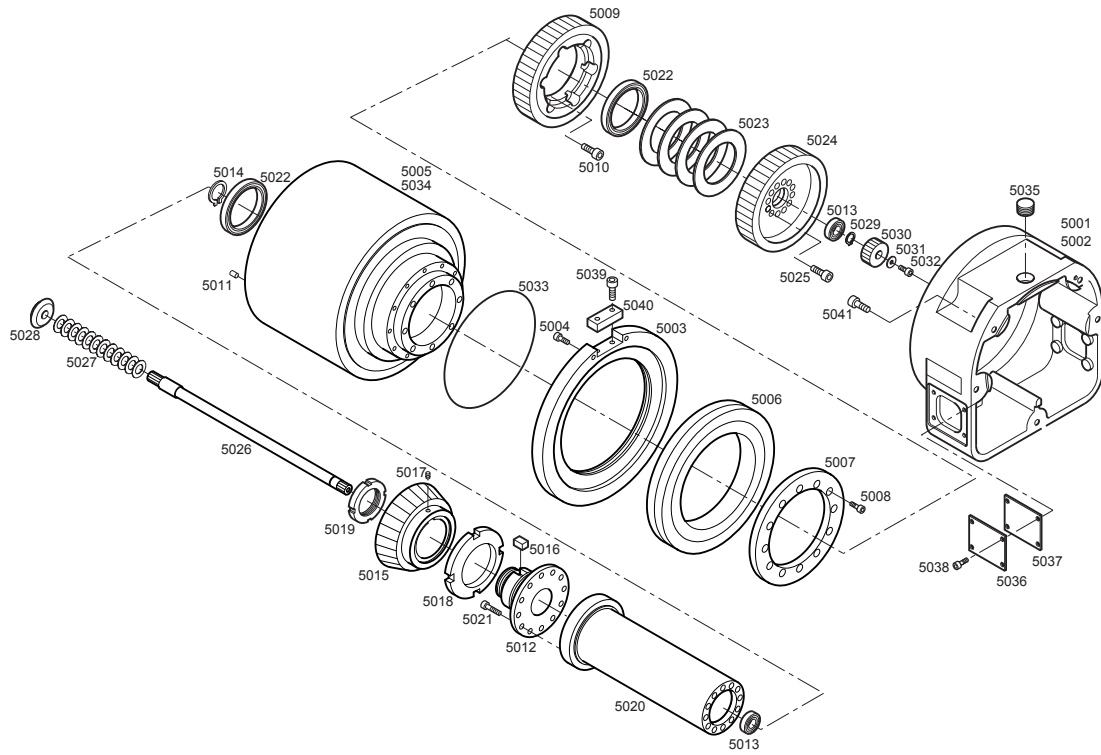
No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
2001	HW9201018-1	Cover	1	2061	2H-12	Spring washer	16
2002	M6 × 20	Socket screw	3	2062	HW9201044-1	Cover	1
2003	2H-6	Spring washer	3	2063	M6 × 20	Bolt	2
2004	HW0200094-1	Cover	1	2064	2H-6	Spring washer	2
2005	HW9302786-1	Packing	1	2065	HW9406015-1	O ring	1
2006	M6 × 20	Socket screw	10	2066	M16 × 60	Socket screw	6
2007	2H-6	Spring washer	10	2067	2H-16	Spring washer	6
2008	SGMDH-12A2A-YRA1	Motor	1	2068	M10 × 50	Socket screw	18
2009	M8 × 25	Socket screw	4	2069	2H-10	Spring washer	18
2010	2H-8	Spring washer	4	2070	HW9100809-1	Arm	1
2011	HW0300367	Frange	1	2071	KES8-35	Key	1
2012	M12 × 35	Socket screw	4	2072	HW9406135-1	Cover	4
2013	2H-12	Spring washer	4	2073	M16 × 45	Bolt	8
2014	AS568-172	O ring	1	2074	2H-16	Spring washer	8
2015	Y355212.5	Oil seal	2	2075	HW9100845-1	Arm	1
2016	HW0400470-1	Coller	1				
2017	HW0300368-1	Shaft	1				
2018	HW0400471-1	Washer	1				
2019	M6 × 80	Socket screw	1				
2020	2H-6	Spring washer	1				
2021	HW0400739	Plate	1				
2022	M16 × 45	Socket screw	8				
2023	2H-16	Spring washer	8				
2024	HW9482864-A	Reduction gear	1				
2025	M12 × 45	Socket screw	6				
2026	M12 × 70	Socket screw	4				
2027	2H-12	Spring washerr	10				
2028	HW9302787-1	Stopper	1				
2029	HW9406016	Gum plate	2				
2030	HW0400483-1	Plate	1				
2031	HW0400483-3	Plate	1				
2032	HW9302679-1	Cover	1				
2033							
2034	M6 × 25	Socket screw	4				
2035	2H-6	Spring washer	4				
2036	KQLE10-00	Joint	1				
2037	SW-16	Packing	1				
2038	KQH10-02S	H union	1				
2039	SGMGH-30A2A-YRA1	Motor	1				
2040	M12 × 35	Socket screw	4				
2041	2H-12	Spring washer	4				
2042	HW0300362-1	Frange	1				
2043	AS568-168	O ring	1				
2044	M12 × 50	Socket screw	4				
2045	2H-12	Spring washer	4				
2046	HW0400738-1	Coller	1				
2047	Y507212.5	Oil seal	2				
2048	HW0300360-1	Shaft	1				
2049	HW9482318-A	Gear	1				
2050	HW9481343-A	Shaft	1				
2051	M8 × 150	Bolt	1				
2052	2H-8	Spring washer	1				
2053	M8	Washer	1				
2054	HW9302730-1	Packing	1				
2055	HW0200093-1	Cover	1				
2056	M6 × 20	Socket screw	10				
2057	2H-6	Spring washer	10				
2058	HW9381465-A	Reduction gear	1				
2059	G270	O ring	1				
2060	M12 × 50	Socket screw	16				



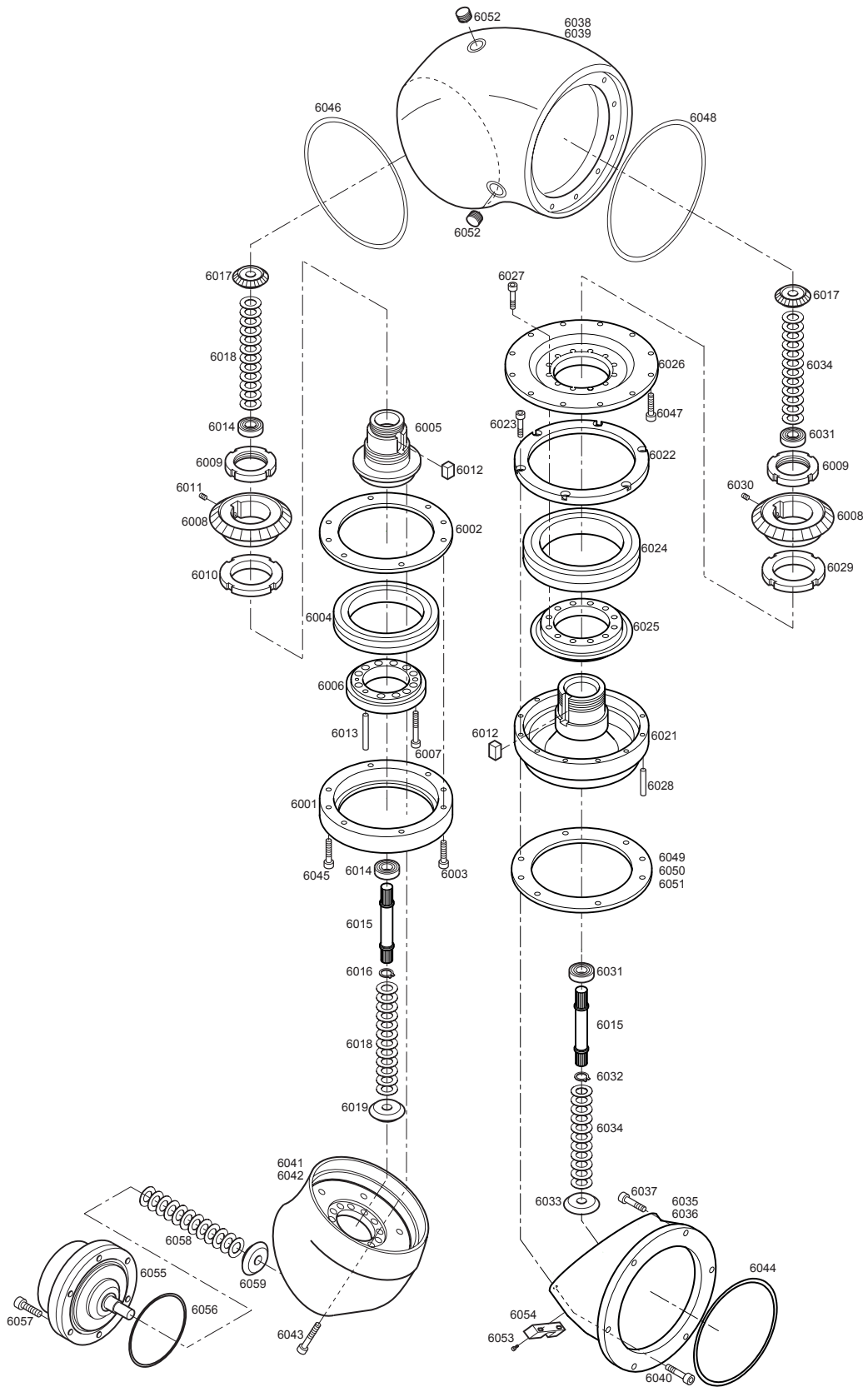
No.	DWG No.	Name	Pcs
3001	HW9302757-3	Plate	1
3002	VXA2260-04	Solenoid	1
3003	M5 x 10	Socket screw	1
3004	DG-50U	Switch	1
3005	NJ2139-1	NP	1
3006	PT1/4	Nipple	1
3007	PT1/4	Tees	1
3008	1/2 x 1/4	Nipple	1
3009	KQL06-01S	Joint	1
3010	KQH10-02S	Half union	1
3011	BD8-MB11	Terminal plate	1
3012	M4 x 12	Head machine screws with washer	2
3013	M-200-A31	Switch	1
3014	KQL10-03S	Union	1
3015	AP100-02-X201	Pressure regulation	1
3016	PT3/8	Nipple	1
3017	3/8 x 1/4	Nipple	1
3018	PT3/8	Tees	1
3019	KQH10-03S	Half union	1
3020	A terminal 0.5-3	Terminal	2
3021	Marker tube	Marker tube	2
3022	HW0370344-A	Cable assembly	1



No.	DWG No.	Name	Pcs	No.	DWG No.	Name	Pcs
4001	HW9101008-1	Arm	1	4060	HW0400241-1	Shaft	1
4002	T50R	Insulock' tie	1	4061	HW0400242-1	Frange	1
4003	KQLE10-00	Joint	2	4062	Y234010.5	Oil seal	1
4004	SW-36	Packing	2	4063	M5 × 45	Socket screw	1
4005	M5 × 25	Bolt	8	4064	2H-5	Spring washer	1
4006	2H-5	Spring washer	8	4065	M5	Washer	4
4007	HW9201020-1	Cover	1				
4008	HW9302785-1	Packing	1				
4009	M6 × 20	Socket screw	8				
4010	2H-6	Spring washer	8				
4011	6907ZZ	Bearing	2				
4012	RTW-55	C stopper	2				
4013	HW9302682-1	Holder	2				
4014							
4015	M6 × 25	Socket screw	4				
4016	2H-6	Spring washer	4				
4017	M6	Washer	4				
4018	6906ZZ	Bearing	2				
4019	M4 × 8	Pan head screw	2				
4020							
4021	4MM × 10	Pin	2				
4022	HW9405702-1	Cover	2				
4023	M4 × 8	Socket screw	12				
4024	2H-4	Spring washer	12				
4025	HW9406176-1	Stopper	1				
4026	HW0400588-1	Packing	1				
4027	HW0400587-1	Frange	1				
4028	HW9482404-1	Seat	6				
4029	HW9482408-1	Seat	3				
4030	SGMPH-04A1A-YR61	Motor	2				
4031	HW9482863-A	Reduction gear	2				
4032	M5 × 55	Socket Screw	8				
4033	2H-5	Spring washer	8				
4034	HW9302724-B	Rod	2				
4035	M4 × 8	H set screw	2				
4036	HW9302714-1	Gear	1				
4037	HW9302715-1	Gear	1				
4038	M4 × 16	Socket screw	12				
4039	2H-4	Spring washer	12				
4040	M4 × 16	Bolt	4				
4041	2H-4	Spring washer	4				
4042	M5 × 16	Socket screw	8				
4043	2H-5	Spring washer	8				
4044	HW9406015-2	O ring	1				
4045	HW0400440-2	Shaft	2				
4046	HW0400439-2	Frange	2				
4047	M5	Washer	8				
4048	HW0400326-1	Key process	3				
4049	M5 × 55	Socket screw	2				
4050	2H-5	Spring washer	2				
4051	AD22327	Oil seal	2				
4052	M6 × 8	Screw	3				
4053							
4054	SGMPH-04A1A-YR61	Motor	1				
4055	HW9302725-A	Rod	1				
4056	M4 × 8	H set screw	1				
4057	CO-0544A	O ring	1				
4058	M5 × 40	Socket screw	4				
4059	2H-5	Spring washer	4				



No.	DWG No.	Name	Pcs
5001	HW9201015-1	Gear case	1
5002	HW9201014-1	Gear case	1
5003	HW9302794-2	Stopper	1
5004	M4 × 12	Bolt	12
5005	HW9200995-2	Jig	1
5006	HW9482861-B	Bearing	1
5007	HW9302720-1	Stopper	1
5008	M4 × 12	Bolt	12
5009	HW9302717-2	Gear	1
5010	M6 × 16	Bolt	8
5011	4MM × 10	Pin	1
5012	HW9302719-2	Jig	1
5013	6000ZZ	Bearing	2
5014	RTW-26	C stopper	1
5015	HW9302716-1	Gear	1
5016	HW0401105-1	Key	1
5017	M4 × 6	H set screw	1
5018	HW9406066-1	Nut	1
5019	AN06	B nut	1
5020	HW9302721-2	Jig	1
5021	M5 × 12	Bolt	12
5022	6811ZZ	Bearing	2
5023	BD-80B	Spring	5
5024	HW9302718-2	Gear	1
5025	M6 × 16	Bolt	12
5026	HW9302722-1	Jig	1
5027	BD-19B	Spring	15
5028	HW9302743-1	Gear	1
5029	STW-10	C stopper	1
5030	HW9406065-1	Gear	1
5031	HW9406096-1	Coller	1
5032	M4 × 8	Bolt	1
5033	AS568-158	O ring	1
5034	HW9200994-1	Jig	1
5035	PT3/8	Bolt	1
5036	HW9406067-1	Cover	2
5037	HW9406068-1	Packing	2
5038	M4 × 8	Bolt	8
5039	Head machine screws with washer M4 × 16	Bolt	2
5040	HW0401151-1	Block	1
5041	M6 × 25	Bolt	5





No.	DWG No.	Name	Pcs
6001	HW9302685-1	Housing	1
6002	HW9406019-1	Stopper	1
6003	M4 × 12	Bolt	2
6004	HW9482861-D	Bearing	1
6005	HW9302686-2	Jig	1
6006	HW9406020-2	Frange	1
6007	M3 × 16	Bolt	2
6008	HW9302683-1	Gear	2
6009	HW9406021-1	Nut	2
6010	HW9406022-1	Nut	1
6011	M4 × 6	H set screw	1
6012	HW0401105-1	Key	2
6013	4MM × 25	Pin	1
6014	6000ZZ	Bearing	2
6015	HW9302684-1	Jig	2
6016	STW-10	C stopper	1
6017	HW9302771-1	Gear	2
6018	BD-19B	Spring	30
6019	HW9302743-1	Gear	1
6020			
6021	HW9302747-2	Frange	1
6022	HW9406095-1	Stopper	1
6023	M4 × 12	Bolt	6
6024	HW9482861-C	Bearing	1
6025	HW9302745-2	Gear	1
6026	HW9302746-2	Frange	1
6027	M5 × 10	Bolt	12
6028	4MM × 12	Pin	1
6029	HW9406066-1	Nut	1
6030	M4 × 6	H set screw	1
6031	6000ZZ	Bearing	2
6032	STW-10	C stopper	1
6033	HW9302743-1	Gear	1
6034	BD-19B	Spring	30
6035	HW9201004-2	Case	1
6036	HW9201002-1	Case	1
6037	M6 × 16	Bolt	6
6038	HW9201005-2	Case	1
6039	HW9201003-1	Case	1
6040	M4 × 16	Bolt	11
6041	HW9201007-2	Case	1
6042	HW9201006-1	Case	1
6043	M6 × 30	Bolt	11
6044	S125	O ring	1
6045	M4 × 16	Bolt	6
6046	AS568-158	O ring	1
6047	M4 × 14	Bolt	12
6048	AS568-159	O ring	1
6049	HW9406017-1	Shim	1
6050	HW9406017-2	Shim	1
6051	HW9406017-3	Shim	1
6052	PT3/8	Bolt	5
6053	Head machine screws with washer(M4 × 10)	Bolt	2
6054	HW0401150-1	Block	1
6055	HW0480040-A	Reduction gear	1
6056	S67	O ring	1
6057	M5 × 25	Socket screw	6
6058	BD-19B	Spring	15
6059	HW9302743-1	Gear	1

# MOTOMAN-PX2850/-PX2750 INSTRUCTIONS

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YASKAWA ELECTRIC CORPORATION

YASKAWA

Specifications are subject to change without notice  
for ongoing product modifications and improvements.

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# YASNAC XRC INSTRUCTIONS

**SUPPLEMENTARY FOR YASNAC XRC FOR PX2850,PX2750,PX2050,PX1850**

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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-PX2850 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.



YASKAWA

MANUAL NO. HW0480695

These supplementary instructions describe the YASNAC XRC for the MOTOMAN-PX2850, PX2750, PX2050, PX1850 manipulator.

Read this manual thoroughly together with the "YASNAC XRC INSTRUCTIONS" (Manual No.: RE-CTO-A203).

This manual only describes the information for this particular type. For any information other than that described in this manual, refer to the aforementioned instruction manuals.

# 1 COFIGURATION

The devices shown in the following figure configure the XRC for PX2850, PX2750, PX2050, and PX1850.

- XRC Type: ERCR-PX2850-RF00  
ERCR-PX2850-RF01 (specified for travel axis)
- External dimensions in mm (WxHxD): 974\* x 1300 x 600  
\*800 for XRC and 174 for Purging Unit

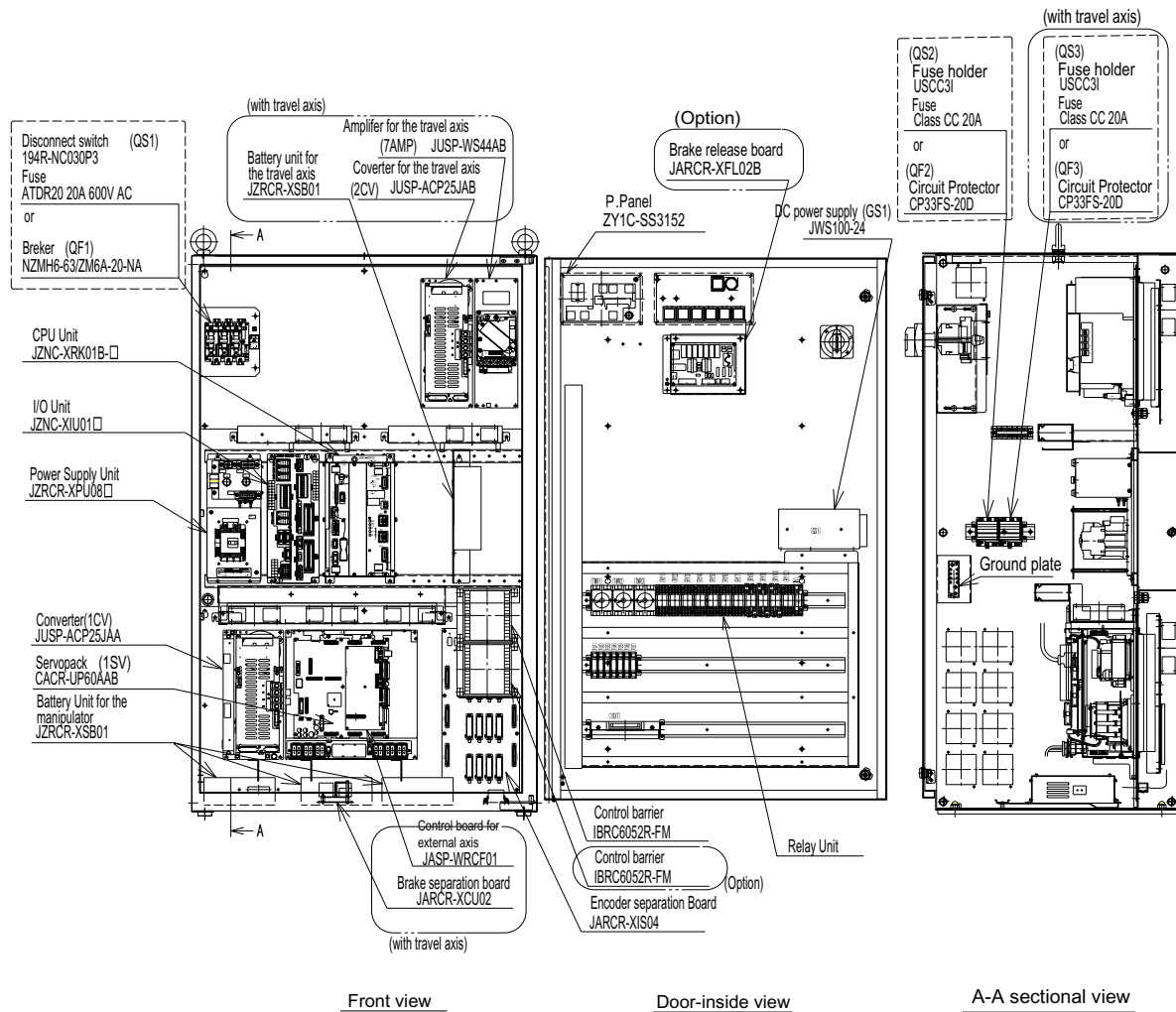


Fig. 1 Configuration

## 1.1 Power Supply Unit

Use the following type of Power Supply Unit for the XRC for PX2850, PX2750, PX2050, and PX1850.

- Power Supply Unit type: JZRCR-XPU08

## 1.2 CPU Unit and I/O Unit

Use the following type of CPU Unit and I/O Unit for XRC for PX2850, PX2750, PX2050, and PX1850.

- CPU Unit: JZNC-XRK01B-
- I/O Unit: JZNC-XIU01

## 1.3 SERVOPACK

The following table shows the configuration of SERVOPACK used for the XRC for PX2850, PX2750, PX2050, and PX1850.

Devices		XRC for PX2850, PX2750, PX2050, PX1850	
		Type	Capacity
SERVOPACK		CACR-UP60AAB	-
Amplifier	S-axis	JUSP-WS20AA	2 kW
	L-axis	JUSP-WS30AA	3 kW
	U-axis	JUSP-WS20AA	2 kW
	R-axis	JUSP-WS10AA	1 kW
	B-axis	JUSP-WS10AA	1 kW
	T-axis	JUSP-WS10AA	1 kW
Servo control board		JASP-WRCA01	-
Converter		JUSP-ACP25JAA	25 A
Servo control power supply		JUSP-RCP01AAC	-

The following table shows the configuration of SERVOPACK for the travel axis.

Devices	Travel axis	
	Type	Capacity
Amplifier	JUSP-WS44AB	4.4 kW
Servo control board	JUSP-WRCF01	-
Converter	JUSP-ACP25JAB	25 A

## 1.4 Encoder Separation Board

The relay board which intercepts the PG power supply and signal to the motor when purging and abnormal internal pressure.

- Board type: JARCR-XIS04

## 1.5 Battery Unit

A battery for backup of the manipulator and motor encoder for external axis.

**(Note)**

Replace the battery unit every two years or when the alarm: Encoder Battery Error occurred.

- Battery Unit type: JZRCR-XSB01

## 2 Allocating the I/O

The XRC employs the I/O allocation for painting application (painting standard). The I/O allocation table is given in the following pages.

Because the CN10 is used for purging and internal pressure control, it must not be connected to any other external devices.

## ■ Painting Application (For One Robot)

I/O Allocation Table of the JANCD-XIO02 Board

Logic No.	Connector No.	Name	Logic No.	Connector No.	Name
2010	CN12-B1	External Start	3010	CN12-B8	Running
2011	CN12-A1	—	3011	CN12-A8	Servo ON
2012	CN12-B2	Call Master Job	3012	CN12-B9	Start of Master Job
2013	CN12-A2	Alarm/Error Reset	3013	CN12-A9	Alarm/Error Occurred
2014	CN12-B3	Select Remote Mode	3014	CN12-B10	Battery Alarm
2015	CN12-A3	Select Play Mode	3015	CN12-A10	Remote Mode Selected
2016	CN12-B4	Select Teach Mode	3016	CN12-B11	Play Mode Selected
2017	CN12-A4	IN192 General-purpose	3017	CN12-A11	Teach Mode Selected
2020	CN12-B5	Interference 1 Entrance Prohibited	3020	CN12-B12	In Cube 1
2021	CN12-A5	Interference 2 Entrance Prohibited	3021	CN12-A12	In Cube 2
2022	CN12-B6	—	3022	CN12-B13	Operation Origin Point
2023	CN12-A6	—	3023	CN12-A13	Intermediate Start OK
2024	CN13-B1	Interference 3 Entrance Prohibited	3024	CN13-B8	In Cube 3
2025	CN13-A1	Interference 4 Entrance Prohibited	3025	CN13-A8	In Cube 4
2026	CN13-B2	—	3026	CN13-B9	—
2027	CN13-A2	—	3027	CN13-A9	—
2030	CN13-B3	IN01 General-purpose Input	3030	CN13-B10	OUT01 General-purpose Output
2031	CN13-A3	IN02	3031	CN13-A10	OUT02
2032	CN13-B4	IN03	3032	CN13-B11	OUT03
2033	CN13-A4	IN04	3033	CN13-A11	OUT04
2034	CN13-B5	IN05	3034	CN13-B12	OUT05
2035	CN13-A5	IN06	3035	CN13-A12	OUT06
2036	CN13-B6	IN07	3036	CN13-B13	OUT07
2037	CN13-A6	IN08	3037	CN13-A13	OUT08
2040	CN10-B1	Internal Pressure Error: 1	3040	CN10-B8	For extra use(Error Reset)
2041	CN10-A1	Purging Error: 1	3041	CN10-A8	
2042	CN10-B2	Purging Completed: 1	3041	CN10-B9	For extra use (Gear Pump Reset)
2043	CN10-A2	—	3041	CN10-A9	
2044	CN10-B3	—	3042	CN10-B10	—
2045	CN10-A3	—	3042	CN10-A10	
2046	CN10-B4	—	3043	CN10-B11	—
2047	CN10-A4	—	3043	CN10-A11	
2050	CN11-B1	IN09	3044	CN10-B12	—
2051	CN11-A1	IN10	3044	CN10-A12	
2052	CN11-B2	IN11	3045	CN10-B13	—
2053	CN11-A2	IN12	3045	CN10-A13	
2054	CN11-B3	IN13	3046	CN10-B14	—
2055	CN11-A3	IN14	3046	CN10-A14	
2056	CN11-B4	IN15	3047	CN10-B15	—
2057	CN11-A4	IN16	3047	CN10-A15	
			3050	CN11-B8	OUT09
			3050	CN11-A8	
			3051	CN11-B9	OUT10
			3051	CN11-A9	
			3052	CN11-B10	OUT11
			3052	CN11-A10	
			3053	CN11-B11	OUT12
			3053	CN11-A11	
			3054	CN11-B12	OUT13
			3054	CN11-A12	
			3055	CN11-B13	OUT14
			3055	CN11-A13	
			3056	CN11-B14	OUT15
			3056	CN11-A14	
			3057	CN11-B15	OUT16
			3057	CN11-A15	



### 3 Connecting the Power Supply Cables for Manipulator and Travel-Axes, Intrinsically Safe Cables

#### 3.1 Power Supply Cables for Manipulator and Travel-Axes

Connect the power supply cables as shown in the following table.

Power Supply Cables	Connect To		
Signal cable	The connectors CNPG123 and CNPG456, on the encoder separation board (JARCR-XIS04) on the bottom inside the XRC		
Power cable	For power	The connector of each axis of SERVOPACK on the bottom inside the XRC	
	For brake	With travel axis	The connector CN29 on the I/O unit (JZNC-XIU01 ) at the center inside the XRC
		Without travel axis	The connector CN29(BRAKE OUT) on the brake separation board (JARCR-XCU02) at the bottom inside the XRC

Connect the power supply cables for travel axis as shown in the following table.

Power Supply Cables	Connect To		
Signal cable	The connectors CNPG7, on the encoder separation board (JARCR-XIS04) on the bottom-right inside the XRC		
Power cable	7AMP terminal block at the upper inside the XRC (Screw size: M5)		
Brake cable	The connector CN2(EXBRAKE OUT) on the brake separation board (JARCR-XCU02) at the bottom inside the XRC		

#### 3.2 Intrinsically Safe Cables

There are following two intrinsically safe cables:

A signal cable for pressure switch, signal cable for flow switch.

Connect two intrinsically safe cables as shown in the following table.

Intrinsically Safe Cables	Connect To		
Signal cable for pressure switch	P1 and N1 of the terminal stand of the Barrier Unit on right-bottom inside the XRC (screw size: M3)		
Signal cable for flow switch	P2 and N2 of the terminal stand of the Barrier Unit on right-bottom inside the XRC (screw size: M3)		
Over travel for travel axis	P4 and N4 of the terminal stand of the Barrier Unit on right-bottom inside the XRC (screw size: M3)		

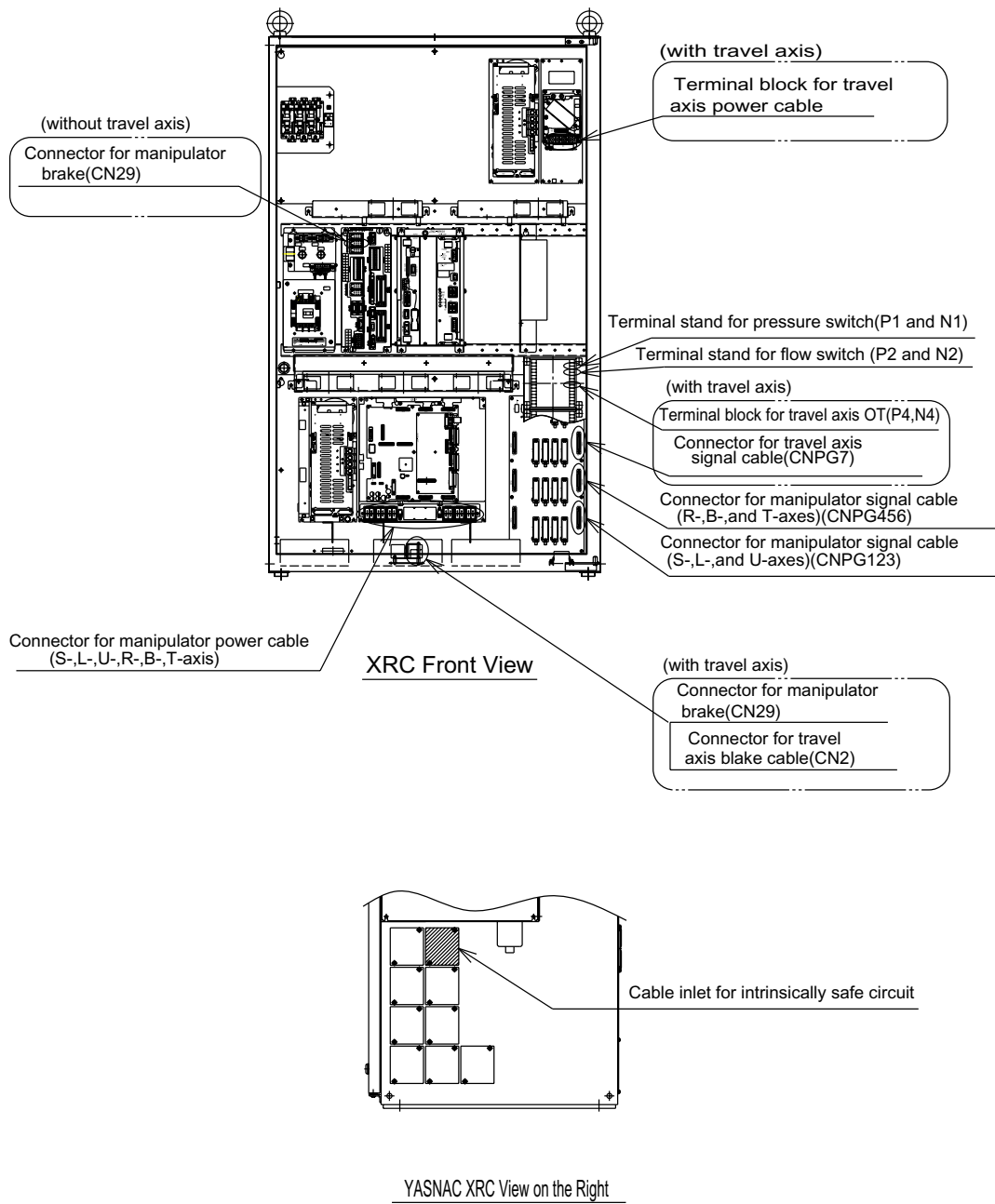


Fig. 2 Connection of the Power Supply Cables and Intrinsically Safe Cables

## 4 Connecting the Tubes to the Pneumatic Unit

Connect each tube to the Pneumatic Unit as shown in Fig. 3.

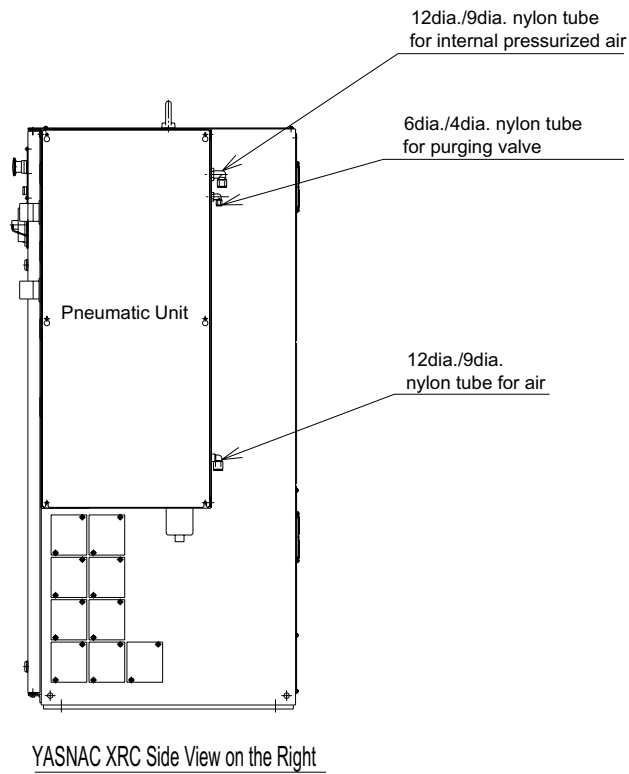


Fig. 3 Tube Connection to Pneumatic Unit

## 5 Timer for the Purging Control Circuit



**PROHIBITED**

**Do not change the value of the timer.**

The performance of the internal pressure explosion-proof can not be maintained.

The timer (TMR1, TMR2, TMR3) for the purging control is installed at the door inside the controller.

The setting value is as follows.

Model		TMR1	TMR2	TMR3
PX2850	Without travel axis	11 min.	3 sec.	15 sec.
	With travel axis	17 min.	5 sec.	15 sec.
PX2750	Without travel axis	11 min.	3 sec.	15 sec.
	With travel axis	17 min.	5 sec.	15 sec.
PX2050	Without travel axis	8.5 min.	3 sec.	15 sec.
	With travel axis	14.5 min.	5 sec.	15 sec.
PX1850	Without travel axis	8.5 min.	3 sec.	15 sec.
	With travel axis	14.5 min.	5 sec.	15 sec.

Do not change the value of the purging control timer (TMR1, TMR2, TMR3).

The purging is not performed enough if the timer value is changed.

## 6. YASNAC XRC Parts List

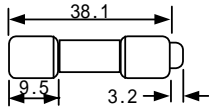
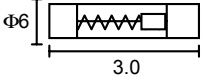
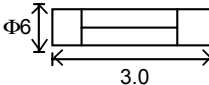
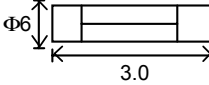
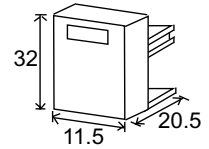
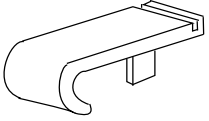
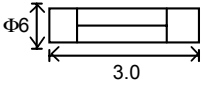
No.	Name	Type	Remarks	
1	SERVOPACK	CACR-UP60AAB	6 Axis type	
	Amplifier	S	JUSP-WS20AA	
		L	JUSP-WS30AA	
		U	JUSP-WS20AA	
		R	JUSP-WS10AA	
		B	JUSP-WS10AA	
		T	JUSP-WS10AA	
Servo control board	JASP-WRCA01			
2	Converter	JUSP-ACP25JAA		
	Servo control power supply	JUSP-RCP01AAC		
3	CPU rack	JZNC-XRK01B-		
	Backboard	JANCD-XBB01		
	System control circuit board	JANCD-XCP01		
	High speed serial interface Circuit board	JANCD-XIF03		
	Control power supply	CPS-150F		
4	I/O unit	JZNC-XIU01		
	Power ON Board	JANCD-XTU01		
	Specific I/O circuit board	JANCD-XIO01		
	General I/O circuit board	JANCD-XIO02		
5	Power supply unit	JZRRCR-XPU08		
6	P.Panel	ZY1C-SS3152		
7	Fan	4715PS-22T-B30-B00		
8	Power ON circuit board fuse	313005 5A 250V		
		312003 3A 250V		
		GP40 4.0A 250V	Alarm fuse	
9	Power ON circuit board relay	LY2 DC24V		
10	Battery	ER6VC3 3.6V		
11	Battery Unit	JZRRCR-XSB01		
12	Encoder separation board	JARCR-XIS04		
13	Power supply fuse	ATDR20 20A	CLASS CC/TIME DELAY	
14	Barrier box	IBRC6052R-FM		
15	Purging control circuit DC power supply	JWS100-24		
16	Purging control circuit relay	MY4ZN-D2 DC24V		
17	Purging control circuit relay	LY2ZN-D2 DC24V		
18	Purging control circuit timer	H3CR-A8 DC24V		
19	Purging control circuit fuse	312003 3A 250V		
20	Purging control circuit fuse	313.500 0.5A 250V		
21	Amplifier for the travel axis	JUSP-WS44AB	Only for the travel axis system	
22	Converter for the travel axis	JUSP-ACP25JAB	Only for the travel axis system	
23	Servo control board	JASP-WRCF01	Only for the travel axis system	
24	Brake separation board	JARCR-XCU02	Only for the travel axis system	

## 7. Supplied Parts List

The supplied parts of YASNAC XRC is as follows.

Parts No.1 to 5 and 7 are used for fuse for replacement and No.6 is used as a tool for connecting the I/O.

Supplied Parts List

No	Parts Name	Dimensions	Pcs	Model	Application
1	Time Delay Fuse Power Supply Fuse		2	ATDR20 20A 600V (GOULD)	Disconnecting switch Fuse holders
2	5A Glass-Tube fuse		2	313005 5A 250V (LITTEL)	JANCD-XTU01 FU1,2
3	3 A Glass-Tube fuse		2	312003 3A 250V (LITTEL)	JANCD-XTU01 FU3,4 Purging control ciucuitFU2,3
4	10A Ceramic fuse		2	326010 10A 250V (LITTEL)	JZRCR-XPU07, 08, 09 1F,2F
5	4.0A Alarm fuse		2	GP40 4.0A 250V (Daito Tsushin)	JANCD-XTU01 FU5, 6
6	WAGO Connector wiring too		2	231-131 (WAGO)	JANCD-XIO01 CN05,06 JANCD-XTU01 CN26,27 CPS-150F CN04
7	0.5A Glass-Tube fuse		2	313.500 0.5A,250V (LITTLE)	Purging control ciucuit FU4,5,6,7

## 8. Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the XRC. The spare parts list for the XRC is shown below. Product performance can not be guaranteed when using spare parts from any company other than Yaskawa. To buy the spare parts which are ranked B or C, inform the manufacturing number (or order number) of XRC to Yaskawa representative. The spare parts are ranked as follows:

RankA : Expendable and frequently replaced parts

RankB : Parts for which replacement may be necessary as a result of frequent operation

RankC : Unit

( NOTE ) For replacing parts in Rank B or Rank C, contact your Yaskawa representative

No	Rank	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Battery Unit	JZRCR-XSB01	Yaskawa Electric Corporation	2	4	*1
3	A	Rack Fan	JZNC-XZU02	Yaskawa Electric Corporation	2	2	
4	A	In-panel Fan on upper part of Servo /Backside Duct Fan	4715PS-22T-B30-B00	Minebea	3	7	
5	A	Main Circuit Fuse	ATDR20 20A 600VAC	GOULD	3	6	
6	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	25	2	
7	A	Control Power Fuse	313005 5A 250V	LITTEL	10	2	
8	A	24VDC Fuse	313003 3A 250V	LITTEL	10	2	
9	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
10	A	Control Relay	LY2 DC24V	Omron	3	3	
11	A	Purging Control Circuit Relay	MY4ZN-D2 DC24V	Omron	3	7	
12	A	Purging Control Circuit Relay	LY2ZN-D2 DC24V	Omron	3	3	

13	A	Purging Control Circuit Timer	H3CR-A8 DC24V	Omron	3	3	*2
14	A	Purging Control Circuit Fuse	312003 3A 250V	LITTEL	10	2	
15	A	Purging Control Circuit Fuse	313.500 0.5A 250V	LITTEL	10	4	
16	B	Converter	JUSP-ACP25JAA	Yaskawa Electric Corporation	1	1	
17	B	Converter	JUSP-ACP25JAB	Yaskawa Electric Corporation	1	1	For travel axis
18	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
19	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa Electric Corporation	1	1	
20	B	SERVOPACK Control Board	JASP-WRCF01	Yaskawa Electric Corporation	1	1	For travel axis
21	B	Amplifier	JUSP-WS30AA	Yaskawa Electric Corporation	1	1	For L-axis
22	B	Amplifier	JUSP-WS20AA	Yaskawa Electric Corporation	1	2	For S-and L-axis
23	B	Amplifier	JUSP-WS10AA	Yaskawa Electric Corporation	1	3	For S-and L-axis
24	B	Amplifier	JUSP-WS44AB	Yaskawa Electric Corporation	1	1	For travel axis
25	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
26	B	System Control Board	JANCD-XCP01-1	Yaskawa Electric Corporation	1	1	
27	B	Communication Board	JANCD-XIF03-1	Yaskawa Electric Corporation	1	1	
28	B	Specific I/O Board	JANCD-XIO01B	Yaskawa Electric Corporation	1	1	
29	B	General I/O Board	JANCD-XIO02	Yaskawa Electric Corporation	1	1	
30	B	Power On Board	JANCD-XTU01B	Yaskawa Electric Corporation	1	1	
31	B	Encoder separation board	JARCR-XIS04	Yaskawa Electric Corporation	1	1	
32	B	Brake separation board	JARCR-XCU02	Yaskawa Electric Corporation	1	1	For travel axis
33	B	Purging control circuit DC power supply	JWS100-24	Denseiramuda	1	1	



34	C	Servopack	CACR-UP60AAB	Yaskawa Electric Corporation	1	1	
35	C	CPU Unit	JZNC-XRK01B-1	Yaskawa Electric Corporation	1	1	
36	C	I/O Unit	JZNC-XIU01B	Yaskawa Electric Corporation	1	1	
37	C	Power Supply Unit	JZRRCR-XPU08B	Yaskawa Electric Corporation	1	1	
38	C	Barrier Box	IBRC6052R-FM	Izumi Electric	1	1	
39	C	Programming Pendant	JZNC-XPP02B	Yaskawa Electric Corporation	1	1	With Cable 8m

\*1. Replace the battery unit No.2 every two years or when the alarm: Encoder Battery Error occurred.

\*2. Contact your Yaskawa representative for the replacement of the purging control circuit timer No.13.

# YASNAC XRC INSTRUCTIONS

## SUPPLEMENTARY FOR YASNAC XRC FOR PX2850,PX2750,PX2050,PX1850

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YASKAWA ELECTRIC CORPORATION

YASKAWA

Specifications are subject to change without notice  
for ongoing product modifications and improvements.

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# YASNAC XRC INSTRUCTIONS

**SUPPLEMENTALY FOR NORTH AMERICAN (XRC 2001) STANDARD**

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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.





## CAUTION

- **This manual explains the North American specifications which differ from the standard XRC specifications.**
- **The items which are not explained in the manual are the same as the standard specifications. Use the standard XRC instructions with this manual.**



## MANDATORY

- **This manual explains setup, diagnosis, maintenance, hardware and so on of the YASNAC XRC system. Read this manual carefully and be sure to understand its contents before handling the YASNAC XRC.**
- **General items related to safety are listed in the Setup Manual Section 1: Safety of 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”.

 **WARNING**

- **Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.**

**When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned off.**

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

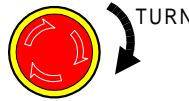
Emergency Stop Button



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

Injury may result from unintentional or unexpected manipulator motion.

Release of Emergency Sto



- **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.**

## 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.

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 YASNAC XRC Specification

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# 1 YASNAC XRC Specification



## WARNING

- **Before operating the manipulator, check that the SERVO ON lamp goes out when the emergency stop buttons on the playback panel and programming pendant are pressed.**

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency. The emergency stop buttons are attached on upper-right of the playback panel and right of the programming pendant.

- **Always set the teach lock before starting teaching.**

Failure to observe this caution may result in injury from inadvertent operation of the playback panel.

- **Observe the following precautions when performing teaching operations within the working envelope of the manipulator:**

- **Always view the manipulator from the front.**
- **Always follow the predetermined operating procedure.**
- **Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.**
- **Ensure that you have a place to retreat to in case of emergency.**

Improper or unintentional manipulator operation can result in injury.

- **Prior to performing the following operations, be sure that there is no one within the working envelope of the manipulator, and be sure that you are in a safe place yourself.**

- **Turning the power ON to the YASNAC XRC.**
- **Moving the manipulator with the programming pendant.**
- **Running check operation.**
- **Performing automatic operation.**

Injury may result from collision with the manipulator to anyone entering the working envelope of the manipulator.



## CAUTION

- **Perform the following inspection procedures prior to performing teaching operations. If problems are found, correct them immediately, and be sure that all other necessary processing has been performed.**
  - **Check for problems in manipulator movement.**
  - **Check for damage to the insulation and sheathing of external wires.**
- **Always return the programming pendant to its specified position after use.**

If the programming pendant is inadvertently left on the manipulator, fixture, or on the floor, the manipulator or a tool could collide with it during manipulator movement, possibly causing injuries or equipment damage.

# 1.1 Specification List

Controller	
Configuration	Free-standing, enclosed type
Dimensions	Refer to following
Cooling System	Indirect cooling
Ambient Temperature	0°C to + 45°C (During operation) -10°C to + 60°C (During transit and storage)
Relative Humidity	90%RH max. (non-condensing)
Power Supply	3-phase, 240/480/575 VAC(+10% to -15%) at 50/60Hz(±2 Hz) (Built-in transformer tap switchable) Built-in transformer 240 V - 480 V - 575 V/208 V ( △ ☆) Switch built-in transformer tap according to the supplied voltage on customer side. (480 VAC is set before shipment.) If the transformer is not used, the specification is three phase AC200/220V(+10% to -15%) at 50/60Hz(±2 Hz)
Grounding	Grounding resistance : 100 Ω or less Exclusive grounding
Digital I/O	Specific signal (hardware) 15 inputs and 2 outputs General signals (standard, max.) 40 inputs and 40 outputs
Positioning System	By serial communication (absolute encoder)
Drive Unit	SERVOPACK for AC servomotors
Acceleration/Deceleration	Software servo control
Programming Capacity	5000 steps, 3000 instructions
Playback Panel*1	
Dimensions	190(W) × 120(H) × 50(D) mm
Buttons Provided	Mode change Start / Hold, Emergency stop

\*1 An optional remote playback panel is available

Dimensions	750(W) × 1100(H) × 550(D) mm (Except for SV3X (Small capacity type))
	750(W) × 860(H) × 550(D) mm (SV3X (Small capacity type))

## 1.2 Function List

Programming Pendant Operation	Coordinate System	Joint, Rectangular/Cylindrical, Tool, User Coordinates
	Modification of Teaching Points	Adding, Deleting, Correcting (Robot axes and external axes can be independently corrected.)
	Inching Operation	Possible
	Locus Confirmation	Forward/Reverse step, Continuous feeding
	Speed Adjustment	Fine adjustment possible during operating or pausing
	Timer Setting	Possible every 0.01 s
	Short-cut Function	Direct-open function, Screen reservation function
	Interface	RS-232 × 1 port for FC 1/FC2 (At Programming Pendant)
	Application	Arc welding, Spot welding, Handling, General, Others
Safety Feature	Running Speed Limit	User definable
	Deadman Switch	3 position type. Servo power can be turned on at the mid position only. (Located on programming pendant)
	Collisionproof Frames	S-axis frame (doughnut-sector), Cubic frame (user coordinate)
	Self-Diagnosis	Classifies error and two types of alarms (major and minor) and displays the data
	User Alarm Display	Possible to display alarm messages for peripheral device
	Machine Lock	Test-run of peripheral devices without robot motion
	Door Interlock	A door can be opened only when a circuit breaker is off.
Maintenance Function	Operation Time Display	Control power-on time, Servo power-on time, Playback time, Operation time, Work time
	Alarm Display	Alarm message and previous alarm records
	I/O Diagnosis	Simulated enabled/disabled output possible
	T.C.P. Calibration	Automatically calibrates parameters for end effectors using a master jig

Programing Functions	Programming	Interactive programming
	Language	Robot language: INFORM II
	Robot Motion Control	Joint coordinates, Linear/Circular interpolations, Tool coordinates
	Speed Setting	Percentage for joint coordinates, 0.1mm/s units for interpolations, Angular velocity for T.C.P.fixed motion
	Program Control Instructions	Jumps, Calls, Timer, Robot stop, Execution of some instructions during robot motion
	Operation Instructions	Preparing the operation instructions for each application (Arc-ON, Arc-OFF, etc...)
	Variable	Global variable, Local variable
	Variable Type	Byte type, Integer type, Double precision type, Real number type, Position type
	I/O Instructions	Discrete I/O, Pattern I/O processing

## 1.3 Programming Pendant

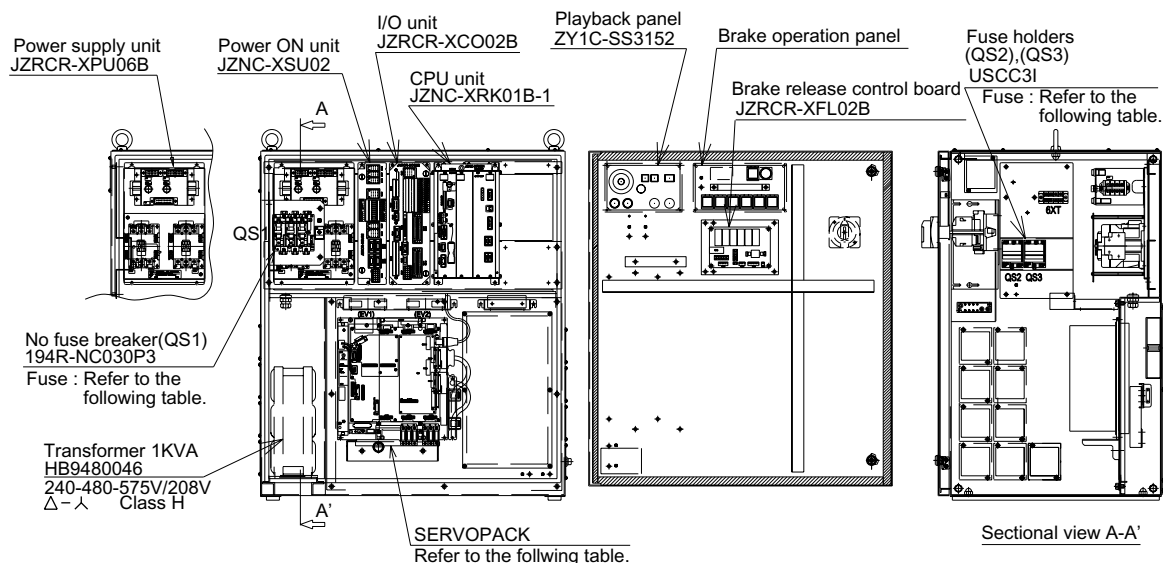
Material	Reinforced thermoplastic enclosure with a detachable suspending strap
Dimensions	200(W) × 348(H) × 61.8(D) mm
Displayed Units	40 characters 12 lines
	Multilingual function (English, Japanese, Hankul)
	Backlight
Others	3 position deadman switch, RS-232C × 1 port

# 1.4 Equipment Configuration

The XRC is comprised of individual units and modules (circuit boards). Malfunctioning components can generally be easily repaired after a failure by replacing a unit or a module. This section outlines the XRC equipment configuration.

## 1.4.1 Arrangement of Units and Circuit Boards

### ■ Configuration

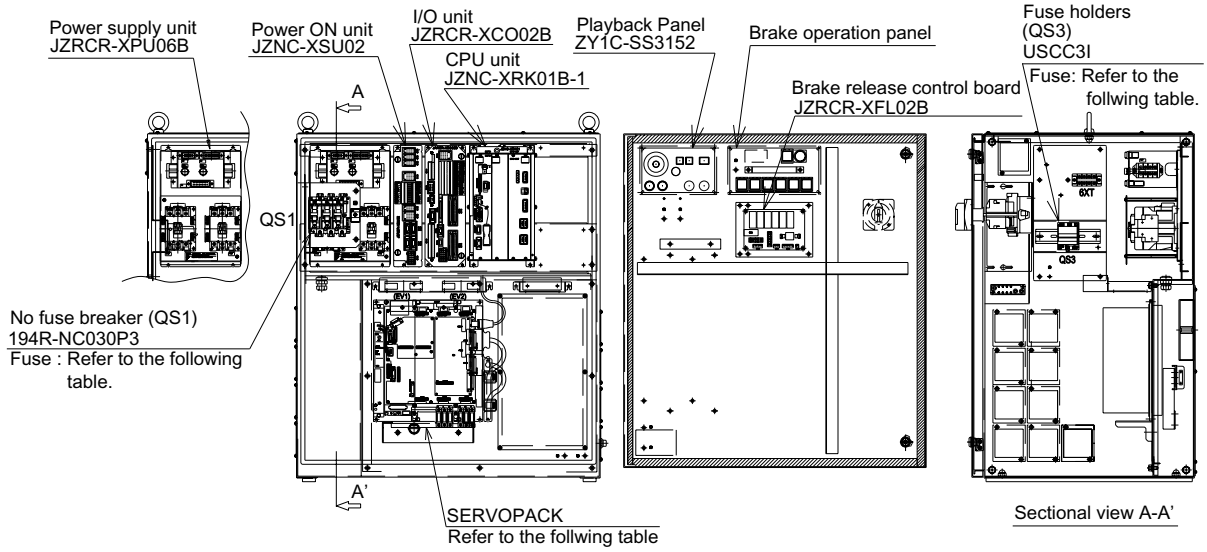


Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
SV3X	ERCR-SV3-RB07	CACR-SV3AAA	3A	10A	5A

\* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

SV3X Configuration (With transformer built-in)

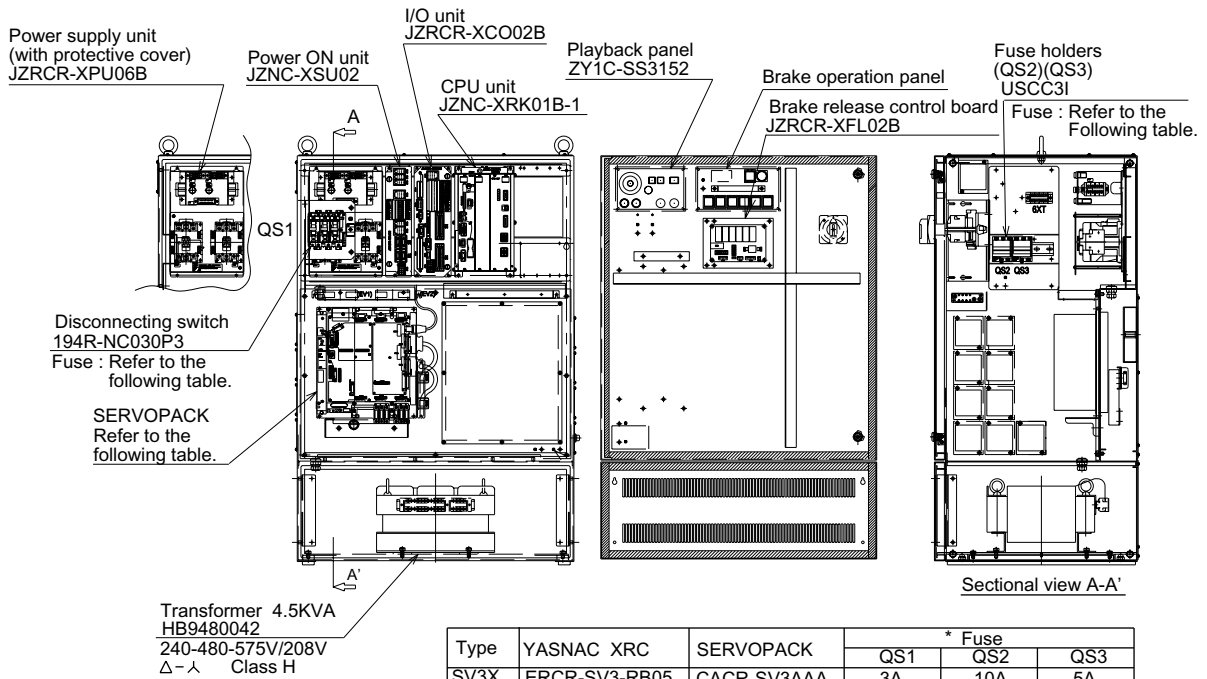




Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
SV3X	ERCR-SV3-RB08	CACR-SV3AAA	10A	—	5A

\* : Time delay fuses of class CC are used for QS1, and QS3.

SV3X Configuration (Without transformer)

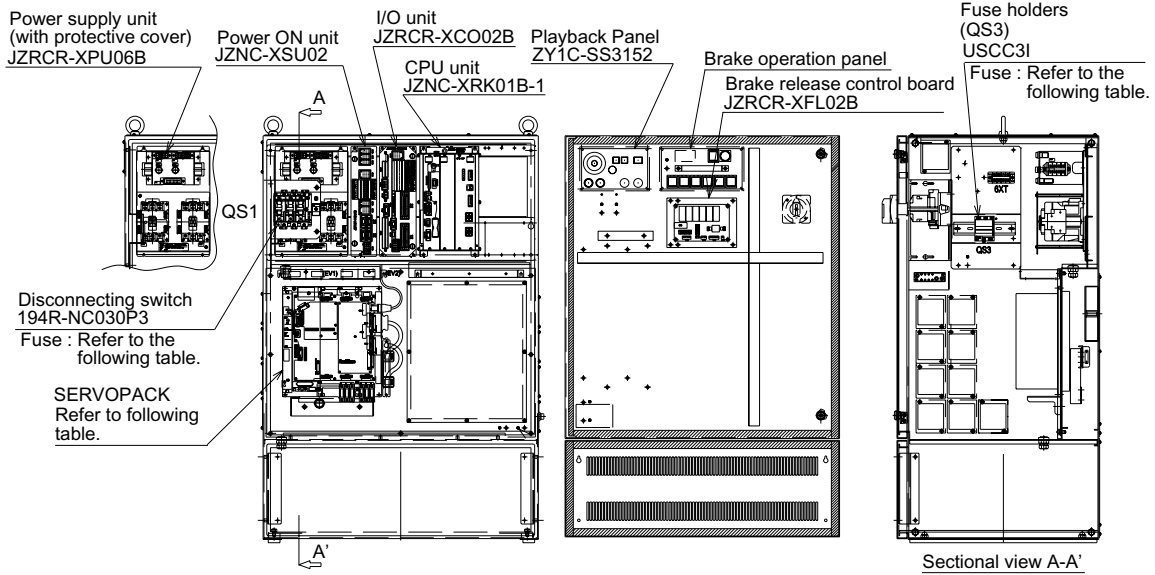


Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
SV3X	ERCR-SV3-RB05	CACR-SV3AAA	3A	10A	5A
UP6	ERCR-UP6-RB04	CACR-UP6AAC	5A	10A	10A
SK16X	ERCR-SK16-RB05	CACR-SK16AAC	10A	15A	15A
UP20	ERCR-UP20-RB03	CACR-UP20AAA	10A	15A	15A

\* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

SV3X, UP6, SK16X, UP20 Configuration (With transformer built-in)

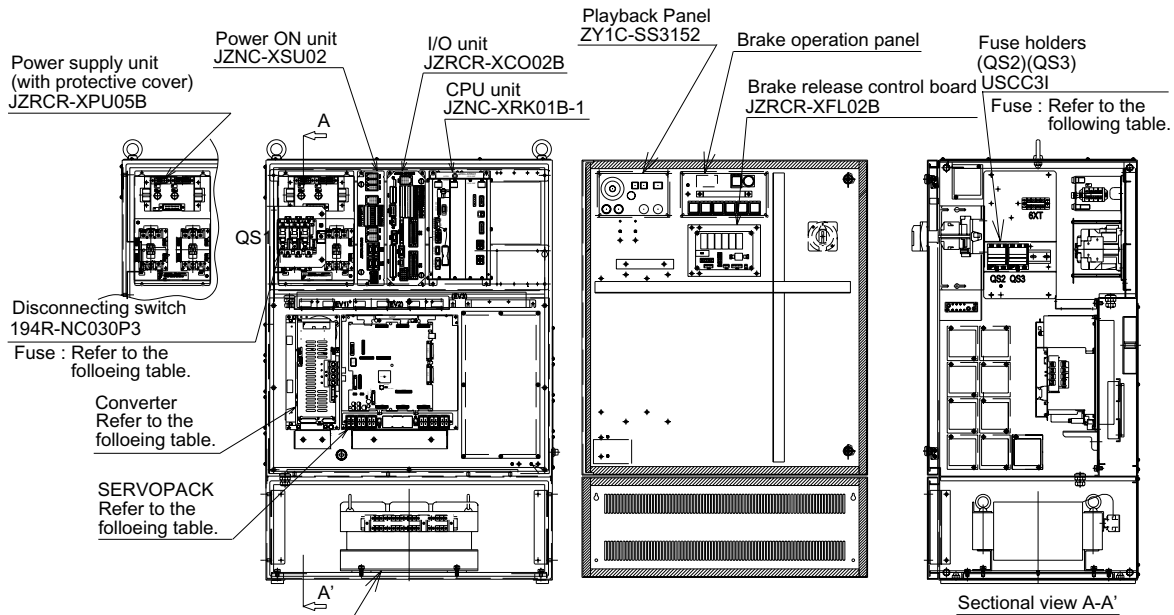
## 1.4 Equipment Configuration



Type	YASNAC XRC	SERVO PACK	* Fuse		
			QS1	QS2	QS3
SV3X	ERCR-SV3-RB06	CACR-SV3AAA	10A	—	5A
UP6	ERCR-UP6-RB05	CACR-UP6AAC	10A	—	10A
SK16X	ERCR-SK16-RB06	CACR-SK16AAC	15A	—	15A
UP20	ERCR-UP20-RB04	CACR-UP20AAA	15A	—	15A

\* : Time delay fuses of class CC are used for QS1, and QS3.

### SV3X, UP6, SK16X, UP20 Configuration (Without transformer)

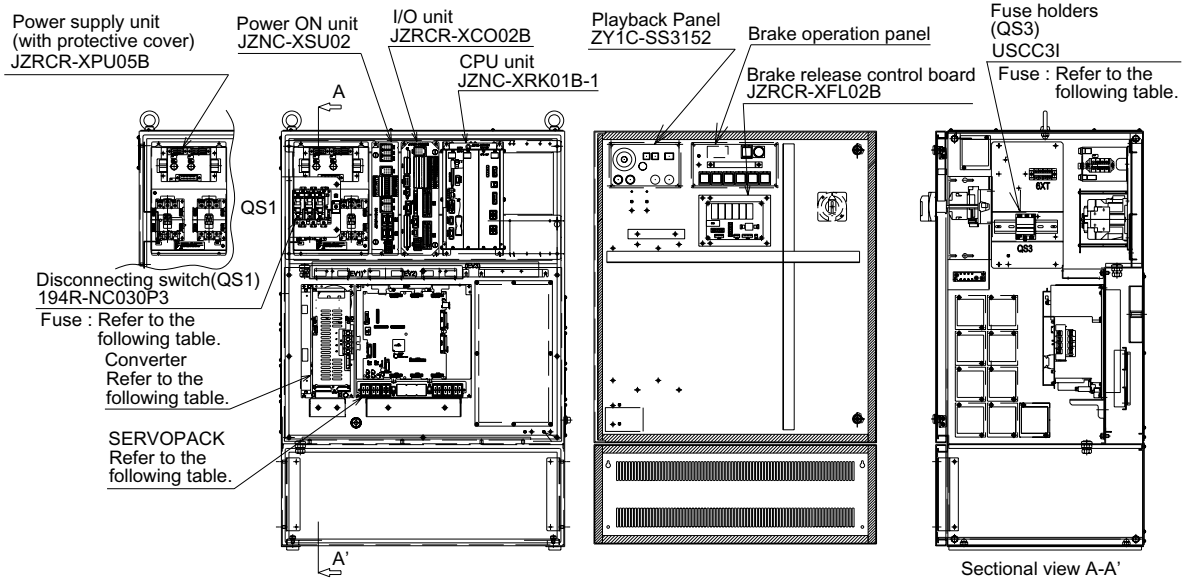


Transformer 8KVA  
HB9480043  
240-480-575V/208V  
△-△ Class H

Type	YASNAC XRC	SERVO PACK	Converter	* Fuse		
				QS1	QS2	QS3
UP50	ERCR-UP50-RB03	CACR-UP50AAB	JUSP-ACP25JAAY11	15A	20A	20A
UP20M	ERCR-UP20M-RB02	CACR-UP20MAAB	"	15A	20A	20A
SK45X	ERCR-SK45-RB02	CACR-SK45AAB	JUSP-ACP25JAA	15A	20A	20A
SK16MX	ERCR-SK16M-RB02	CACR-SK16MAAB	"	15A	20A	20A
SP70X	ERCR-SP70-RB03	CACR-SP70AAB	"	15A	20A	20A

\* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

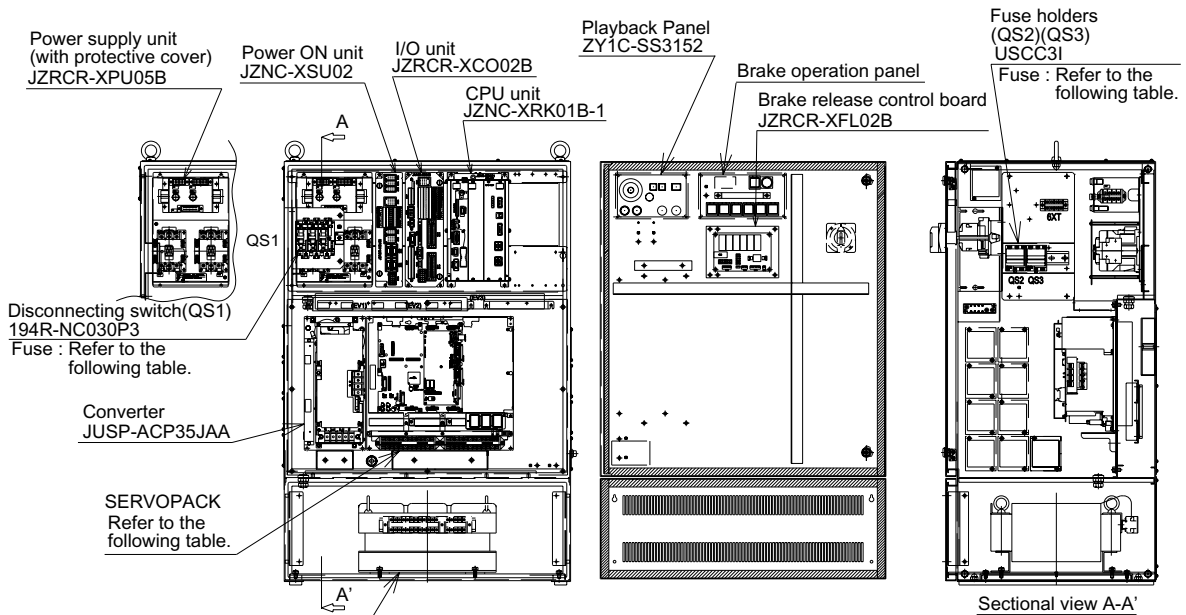
### SK45X, SK16MX, UP50, UP20M, SP70X Configuration (With transformer built-in)



Type	YASNAC XRC	SERVOPACK	Converter	* Fuse		
				QS1	QS2	QS3
UP50	ERCR-UP50-RB04	CACR-UP50AAB	JUSP-ACP25JAAY11	20A	—	20A
UP20M	ERCR-UP20M-RB03	CACR-UP20MAAB	"	20A	—	20A
SK45X	ERCR-SK45-RB03	CACR-SK45AAB	JUSP-ACP25JAA	20A	—	20A
SK16MX	ERCR-SK16M-RB03	CACR-SK16MAAB	"	20A	—	20A
SP70X	ERCR-SP70-RB04	CACR-SP70AAB	"	20A	—	20A

\* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

SK45X, SK16MX, UP50, UP20M, SP70 Configuration (Without transformer)

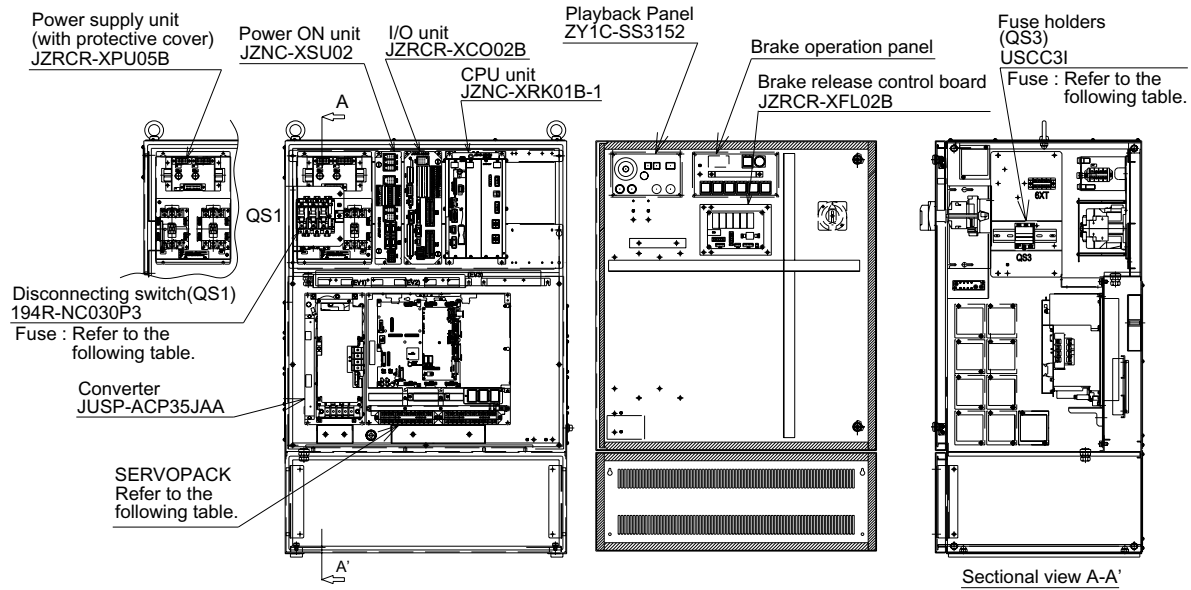


Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
UP130	ERCR-UP130-RB04	CACR-UP130AAB	20A	30A	30A
UP165	ERCR-UP165-RB04	CACR-UP130AAB	20A	30A	30A
UP165-100	ERCR-UP165-RB06	CACR-UP130AABY18	20A	30A	30A
UP200	ERCR-UP200-RB03	CACR-UP130AABY18	20A	30A	30A

\* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

UP130, UP165, UP165-100, UP200 Configuration (With transformer built-in)

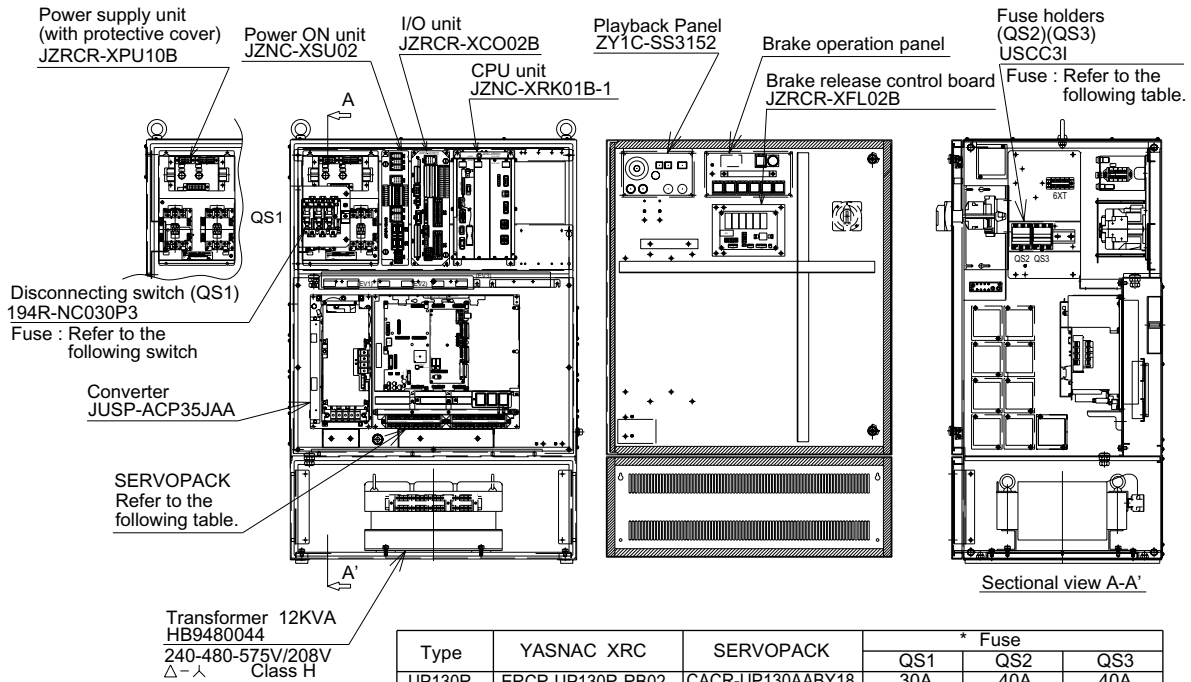
## 1.4 Equipment Configuration



Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
UP130	ERCR-UP130-RB05	CACR-UP130AAB	30A	—	30A
UP165	ERCR-UP165-RB05	CACR-UP130AAB	30A	—	30A
UP165-100	ERCR-UP165-RB07	CACR-UP130AABY18	30A	—	30A
UP200	ERCR-UP200-RB04	CACR-UP130AABY18	30A	—	30A

\* : Time delay fuses of class CC are used for QS1, and QS3.

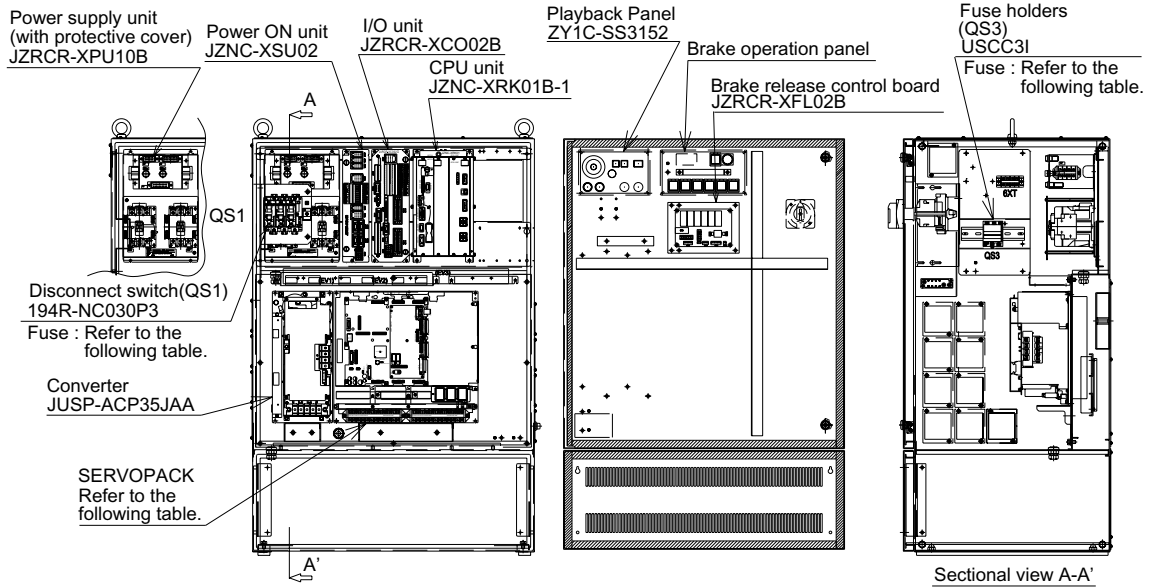
UP130, UP165, UP165-100, UP200 Configuration (Without transformer)



Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
UP130R	ERCR-UP130R-RB02	CACR-UP130AABY18	30A	40A	40A
UP130RL	ERCR-UP130RL-RB02	CACR-UP130AABY21	30A	40A	40A
SK300X	ERCR-SK300-RB02	CACR-SK300AAB	30A	40A	40A
SR200X	ERCR-SR200-RB02	CACR-SK300AAB	30A	40A	40A
SP100X	ERCR-SP100-RB02	CACR-SP100AAB	30A	40A	40A

\* : Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, QS2, and QS3.

UP130R, UP130RL, SK300X, SR200X, SP100X Configuration (With transformer built-in)

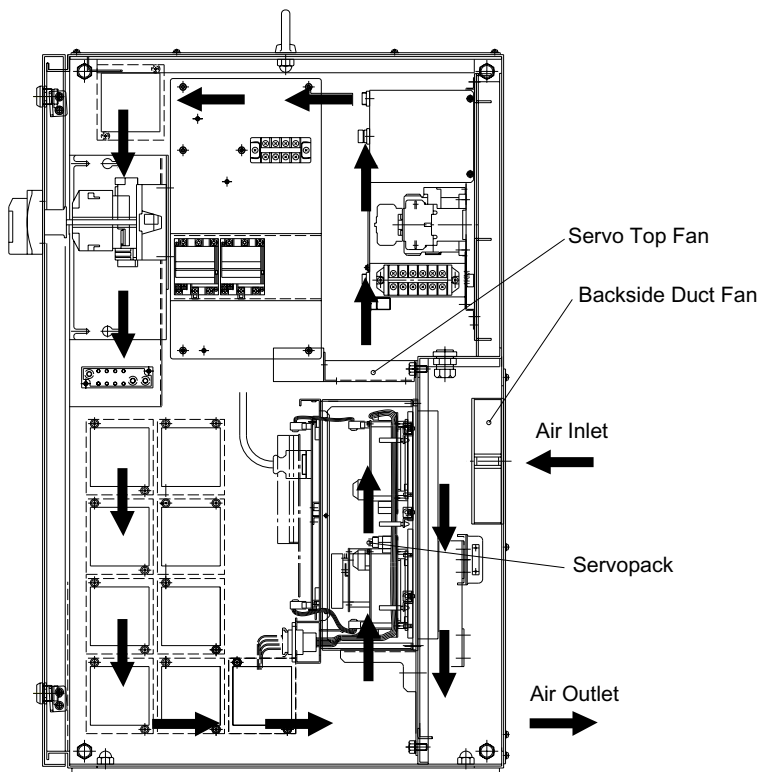


Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
UP130R	ERCR-UP130R-RB03	CACR-UP130AABY18	40A	—	40A
UP130RL	ERCR-UP130RL-RB03	CACR-UP130AABY21	40A	—	40A
SK300X	ERCR-SK300-RB03	CACR-SK300AAB	40A	—	40A
SR200X	ERCR-SR200-RB03	CACR-SK300AAB	40A	—	40A
SP100X	ERCR-SP100-RB03	CACR-SP100AAB	40A	—	40A

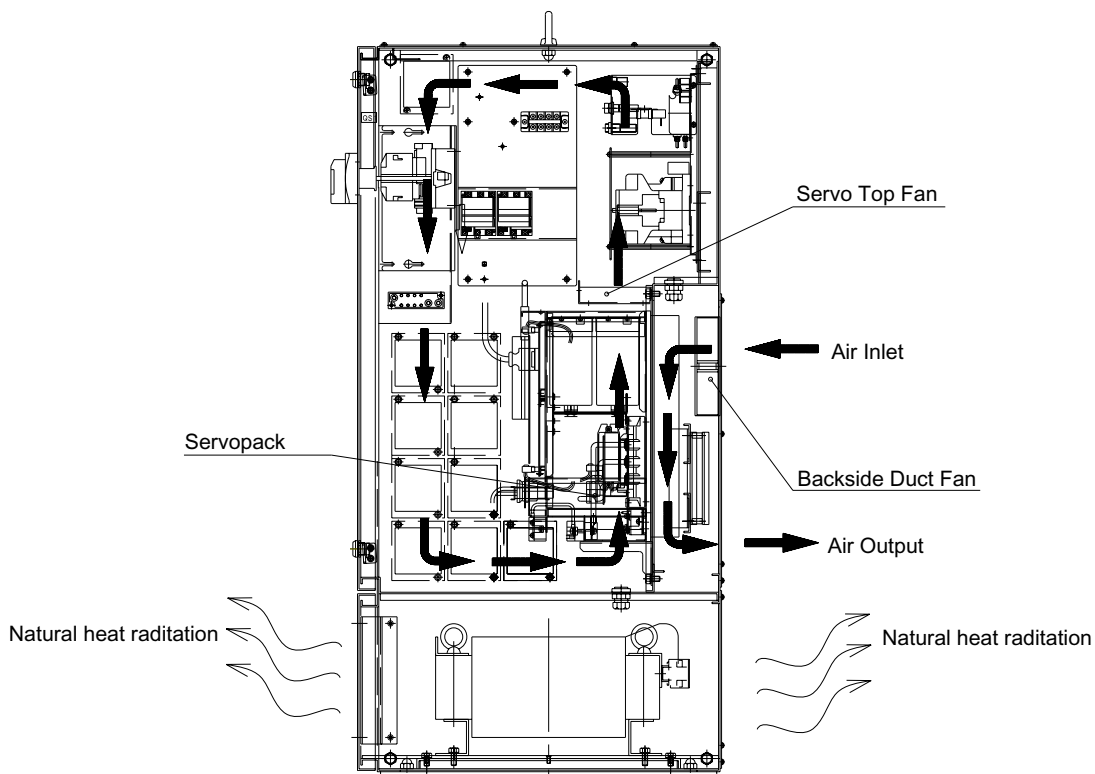
\* : Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, and QS3

UP130R, UP130RL, SK300X, SR200X, SP100X Configuration (Without transformer)

## 1.4.2 Cooling System of the Controller Interior



Cooling System (SV3X (Small Capacity type))(Right side view)



Cooling System (Except for SV3X (Small Capacity type))(Right side view)

---

## 2 Description of Units and Circuit Boards



### WARNING

- **Before operating the manipulator, check that the SERVO ON lamp goes out when the emergency stop buttons on the playback panel and programming pendant are pressed.**

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency.

- **Always set the teach lock before starting teaching.**

Failure to observe this caution may result in injury due to inadvertent operation on the playback panel.

- **Observe the following precautions when performing teaching operations within the working envelope of the manipulator:**

- **Always view the manipulator from the front.**
- **Always follow the predetermined operating procedure.**
- **Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.**
- **Ensure that you have a place to retreat to in case of emergency.**

Improper or unintentional manipulator operation can result in injury.

- **When turning the power on to the YASNAC XRC, be sure that there is no one within the working envelope of the manipulator, and be sure that you are in a safe place yourself.**

Injury may result from collision with the manipulator to anyone entering the working envelope of the manipulator. Always press the emergency stop button immediately if there are problems.



## CAUTION

- **Perform the following inspection procedures prior to performing teaching operations. If problems are found, correct 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 its specified position after use.**

If the programming pendant is inadvertently left on the manipulator or fixture, or on the floor, the manipulator or a tool could collide with it during manipulator movement, possibly causing injuries or equipment damage.

## 2.1 Power Supply Unit

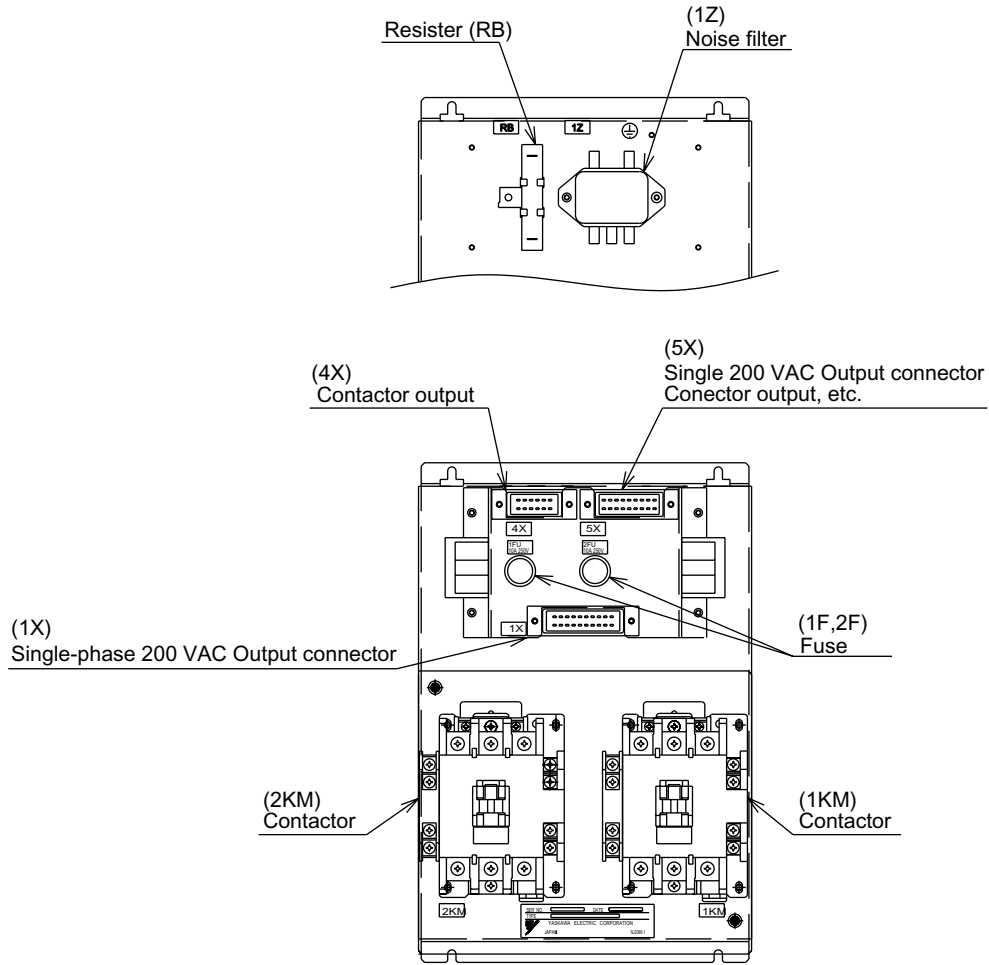
The power supply unit consists of the contactors (1KM, 2KM) for servo power and the line filter (1Z). It turns the contactor servo power on and off using the signal for servo power control from the I/O power ON unit, and supplies power(3-phase AC200/220V) to the unit.

The power supply (single phase AC200/220V) is supplied to the control power supply unit , I/O power ON unit and servopack (servo control power supply) via the line filter.

Power Supply Unit Models

Model	Robot Type
JZRRCR-XPU06B	SV3X, UP6, SK16X, UP20
JZRRCR-XPU05B	UP50, UP20M, SK45X, SK16MX, SP70, UP130, UP165, UP165-100, UP200
JZRRCR-XPU10B	UP130R, UP130RL, SK300X, SR200X, SP100X

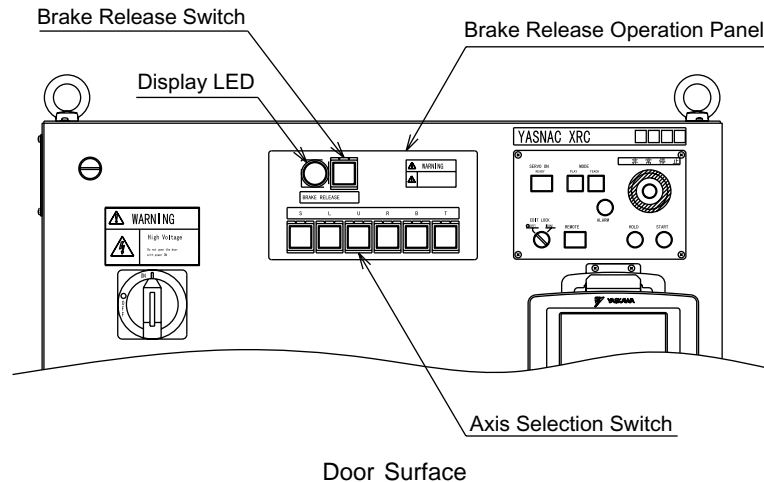




Power Supply Unit Configuration (JZR CR-XPU05B, JZR CR-XPU06B, JZR CR-XPU10B)

## 2.2 Brake Release Unit

A Switch to release the robot brake is provided on the door of the XRC for North America (ANSI) specification.



### 2.2.1 Operation Methods

1. Make sure that the XRC is in the status of Servo OFF (the lamp "SERVO ON READY" on the P.PANEL is unlit).
2. Press the button "BRAKE RELEASE" of the brake release unit on the XRC door surface. The lamp "BRAKE RELEASE" is lit. (The lamp is unlit when the button "BRAKE RELEASE" is released.)
3. With the button "BRAKE RELEASE" held pressed, press the button of axis for which the brake is to be released. The brake for the corresponding axis is released as long as the button is pressed.



### CAUTION

- **Watch on your feet and surroundings when releasing the brake.**

When the brake is released, the robot may move by its own weight, which may cause a injury and damage to the equipment.

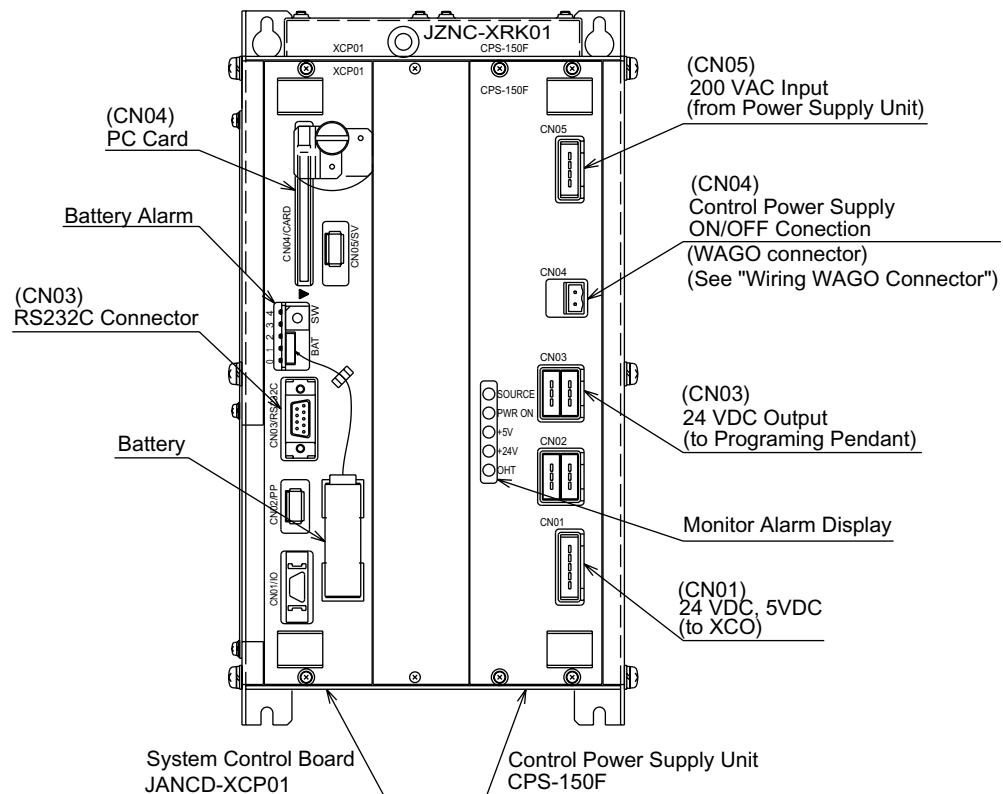
- **Release the axis brake one by one.**

In the case that simultaneous release of brakes of multiple number of axes is necessary, pay full attention for an unexpected motion of robot. Otherwise, an injury or damage to the equipment may be resulted.

## 2.3 CPU Rack

### 2.3.1 CPU Rack Configuration

CPU rack consists of the control power supply unit, circuit board racks, and system control circuit boards.



CPU Rack Configuration (JZNC-XRK01B-□)

### 2.3.2 Circuit Board in the CPU Rack

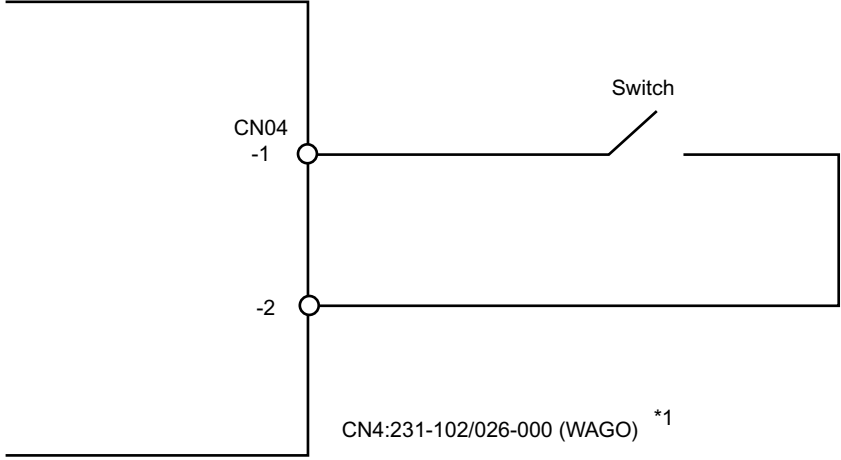
#### ■ System Control Circuit Board (JANCD-XCP01)

This board performs to control the entire system, display to the programming pendant, control the operating keys, control operation, calculate interpolation, and interface the servo control circuit board (with a serial communication board JANCD-XIF03). This board has the PC card interface and Serial interface for RS-232C. The JANCD-XMM 01 board (option) can be installed when CMOS memory is expanded.

## ■ Control Power Supply Unit (CPS-150F)

This unit supplies the DC power (5VDC, 24VDC) to the I/O unit (JZRCR-XCO02B), the power ON unit (JZRCR-XSU02) and the programming pendant. It is also equipped with the input function for turning the control power supply on and off.

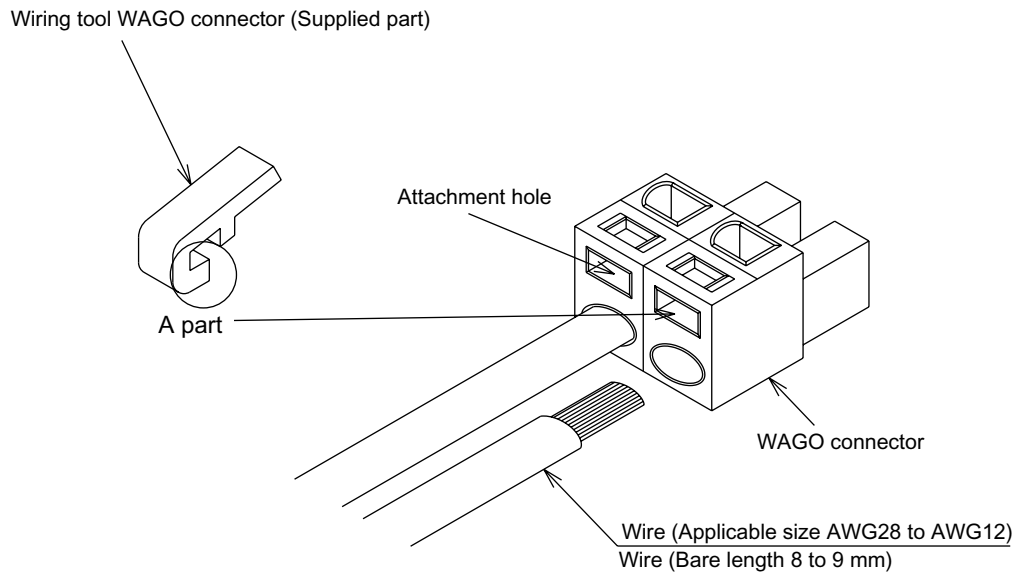
Items	Specifications		
Input	Rated Input Voltage: 200/220VAC Voltage Fluctuation Range: +10% to -15% (170 to 242VAC) Frequency: 50/60Hz $\pm$ 2Hz (48 to 62Hz)		
Output Voltage	+5VDC : 10A +24VDC : 4.0A		
Indicator	DISPLA	Color	Status
	SOURCE	Green	Lights when AC power supply input (Normally ON)
	POWER ON	Green	Lights when DC power supply input (Normally ON)
	+5V	Red	Lights when +5V supply overvoltage or overcurrent (ON when abnormal)
	+24V	Red	Lights when +24V supply overcurrent (ON when abnormal)
	OHT	Red	Lights when units interior overheats (ON when abnormal)
Overheat Detector	It is detected when the temperature inside of the controller is about 65°C		

Items	Specifications
Control Power ON/OFF	<p>To turn on the XRC controller power, turn the main switch to the ON position then turning on the control power supply. If the controller is not located at the workplace, the control power supply can be turned ON and OFF by input from external device. It is operated by the external switch connected with CN 04 of control power supply unit as shown in the following figures. (CN04 is shortaged when shipment)</p> <p>Control Power Supply Unit (CPS-150F)</p>  <p>Connection to Control Power Supply Unit</p> <p>GO "Wiring WAGO Connector" for wiring of CN04 connector.</p>

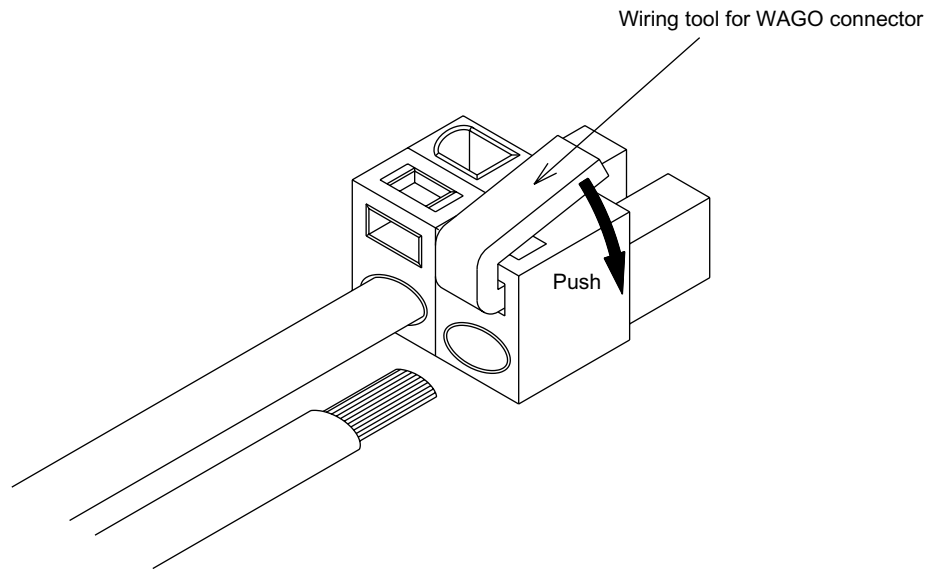
### ■ Wiring WAGO Connector

CN04 on the control power supply unit (CPS-150F) is equipped with a connector produced by WAGO. The "wiring tool for WAGO connector" is necessary to wire with WAGO connector. Two wiring tools are provided with the XRC as supplied parts. The wiring procedure is described as follows:

1. Insert the A part of the wiring tool into a attachment hole.



2. Insert or pull out the wire while pushing the wiring tool downward (Direction of the arrow).



3. Remove the wiring tool from the connector. (Complete)  
The wiring tool for WAGO connector should be kept for future use.

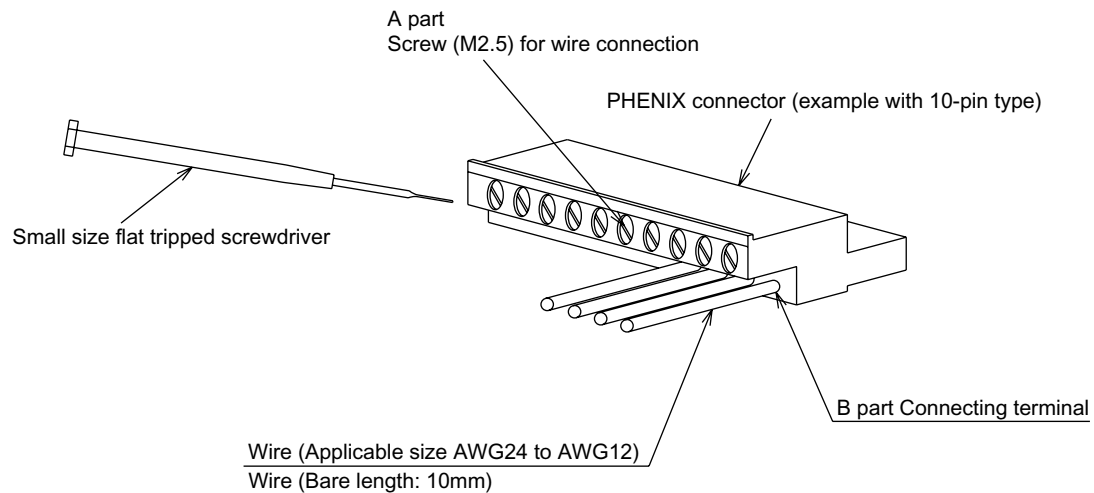
## ■ Wiring PHOENIX Connector

CN05, 06, 40 and 44 on the I/O unit (JZRRCR-XCO01) and CN27 and 28 of the power ON unit (JZRRCR-XSU02) are equipped with a connector produced by PHOENIX.

The “small size flat tipped screwdriver” is necessary to wire to PHOENIX connector.

The wiring procedure is described as follows:

1. Loosen the screw on A part of the connector by using “small size flat tipped screwdriver”.

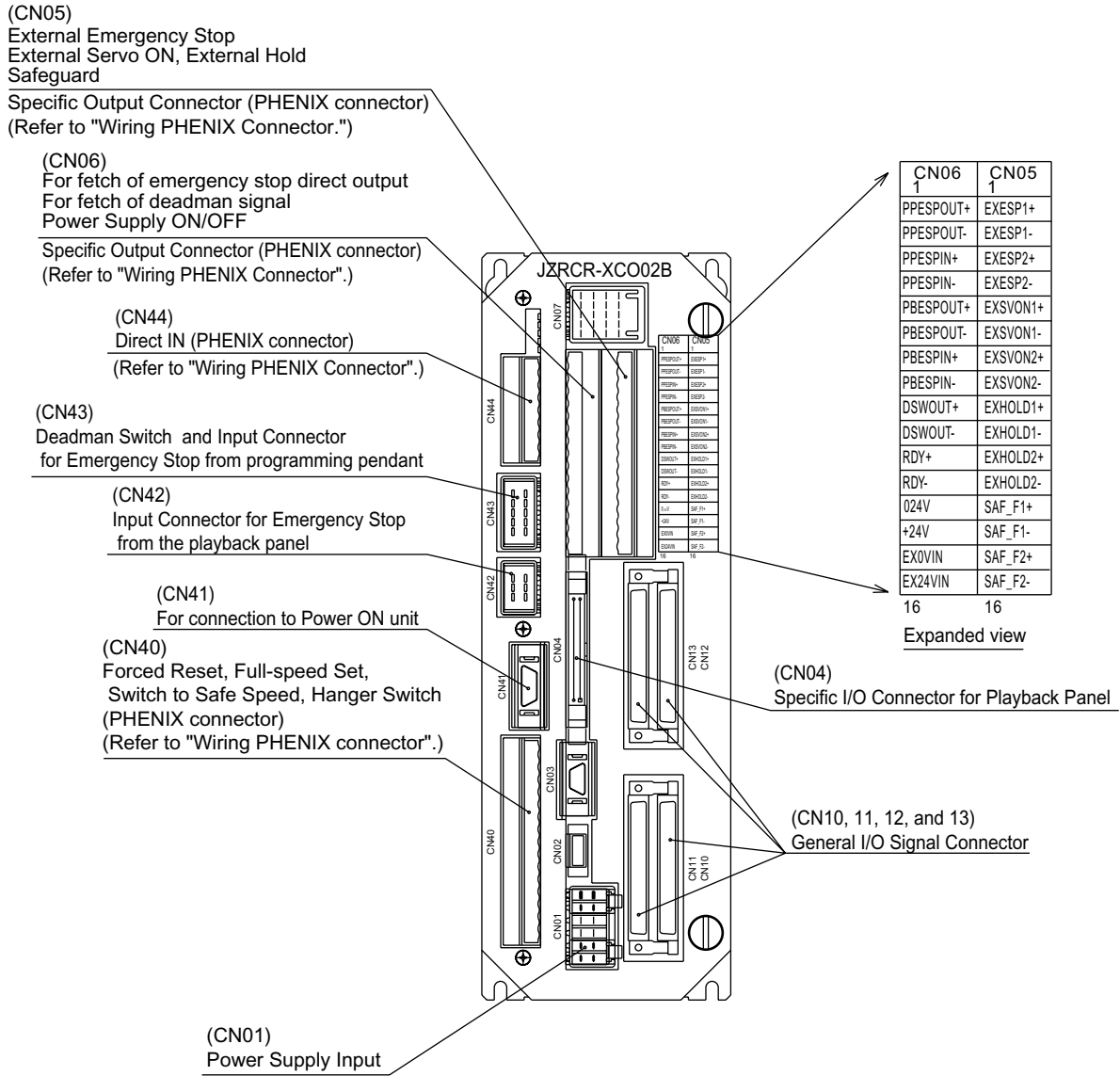


2. Insert a wire into the B part of connector, and tighten the A part screw by using a “small size flat tipped screwdriver”. (Recommended tightening torque: 0.8 Nm)

**NOTE** Make sure that the screw is securely tightened so that the wire will not come out.

## 2.4 I/O Unit (JZRRCR-XCO02B)

The I/O unit consists of the specific I/O circuit board 1 (JARCR-XCI01), the specific I/O circuit board 2 (JARCR-XCU01B) and the general I/O circuit board (JARCR-XCI03).



I/O Unit Configuration (JZRRCR-XCO02B)



Refer to "Wiring PHOENIX Connector".



## 2.4.1 Specific I/O Circuit Board 1 (JARCR-XCI01) and Specific I/O Circuit Board 2 (JARCR-XCU01B)

The specific I/O circuit board consists of the specific I/O circuit board 1 (JARCR-XCI01) and the specific I/O circuit board 2 (JARCR-XCU01B) both of which have a control function. The main functions are as follows.

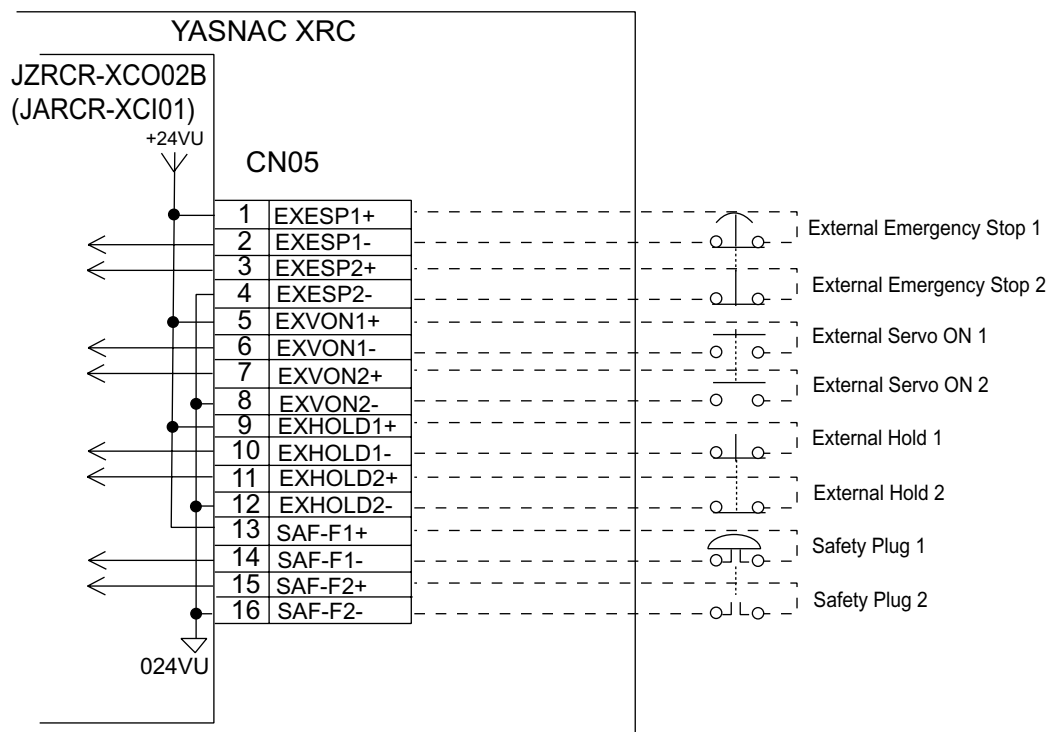
- Safety circuit control (depulexing + cross-diagnosis) function
- Specific I/O for playback panel (IN / OUT = 8 points / 8 points)
- Direct input (3 points)
- Deadman Switch Control Circuit



### CAUTION

- **Before use, remove any jumper leads from the specific input signals.**

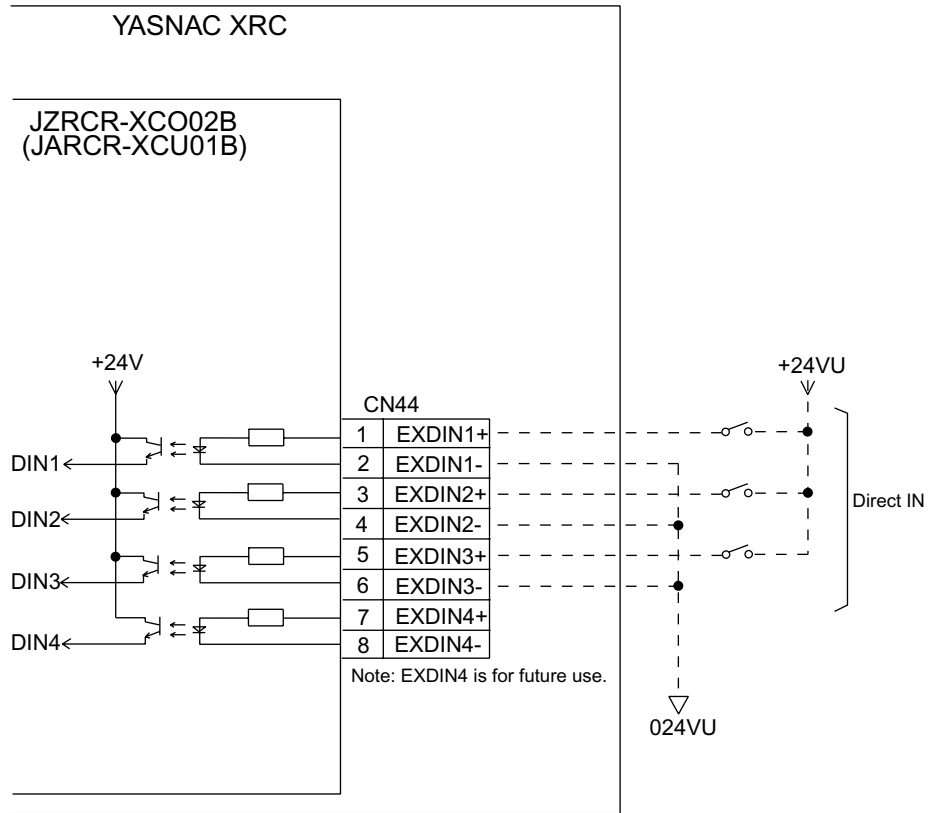
The unit may malfunction resulting in injury or damage to equipment.



JZRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

■ Direct IN

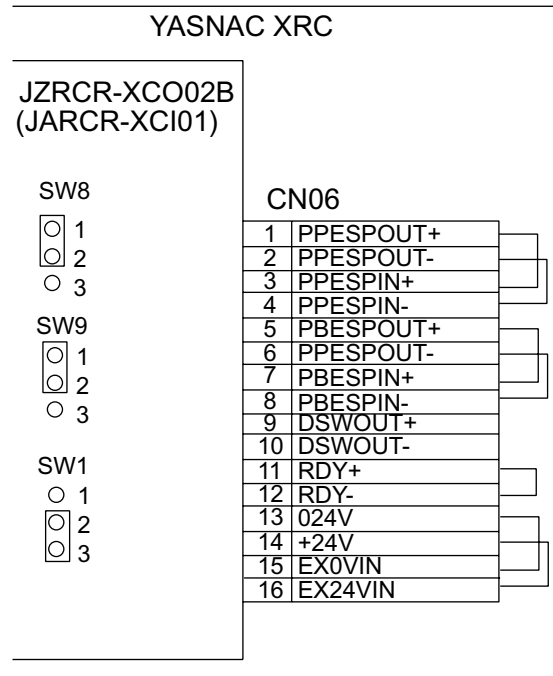
The signals can be directly and externally connected.



JZRRCR-XCO02B Specific I/O Circuit Board Allocation and Connection Diagram

## ■ Connected Jumper Leads Before Shipment

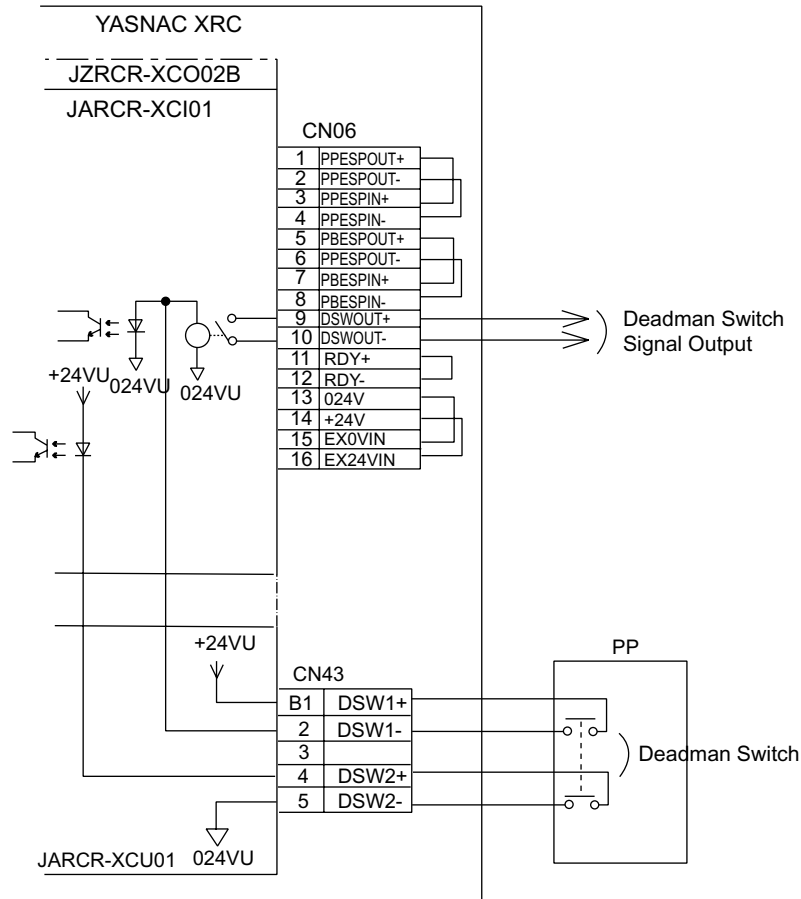
CN06 of the I/O unit (JZRCR-XCO02B) is connected with jumper leads as shown in the figure below before shipment. The short-circuit pins SW1, 8, and 9 on the specific input circuit board (JARCR-XCI01) are set across 2 and 3 of SW 1, 1 and 2 of SW8 , and 1 and 2 of SW9.



JZRCR-XCO02B Specific I/O Circuit Board Allocation and Connection Diagram

## ■ Deadman Switch Signal Output

A deadman switch signal is output from CN06-9 and -10.

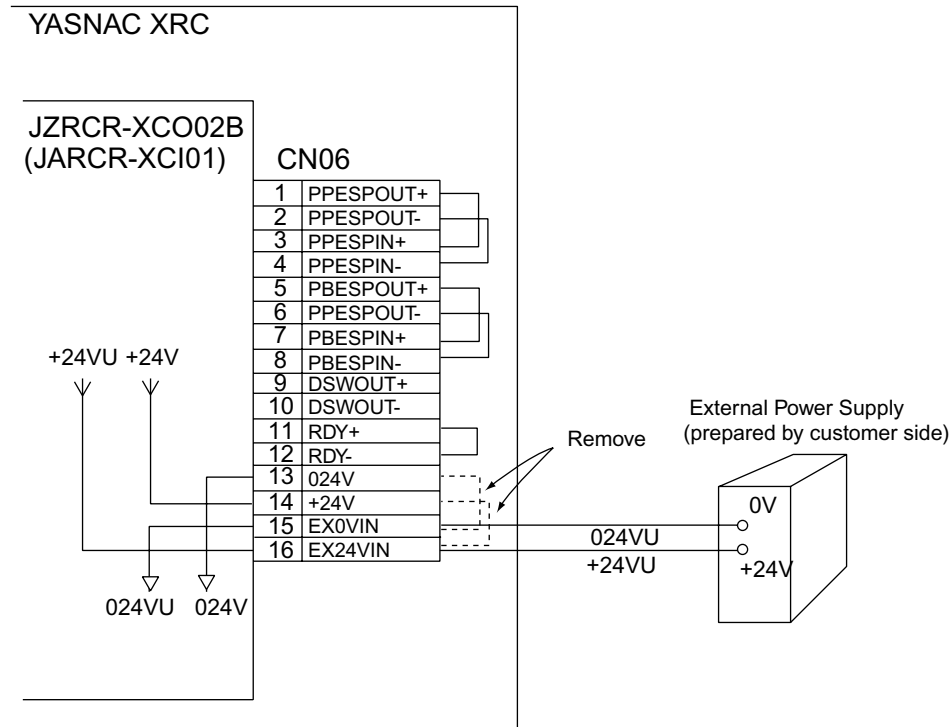


JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

## ■ Connection to I/O External Power Supply

In the standard specification, the I/O power supply is installed internally. When an external power supply is used, proceed as follows.

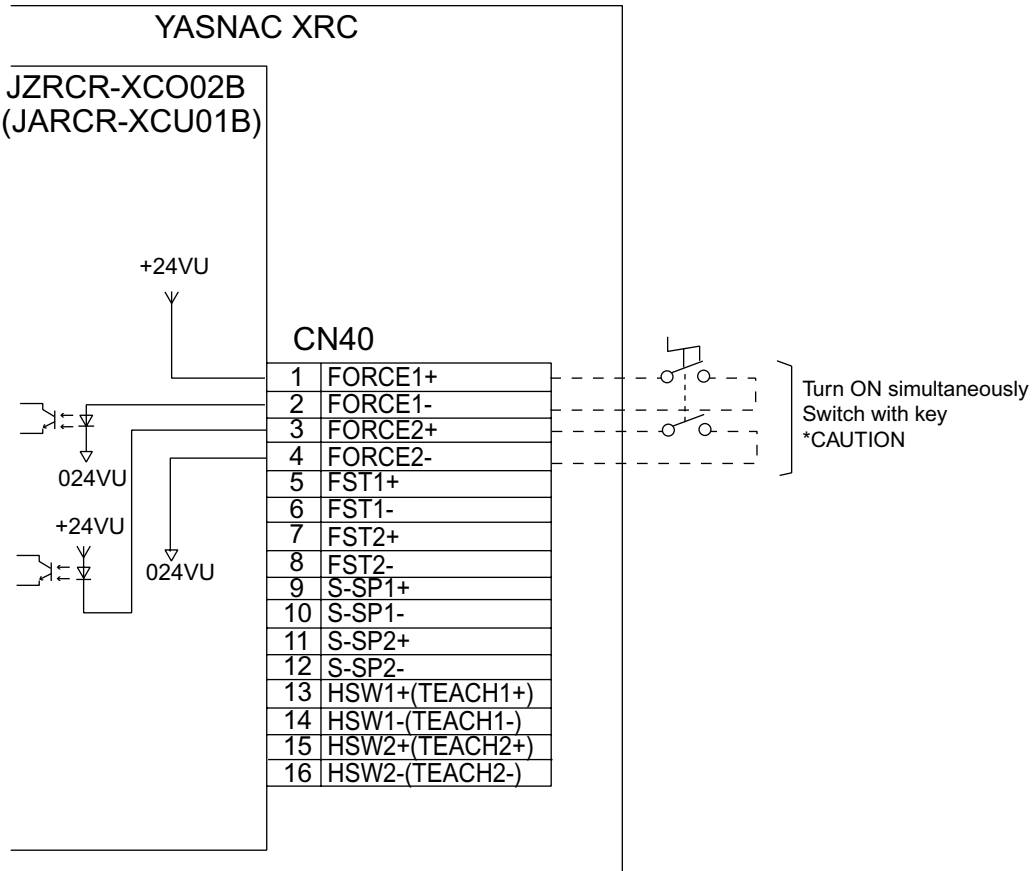
1. Remove the jumper lead between CN6-13 and -15, and between CN06-14 and -16 of I/O unit (JZRRCR-XCO02B).
2. Connect CN06-16 and -15 of the I/O unit (JZRRCR-XCO02B) to +24 V and 0V of the external power supply respectively.



JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

## ■ FORCE (Forced Reset)

The signals are input externally to FORCE1 (Forced Reset 1) (CN40-1 and -2) and FORCE2 (Forced Reset 2) (CN40-3 and -4). When both of FORCE1 and FORCE2 are turned ON, the deadman switch is invalidated. When only one is input, an alarm occurs.



JZRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram



## CAUTION

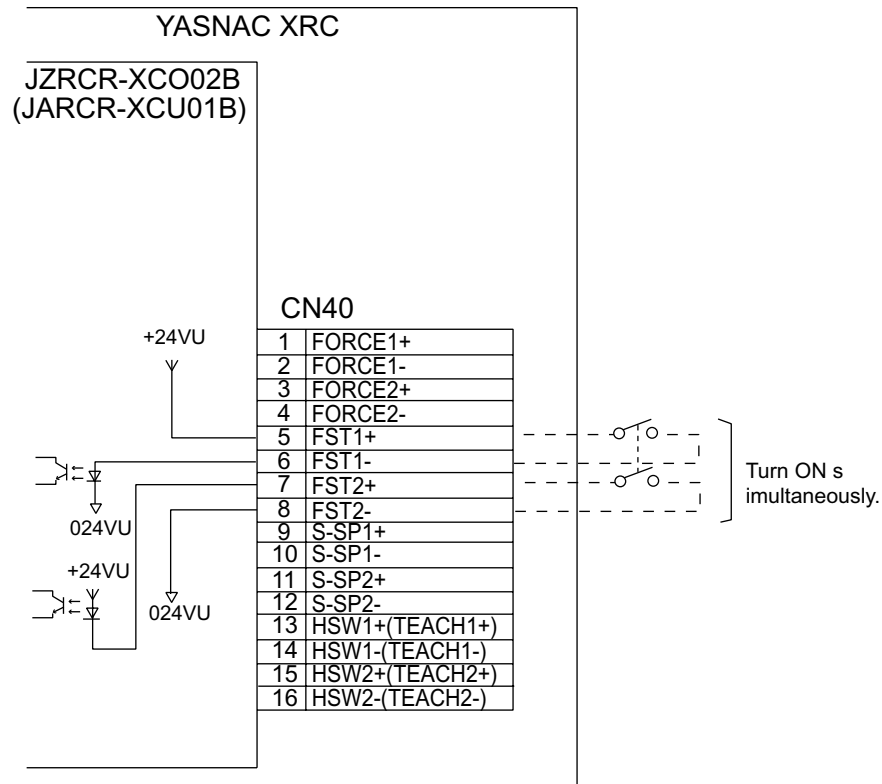
Do not use the "FORCE" (Forced release) input.

If the "FORCE" input should be used for an unavoidable reason, be sure to use a switch with a key. The systems manager is responsible for storage of the key.

When "FORCE" is input, all the deadman switches become invalid, so handle with extreme care.

## ■ FST (Full-speed Test)

When both of FST1 (Full-speed Test 1) input (CN40-5 and -6) and FST2 (Full-speed Test 2) input (CN40-7 and -8) are turned ON, the manipulator motion speed will be a PLAY-mode speed when XRC is in play mode, and a TEACH-mode speed when XRC is in teach mode. Note that 1st Safe Speed and 2nd Safe Speed can not be selected. When only one is input, an alarm occurs.



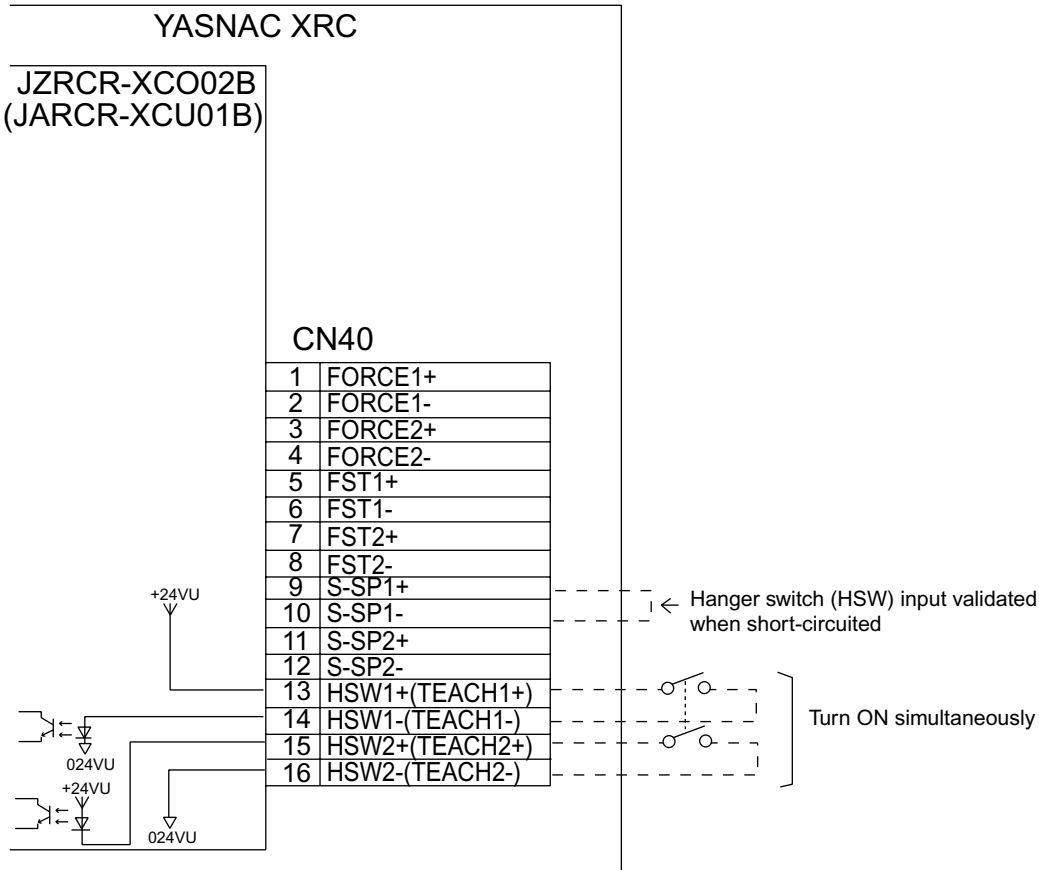
JZRCCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

### ■ Hanger Switch (HSW)

Short-circuiting the S-SP1 (CN40-9 and -10) validates the hanger switch (HSW).

At this time, the deadman switch (DSW) is invalidated. (Before shipment, the S-SP1 is set open, therefore, the deadman switch (DSW) is set valid while the hanger switch (HSW) is set invalid).

For HSW, there are HSW1 (CN40-13 and -14) and HSW2 (CN40-15 and -16). Use two-contact type input switch so that both of HSW1 and HSW2 turn ON/OFF simultaneously. If only one is input, an alarm occurs.



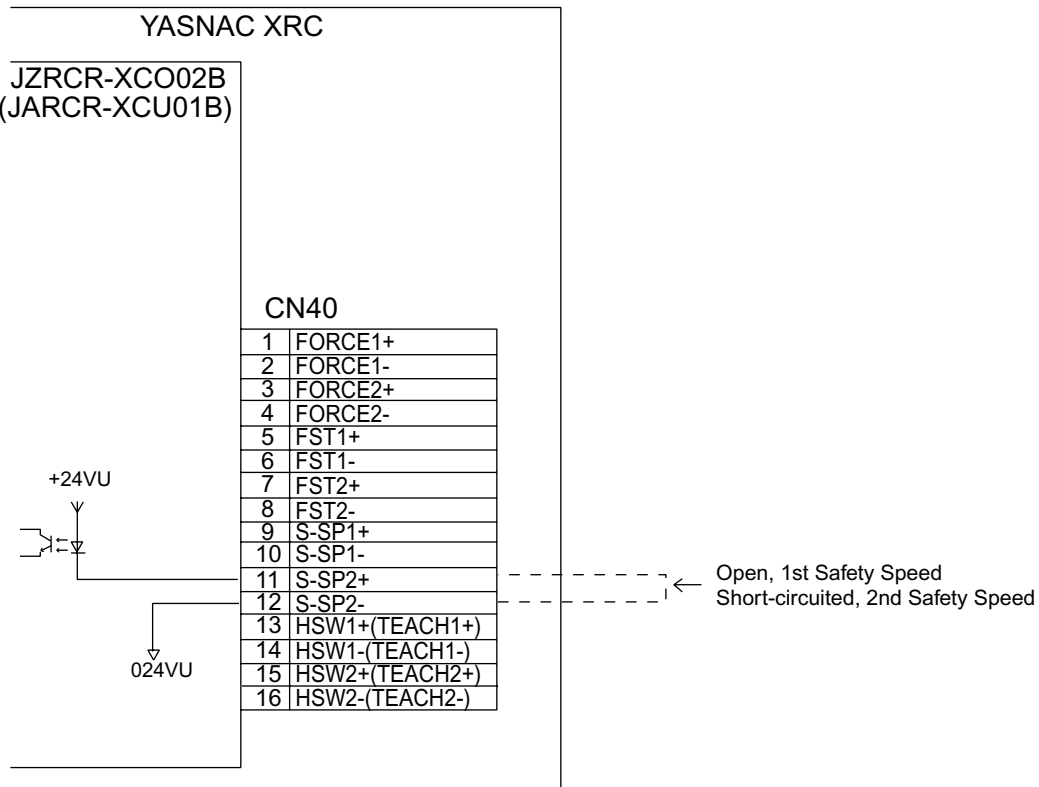
JZRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram



## ■ 1st Safety Speed and 2nd Safety Speed

When either the deadman switch (DSW) or the hanger switch (HSW) is turned ON, the speed is limited to safety speeds. With the S-SP2 (CN40-11 and -12) open, the speed is limited to 1st Safety Speed, with the S-SP2 (CN40-11 and -12) short-circuited, the speed is limited to 2nd Safety Speed.

- 1st Safety Speed: limited to 16 % of the play maximum speed.
- 2nd Safety Speed: limited to 2 % of the play maximum speed.



JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

## Specific Input List (XCO02B)

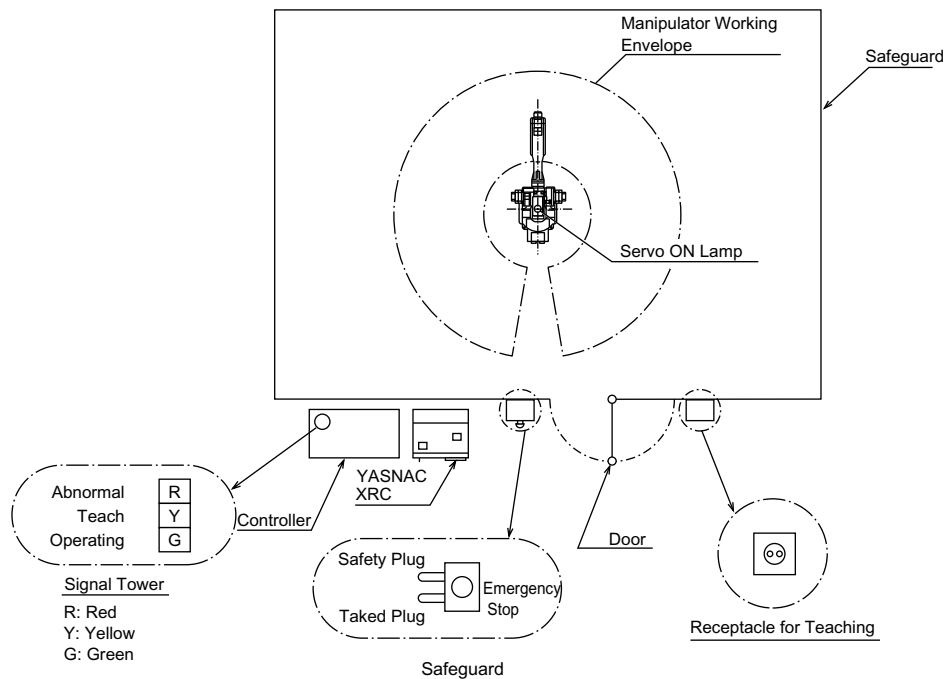
Terminal	Input Name / Function	Factory Setting
EXESP1	External emergency stop	Disabled by jumper lead
CN05 -1 -2	Use to connect the emergency stop switch of an external operation device. The servo power turns OFF and job execution stops when this signal is input. The servo power cannot be turned ON while this signal is ON.	
EXESP2		
CN05 -3 -4		
EXSVON1	Servo ON	Open
CN05 -5 -6	Use to connect the servo ON switch of an external operation device. The servo power turns ON when this signal is input.	
EXSVON2		
CN05 -7 -8		
EXHOLD1	External hold	Disabled by jumper lead
CN05 -9 -10	Use to connect the HOLD switch of an external operation device. Job execution stops when this signal is input. Starting and axis operations are disabled while this signal is ON.	
EXHOLD2		
CN05-11 -12		
SAF-F1	Safety plug	Disabled by jumper lead
CN05-13 -14	This signal turns OFF the servo power when the door of the safeguard is opened. Connect to the interlock signal from the safety plug attached to the door. The servo power turns OFF when the interlock signal is input. The servo power cannot be turned ON while this signal is ON. However, in the teach mode, this function is disabled.	
SAF-F2		
CN05-15 -16		
DIN1	Direct-in 1	Open
CN44 -1 -2	Used for the search function.	
DIN2	Direct-in 2	Open
CN44 -3 -4	Used for the search function.	
DIN3	Direct-in 3	Open
CN44 -5 -6	Used for the search function.	

## Specific Input List (XCO02B)

Terminal	Input Name / Function	Factory Setting
DIN	Direct-in 4	Open
CN44 -7 -8	Direct-in4 is for future use.	
FORCE1	Forced reset input	Open
CN40 -1 -2	Do not use the "FORCE" (Forced release) input. If the "FORCE" input should be used for an unavoidable reason, be sure to use a switch with a key. The systems manager is responsible for storage of the key.	
FORCE2	When "FORCE" is input, all the deadman switches become invalid, so handle with extreme care.	
CN40 -3 -4		
RDY	Optional board Ready signal	Disabled by Jumper lead
CN06-11 -12	Use to add safety circuit conditions.	
FST1	Full-speed test	Open
CN40 -5 -6	PLAY normal speed is selected in PLAY mode, and TEACH normal speed is selected in TEACH mode.	
FST2		
CN40 -7 -8		
S-SP1	Switches Valid/Invalid of HSW/DSW.	Open
CN40 -9 -10	When open, DSW valid When short-circuited, HSW valid	
S-SP2	Switches between 1st Safety Speed and 2nd Safety Speed.	Open
CN40-11 -12	1st Safety Speed: the speed is limited to 16 % of PLAY maximum speed. 2nd Safety Speed: the speed is limited to 2 % of PLAY maximum speed. When open, 1st Safety Speed is selected When short-circuited, 2nd Safety Speed is selected.	
HSW1	Hanger switch	Open
CN40-13 -14	Validates the hanger switch with S-SP1 short-circuited. When open, a normal speed	
HSW2	When short-circuited, a safety speed (according to the setting of S-SP2)	
CN40-15 -16		

## ■ Safety Plug Input Signal

The manipulator must be surrounded by a safeguard and a door protected by an interlock function. The door must be opened by the technician to enter and the interlock function stops the robot operation when the door is open. The safety plug input signal is connected to the interlock signal from the gate.



If the servo power is ON when the interlock signal is input, the servo power turns OFF. The servo power cannot be turned ON while the interlock signal is input. However, the servo power does not turn OFF when the door is opened only during the TEACH mode. In this case, the servo power can be turned ON while the interlock signal is input.

### 2.4.2 General I/O Circuit Board (JARCR-XCI03)

The general I/O circuit board is controlled by the system control circuit board (JANCD-XCP 01) through the specific I/O circuit board (JARCR-XCI01).

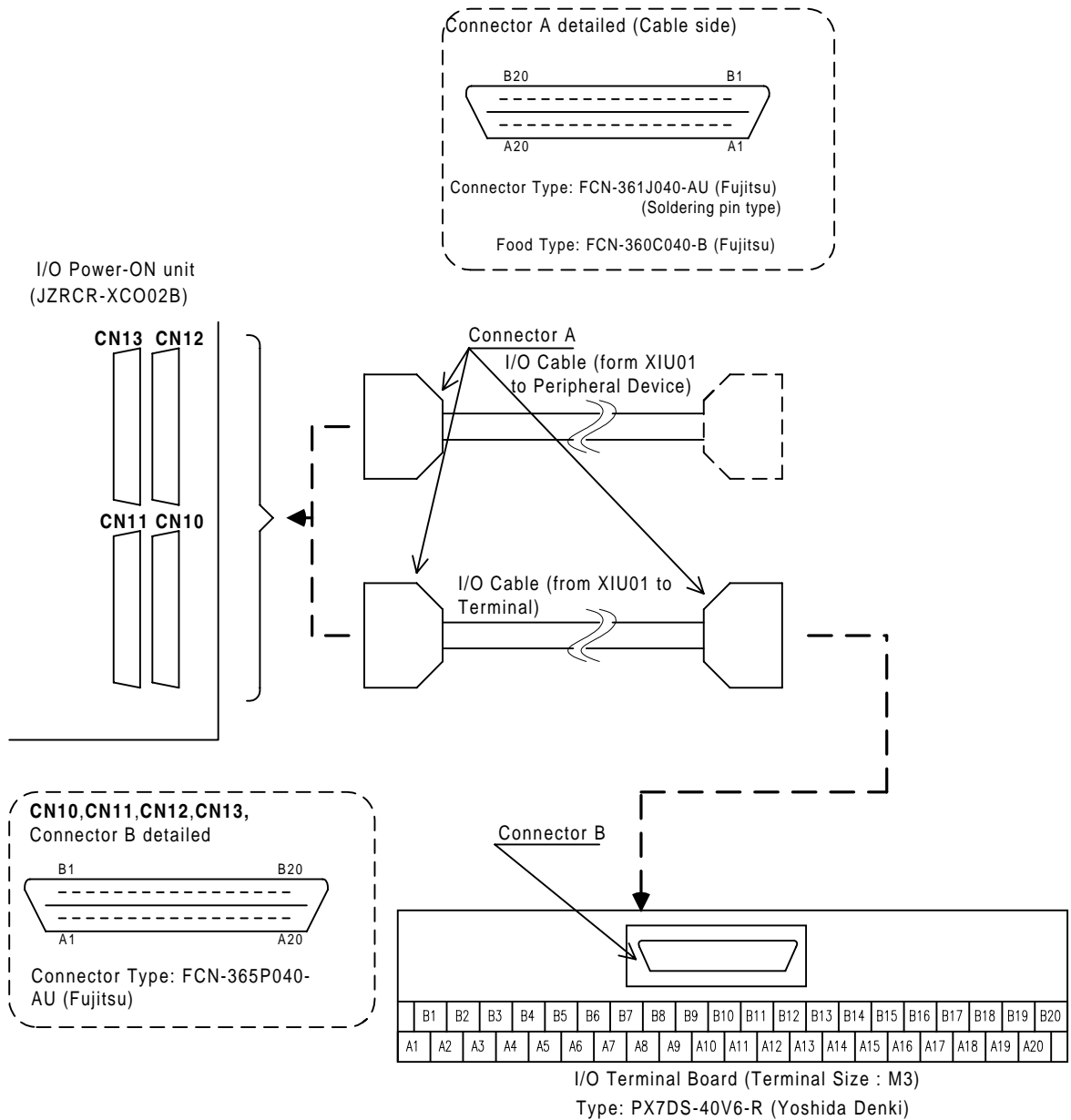
I/O can be separated as specific I/O and general I/O allocated software as follows:

- Specific I/O : IN/OUT = 24 points / 24 points
- General I/O : IN/OUT= 16 points / 16 points (relay contact output)

The specific I/O is a signal in which the part is decided in advance. The specific I/O is used when the external operation equipment, jig controller and centralized controller control the manipulator and related equipment as a system. The assignment of the general input signal depends on the applications as shown in " 2.8 General I/O Signal Assignment ". The main example using specific I/O is shown as follows.

■ Connection wire with General I/O (CN10, 11, 12, 13)

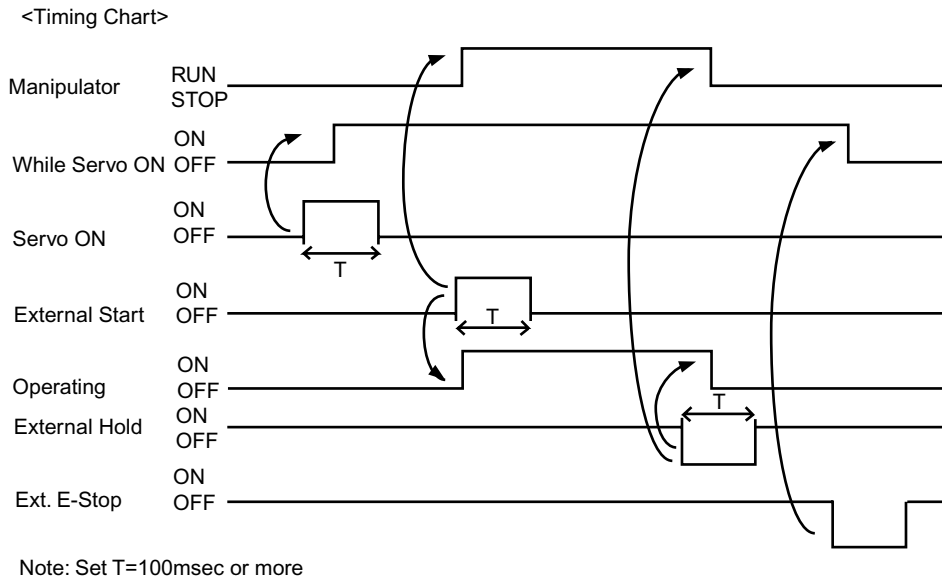
Please refer to the figure below when you manufacture the cable connecting with general I/O connector (CN10,11,12,13). (The cable side connector and the I/O terminal are the options)



## ■ Specific I/O Signal Related to Start and Stop

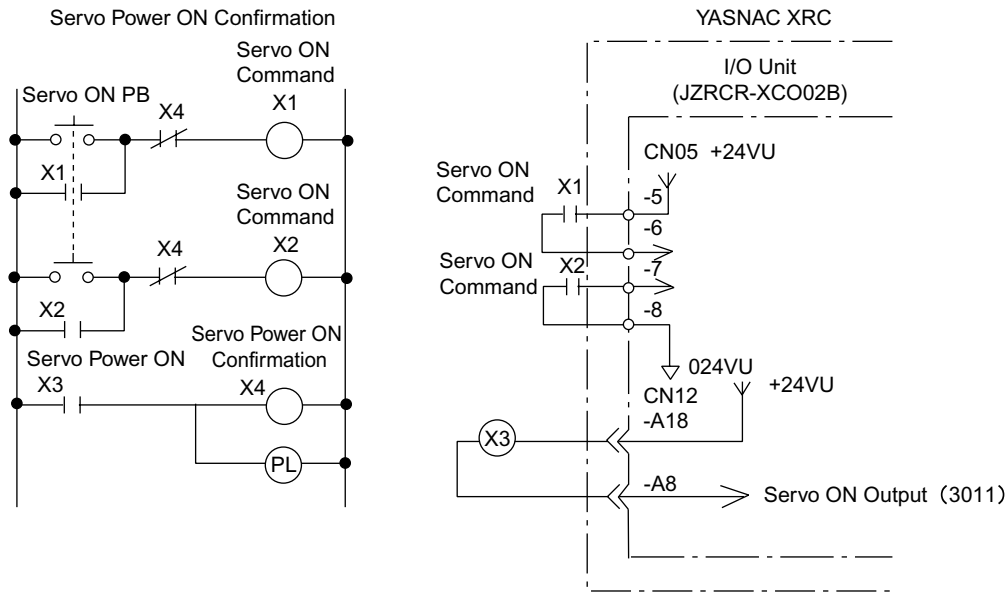
The following signals are specific I/O signals related to start and stop.

- Servo On (depending on application:JARCR-XCI03)
- External Servo On (common to all application:JARCR-XCI01)
- External Start (depending on application:JARCR-XCI03)
- Operating (depending on application:JARCR-XCI03)
- External Hold (common to all application:JARCR-XCI01)
- External Emergency Stop (common to all application:JARCR-XCI01)



### Example of Servo ON Sequence Circuit from External Device

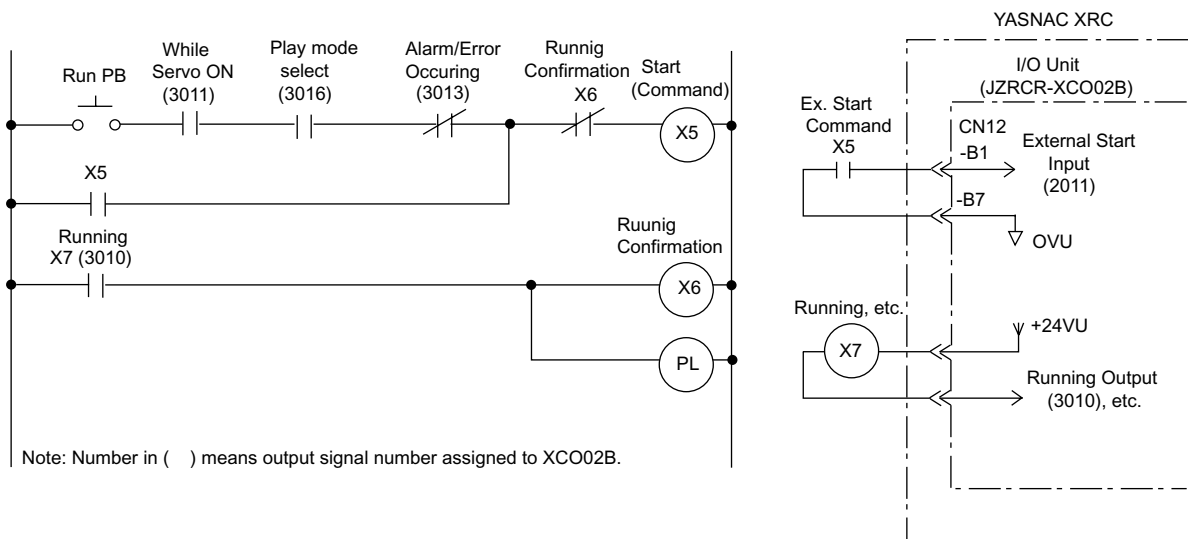
Only the rising edge of the servo ON signal is valid. This signal turns ON the manipulator servo power supply. The set and reset timings are shown in the following.



Note: Number in ( ) means output signal number assigned to XCO02B.  
 PL: Pilot Lamp

### Example of Start Sequence Circuit from External Device

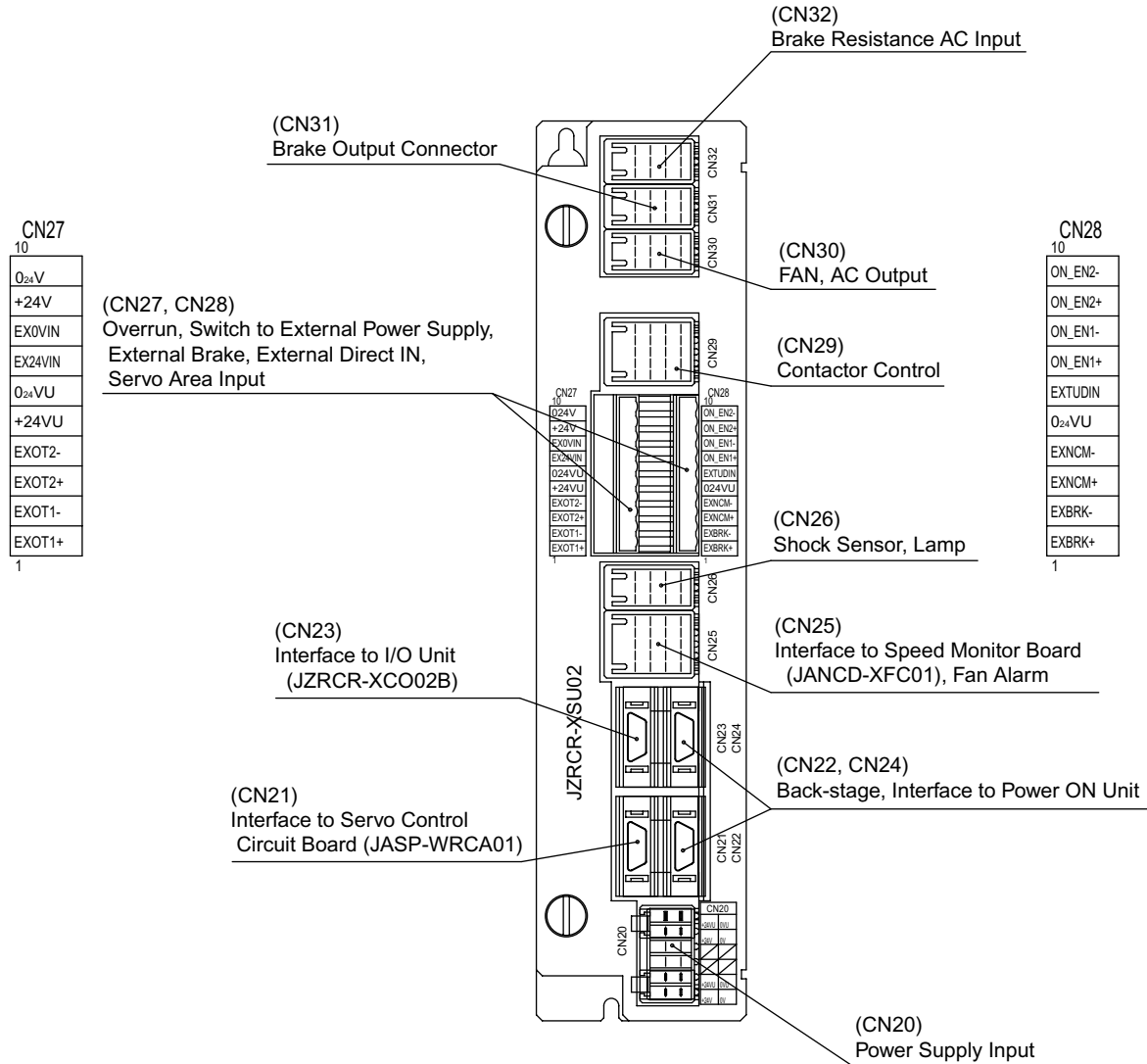
Only the rising edge of the external start signal is valid. This signal starts the manipulator. Reset this signal with the interlock configuration that determines if operation can start and with the playback (RUNNING) signal confirming that the robot has actually started moving.



Note: Number in ( ) means output signal number assigned to XCO02B.

## 2.5 Power ON Unit (JZRRCR-XSU02)

The power ON unit consists of the power ON circuit board (JARCR-XCT01) to control the servo power ON sequence.



Power ON Unit Configuration (JZRRCR-XSU02)



## 2.5.1 Power ON Circuit Board (JARCR-XCT01)

The power ON circuit board is controlled by the servo control circuit board (JASP-WRCA01). The main functions are as follows:

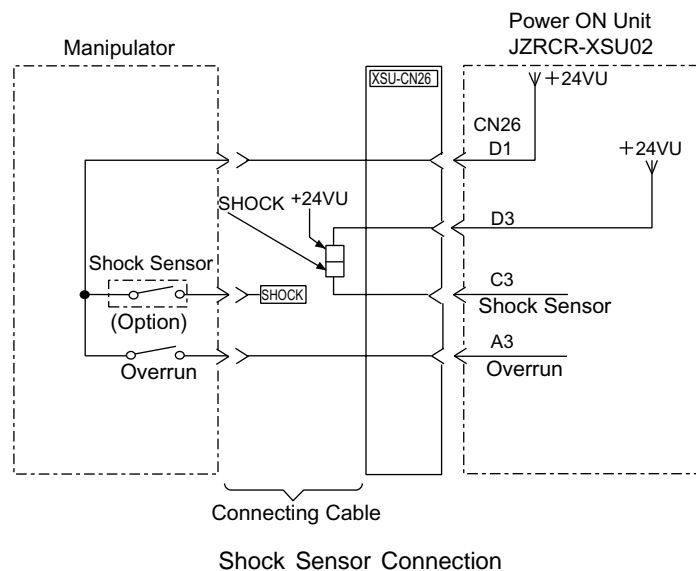
- Specific I/O circuit, for instance, servo power supply contactor I/O circuit and emergency stop circuit
- Brake power supply circuit and its output
- Overrun(OT) shock sensor(SHOCK) and lamp light power supply output to robot

### ■ Connection of Shock Sensor

Remove "SHOCK-" and "+24VU" from XSU-CN26 (Dynamic Connector) , and connect the shock sensor signal "SHOCK-" to the robot.

Shock Sensor Connection Terminal

Terminal	Type	Factory Setting	Use Shock Sensor
SHOCK-	PC-2005W		
+24VU	PC-2005M		
SHOCK-	PC-2005M		



When the shock sensor input signal is used, the stopping method of the robot can be specified. The stopping methods are hold stop and servo power supply off. Selection of the stopping method is set in the display of the programming pendant. Refer to Explanation \*1 in " 3.6 Overrun / Shock Sensor Releasing " of the YASNAC XRC Instructions for details.

## ■ Method of Connecting External Axis Overrun Signal

In a standard specification, the external axis overrun input is unused. (It is set invalid by a jumper lead.)

Please connect the signal according to the following procedures when the overrun input for an external axis is necessary, besides for the manipulator.

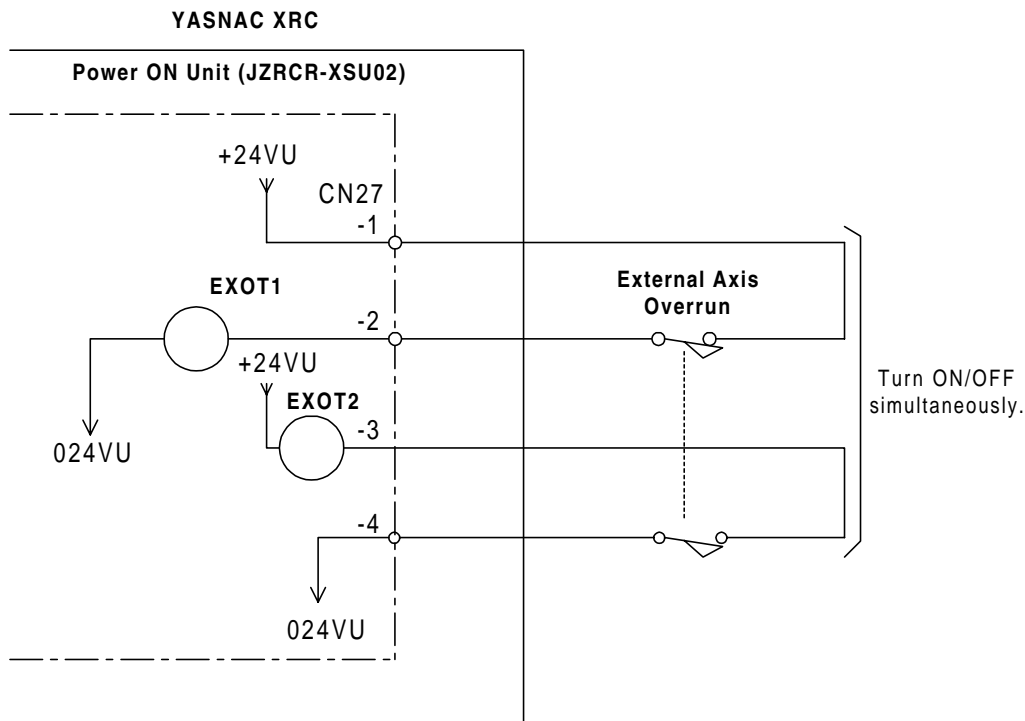
1. Remove jumper leads connected between CN27-1 and -2 , and CN27-3 and -4 of power ON unit (JZRRCR-XSU02).
2. Connect the overrun input of an external axis between CN27-1 and -2 , and CN27-3 and -4 of power ON unit (JZRRCR-XSU02) as shown in the figure below. The input switch for external axis overrun should be of 2-contact type so that both signals are turned ON/OFF simultaneously.



### CAUTION

- **Remove a jumper when there is a jumper in the specific input signal to be used.**

The injury and damage may result because it doesn't function even if the soecific signal is input.

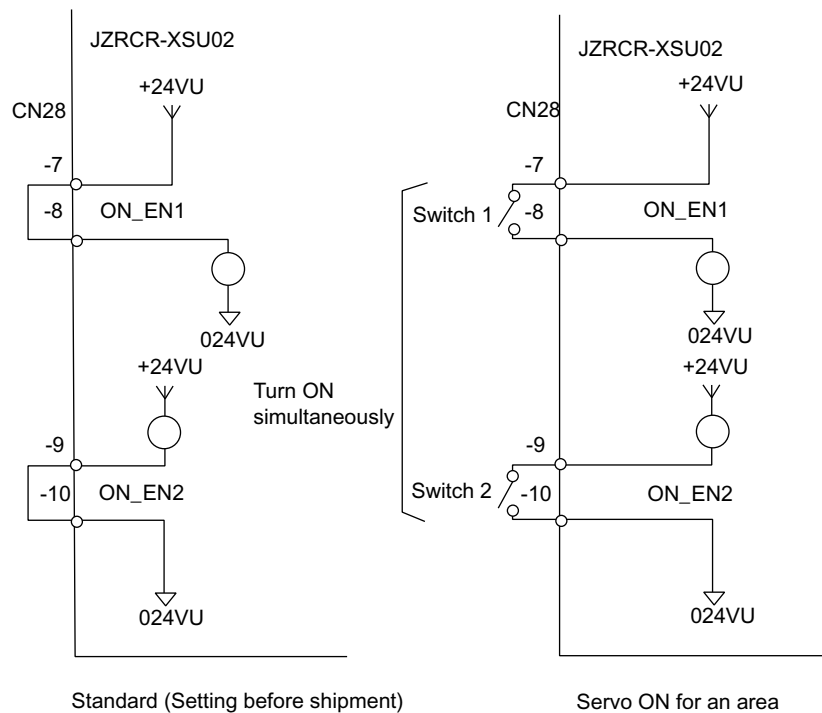


## ■ Servo ON Enable Input (ON\_EN1 and 2)

This function divides the system into multiple servo areas and turns ON the servo power for each area.

In the standard specification, this is short-circuited by a jumper lead.

1. Remove jumper leads between CN28-7 and -8, and between CN28-9 and -10 of the power ON unit (JZRRCR-XSU02).
2. Connect the switch 1 for servo area to the servo ON enable input (ON\_EN1) across CN28-7 and -8, the switch 2 to the servo ON enable input (ON\_EN2) across CN28-9 and -10. Make a connection so that both of these switches turn ON/OFF simultaneously. When both of ON\_EN1 and 2 are ON, the servo power supply turns ON. When only one is ON, an alarm occurs.



Servo ON Enable Input (ON\_EN1 and 2)

## 2.6 SERVOPACK

A SERVOPACK consists of a servo control circuit board (JASP-WRCA01), a servo control power supply (JUSP-RCP01AA□), a converter and an amplifier (Refer to the following tables “SERVOPACK Configuration”).

As for large capacity type, the converter and the servo power supply are separate.

### 2.6.1 SERVOPACK Configuratio

SERVOPACK Configuration (Small Capacity Type)

Component	SV3X		UP6		
	Type	Capacity	Type	Capacity	
SERVOPACK	CACR-SV3AAA	-	CACR-UP6AAC	-	
Converter	JUSP-ACP05JAA	5A	JUSP-ACP05JAA	5A	
Amplifier	S	JUSP-WS02AA	200W	JUSP-WS05AAY17	500W
	L	JUSP-WS02AA	200W	JUSP-WS10AAY17	1kW
	U	JUSP-WS01AA	100W	JUSP-WS05AAY17	500W
	R	JUSP-WSA5AA	50W	JUSP-WS01AA	100W
	B	JUSP-WSA5AA	50W	JUSP-WS01AA	100W
	T	JUSP-WSA5AA	50W	JUSP-WS01AA	100W
Servo control circuit board	JASP-WRCA01	-	JASP-WRCA01	-	
Servo control power supply	JUSP-RCP01AA□	-	JUSP-RCP01AA□	-	
Speed monitor board	JANCD-XFC01	-	JANCD-XFC01	-	

SERVOPACK Configuration (Small Capacity Type)

Component	SK16X		UP20		
	Type	Capacity	Type	Capacity	
SERVOPACK	CACR-SK16AAC	-	CACR-UP20AAA	-	
Converter	JUSP-ACP05JAA	5A	JUSP-ACP05JAA	5A	
Amplifier	S	JUSP-WS10AAY17	1kW	JUSP-WS10AA	1kW
	L	JUSP-WS10AAY17	1kW	JUSP-WS20AAY22	2kW
	U	JUSP-WS10AAY17	1kW	JUSP-WS10AAY17	1kW
	R	JUSP-WS02AA	200W	JUSP-WS02AA	200W
	B	JUSP-WS02AA	200W	JUSP-WS02AA	200W
	T	JUSP-WS02AA	200W	JUSP-WS02AA	200W
Servo control circuit board	JASP-WRCA01	-	JASP-WRCA01	-	
Servo control power supply	JUSP-RCP01AA□	-	JUSP-RCP01AA□	-	
Speed monitor board	JANCD-XFC01	-	JANCD-XFC01	-	

SERVOPACK Configuration (Medium Capacity Type)

Component	SK45X		SK16MX		
	Type	Capacity	Type	Capacity	
SERVOPACK	CACR-SK45AAB	-	CACR-SK16MAAB	-	
Amplifier	S	JUSP-WS30AA	3kW	JUSP-WS30AA	3kW
	L	JUSP-WS20AA	2kW	JUSP-WS20AA	2kW
	U	JUSP-WS20AA	2kW	JUSP-WS20AA	2kW
	R	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
	B	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
	T	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
Servo control circuit board	JASP-WRCA01	-	JASP-WRCA01	-	
Speed monitor board	JANCD-XFC01	-	JANCD-XFC01	-	
Converter	JUSP-ACP25JAA	25A	JUSP-ACP25JAA	25A	
Servo control power supply	JUSP-RCP01AA□	-	JUSP-RCP01AA□	-	

SERVOPACK Configuration (Medium Capacity Type)

Component		UP50		UP20M	
		Type	Capacity	Type	Capacity
SERVOPACK		CACR-UP50AAB	-	CACR-UP20MAAB	-
Amplifier	S	JUSP-WS44AA	4.4kW	JUSP-WS44AA	4.4kW
	L	JUSP-WS60AA	6kW	JUSP-WS60AA	6kW
	U	JUSP-WS20AA	2kW	JUSP-WS20AA	2kW
	R	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
	B	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
	T	JUSP-WS10AA	1kW	JUSP-WS02AA	200W
Servo control circuit board		JASP-WRCA01	-	JASP-WRCA01	-
Speed monitor board		JANCD-XFC01	-	JANCD-XFC01	-
Converter		JUSP-ACP25JAAY11	25A	JUSP-ACP25JAAY1	25A
Servo control power supply		JUSP-RCP01AA□	-	JUSP-RCP01AA□	-

SERVOPACK Configuration (Medium Capacity Type)

Component		SP70X	
		Type	Capacity
SERVOPACK		CACR-SP70AAB	-
Amplifier	S	JUSP-WS20AA	2kW
	L	JUSP-WS15AA	1.5kW
	U	JUSP-WS44AA	4.4kW
	R	JUSP-WS05AA	500W
	B	-	-
	T	-	-
Servo control circuit board		JASP-WRCA01	-
Speed monitor board		JANCD-XFC01	-
Converter		JUSP-ACP25JAA	25A
Servo control power supply		JUSP-RCP01AA□	-

SERVOPACK Configuration (Large Capacity Type)

Component	UP130, UP165		UP130R, UP200 UP165-100		
	Type	Capacity	Type	Capacity	
SERVOPACK	CACR-UP130AAB	-	CACR-UP130AABY18	-	
Amplifier	S	JUSP-WS60AA	6kW	JUSP-WS60AAY18	6kW
	L	JUSP-WS60AA	6kW	JUSP-WS60AAY18	6kW
	U	JUSP-WS60AA	6kW	JUSP-WS60AA	6kW
	R	JUSP-WS20AAY13	2kW	JUSP-WS20AAY13	2kW
	B	JUSP-WS15AAY13	1.5kW	JUSP-WS15AAY13	1.5kW
	T	JUSP-WS15AAY13	1.5kW	JUSP-WS15AAY13	1.5kW
Servo control circuit board	JASP-WRCA01	-	JASP-WRCA01	-	
Speed monitor board	JANCD-XFC01	-	JANCD-XFC01	-	
Converter	JUSP-ACP35JAA	35A	JUSP-ACP35JAA	35A	
Servo control power supply	JUSP-RCP01AA□	-	JUSP-RCP01AA□	-	

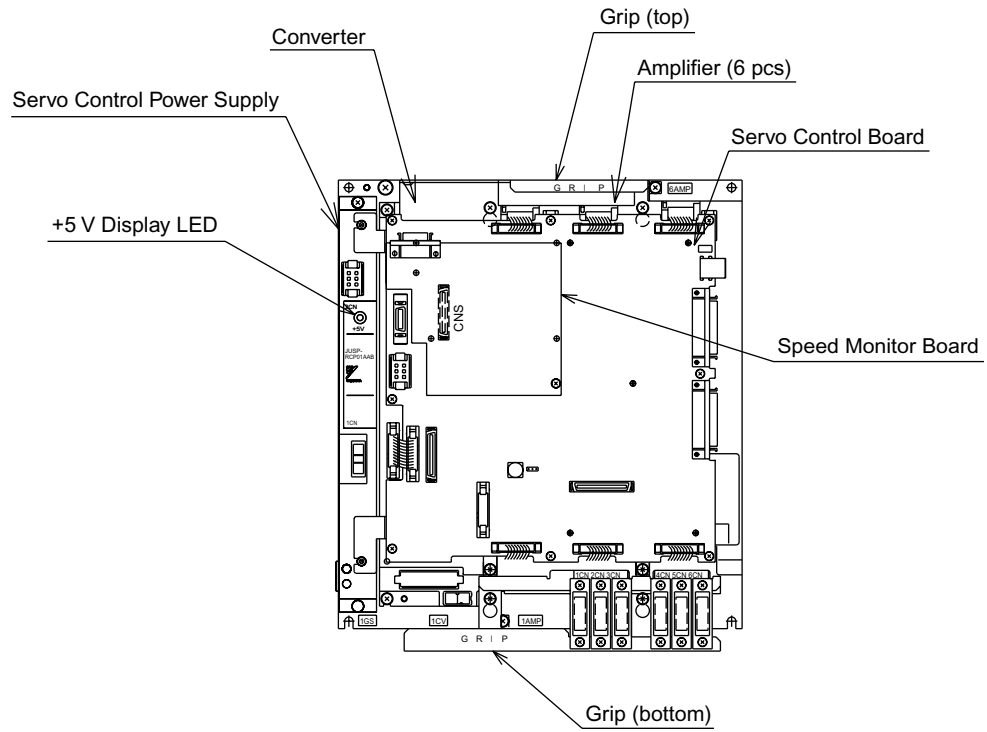
SERVOPACK Configuration (Large Capacity Type)

Component	UP130RL		
	Type	Capacity	
SERVOPACK	CACR-UP130AABY21	-	
Amplifier	S	JUSP-WS60AAY18	6kW
	L	JUSP-WS60AAY18	6kW
	U	JUSP-WS60AAY18	6kW
	R	JUSP-WS20AAY13	2kW
	B	JUSP-WS15AAY13	1.5kW
	T	JUSP-WS15AAY13	1.5kW
Servo control circuit board	JASP-WRCA01	-	
Speed monitor board	JANCD-XFC01	-	
Converter	JUSP-ACP35JAA	35A	
Servo control power supply	JUSP-RCP01AA□	-	

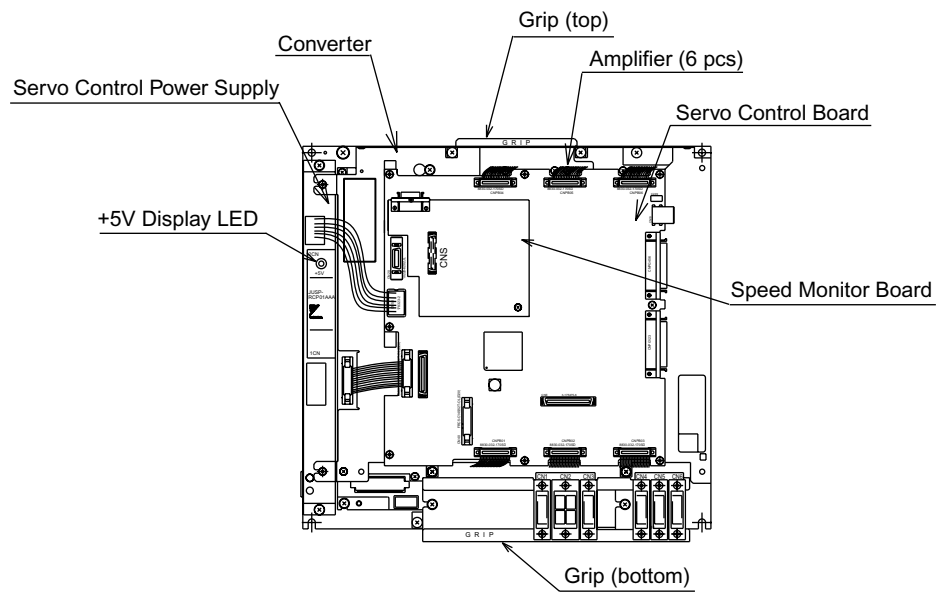
SERVOPACK Configuration (Large Capacity Type)

Component		SK300X, SR200X		SP100X	
		Type	Capacity	Type	Capacity
SERVOPACK		CACR-SK300AAB	-	CACR-SP100AAB	-
Amplifier	S	JUSP-WS60AAY18	6kW	JUSP-WS60AAY18	6kW
	L	JUSP-WS60AAY18	6kW	JUSP-WS60AAY18	6kW
	U	JUSP-WS60AAY18	6kW	JUSP-WS60AAY18	6kW
	R	JUSP-WS30AAY18	3kW	-	-
	B	JUSP-WS30AAY18	3kW	-	-
	T	JUSP-WS30AAY18	3kW	JUSP-WS20AAY19	2kW
Servo control circuit board		JASP-WRCA01	-	JASP-WRCA01	-
Speed monitor board		JANCD-XFC01	-	JANCD-XFC01	-
Converter		JUSP-ACP35JAA	35A	JUSP-ACP35JAA	35A
Servo control power supply		JUSP-RCP01AA□	-	JUSP-RCP01AA□	-

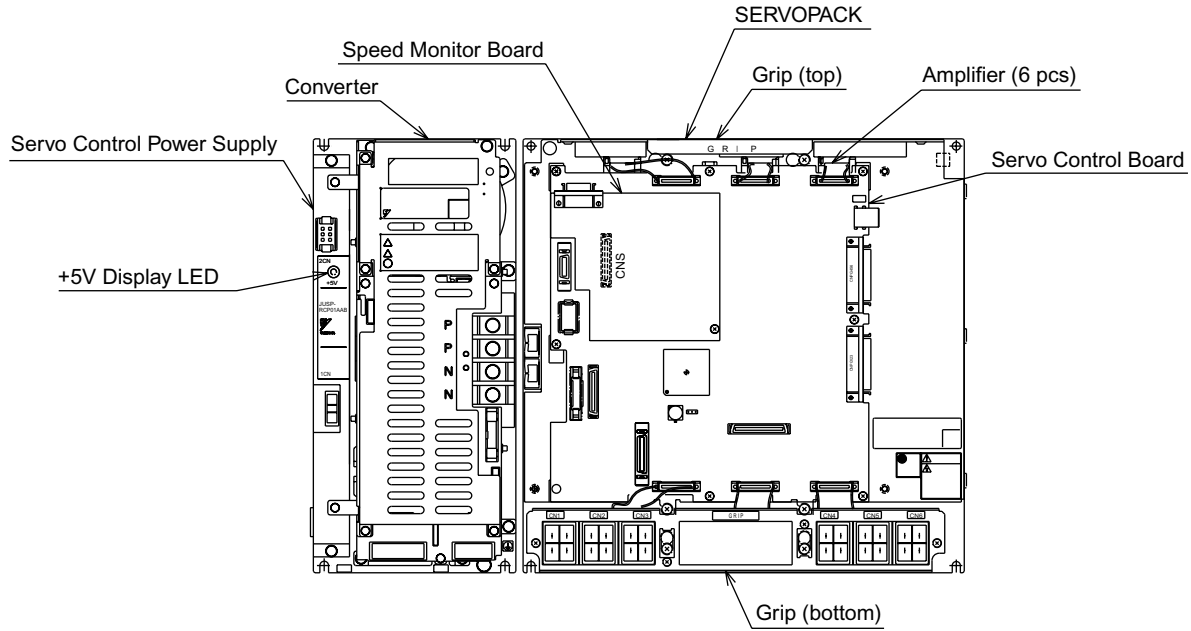




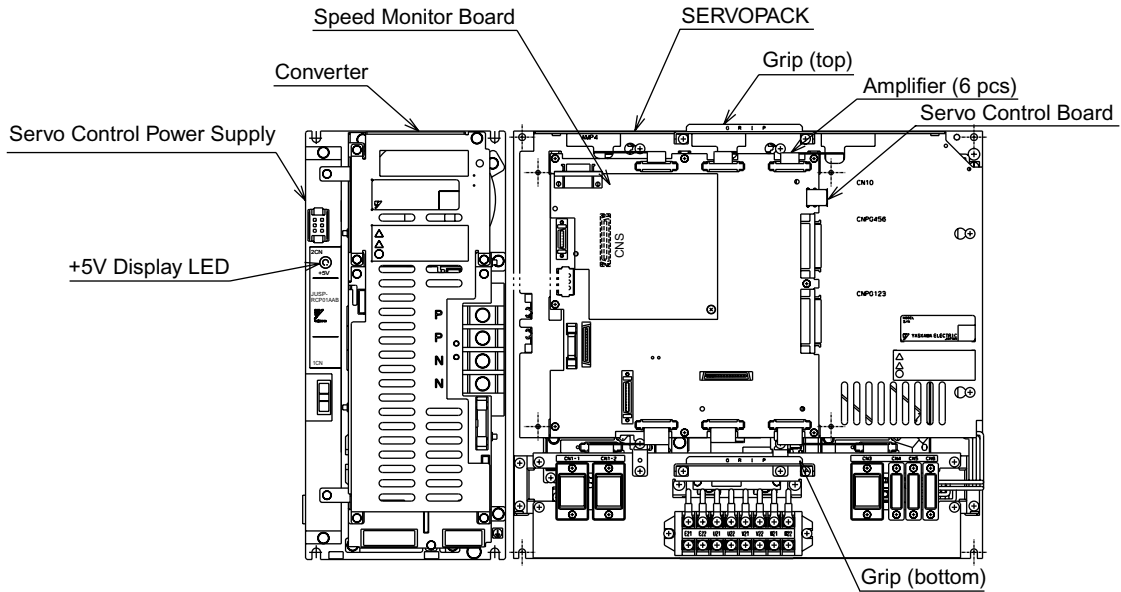
SV3X, UP6, SK16X SERVOPACK Configuration



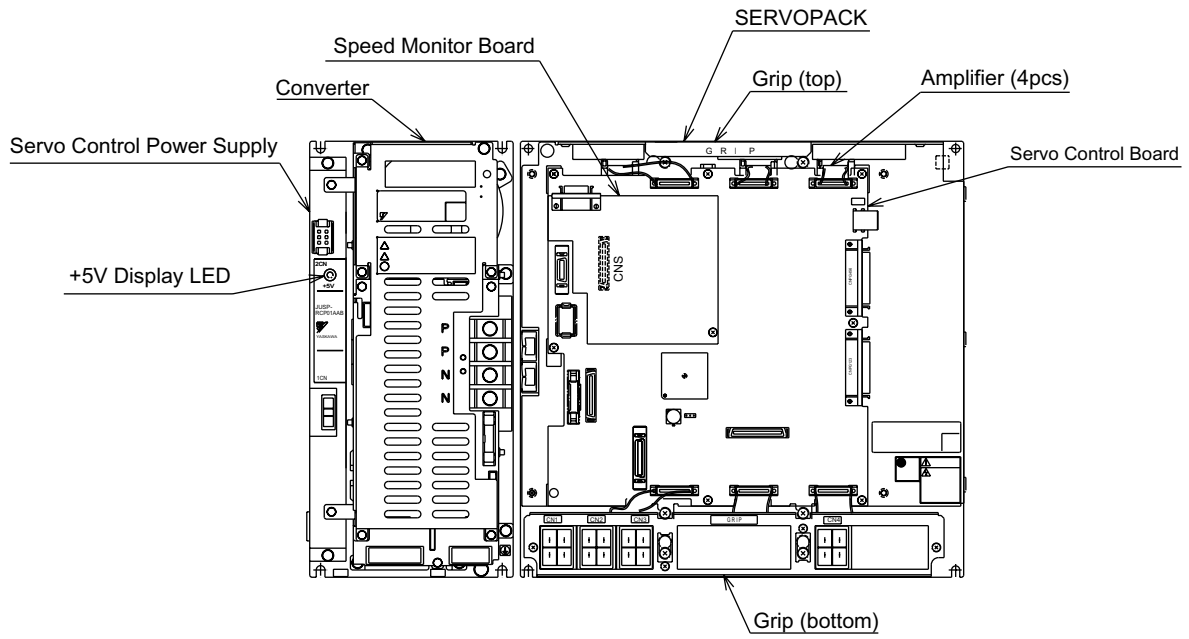
UP20 SERVOPACK Configuration



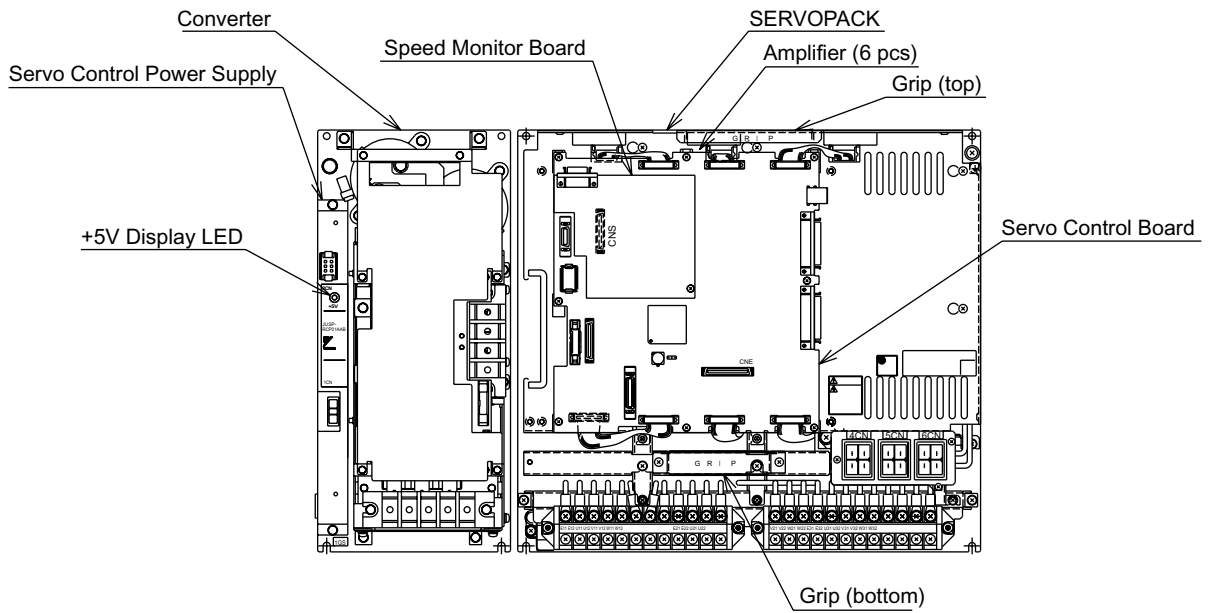
SK45X, SK16MX SERVOPACK Configuration



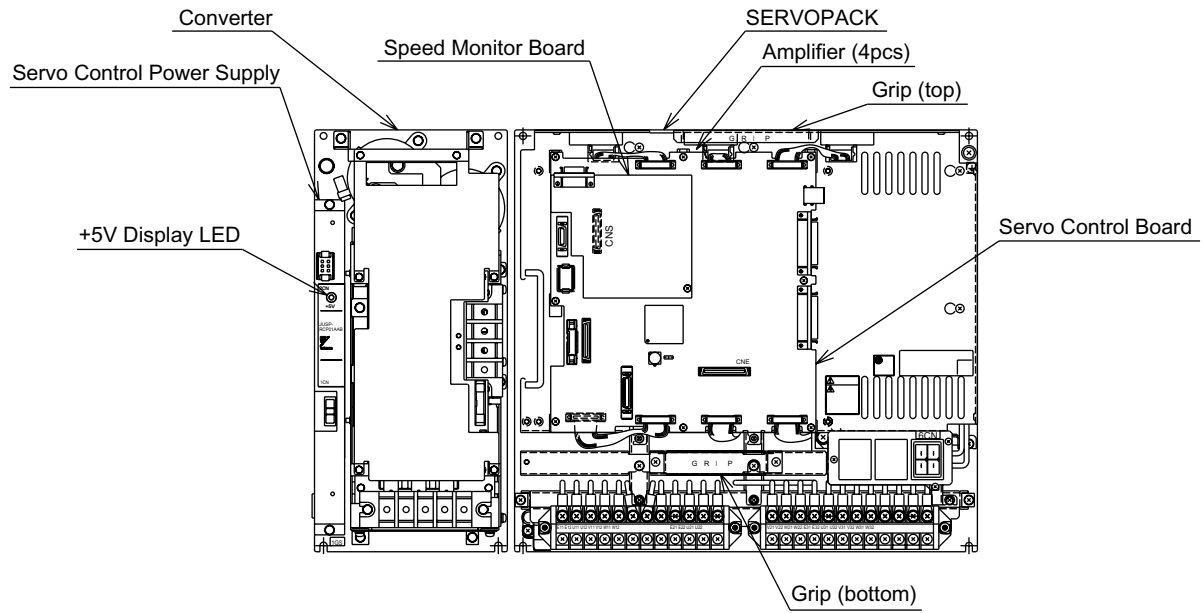
UP50, UP20M SERVOPACK Configuration



SP70X SERVOPACK Configuration



UP130, UP165, UP200, UP130R, UP130RL, UP165-100, SK300, SR200X SERVOPACK Configuration



SP100X SERVOPACK Configuration

## 2.6.2 Description of Each Unit

### ■ Servo Control Circuit board (JASP-WRCA01)

This is a circuit board which controls the servo motors of six axes of the manipulator. This board controls the converter, amplifiers and the power ON unit (JZRRCR-XSU02). The power source is supplied by a servo control power supply.

### ■ Servo Control Power Supply (JUSP-RCP01AA□)

This unit generates DC power (+5V, +7V,  $\pm 15V$ ) for servo control. AC input (Single phase:200/220VAC) is supplied by power supply unit.

Items		Specification
AC input	Rated Input Voltage	200 to 220VA
	Voltage Fluctuation Range	+10% to -15% (AC170V to 242V)
	Frequency	50/60Hz (48Hz to 62Hz)
Output	+ 5V	5A
	+ 7V	2.5A
	$\pm 15V$	1.3A(+15V), 0.6A(-15V)
Indicator	+5V	This lights when +5V power supply is output. (Color : Green)

### ■ Converter

This exchanges the power source (3-phase : 200/220VAC) supplied by the power supply unit for DC power source and supplies the power to amplifiers for each axis.

### ■ Amplifier

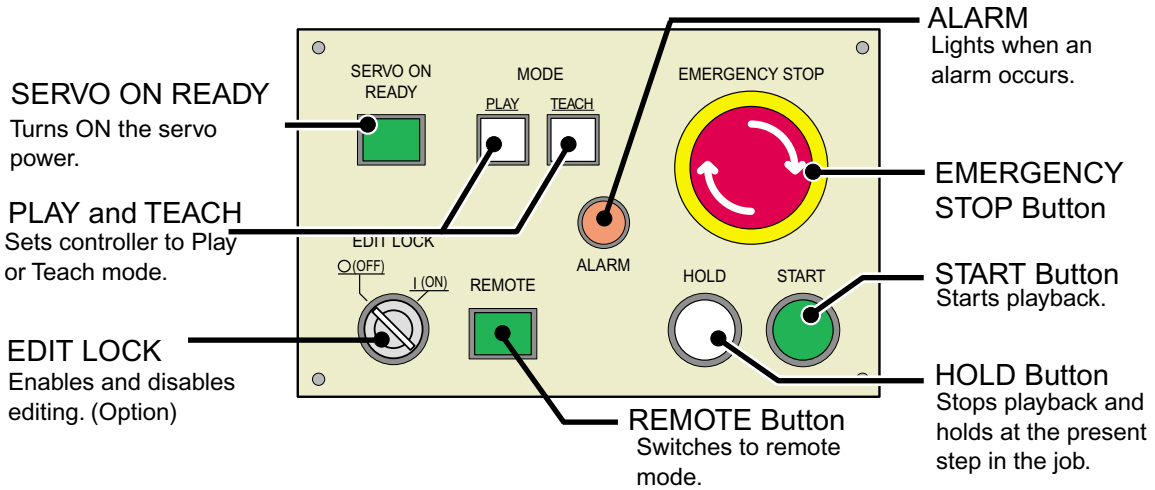
This exchanges the DC power source supplied by a converter for a 3-phase motor power source and outputs to each servo motor.

### ■ Speed Monitor Board (JANCD-XFC01)

This monitors the robot motion speed and outputs a speed error signal to the servo control board (JASP-WRCA01) if the speed exceeds the set value.

## 2.7 Playback Panel

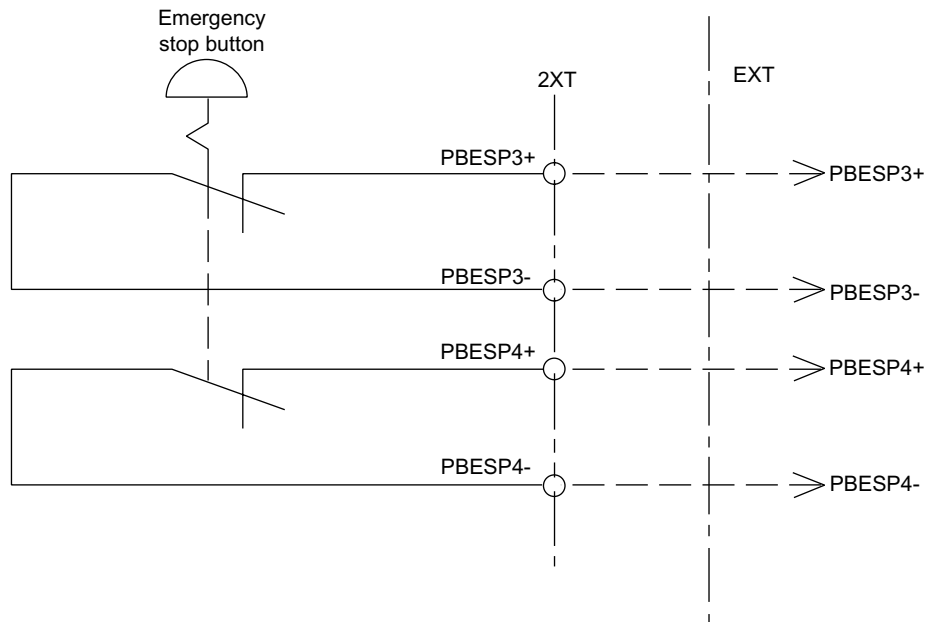
The playback panel is equipped with the buttons used to play back the manipulator.



### ■ Contact Output for Emergency Stop Button

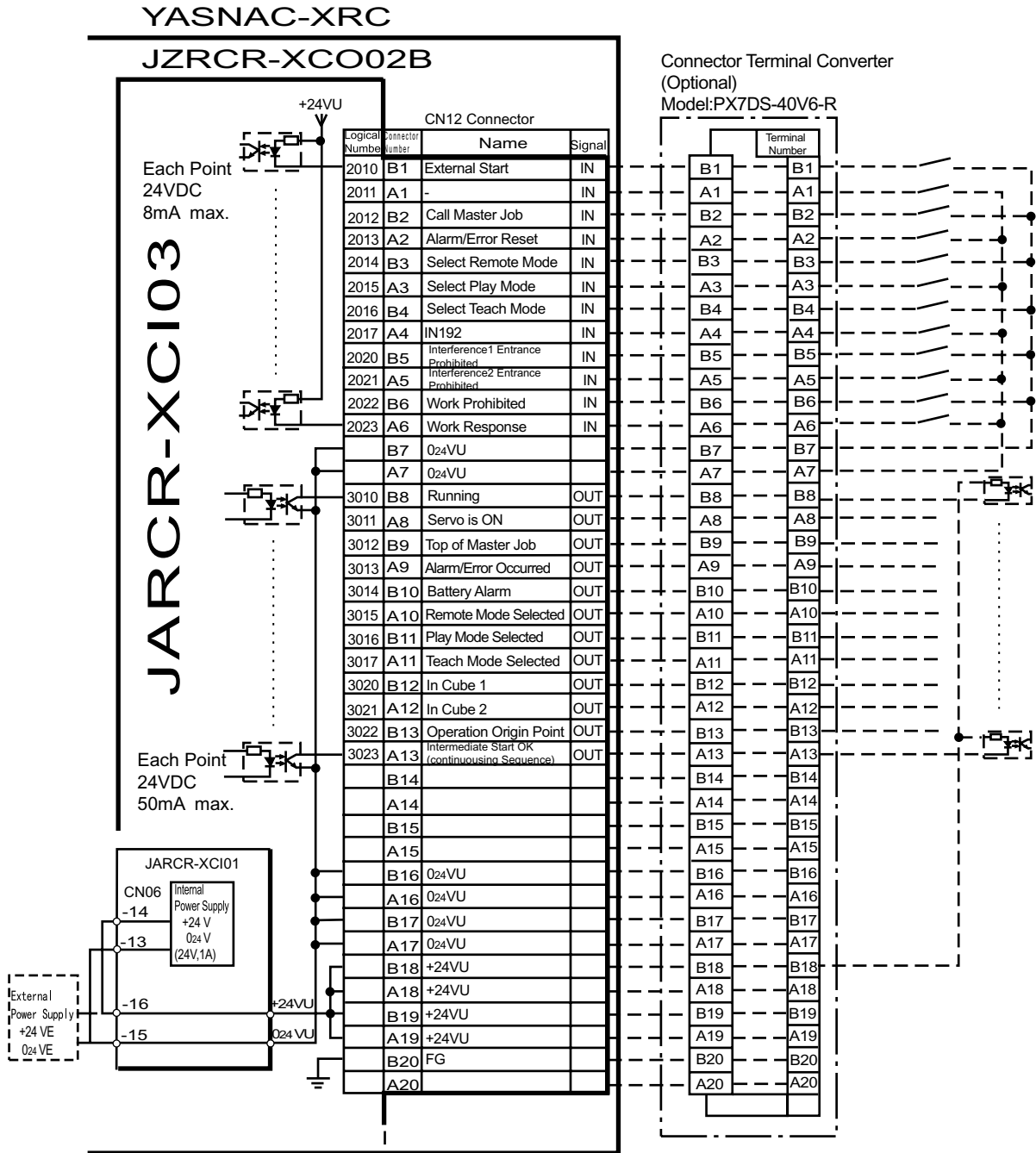
The contact output for the emergency stop button is on terminal block 2XT (Screw size: M3.5) at the bottom of the panel.

This emergency stop output is always valid, regardless of whether the main power supply of the XRC is ON or OFF. (Status output signal: NC contact)

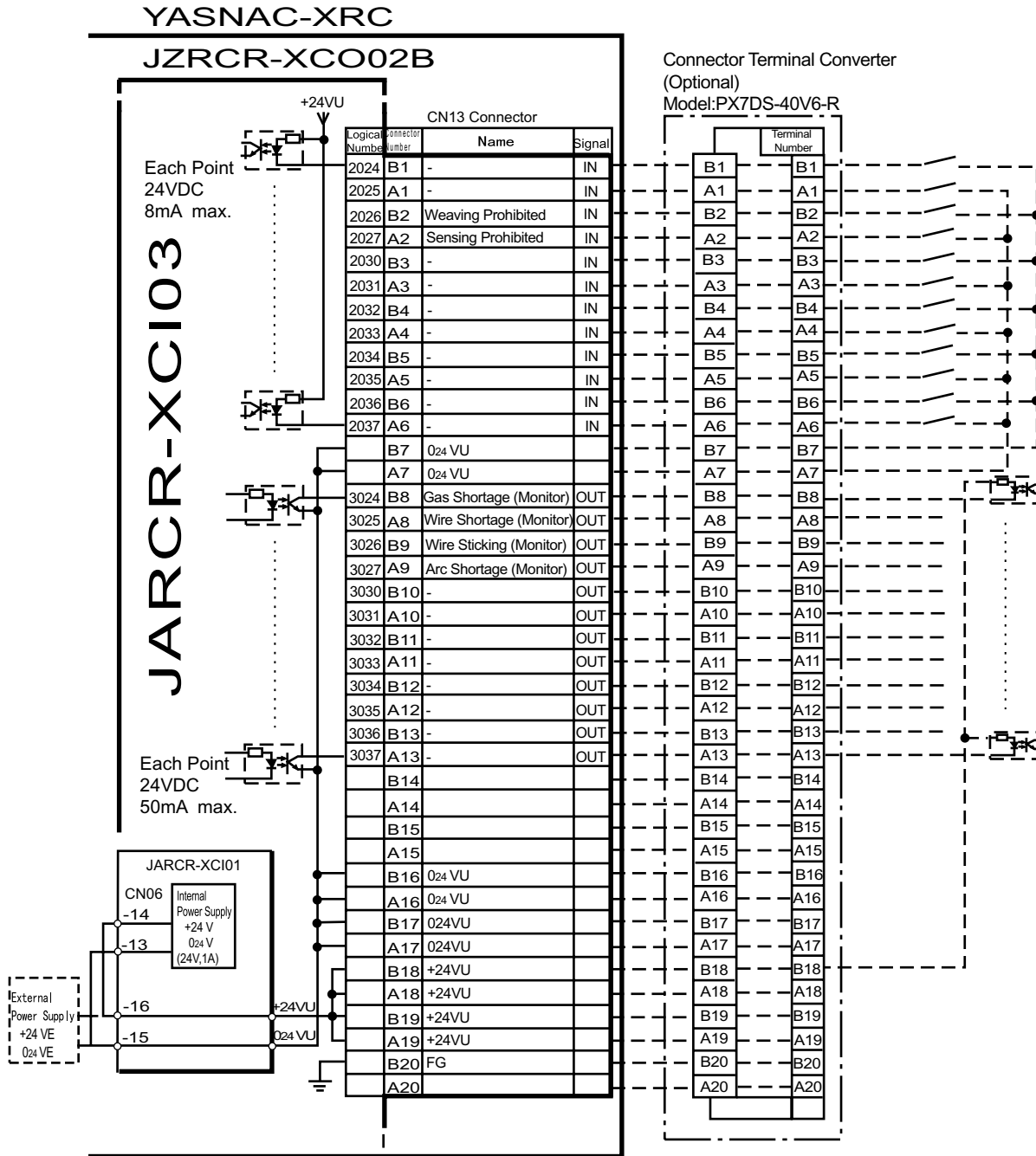


## 2.8 General I/O Signal Assignment

### 2.8.1 Arc Welding



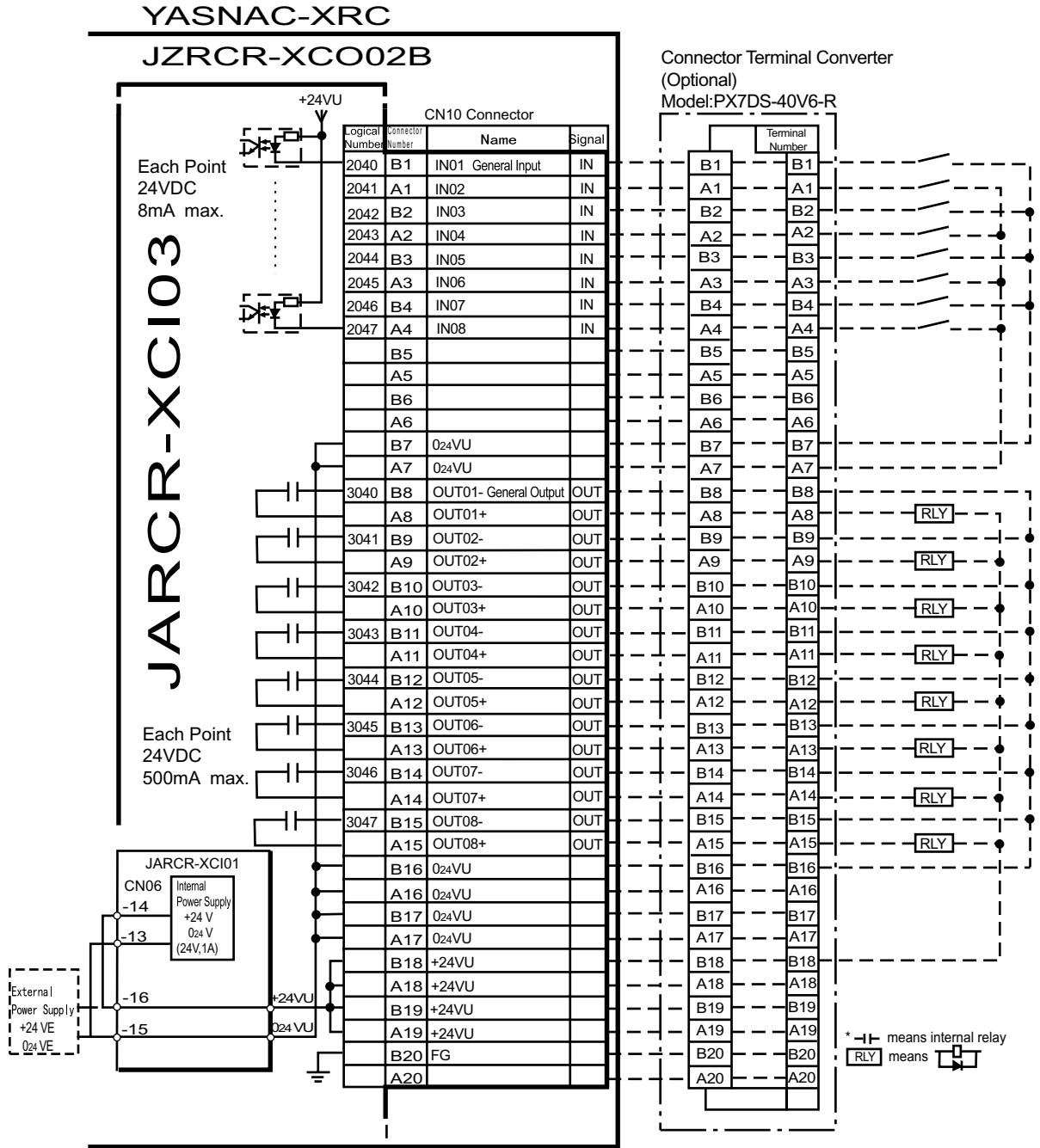
JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

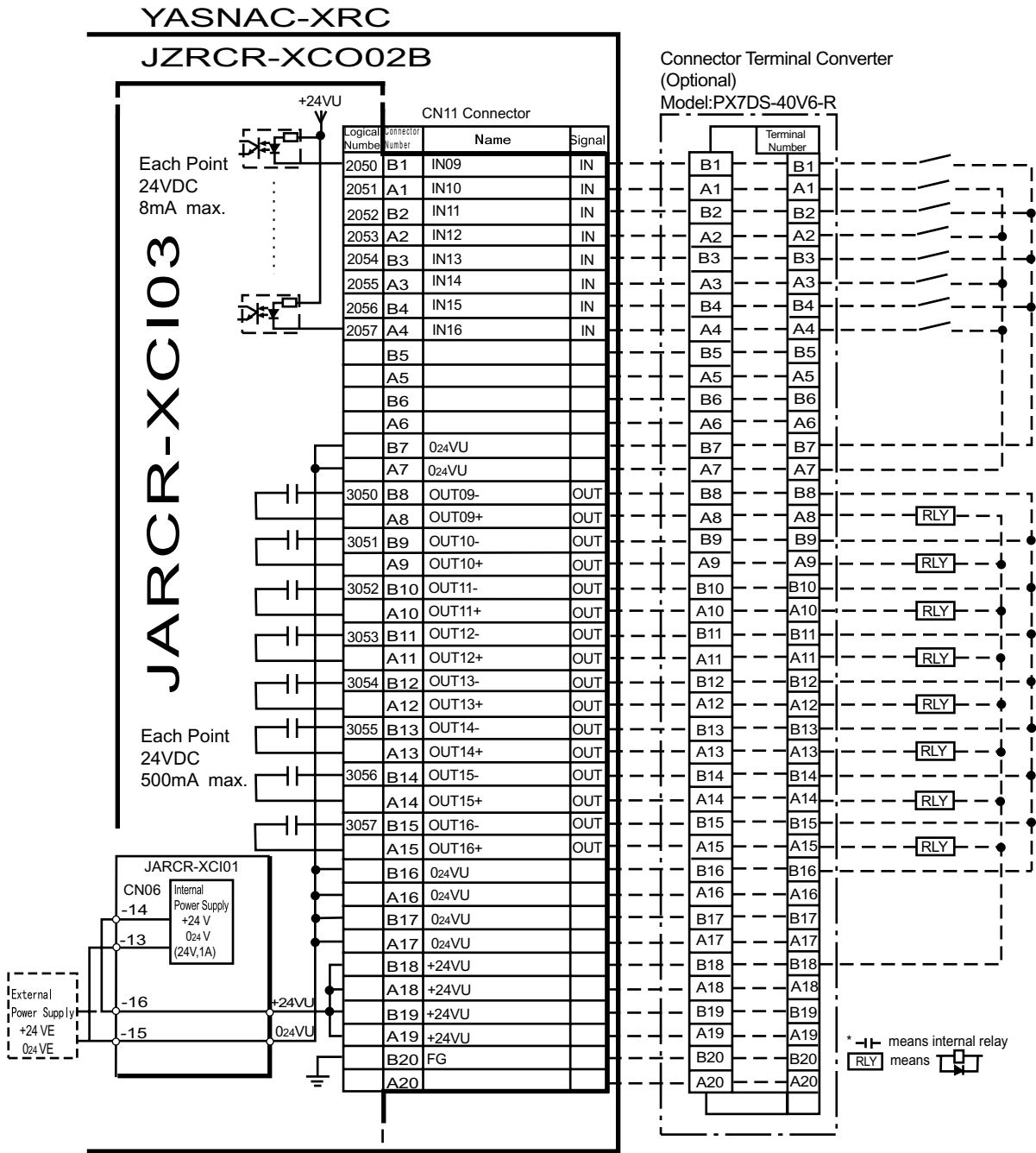
JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram





\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN10 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

JARCR-XCI03 (CN11 Connector) I/O Allocation and Connection Diagram

Specific Input List XCO02B (Arc Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2010	<p><b>EXTERNAL START</b> Functions the same as the [START] button in the playback panel . Only the rising edge of the signal is valid. It starts robot operation (playback). This signal is invalid if external start is prohibited from the playback condition display.</p>	2020	<p><b>INTERFERENCE 1 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 1*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>
2012	<p><b>CALL MASTER JOB</b> Only the rising edge of the signal is valid. It calls up the top of the robot program, that is the top of the master job *1. This signal is invalid during playback, during teach-lock and when play master or call is prohibited (set from the playback operation condition display).</p>	2021	<p><b>INTERFERENCE 2 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 2*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>
2013	<p><b>ALARM/ERROR RESET</b> After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.</p>	2022	<p><b>WORK PROHIBITED (Arc Generation Prohibited)</b> Arc generation is prohibited while this signal is ON. Arc generation starts when this signal turns OFF inside the arc-generation area. Use this signal to confirm teaching.</p>
2014	<p><b>SELECT REMOTE MODE</b> Functions the same as [REMOTE] on the playback panel. Valid only while the signal is ON. It selects the REMOTE mode.</p>	2023	<p><b>WORK RESPONSE (Pseudo Arc ON Response)</b> This signal is used as a pseudo signal in cases that "Arc Generation Confirmation" signal is not equipped on a welding power supply. Wire this signal ON normally (short to OV).</p>
2015	<p><b>SELECT PLAY MODE</b> Functions the same as [MODE] on the playback panel. Only the rising edge of the signal is valid. It selects the PLAY mode. If designated simultaneously with other modes, the TEACH mode takes priority. This signal is invalid if external mode selection is prohibited from the operation condition display.</p>	2026	<p><b>WEAVING PROHIBITED</b> Weaving is prohibited while this signal is ON. Use this signal to check taught steps and movements without performing the weaving operation.</p>

## Specific Input List XCO02B (Arc Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2016	<b>SELECT TEACH MODE</b> The TEACH mode is selected if this signal turns ON during PLAY mode. Switching to other modes is disabled while this signal is ON. If this signal turns ON while the SELECT PLAY MODE signal is ON, this signal takes priority and the TEACH mode is selected.	2027	<b>SENSING PROHIBITED</b> Arc sensing is prohibited while this signal is ON. Use this signal to check taught steps and movements if an arc sensor is mounted.

**\*1** A master job is a job (program) which can be called by CALL MASTER JOB. Other functions are the same as for normal jobs. Normally, the parent job, which manages the child jobs called up immediately after the power is turned ON, is set as the master job.

**\*2** See " 3.7 Interference Area " of the YASNAC XRC Instructions.

## Specific Output List XCO02B (Arc Welding)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	<b>RUNNING</b> This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	<b>IN CUBE 2</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 2). Use this signal to prevent interference with other manipulators and jigs.
3011	<b>SERVO IS ON</b> This signal signifies that the servo power is turned ON, internal processing such as current position creation is complete, and the system is able to receive the START command. This signal turns OFF when the servo power supply turns OFF. It can be used for XRC status diagnosis for an external start.	3022	<b>OPERATION ORIGIN POINT (IN CUBE 24)*1</b> This signal turns ON when the current tool center point lies inside a the operation origin area. Use this signal to evaluate whether the robot is in the start position.
3012	<b>TOP OF MASTER JOB</b> This signal signifies that the execution position is the top of the master job. This signal can be used to confirm that the master job has been called.*2	3023	<b>INTERMEDIATE START OK (Sequence Continues)</b> This signal turns ON when the manipulator operates. It turns OFF when the currently executed line is moved with the cursor or when editing operation is carried out after HOLD is applied during operation. Therefore, this signal can be used as a restart interlock after a HOLD is applied. However, it also turns ON in the TEACH mode and TEACH MODE SELECTED signal must be referred together.

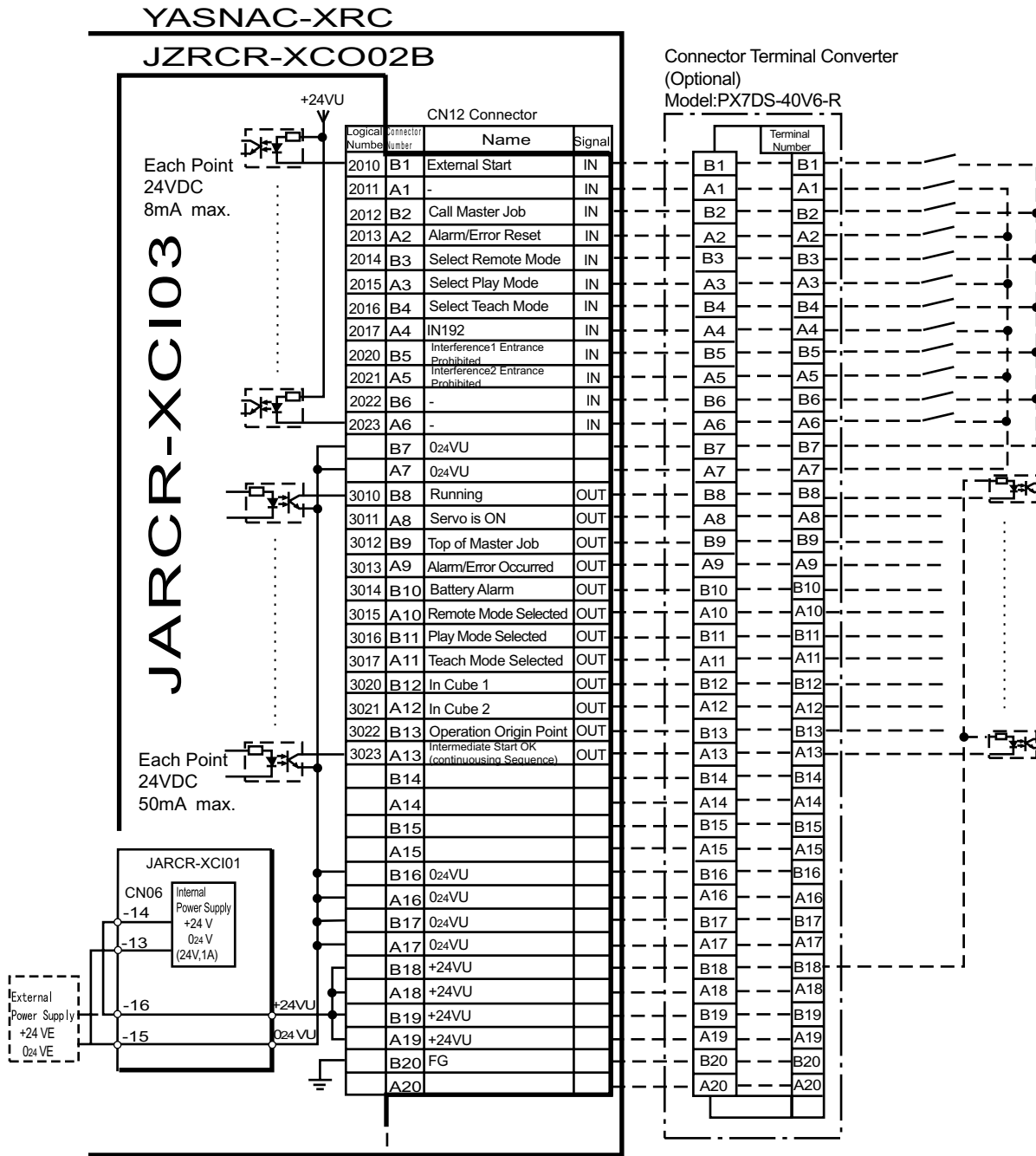
## Specific Output List XCO02B (Arc Welding)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3013	<b>ALARM/ERROR OCCURRE</b> This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.	3024	<b>GAS SHORTAGE (MONITOR)</b> This signal stays ON while the gas shortage signal from the welding power supply is ON.
3014	<b>BATTERY ALARM</b> This signal turns ON to notify that the battery requires replacing when the voltage drops from the battery for backup memory of the encoder. Major problems may result if memory data is lost because of an expired battery. It is recommended to avoid these problems by using this signal as a warning signal.	3025	<b>WIRE SHORTAGE (MONITOR)</b> This signal status ON while the wire shortage signal from the welding power supply is ON.
3015 to 3017	<b>REMOTE/PLAY/TEACH MODE SELECTED</b> This signal notifies the current mode setting. These signals are synchronized with the lamps [REMOTE] and [MODE] in the playback panel. The signal corresponding to the selected mode turns ON.	3026	<b>WIRE STICKING (MONITOR)</b> The sticking check is conducted automatically when the arc turns off. If wire sticking is detected, this signal remains ON until the stick is released.
3020	<b>IN CUBE 1</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 1). Use this signal to prevent interference with other manipulators and jigs.	2027	<b>ARC SHORTAGE (MONITOR)</b> This signal stays ON while the arc shortage signal from the welding power supply is ON.

**\*1** The operation origin cube and Cube 24 are same.

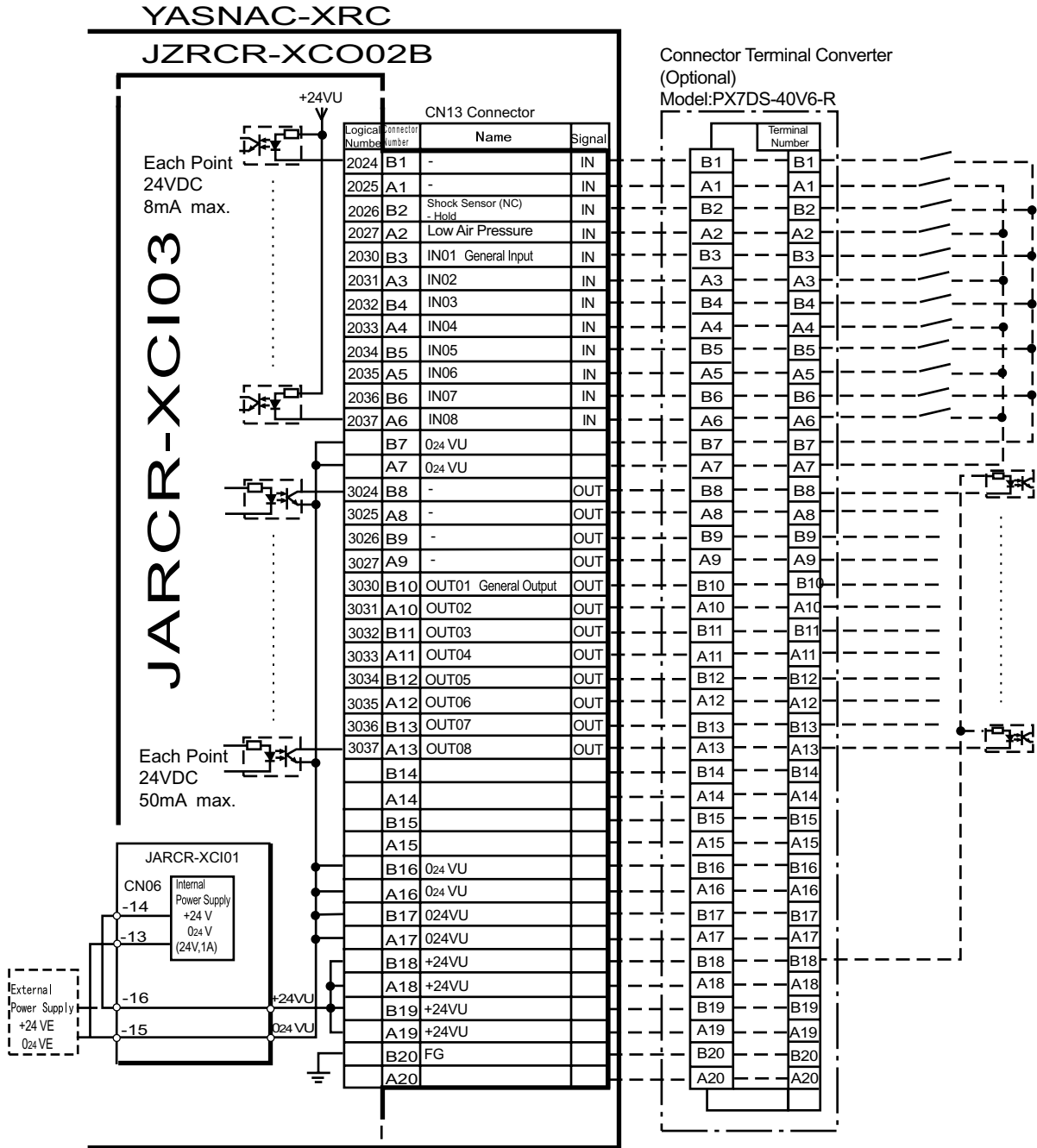
**\*2** This signal is not output during operation.

## 2.8.2 Handling



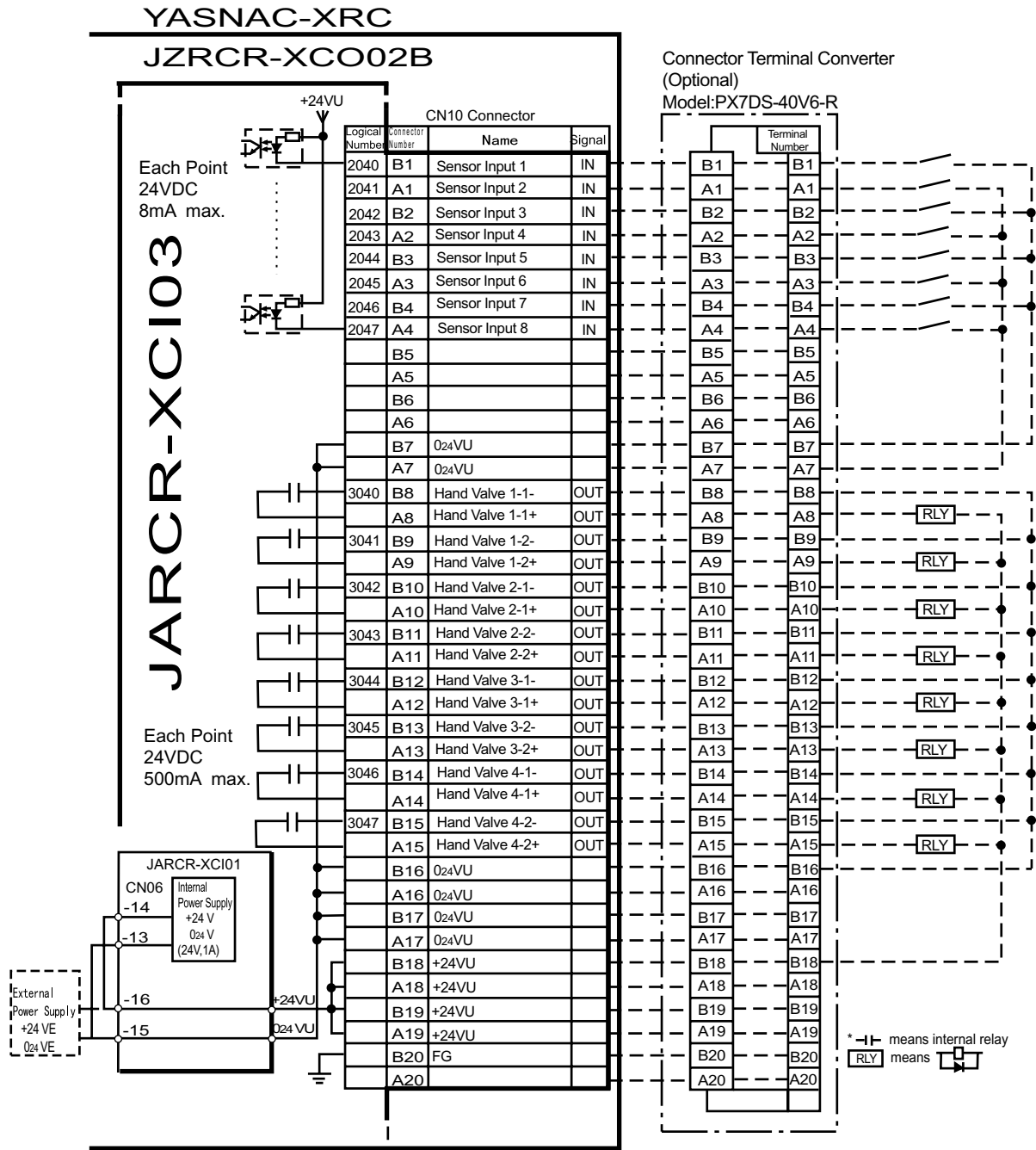
\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, -13 and -15 when an external power supply is used.

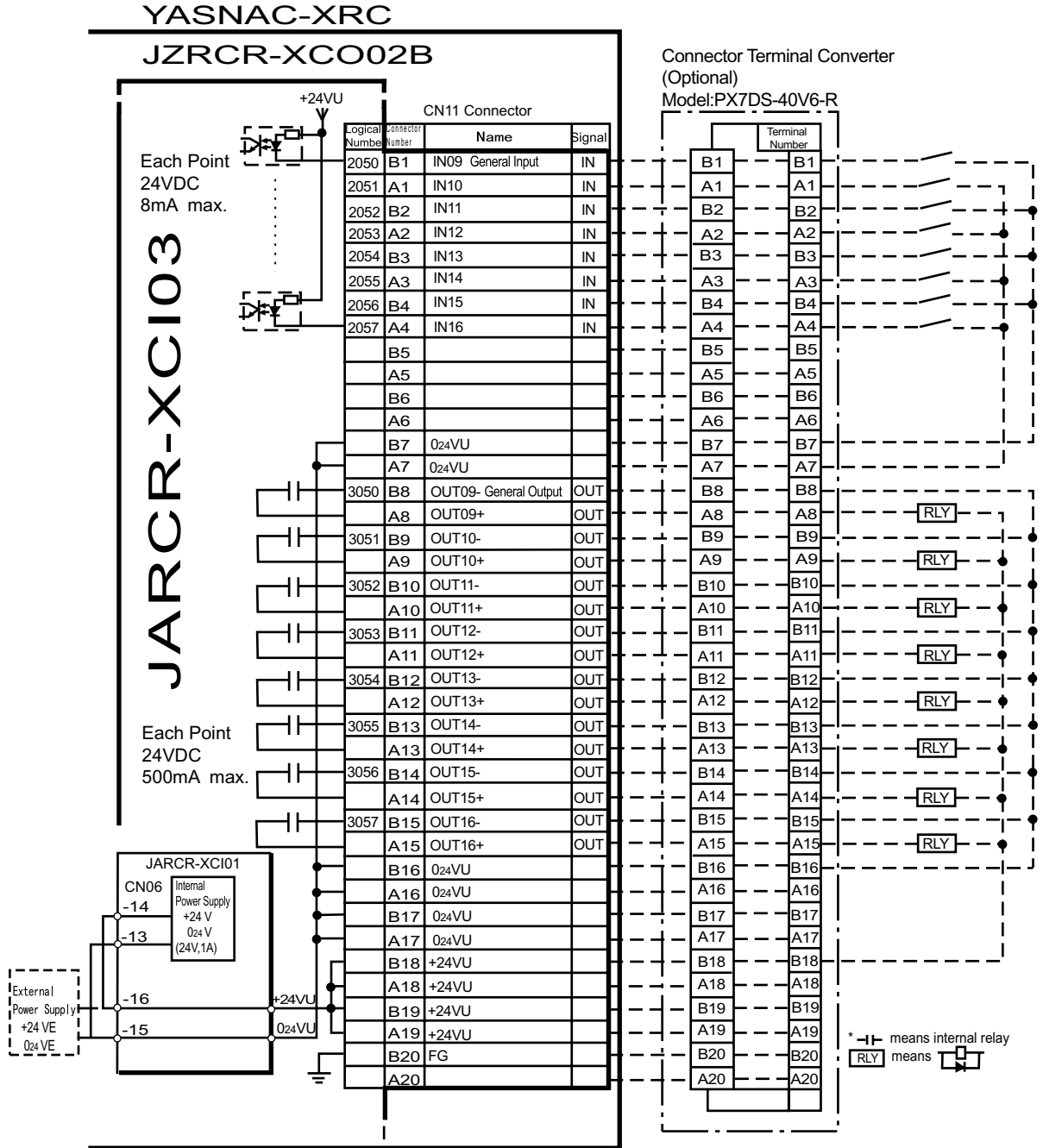
JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

JARCR-XCI03 (CN10 Connector) I/O Allocation and Connection Diagram





\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN11 Connector) I/O Allocation and Connection Diagram

Specific Output List XCO02B (Handling)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
2010	EXTERNAL START Functions the same as the [START] button in the playback panel . Only the rising edge of the signal is valid. It starts robot operation (playback). This signal is invalid if external start is prohibited from the playback condition display.	2020	INTERFERENCE 1 ENTRANCE PROHIBITED If the manipulator attempts to enter the cube 1*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.
2012	CALL MASTER JOB Only the rising edge of the signal is valid. It calls up the top of the robot program, that is the top of the master job *1. This signal is invalid during playback, during teach-lock and when play master or call is prohibited (set from the playback operation condition display).	2021	INTERFERENCE 2 ENTRANCE PROHIBITED If the manipulator attempts to enter the cube 2*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.
2013	ALARM/ERROR RESET After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.	2026	SHOCK SENSOR This is normally ON (NC) signal input. When it turns OFF, an XRC displays message "HAND SHOCK SENSOR OPERATING" and a HOLD is applied. The releasing in TEACH mode is done on the handling application diagnostic display. Set hand shock sensor function "NOT USE" on the handling applications diagnostic display if this signal is not be used.
2014	SELECT REMOTE MODE Functions the same as [REMOTE] on the playback panel. Valid only while the signal is ON. It selects the REMOTE mode.	2027	LOW AIR PRESSUR This signal is normally OFF (NO). When it turns ON, XRC displays user alarm in the PLAY mode or displays user message in the TEACH mode.
2015	SELECT PLAY MODE Functions the same as [MODE] on the playback panel. Only the rising edge of the signal is valid. It selects the PLAY mode. If designated simultaneously with other modes, the TEACH mode takes priority. This signal is invalid if external mode selection is prohibited from the operation condition display.	2040 to 2047	SENSOR INPUT 1 - 8 Inputs 1 to 8 are monitored with the HSEN handling specific instructions. Sensor inputs 1 to 8 correspond to HSEN 1 to 8.
2016	SELECT TEACH MODE The TEACH mode is selected if this signal turns ON during PLAY mode. Switching to other modes is disabled while this signal is ON. If this signal turns ON while the SELECT PLAY MODE signal is ON, this signal takes priority and the TEACH mode is selected.		

- \*1** A master job is a job (program) which can be called by CALL MASTER JOB. Other functions are the same as for normal jobs. Normally, the parent job, which manages the child jobs called up immediately after the power is turned ON, is set as the master job.
- \*2** See " 3.7 Interference Area " of the YASNAC XRC Instructions.

Specific Output List XCO02B (Handling)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	<b>RUNNING</b> This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	<b>IN CUBE 2</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 2). Use this signal to prevent interference with other manipulators and jigs.
3011	<b>SERVO IS O</b> This signal signifies that the servo power is turned ON, internal processing such as current position creation is complete, and the system is able to receive the START command. This signal turns OFF when the servo power supply turns OFF. It can be used for XRC status diagnosis for an external start.	3022	<b>OPERATION ORIGIN POINT (IN CUBE 24)<sup>*1</sup></b> This signal turns ON when the current tool center point lies inside a the operation origin area. Use this signal to evaluate whether the robot is in the start position.
3012	<b>TOP MASTER JOB</b> This signal signifies that the execution position is the top of the master job. This signal can be used to confirm that the master job has been called. <sup>*2</sup>	3023	<b>INTERMEDIATE START OK (Sequence continues)</b> This signal turns ON when the manipulator operates. It turns OFF when the currently executed line is moved with the cursor or when editing operation is carried out after HOLD is applied during operation. Therefore, this signal can be used as a restart interlock after a HOLD is applied. However, it also turns ON in the TEACH mode and TEACH MODE SELECTED signal must be referred together.
3013	<b>ALARM/ERROR OCCURRING</b> This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.	3040 to 3047	<b>HAND VALVE 1-4</b> These outputs are controlled by the HAND handling specific instructions. Hand valves 1 to 4 correspond to HAN 1 to 4.
3014	<b>BATTERY ALARM</b> This signal turns ON to notify that the battery requires replacing when the voltage drops from the battery for backup memory of the encoder. Major problems may result if memory data is lost because of an expired battery. It is recommended to avoid these problems by using this signal as a warning signal.		

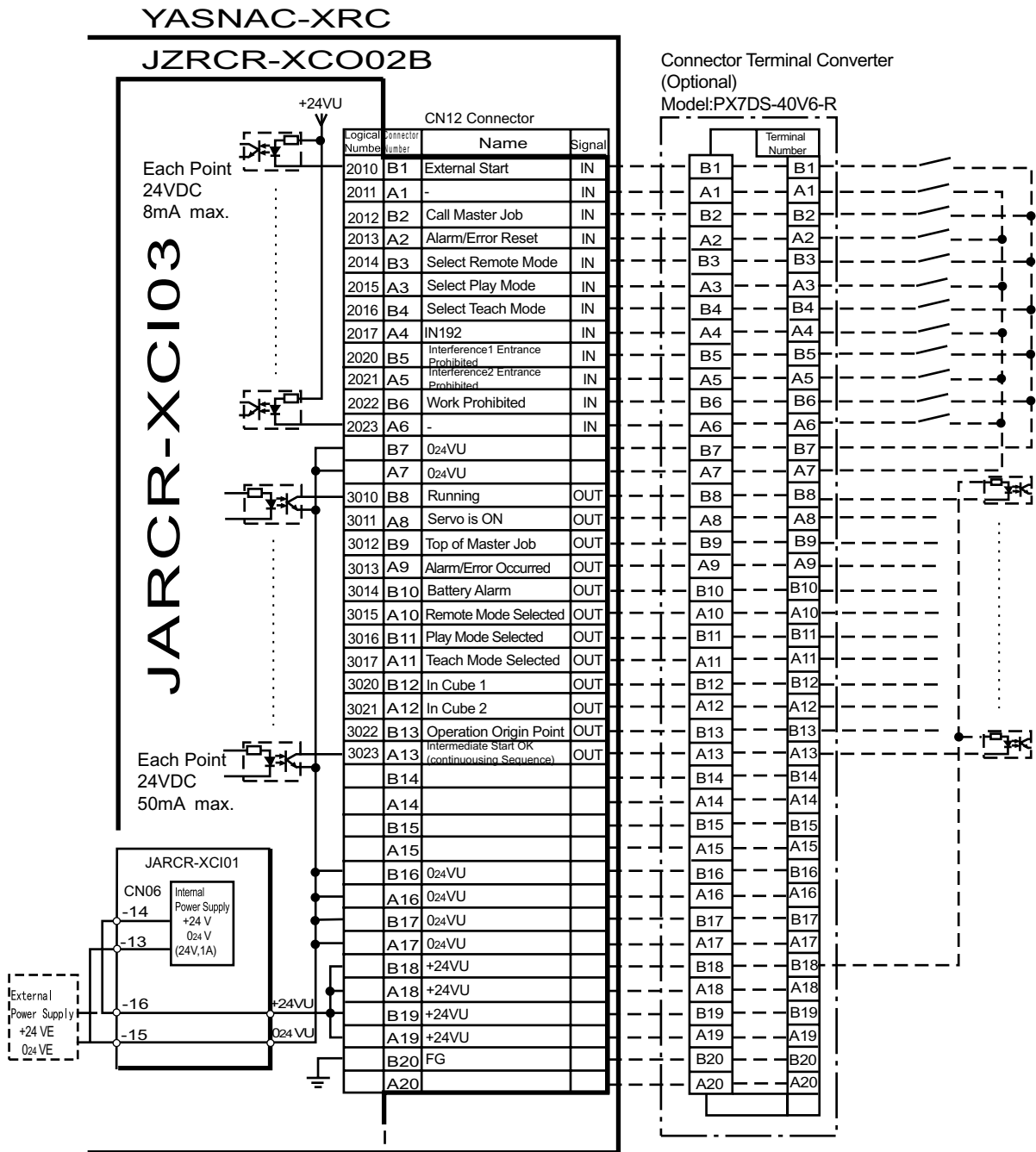
## Specific Output List XCO02B (Handling)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3015 to 3017	<p>REMOTE/PLAY/TEACH MODE SELECTED</p> <p>This signal notifies the current mode setting. These signals are synchronized with the lamps [REMOTE] and [MODE] in the playback panel. The signal corresponding to the selected mode turns ON.</p>		
3020	<p>IN CUBE 1</p> <p>This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 1). Use this signal to prevent interference with other manipulators and jigs.</p>		

**\*1** The operation origin cube and Cube 24 are same.

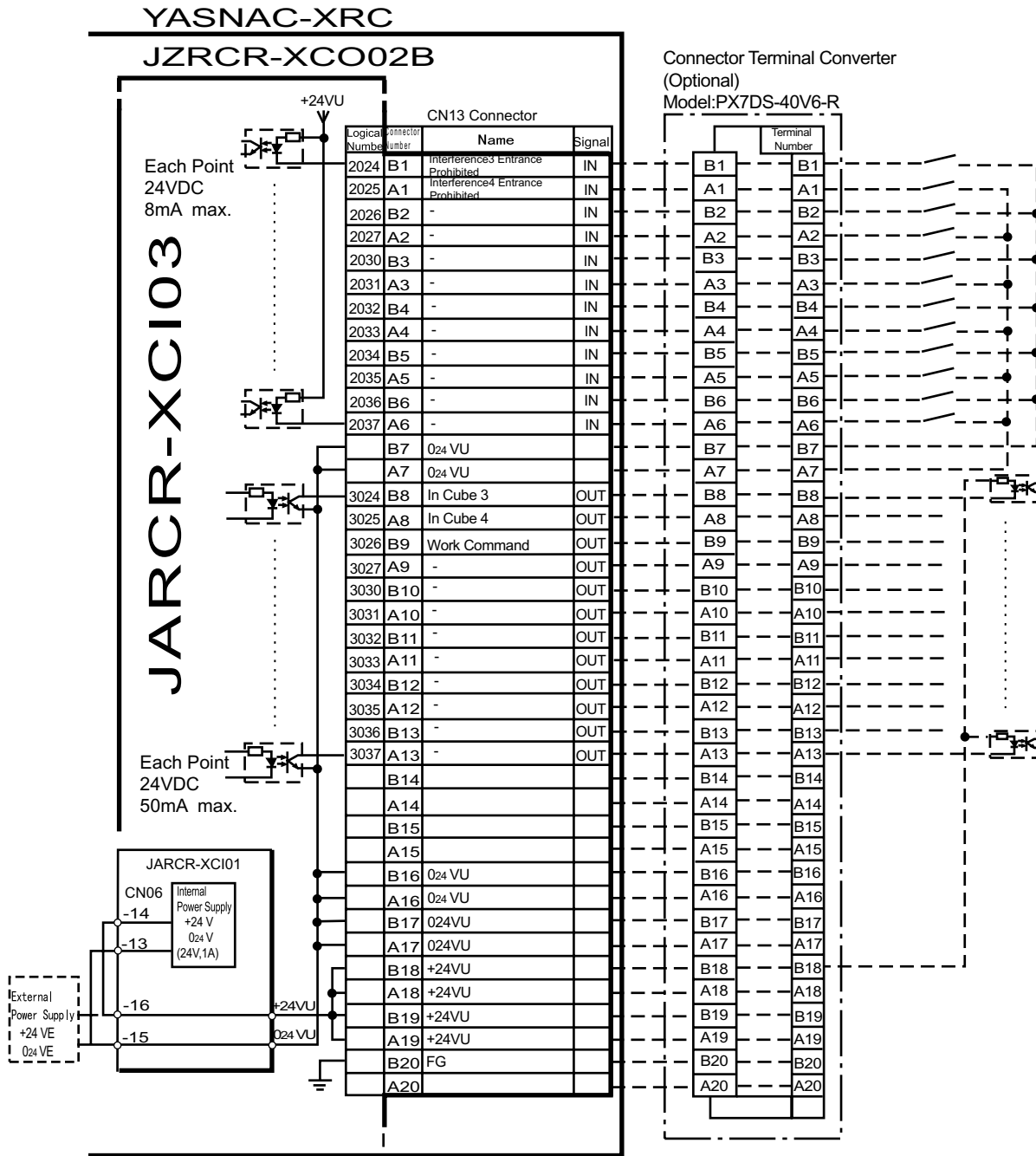
**\*2** This signal is not output during operation.

### 2.8.3 General Application



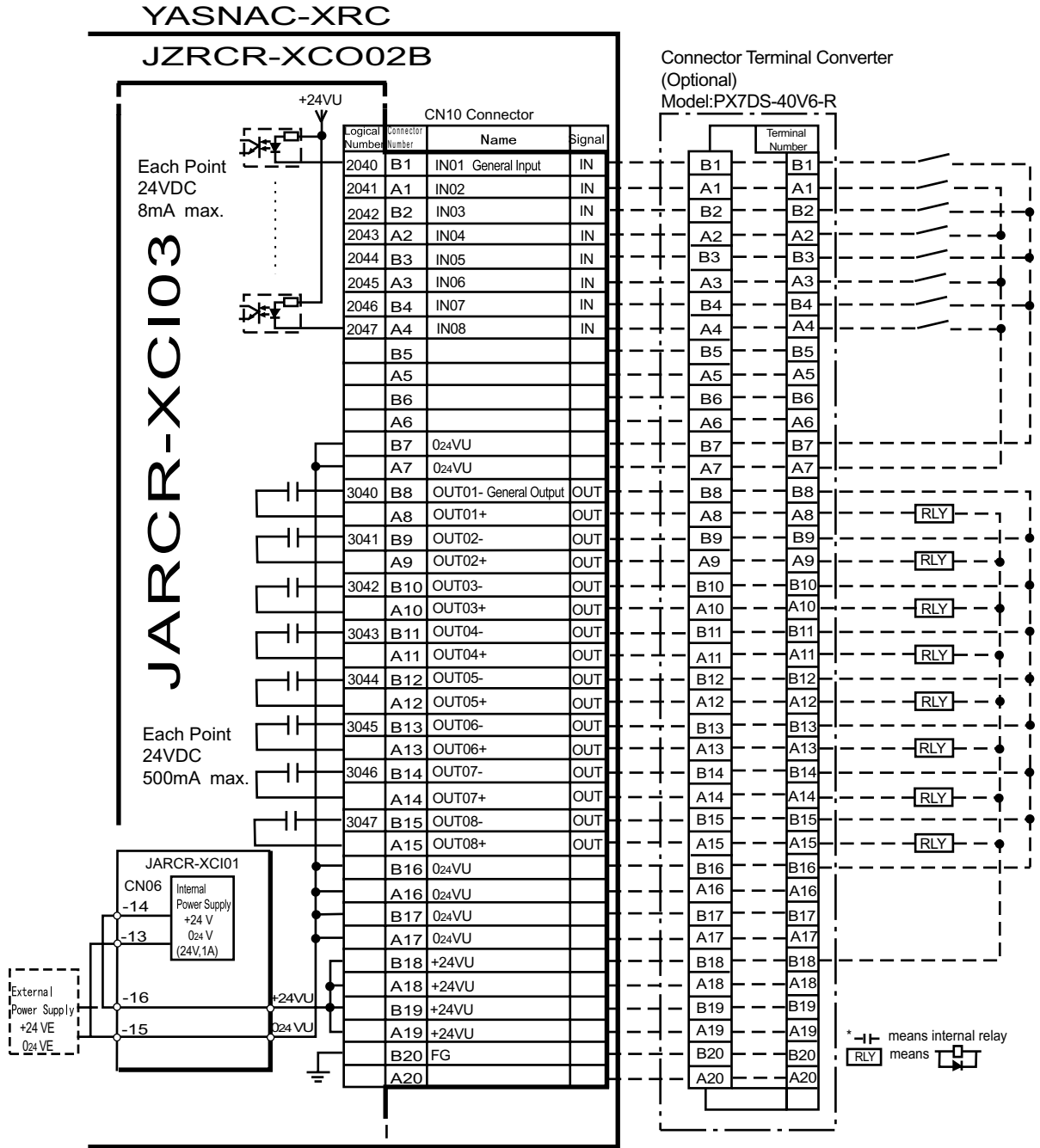
\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram



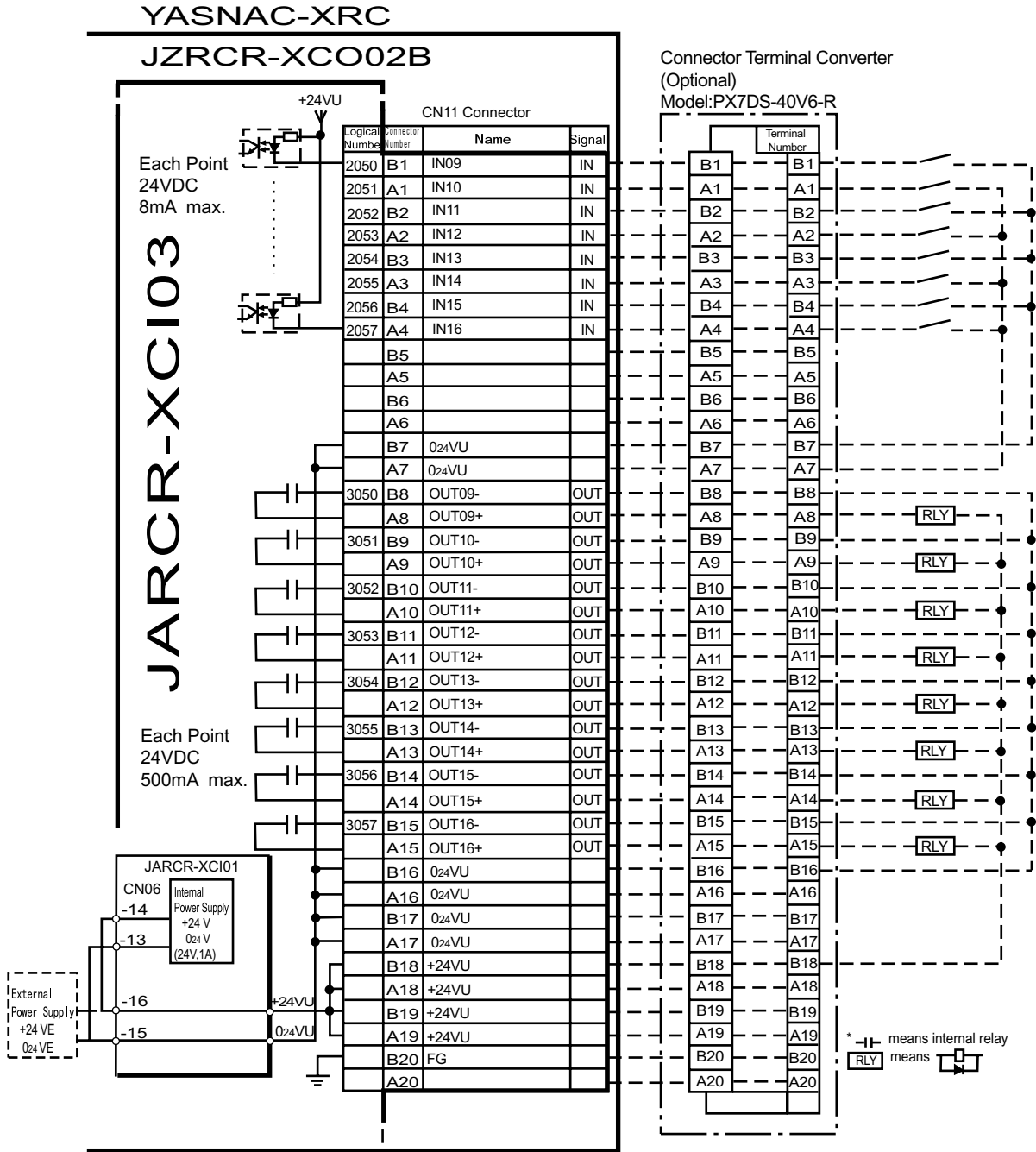
\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN10 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

JARCR-XCI03 (CN11 Connector) I/O Allocation and Connection Diagram



Specific Input List XCO02B (General Application)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2010	<b>EXTERNAL START</b> Functions the same as the [START] button in the playback panel . Only the rising edge of the signal is valid. It starts robot operation (playback). This signal is invalid if external start is prohibited from the playback condition display.	2020	<b>INTERFERENCE 1 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 1 <sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.
2012	<b>CALL MASTER JOB</b> Only the rising edge of the signal is valid. It calls up the top of the robot program, that is the top of the master job *1. This signal is invalid during playback, during teach-lock and when play master or call is prohibited (set from the playback operation condition display).	2021	<b>INTERFERENCE 2 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 2 <sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.
2013	<b>ALARM/ERROR RESET</b> After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.	2022	<b>WORK PROHIBITED (Tool ON Prohibited)</b> Even if TOOLON instruction is executed, XRC doesn't output to external while this signal is ON.
2014	<b>SELECT REMOTE MODE</b> Functions the same as [REMOTE] on the playback panel. Valid only while the signal is ON. It selects the REMOTE mode.	2024	<b>INTERFERENCE 3 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 3 <sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.
2015	<b>SELECT PLAY MODE</b> Functions the same as [MODE] on the playback panel. Only the rising edge of the signal is valid. It selects the PLAY mode. If designated simultaneously with other modes, the TEACH mode takes priority. This signal is invalid if external mode selection is prohibited from the operation condition display.	2025	<b>INTERFERENCE 4 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 4 <sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.

## Specific Input List XCO02B (General Application)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2016	<b>SELECT TEACH MODE</b> The TEACH mode is selected if this signal turns ON during PLAY mode. Switching to other modes is disabled while this signal is ON. If this signal turns ON while the SELECT PLAY MODE signal is ON, this signal takes priority and the TEACH mode is selected.		

**\*1** A master job is a job (program) which can be called by CALL MASTER JOB. Other functions are the same as for normal jobs. Normally, the parent job, which manages the child jobs called up immediately after the power is turned ON, is set as the master job.

**\*2** See " 3.7 Interference Area " of the YASNAC XRC Instructions.

## Specific Output List XCO02B (General Application)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	<b>RUNNING</b> This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	<b>IN CUBE 2</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 2). Use this signal to prevent interference with other manipulators and jigs.
3011	<b>SERVO IS ON</b> This signal signifies that the servo power is turned ON, internal processing such as current position creation is complete, and the system is able to receive the START command. This signal turns OFF when the servo power supply turns OFF. It can be used for XRC status diagnosis for an external start.	3022	<b>OPERATION ORIGIN POINT (IN CUBE 24)*1</b> This signal turns ON when the current tool center point lies inside a the operation origin area. Use this signal to evaluate whether the robot is in the start position.
3012	<b>TOP MASTER JOB</b> This signal signifies that the execution position is the top of the master job. This signal can be used to confirm that the master job has been called.*2	3023	<b>INTERMEDIATE START OK (Sequence continues)</b> This signal turns ON when the manipulator operates. It turns OFF when the currently executed line is moved with the cursor or when editing operation is carried out after HOLD is applied during operation. Therefore, this signal can be used as a restart interlock after a HOLD is applied. However, it also turns ON in the TEACH mode and TEACH MODE SELECTED signal must be referred together.

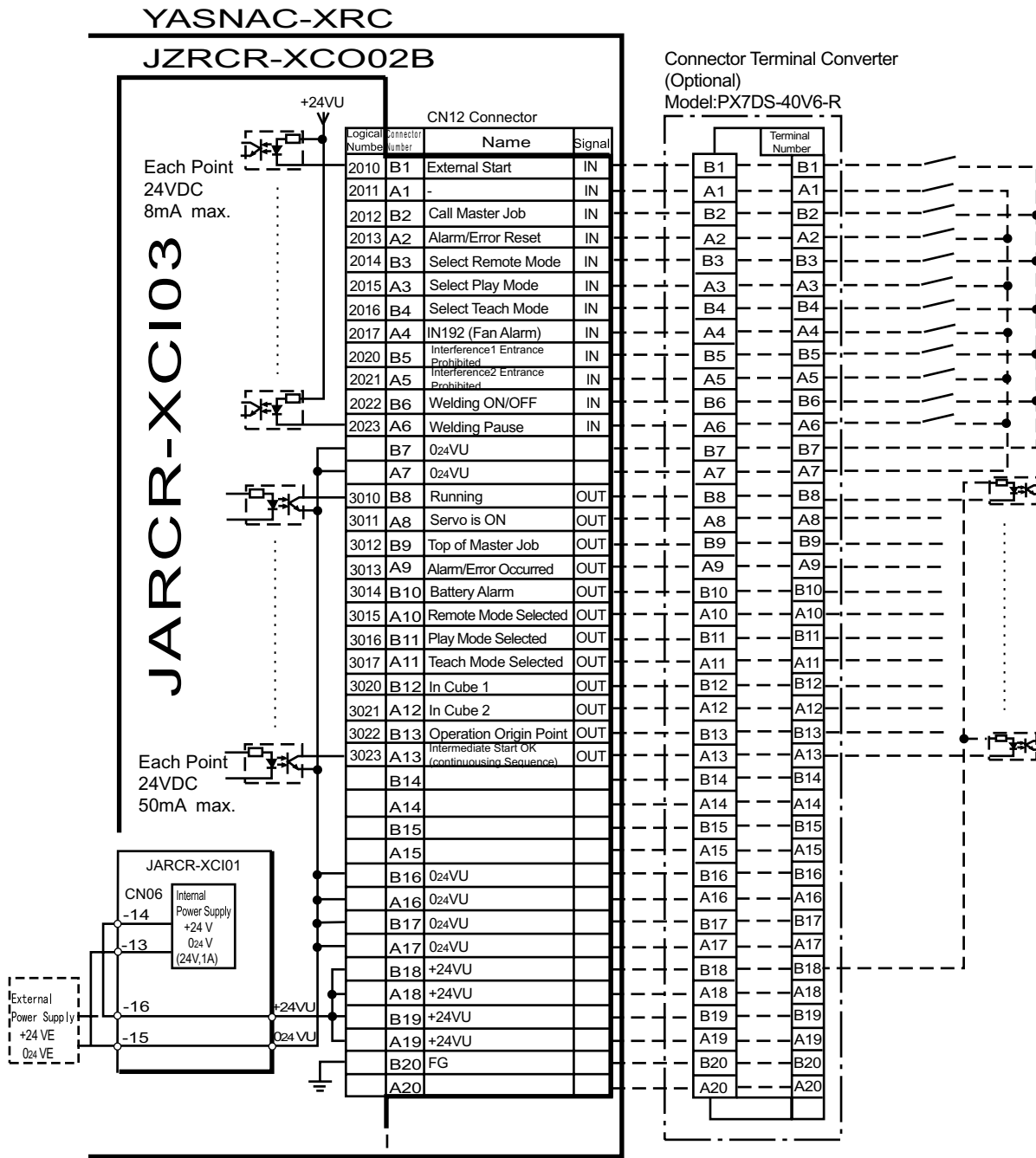
## Specific Output List XCO02B (General Application)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3013	<p><b>ALARM/ERROR OCCURRING</b> This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.</p>	3024	<p><b>IN CUBE 3</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 3). Use this signal to prevent interference with other manipulators and jigs.</p>
3014	<p><b>BATTERY ALARM</b> This signal turns ON to notify that the battery requires replacing when the voltage drops from the battery for backup memory of the encoder. Major problems may result if memory data is lost because of an expired battery. It is recommended to avoid these problems by using this signal as a warning signal.</p>	3025	<p><b>IN CUBE 4</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 4). Use this signal to prevent interference with other manipulators and jigs.</p>
3015 to 3017	<p><b>REMOTE/PLAY/TEACH MODE SELECTED</b> This signal notifies the current mode setting. These signals are synchronized with the lamps [REMOTE] and [MODE] in the playback panel. The signal corresponding to the selected mode turns ON.</p>	3026	<p><b>WORK COMMAND</b> This signal provides the command for the general tool to operate. TOOL ON instruction execution or the [TOOL ON] key in the programming pendant turns this signal ON and TOOL OFF instruction execution or the [TOOL OFF] key in the programming pendant turns it OFF. However, it remains OFF while the WORK PROHIBITED signal (2022) is input or while the robot is stopped.</p>
3020	<p><b>IN CUBE 1</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 1). Use this signal to prevent interference with other manipulators and jigs.</p>		

\*1 The operation origin cube and Cube 24 are same.

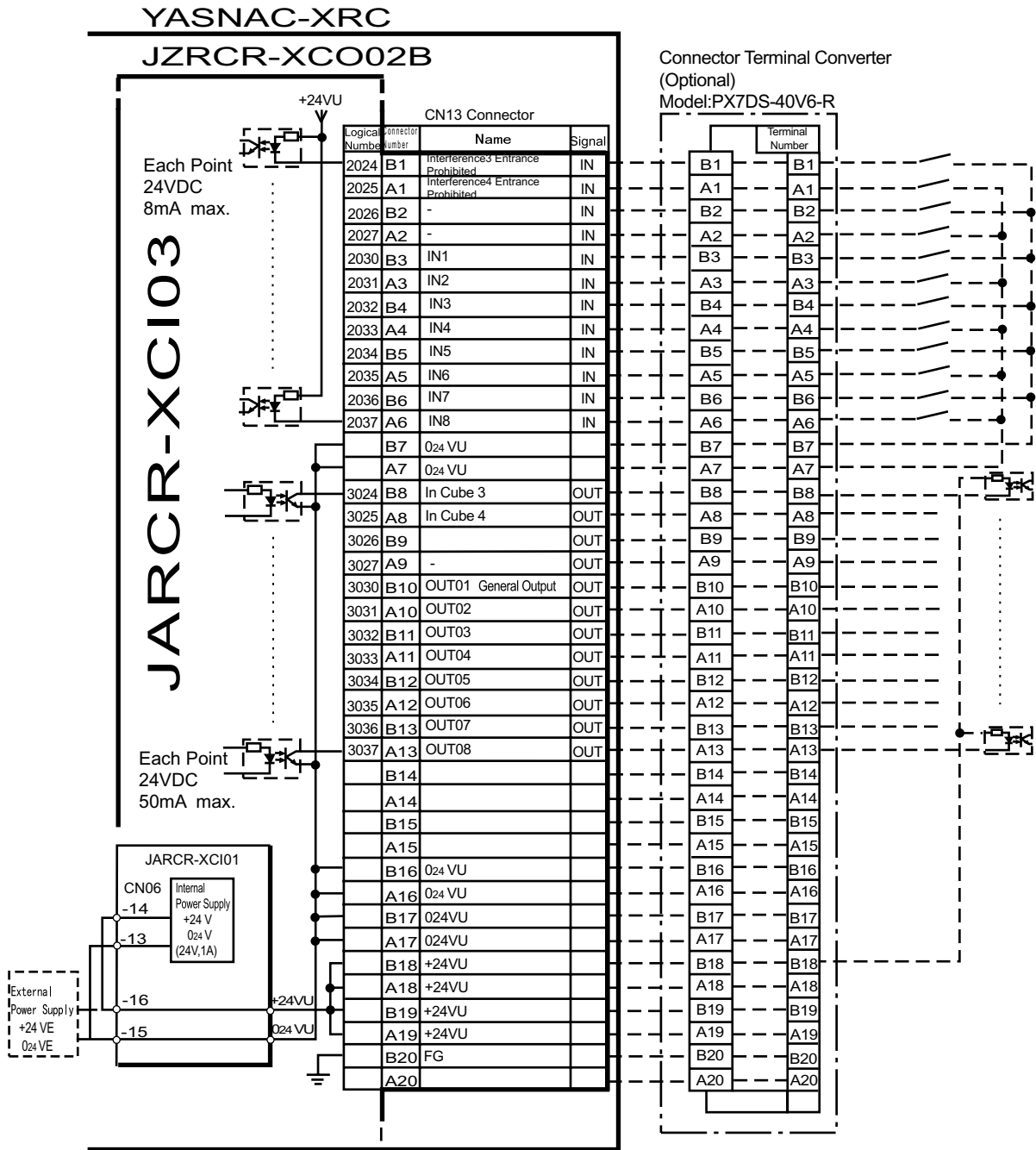
\*2 This signal is not output during operation.

## 2.8.4 Spot Welding



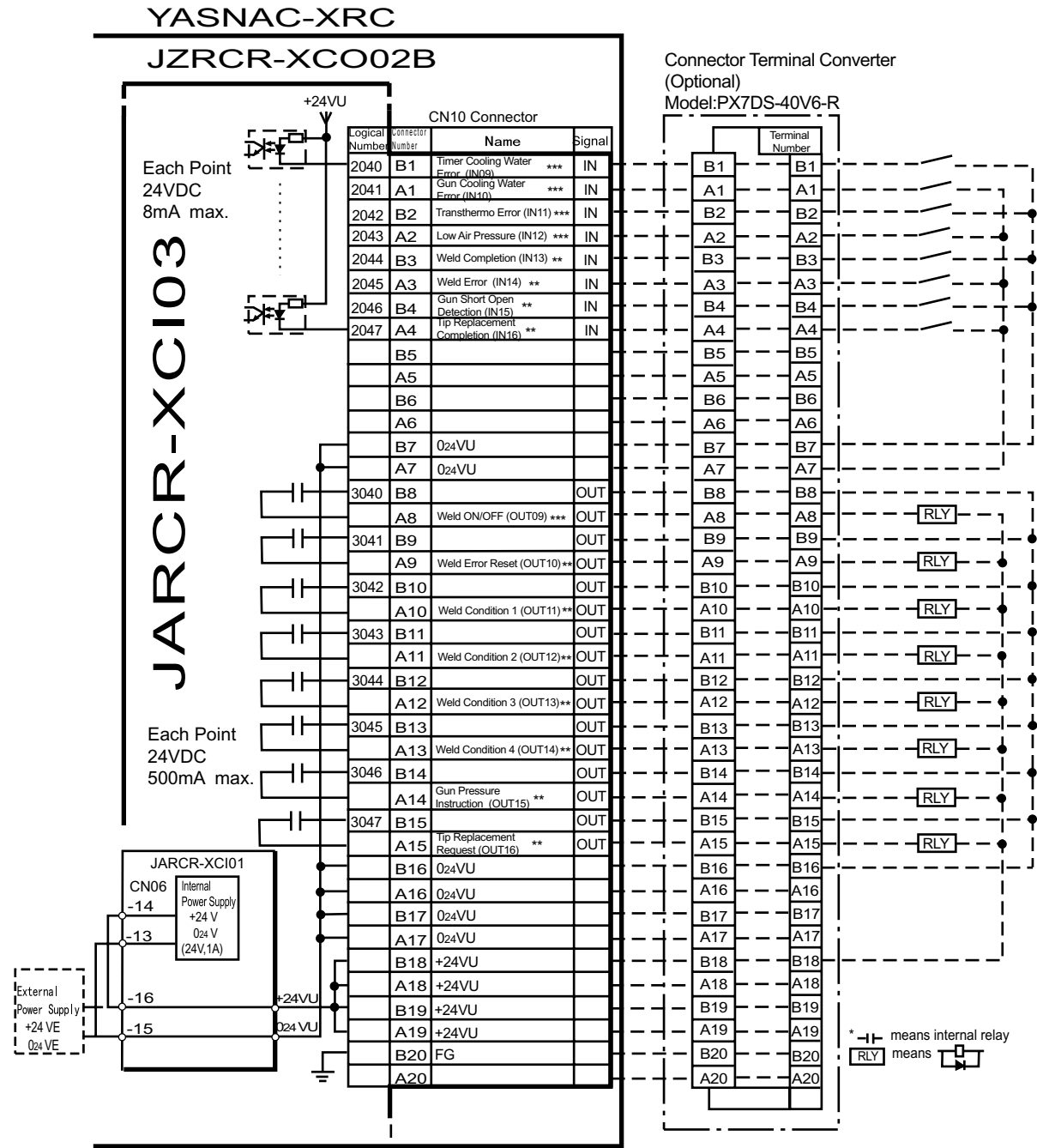
\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram

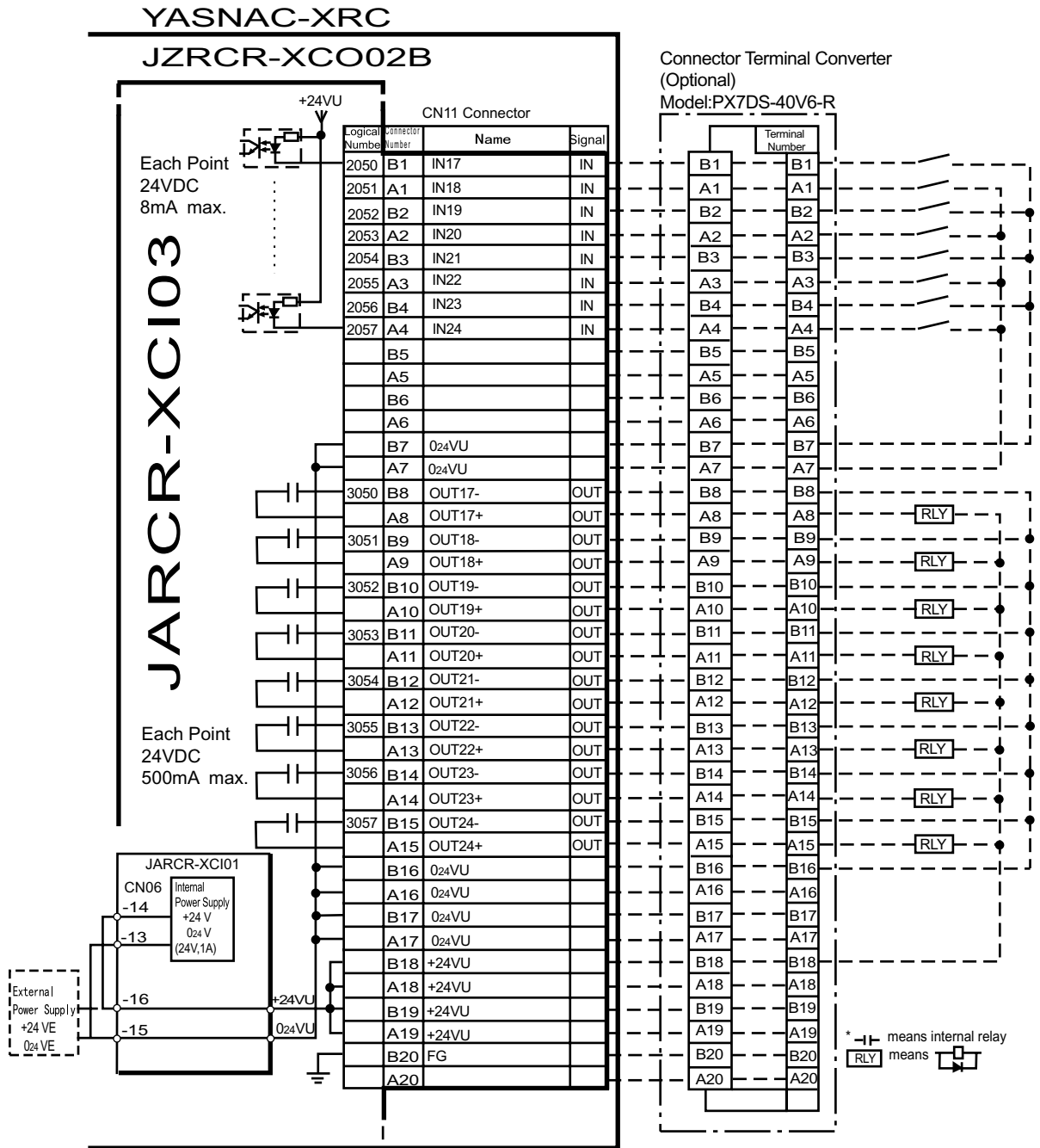


\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

\*\* This assignment can be changed at the I/O assignment display. Refer to Specific Input List XCO02B and Specific Output List XCO02B for detail.

\*\*\* This assignment can be changed at the pseudo input display. Refer to Specific Input List XCO02B and Specific Output List XCO02B for detail.

JARCR-XCI03 (CN10 Connector) I/O Allocation and Connection Diagram



\* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

JARCR-XCI03 (CN11 Connector) I/O Allocation and Connection Diagram

Specific Input List XCO02B (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2010	<p><b>EXTERNAL START</b> Functions the same as the [START] button in the playback panel . Only the rising edge of the signal is valid. It starts robot operation (playback). This signal is invalid if external start is prohibited from the playback condition display.</p>	2022	<p><b>WELDING ON/OFF</b> (From sequencer) This signal inputs the welding ON/OFF selector switch status from the sequencer in the interlock unit. The WELD ON/OFF signal is output to the welder according to this signal and the manipulator status. Welding is not wxecuted when this signal is input (ON).</p>
2012	<p><b>CALL MASTER JOB</b> Only the rising edge of the signal is valid. It calls up the top of the robot program, that is the top of the master job *1. This signal is invalid during playback, during teach-lock and when play master or call is prohibited (set from the playback operation condition display).</p>	2023	<p><b>WELDING PAUSE</b> (From sequencer) This signal is used to move the manipulator to the origin point when an error occurs in the welder or the gun. The robot neglects the spot welding instruction and operates playback motion.</p>
2013	<p><b>ALARM/ERROR RESET</b> After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.</p>	2024	<p><b>INTERFERENCE 3 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 3*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>
2014	<p><b>SELECT REMOTE MODE</b> Functions the same as [REMOTE] on the playback panel. Valid only while the signal is ON. It selects the REMOTE mode.</p>	2025	<p><b>INTERFERENCE 4 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 4*2 area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>
2015	<p><b>SELECT PLAY MODE</b> Functions the same as [MODE] on the playback panel. Only the rising edge of the signal is valid. It selects the PLAY mode. If designated simultaneously with other modes, the TEACH mode takes priority. This signal is invalid if external mode selection is prohibited from the operation condition display.</p>	2040 *4	<p><b>TIMER COOLING WATER ERROR</b> This signal monitors the status of timer cooling water. The manipulator displays alarm and stops when this signal is input. The servo power remains ON.</p>



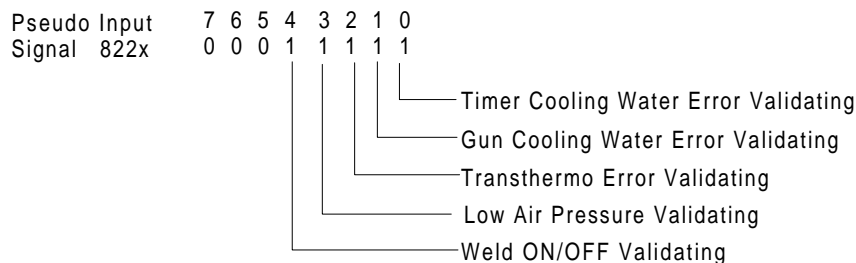
## Specific Input List XCO02B (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2016	<p><b>SELECT TEACH MODE</b> The TEACH mode is selected if this signal turns ON during PLAY mode. Switching to other modes is disabled while this signal is ON. If this signal turns ON while the SELECT PLAY MODE signal is ON, this signal takes priority and the TEACH mode is selected.</p>	2041 *4	<p><b>GUN COOLING WATER ERROR</b> This signal monitors the status of gun cooling water. The manipulator displays alarm and stops when this signal is input. The servo power supply remains ON.</p>
2020	<p><b>INTERFERENCE 1 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 1<sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>	2042 *4	<p><b>TRANSTHERMO ERROR</b> Error signal is sent from the transformer in the gun to the robot. This signal is ON normally (NC) and an alarm occurs when the signal is OFF. The servo power supply remains ON.</p>
2021	<p><b>INTERFERENCE 2 ENTRANCE PROHIBITED</b> If the manipulator attempts to enter the cube 2<sup>*2</sup> area while this signal is ON, the manipulator goes to wait status (with servo power ON). During wait status, the manipulator operation restarts if this signal turns OFF.</p>	2043 *4	<p><b>LOW AIR PRESSURE</b> When air pressure is reduced and this input is turned ON, an alarm occurs. The servo power supply remains ON.</p>

Specific Input List XCO02B (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2044 *3	WELD COMPLETIO This signal indicates that the welder completed welding without error. This signal is used as a confirmation signal for welding instruction execution and manual spot welding. After this signal is input, the welding sequence is completed and the next step is executed when confirmation limit switch is not provided.	2046 *3	GUN SHORT OPEN DETECTION This signal is connected with a single gun open verification limit switch or a double stroke gun short open verification limit switch to verify the gun open.
2045 *3	WELDING ERROR This signal indicates an abnormal welding result or welder's error. Alarm occurs and the manipulator stops if this signal is input during welding.	*3	GUN PRESSURE DETECTION This signal indicates that a gun is in pressing status.
*3	STICK DETECTION This signal indicates an abnormal welding result or welder's error. Alarm occurs and the manipulator stops if this signal is input during welding.	2047 *3	TIP REPLACE COMPLETION When this signal is input after tip replacement, the TIP REPLACE REQUEST signal turns OFF, and the stored number of welding is cleared.
*3	GUN FULL OPEN DETECTIO This signal indicates that the stroke of the double stroke gun is full open.		

- \*1 A master job is a job (program) which can be called by CALL MASTER JOB. Other functions are the same as for normal jobs. Normally, the parent job, which manages the child jobs called up immediately after the power is turned ON, is set as the master job.
- \*2 See " 3.7 Interference Area " of the YASNAC XRC Instructions.
- \*3 This signal can be allocated to any general input signal at the I/O allocation display in operation condition.
- \*4 This signal can be set as "USE" or "NOT USE" by pseudo input signal "822x". If "NOT USE" is selected, this signal can be used as general input signal.



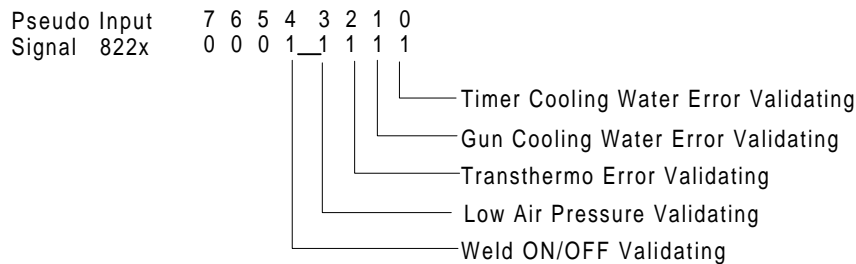
Specific Output List XCO02B (Spot Welding)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	<b>RUNNING</b> This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3023	<b>INTERMEDIATE START OK</b> (Sequence continues) This signal turns ON when the manipulator operates. It turns OFF when the currently executed line is moved with the cursor or when editing operation is carried out after HOLD is applied during operation. Therefore, this signal can be used as a restart interlock after a HOLD is applied. However, it also turns ON in the TEACH mode and TEACH MODE SELECTED signal must be referred together.
3011	<b>SERVO IS O</b> This signal signifies that the servo power is turned ON, internal processing such as current position creation is complete, and the system is able to receive the START command. This signal turns OFF when the servo power supply turns OFF. It can be used for XRC status diagnosis for an external start.	3024	<b>IN CUBE 3</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 3). Use this signal to prevent interference with other manipulators and jigs.
3012	<b>TOP MASTER JOB</b> This signal signifies that the execution position is the top of the master job. This signal can be used to confirm that the master job has been called.*2	3025	<b>IN CUBE 4</b> This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 4). Use this signal to prevent interference with other manipulators and jigs.
3013	<b>ALARM/ERROR OCCURRING</b> This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.	3040 *4	<b>WELD ON/OFF</b> Outputs a signal input from the interlock panel, etc. considering the robot status.
3014	<b>BATTERY ALARM</b> This signal turns ON to notify that the battery requires replacing when the voltage drops from the battery for backup memory of the encoder. Major problems may result if memory data is lost because of an expired battery. It is recommended to avoid these problems by using this signal as a warning signal.	3041 *3	<b>WELD ERROR RESET</b> This signal commands the reset error status of the welder. This is operated with the programming pendant operation.
3015 to 3017	<b>REMOTE/PLAY/TEACH MODE SELECTED</b> This signal notifies the current mode setting. These signals are synchronized with the lamps [REMOTE] and [MODE] in the playback panel. The signal corresponding to the selected mode turns ON.	3042 to 3045 *3	<b>WELD CONDITION</b> (Level signals) 1(1), 2(2), 4(3), 8(4), 16(5), 32(6), 64(7), 128(8) Sets the welding conditions for the welder. The output format can be selected as binary or discrete (bit number). It can handle up to 255 conditions. Most-significant bit is the parity bit (when specified).

Specific Output List XCO02B (Spot Welding)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3020	IN CUBE 1 This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 1). Use this signal to prevent interference with other manipulators and jigs.	*3	WELDING COMMAND This signal outputs execution command signal to the welder. This signal is not necessary for a welder which is executed using the WELDING CONDITION signal.
3021	IN CUBE 2 This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 2). Use this signal to prevent interference with other manipulators and jigs.	*3	STROKE CHANGE1 SINGLE SOLENOID DOUBLE SOLENOID This is a signal, when a double stroke gun is used, to change the open stroke of the welding gun.
3022	OPERATION ORIGIN POINT (IN CUBE 24) <sup>*1</sup> This signal turns ON when the current tool center point lies inside a the operation origin area. Use this signal to evaluate whether the robot is in the start position.	3046 *3	GUN PRESSURE INSTRUCTION This outputs a gun pressure instruction.
3047 *3	TIP REPLACEMENT REQUEST This is output when the number of strokes reaches the set value for tip replacement.		

- \*1 The operation origin cube and Cube 24 are same.
- \*2 This signal is not output during operation.
- \*3 This signal can be allocated to any general output signal at the I/O allocation display in operation condition.
- \*4 This signal can be select "USE" or "NOT USE" by pseudo input signal "822x". If "NOT USE" is selected, this signal can be used as general input signal.



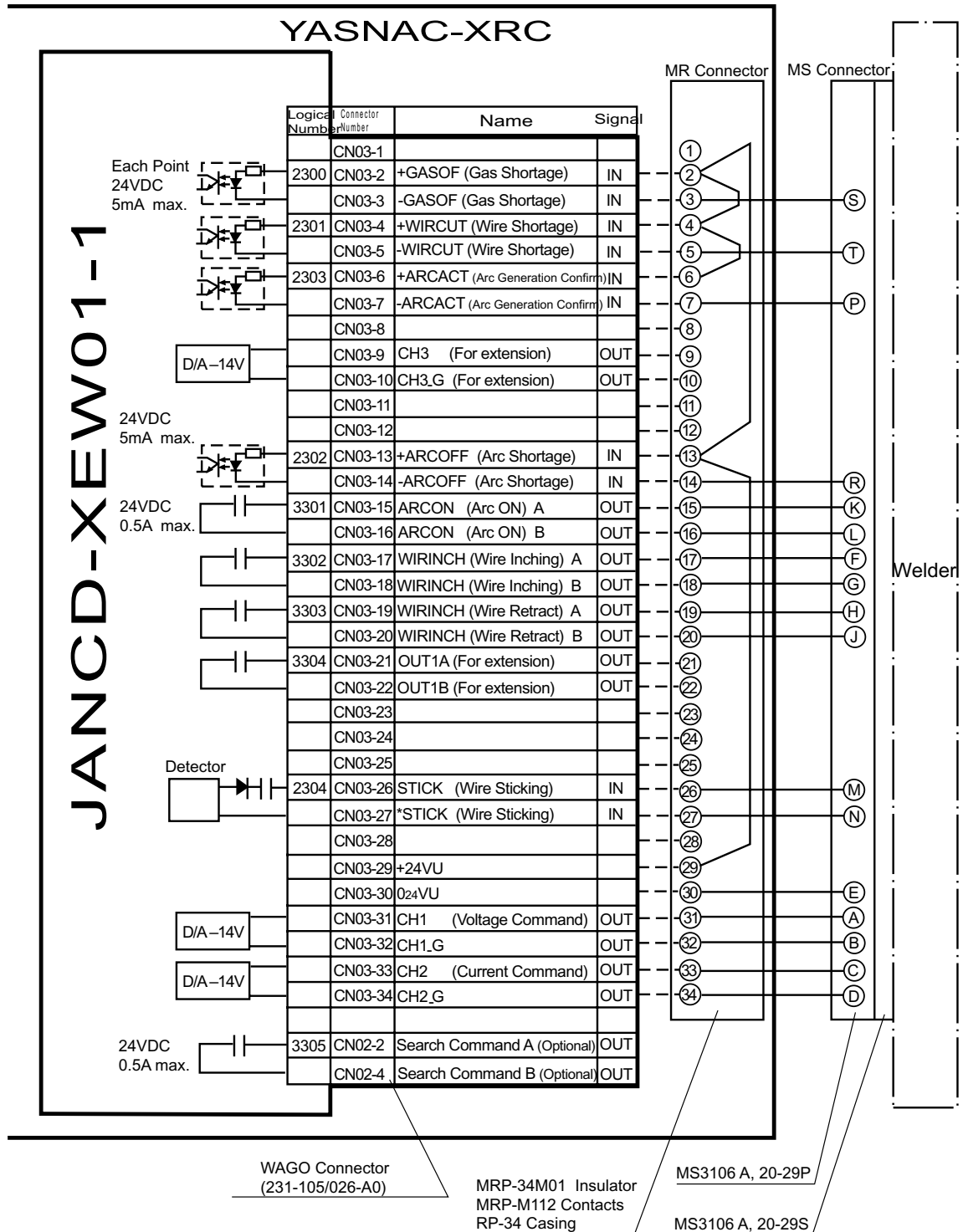
## 2.8.5 JANCD-XEW01 Circuit Board

### ■ Arc Welding Application

There are two types of XEW01 circuit board as follows;

XEW01-01 : Analog Outputs x 3 ports + Status Signal Input of a Welder

XEW01-02 : Analog Outputs x 3 ports only





## 3 Inspections

### 3.1 Regular Inspections



#### CAUTION

- **Do not touch the cooling fan or other equipment while the power is turned ON.**

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

Carry out the following inspections.

Inspection Equipment	Inspection Item	Inspection Frequency	Comments
XRC Controller	Check that the doors are completely closed.	Daily	
	Check for gaps or damage to the sealed construction.	Monthly	
Fan on the upper part of door and backside duct fan	Check operation	As required	While power ON
Emergency stop button	Check operation	As required	While servo ON
Deadman switch	Check operation	As required	On teach mode
Battery	Confirm battery alarm or message is displayed or not	As required	

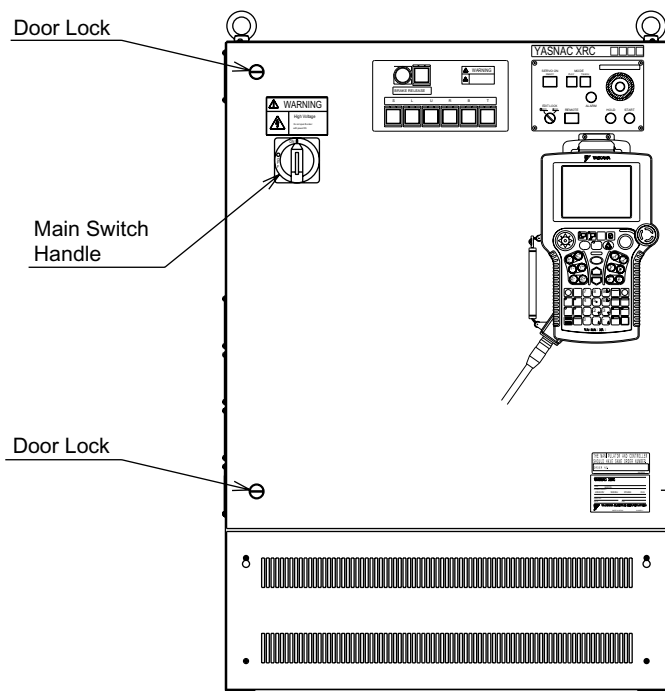
## 3.2 XRC Inspections

### 3.2.1 Checking if the Doors are Firmly Closed

- The YASNAC XRC has a fully sealed construction, designed to keep external air containing oil mist out of the XRC.

Be sure to keep the XRC doors fully closed at all times, even when the controller is not operating.

- Open or close the two locks in each door with the minus driver when opening or closing the doors for maintenance after the main power is turned off. (CW:Open, CCW:Close) Make sure push the door closed and turn the door lock with the driver. When the door is closed, turn the door lock until the door clicks.



YASNAC XRC Front View

### 3.2.2 Checking for Gaps or Damage in the Sealed Construction Section

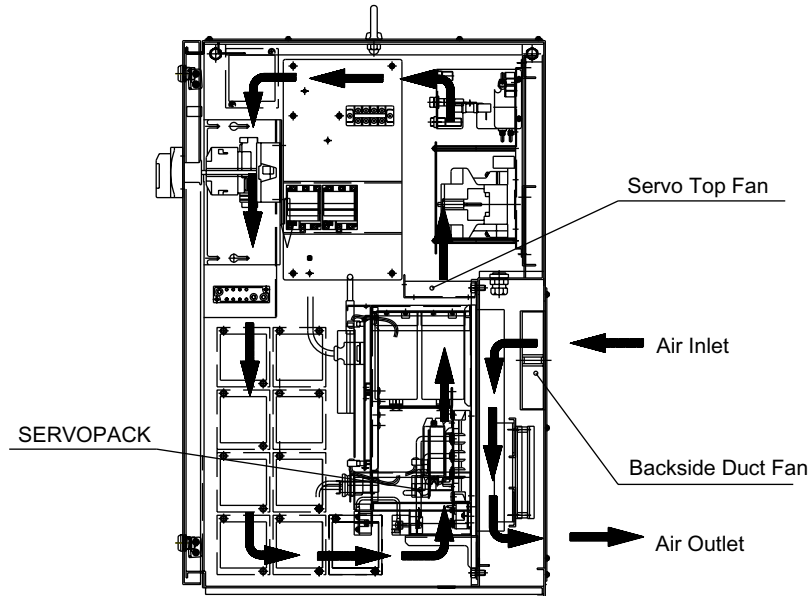
- Open the door and check that the seal around the door is undamaged.
- Check that the inside of the XRC is not excessively dirty. If it is dirty, determine the cause, take measures to correct the problem and immediately clean up the dirt.
- Fully close each door lock and check that no excessive gaps exist around the edge of the door.



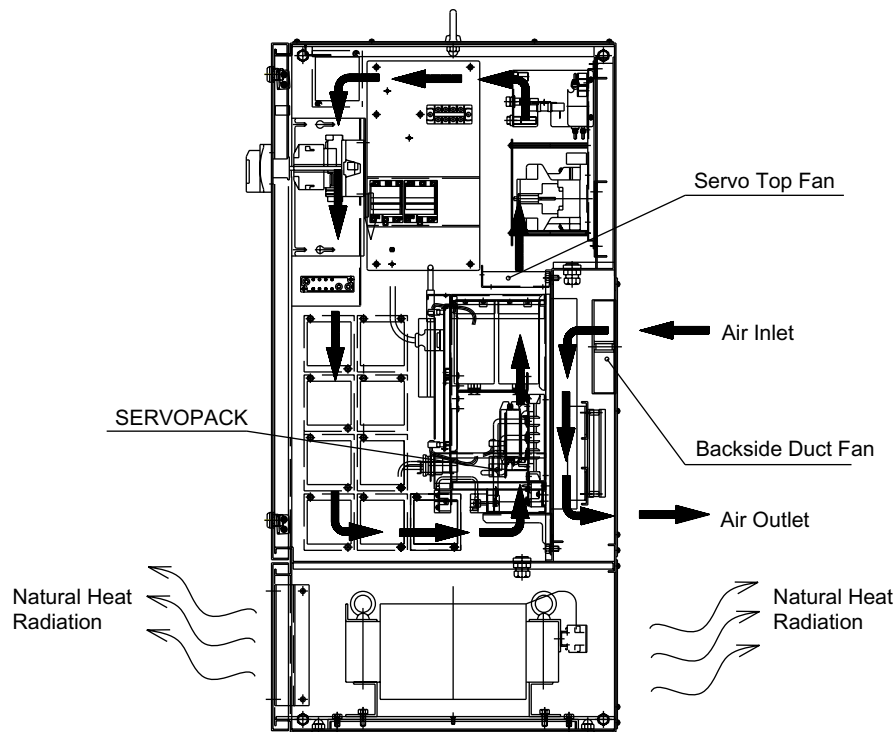
## 3.3 Cooling Fan Inspections

Inspect the cooling fans as required. A defective fan can cause the XRC to malfunction because of excessive high temperatures inside.

The in-panel fan on the upper part of door and backside duct fan normally operate while the power is turned ON. Check if the fans are operating correctly by visual inspection and by feeling air moving into the air inlet and from the outlet.



Cooling System (SV3X (Small Capacity Type))(Right side view)



Cooling System (Except for SV3X (Small Capacity Type))(Right side view)

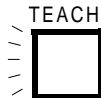
## 3.4 Emergency Stop Button Inspections

The emergency stop buttons are located on both the playback panel and the programming pendant. Confirm the servo power is off by pressing the emergency stop button on the playback panel after the servo ON button, before the robot is operated.

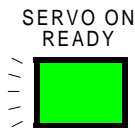
## 3.5 Deadman Switch Inspections

The programming pendant is equipped with a three-position deadman switch. Perform the following operation to confirm the deadman switch operates.

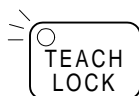
1. Press [TEACH] on the playback panel to switch to teach mode. The [TEACH] lamp lights.



2. Press [SERVO ON READY] on the playback panel. The [SERVO ON READY] lamp blinks.



3. Press [TEACH LOCK] on the programming pendant. The [TEACH LOCK] LED blinks.



4. When the deadman switch is grasped lightly, the servo power is turned ON. When the deadman switch is grasped firmly or released, the servo power is turned OFF.



If the [SERVO ON READY] lamp does not light in previous operation (2), check the following:

- The emergency stop button on the playback panel is pressed.
- The emergency stop button on the programming pendant is pressed.
- The emergency stop signal is input from external.

If the servo is not turned on in a previous operation 4, check the following:

- The overrun LS is operating.
- If a major alarm is occurring.

## 3.6 Battery Inspections

The XRC has a battery that backs up the important program files for user data in the CMOS memory.

A battery alarm indicates when a battery has expired and must be replaced. The programming pendant display and the message "Memory battery weak" appears at the bottom of the display.

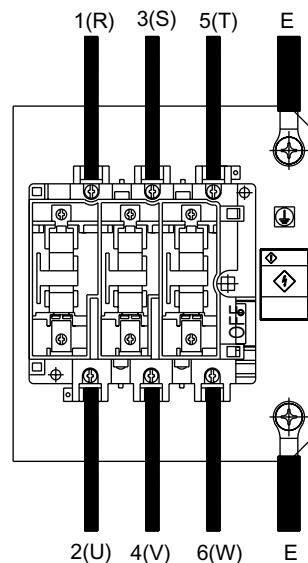
The way to replace the battery is described in "9.1.1 Replacing Parts of the CPU Rack" of the YASNAC XRC Instructions.

## 3.7 Power Supply Voltage Confirmation

Check the voltage of 1 (R), 3 (S), 5 (T) terminal of the disconnecting switch (QS1) with an electric tester.

Power Supply Voltage Confirmation

Measuring Items	Terminals	Correct Value
Correlate voltage	Between 1 and 3 (R and S), 3 and 5 (S and T), 1 and 5 (R and T)	575/480/240 V (+10%, -15%)
Voltage between earth (S phase ground)	Between 1 and E (R and E), 5 and E (T and E)	575/480/240 V (+10%, -15%)
	Between 3 and E (S and E)	About 0V

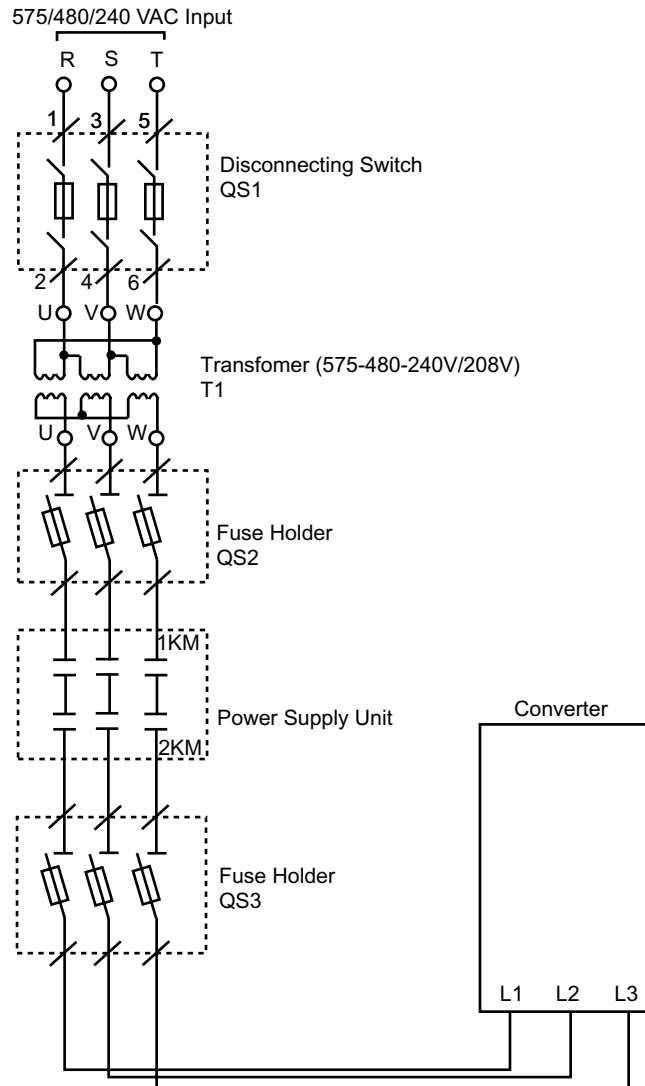


Disconnecting Switch (QS1)

## 3.8 Open Phase Check

Open Phase Check List

Check Item	Contents
Lead Cable Check	Confirm if the lead cable for the power supply is wired as shown in the following. If the wiring is wrong or broken, repair it.
Input Power Supply Check	Check the open phase voltage of input power supply with an electric tester. (Normal value: 575/480/240 VAC (+10%, -15%)) The voltage differs depending on the built-in transformer tap selection.
Disconnecting Switch (QS1) Check	Turn on the control power supply and check the open phase voltage of "U,V,W" of the disconnecting switch (QS1) with an electric tester. If abnormal, replace the disconnecting switch (QS1).



## 4 Replacing Parts

### 4.1 Replacing XRC Parts



#### WARNING

- **Turn OFF the power supply before opening the XRC doors.**

Failure to observe this warning may result in electric shock.

- **After turning OFF the power supply, wait at least 5 minutes before replacing a servopack (including converter) or control power supply unit. Do not touch any terminals during this period.**

Failure to observe this warning may result in electric shock.



#### CAUTION

- **To prevent anyone inadvertently turning ON the power supply during maintenance, put up a warning sign such as "DO NOT TURN ON THE POWER" at the primary power supply (knife switch, wiring circuit breaker, etc.) and at the YASNAC XRC and related controllers and use accepted lockout/tagout procedures.**

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

- **Do not touch the regeneration resistors. They are very hot.**

Failure to observe this caution may result in burn injuries.

- **After maintenance is completed, carefully check that no tools are left inside the YASNAC XRC and that the doors are securely closed.**

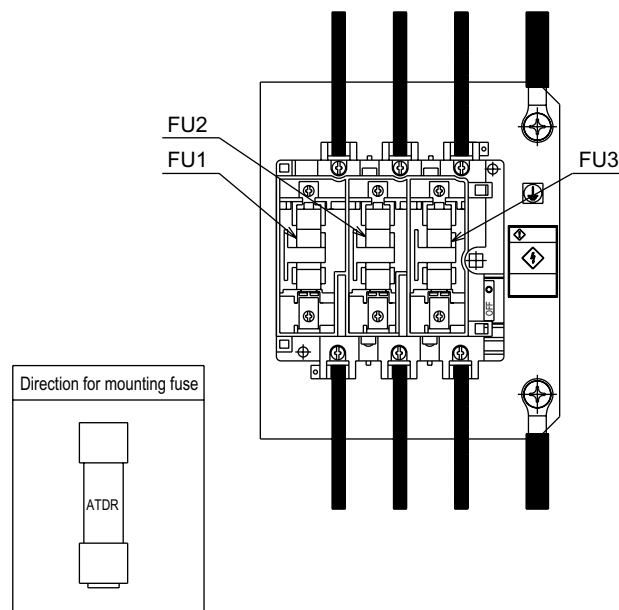
Failure to observe this caution may result in electric shock or injury.

## 4.1.1 Replacing the Disconnecting Switch

The disconnecting switch (QS1) is equipped with the following fuses.

Parts No.	Fuse Name	Specification
FU1, FU2, FU3	Power Supply Fuse	600 VAC <sup>*1</sup> TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)

<sup>\*1</sup> The type of fuse differs depending on the robot model. Refer to the table "Power Supply Fuse List".



Disconnecting Switch Configuration

If a fuse appears to be blown, remove each fuse shown above and check the continuity with an electric tester.

If the fuse is blown, replace it with the same type of fuse (supplied).



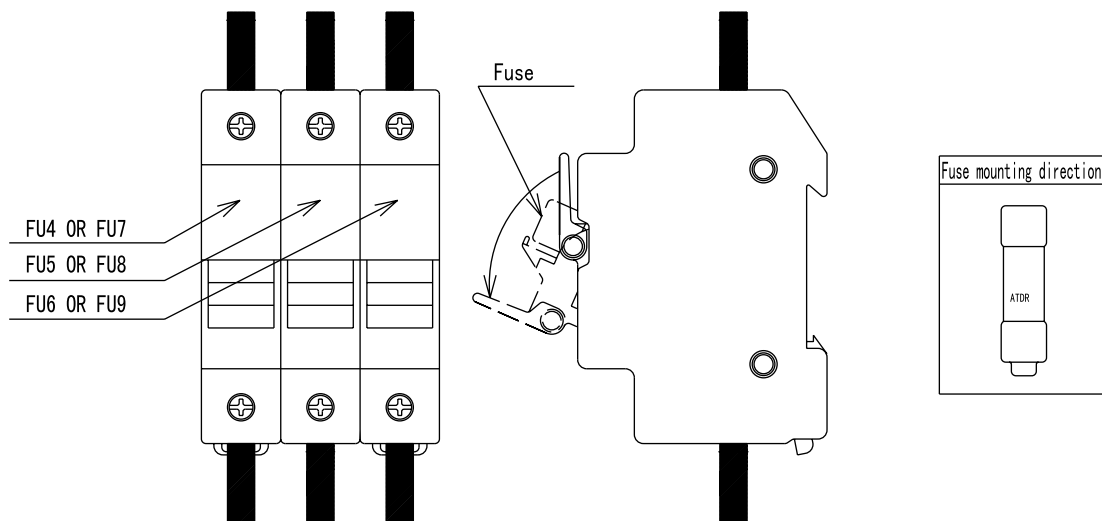
Determine and correct the cause of the blown fuse. If the problem is uncorrected, the fuse may blow again.

## Fuse holders

The fuse holders (QS2, QS3) are equipped with the following fuses.

Fuse holders	Parts No.	Fuse Name	Specification
QS2	FU4, FU5, FU6	Power Supply Fuse	600VAC <sup>*1</sup> TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)
QS3	FU7, FU8, FU9	Power Supply Fuse	600VAC <sup>*1</sup> TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)

<sup>\*1</sup> The type of fuse differs depending on the robot model. Refer to the table "Power Supply Fuse List".



Fuse Holders Configuration

If a fuse appears to be blown, remove each fuse shown above and check the continuity with an electric tester.

If the fuse is blown, replace it with the same type of fuse (supplied).



Determine and correct the cause of the blown fuse. If the problem is uncorrected, the fuse may blow again.

Power Supply Fuse List

Robot Model		Fuse Type		
		QS1	QS2	QS3
SV3X	With built-in transformer	3A	10A	5A
	Without transformer	10A	-	5A
UP6	With built-in transformer	5A	10A	10A
	Without transformer	10A	-	10A
SK16X, UP20	With built-in transformer	10A	15A	15A
	Without transformer	15A	-	15A
SK45X, SK16MX, UP50, UP20M, SP70X	With built-in transformer	15A	20A	20A
	Without transformer	20A	-	20A
UP130, UP165, UP165-100, UP200	With built-in transformer	20A	30A	30A
	Without transformer	30A	-	30A
UP130R, UP130RL, SK300X, SP100X, SR200X	With built-in transformer	30A	40A	40A
	Without transformer	40A	-	40A

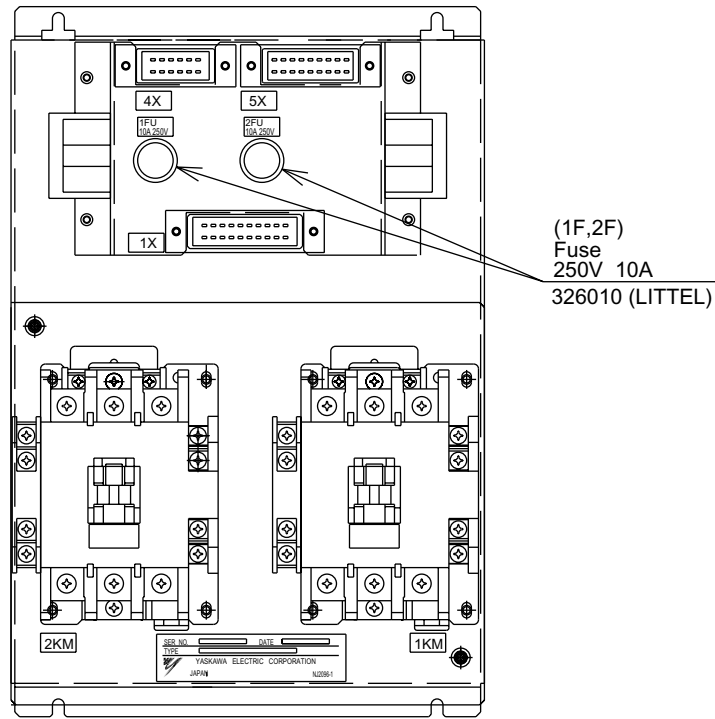
Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, QS2, and QS3.



## 4.1.2 Replacing Parts of Power Supply Unit

The power supply unit (JZRCR-XPU05B, 06B, and 10B) is equipped with the following fuses.

Parts No.	Fuse Name	Specification
1F, 2F	Control Power Supply Fuse	250V, 10A, Time Lag Fuse (Std: 326010, 250V, 10A (LITTEL))



Fuse Locations in Power Supply Unit

### Power Supply Unit Type

Type	Applicable Robot Model
JZRCR-XPU06B	SV3X, UP6, SK16X, UP20
JZRCR-XPU05B	UP50, UP20M, SK45X, SK16MX, SP70X, UP130, UP165, UP165-100, UP200
JZRCR-XPU10B	UP130R, UP130RL, SK300X, SR200X, SP100X

If a fuse appears to be blown, remove each fuse shown above and check the continuity with an electric tester. If the fuse is blown, replace it with the same type of fuse (supplied).



Determine and correct the cause of the blown fuse. If the problem is uncorrected, the fuse may blow again.

## 4.2 YASNAC XRC Parts List

YASNAC XRC Parts List

No.	Name	Model	Comment
1	SERVOPACK	*1	6 Axis type
2	CPU rack	JZNC-XRK01B-□	
	Backboard	JANCD-XBB01	
	System control circuit board	JANCD-XCP01	
	High speed serial interface circuit board	JANCD-XIF03	
3	I/O unit	JZRRCR-XCO02B	
	Specific I/O circuit board 1	JARCR-XCI01	
	Specific I/O circuit board 2	JARCR-XCU01B	
	General I/O circuit board	JARCR-XCI03	
4	Power ON unit	JZRRCR-XSU02	
	Power ON circuit board	JARCR-XCT01	
5	Break release control board	JARCR-XFL02B	
6	Transformer	*4	
7	Power supply unit	*2	
8	Playback pannel	ZY1C-SS3152	
9	Servo ascending fan	3610PS-22T-B30-B00	
10	Backside duct fun	4715PS-22T-B30-B00	Small capacity only
		5915PS-22T-B30-B00	Large capacity only
11	Power ON circuit board fuse	218005, 5A, 250V	Time lag fuse
		2183.15, 3.15A, 250V	Time lag fuse
		GP40, 4.0A, 250V	Alarm fuse
12	Power ON circuit board relay	LY2 24 VDC	
13	Battery	ER6VC3N 3.6V	
14	Power supply fuse	*3	Time deray / class cc

- \*1** The type of the SERVOPACK depends on the robot model. For details, see the Tables. “SERVOPACK List (Small Capacity)” and “SERVOPACKz List (Large Capacity)”.
- \*2** The type of the power supply unit depends on the robot model. For details, see the Table “Power Supply Unit List”.
- \*3** The type of the fuse depends on the robot model. For details, refer to the table “Fuse List”.
- \*4** The type of transformer depends on the robot model. For details, see the table “Transformer List.”

SERVOPACK List (Small Capacity)

Component	SV3X		UP6		SK16X		UP20	
	Type		Type		Type		Type	
Servopack	CACR-SV3AAA		CACR-UP6AAC		CACR-SK16AA		CACR-UP20AAA	
Amplifier	S	JUSP-WS02AA	JUSP-WS05AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AA	JUSP-WS10AA
	L	JUSP-WS02AA	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS20AAY22	JUSP-WS20AAY22
	U	JUSP-WS01AA	JUSP-WS05AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17
	R	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS01AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA
	B	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS01AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA
	T	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS01AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA	JUSP-WS02AA
Servo control circuit board	JASP-WRCA01		JASP-WRCA01		JASP-WRCA01		JASP-WRCA01	
Converter	JUSP-ACP05JAA		JUSP-ACP05JAA		JUSP-ACP05JAA		JUSP-ACP05JAA	
Control power supply	JUSP-RCP01AAC		JUSP-RCP01AAC		JUSP-RCP01AAC		JUSP-RCP01AAC	

SERVOPACK List (Medium Capacity)

Component		SK16MX	SK45X	UP50
		Type	Type	Type
SERVOPACK		CACR-SK16MAAB	CACR-SK45AAB	CACR-UP50AAB
Amplifier	S	JUSP-WS30AA	JUSP-WS30AA	JUSP-WS44AA
	L	JUSP-WS20AA	JUSP-WS20AA	JUSP-WS60AA
	U	JUSP-WS20AA	JUSP-WS20AA	JUSP-WS20AA
	R	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS10AA
	B	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS10AA
	T	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS10AA
Servo control circuit board		JASP-WRCA01	JASP-WRCA01	JASP-WRCA01
Converter		JUSP-ACP25JAA	JUSP-ACP25JAA	JUSP-ACP25JAAY11
Control power supply		JUSP-RCP01AAC	JUSP-RCP01AAC	JUSP-RCP01AAC

SERVOPACK List (Medium Capacity)

Component		UP20M	SP70X
		Type	Type
SERVOPACK		CACR-UP20MAAB	CACR-SP70AAB
Amplifier	S	JUSP-WS44AA	JUSP-WS20AA
	L	JUSP-WS60AA	JUSP-WS15AA
	U	JUSP-WS20AA	JUSP-WS44AA
	R	JUSP-WS02AA	JUSP-WS05AA
	B	JUSP-WS02AA	-
	T	JUSP-WS02AA	-
Servo control circuit board		JASP-WRCA01	JASP-WACA01
Converter		JUSP-ACP25JAAY11	JUSP-ACP25JAA
Control power supply		JUSP-RCP01AAC	JUSP-RCP01AAC

SERVOPACK List (Large Capacity)

component		UP130, UP165	UP130R, UP200 UP165-100	UP130RL
		Type	Type	Type
SERVOPACK		CACR-UP130AAB	CACR-UP130AABY18	CACR-UP130AABY21
Amplifier	S	JUSP-WS60AA	JUSP-WS60AAY18	JUSP-WS60AAY18
	L	JUSP-WS60AA	JUSP-WS60AAY18	JUSP-WS60AAY18
	U	JUSP-WS60AA	JUSP-WS60AA	JUSP-WS60AAY18
	R	JUSP-WS20AAY13	JUSP-WS20AAY13	JUSP-WS20AAY13
	B	JUSP-WS15AAY13	JUSP-WS15AAY13	JUSP-WS15AAY13
	T	JUSP-WS15AAY13	JUSP-WS15AAY13	JUSP-WS15AAY13
Servo control circuit board		JASP-WRCA01	JASP-WRCA01	JAS-WRCA01
Converter		JUSP-ACP35JAA	JUSP-ACP35JAA	JUSP-ACP35JAA
Control power supply		JUSP-RCP01AAC	JUSP-RCP01AAC	JUSP-RCP01AAC

SERVOPACK List (Large Capacity)

Component		SK300X, SR200X	SP100X
		Type	Type
SERVOPACK		CACR-SK300AAB	CACR-SP100AAB
Amplifier	S	JUSP-WS60AAY18	JUSP-WS60AAY18
	L	JUSP-WS60AAY18	JUSP-WS60AAY18
	U	JUSP-WS60AAY18	JUSP-WS60AAY18
	R	JUSP-WS30AAY18	-
	B	JUSP-WS30AAY18	-
	T	JUSP-WS30AAY18	JUSP-WS20AAY19
Servo control circuit board		JASP-WRCA01	JASP-WRCA01
Converter		JUSP-ACP35JAA	JUSP-ACP35JAA
Control power supply		JUSP-RCP01AAC	JUSP-RCP01AAC

Power Supply Unit Type

Type	Robot Type
JZRCR-XPU06B	SV3X, UP6, SK16X, UP20
JZRCR-XPU05B	SK45X, SK16MX, UP50, UP20M, SP70X, UP130, UP165, UP165-100, UP200
JZRCR-XPU10B	UP130R, SK300X, SP100X, UP130RL, SR200X

Transformer Type

Robot Type	Transformer Type
SV3X	HB9480046 1.0KVA 575-480-240V/208V
UP6, SK16X, UP20	HB9480042 4.5KVA 575-480-240V/208V
SK45X, SK16MX, UP50, UP20M, SP70X, UP130, UP165, UP165-100, UP200	HB9480043 8.0KVA 575-480-240V/208V
UP130R, UP130RL, SK300X, SP100X, SR200X	HB9480044 12.0KVA 575-480-240V/208V

Power Supply Fuse List

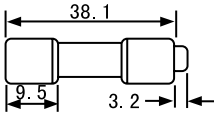
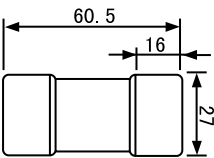
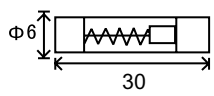
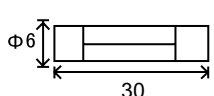
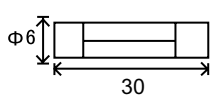
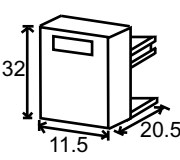
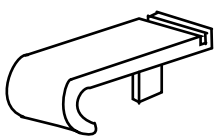
Robot Type		Fuse Type		
		QS1	QS2	QS3
SV3X	With trans- former built-in	3A	10A	5A
	Without trans- former	10A	-	5A
UP6	With trans- former built-in	5A	10A	10A
	Without trans- former	10A	-	10A
SK16X, UP20	With trans- former built-in	10A	15A	15A
	Without trans- former	15A	-	15A
SK45X, SK16MX, UP50, UP20M, SP70X	With trans- former built-in	15A	20A	20A
	Without trans- former	20A	-	20A
UP130, UP165, UP165-100, UP200	With trans- former built-in	20A	30A	30A
	Without trans- former	30A	-	30A
UP130R, UP130RL, SK300X, SP100X, SR200X	With trans- former built-in	30A	40A	40A
	Without trans- former	40A	-	40A

Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, QS2, and QS3.

## 4.3 Supplied Parts List

The supplied parts of YASNAC XRC is as follows.

Parts No.1 to 5 are used for fuse for replacement and No.6 is used as a tool for connecting the I/O.

No	Parts Name		Dimensions	Pcs	Model	Application
1	Time Delay Fuse Power Supply Fuse	Class CC (30 or less)		2	*1	Disconnecting switch Fuse holders
		Class J (40 or more)		2	*1	
2	5A Glass-Tube fuse			2	218005 5A 250V (LITTEL)	JARCR-XSU02 FU3, 4, 7, 8
3	3.15A Glass-Tube fuse			2	2183.15 3.15A 250V (LITTEL)	JARCR-XSU02 FU1, 2, 9, 10
4	10A Ceramic fuse			2	326010 10A 250V (LITTEL)	JZRCR- XPU05B, 06B, 10B 1F,2F
5	4.0A Alarm fuse			2	GP40 4.0A 250V (Daito Tsushin)	JANCD-XSU02 FU5, 6
6	WAGO Connector wir- ing tool			2	231-131 (WAGO)	CPS-150F CN04

\*1 The type of the fuse depends on the robot type. See the table "Power Supply Fuse".



## Power Supply Fuse List

Robot Model		Fuse Type		
		QS1	QS2	QS3
SV3X	With built-in transformer	3A	10A	5A
	Without transformer	10A	-	5A
UP6	With built-in transformer	5A	10A	10A
	Without transformer	10A	-	10A
SK16X, UP20	With built-in transformer	10A	15A	15A
	Without transformer	15A	-	15A
SK45X, SK16MX, UP50, UP20M, SP70X	With built-in transformer	15A	20A	20A
	Without transformer	20A	-	20A
UP130, UP165, UP165-100, UP200	With built-in transformer	20A	30A	30A
	Without transformer	30A	-	30A
UP130R, UP130RL, SK300X, SP100X, SR200X	With built-in transformer	30A	40A	40A
	Without transformer	40A	-	40A

Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, QS2, and QS3.

## 4.4 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the XRC. The spare parts list for the XRC is shown below. Product performance can not be guaranteed when using spare parts from any company other than Yaskawa. To buy the spare parts which are ranked B or C, inform the manufacturing number (or order number ) of XRC to Yaskawa representative. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts
- Rank B: Parts for which replacement may be necessary as a result of frequent operation
- Rank C: Drive unit

**NOTE**

For replacing parts in Rank B or Rank C, contact your Yaskawa representative.

Recommended Spare Parts of XRC for SV3X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Power Supply Fuse	ATDR3 3A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR 5 5A	GOULD	3	3	
7	A	Power Supply Fuse	ATDR 10 10A	GOULD	3	3	
8	A	Control Power Fuse	218005 5A 250V	LITTEL	10	2	
9	A	24VDC Fuse	2183.15 3.15A 250V	LITTEL	10	2	
10	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
11	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
12	A	Control Relay	LY2 DC24V	Omron	3	3	
13	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
14	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
15	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
16	B	Amplifier	JUSP-WS02AA	Yaskawa	1	2	For S, L axes
17	B	Amplifier	JUSP-WS01AA	Yaskawa	1	1	For U axis
18	B	Amplifier	JUSP-WS05AA	Yaskawa	1	3	For R, B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	Servopack	CACR-SV3AAA	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZNC-XIU02B	Yaskawa	1	1	
29	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 "Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP6

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Power Supply Fuse	ATDR5 5A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR10 10A	GOULD	3	6	
7	A	Control Power Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS05AAY17	Yaskawa	1	2	For S,U axes
16	B	Amplifier	JUSP-WS10AAY17	Yaskawa	1	1	For L axis
17	B	Amplifier	JUSP-WS01AA	Yaskawa	1	3	For R,B,T axes
18	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
22	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
23	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
24	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
25	C	SERVOPACK	CACR-UP6AAC	Yaskawa	1	1	
26	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
27	C	I/O Power On Unit	JZNC-XCO02B	Yaskawa	1	1	
28	C	I/O Power On Unit	JZRCR-XSU02	Yaskawa	1	1	
29	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 " Programming Pendant" is ordered.

Recommended Spare Parts of XRC for SK16X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Power Supply Fuse	ATDR10 10A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR15 15A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS10AAY17	Yaskawa	1	3	For S,L,U axes
16	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For R,B,T axes
17	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
18	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
19	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
20	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
21	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
22	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
23	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
24	C	SERVOPACK	CACR-SK16AAC	Yaskawa	1	1	
25	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
26	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
27	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
28	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
29	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.29 " Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP20

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	Servo Top Fan	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Power Supply Fuse	ATDR10 10A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR15 15A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	24VDC Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS10AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS20AAY22	Yaskawa	1	1	For L axis
17	B	Amplifier	JUSP-WS10AAY17	Yaskawa	1	1	For U axis
18	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For R, B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-UP20AAA	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 “ Programming Pendant” is ordered.

Recommended Spare Parts of XRC for SK16MX

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR15 15A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR20 20A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS30AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS20AA	Yaskawa	1	2	For L,U axes
17	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For R, B, T axes
18	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
22	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
23	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
24	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
25	C	SERVOPACK	CACR-SK16MAAB	Yaskawa	1	1	
26	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
27	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
28	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
29	C	Power Supply Unit	JZRRCR-XPU05B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 " Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for SK45X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR15 15A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR20 20A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
13	B	Control Power Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS30AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS20AA	Yaskawa	1	2	For L,U axes
17	B	Amplifier	JUSP-WS10AA	Yaskawa	1	3	For R,B,T axes
18	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
22	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
23	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
24	B	Power ON Board	JARCR-XCT01	Yaskawa	1	1	
25	C	SERVOPACK	CACR-SK45AAB	Yaskawa	1	1	
26	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
27	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
28	C	I/O Power On Unit	JZRCR-XSU02	Yaskawa	1	1	
29	C	Power Supply Unit	JZRCR-XPU05B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 " Programming Pendant" is ordered.



Recommended Spare Parts of XRC for UP20M

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PS-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR15 15A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR20 20A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP25JAAY11	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS44AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS60AA	Yaskawa	1	1	For L axis
17	B	Amplifier	JUSP-WS20AA	Yaskawa	1	1	For Uaxis
18	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For R, B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-UP20MAAB	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRCR-XPU05B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 " Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP50

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR15 15A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR20 20A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP25JAAY11	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS44AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS60AA	Yaskawa	1	1	For L axis
17	B	Amplifier	JUSP-WS20AA	Yaskawa	1	2	For Uaxis
18	B	Amplifier	JUSP-WS10AA	Yaskawa	1	3	For R, B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-UP50AAB	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRCR-XPU05B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for SP70X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR15 15A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR20 20A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A 250V	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS20AA	Yaskawa	1	1	For S axis
16	B	Amplifier	JUSP-WS15AA	Yaskawa	1	2	For L axis
17	B	Amplifier	JUSP-WS44AA	Yaskawa	1	1	For U axis
18	B	Amplifier	JUSP-WS05AA	Yaskawa	1	3	For R axis
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-SP70AAB	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRRCR-XPU05B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 " Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP130, UP165

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR20 20A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR30 30A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AA	Yaskawa	1	3	For S, L, U axes
16	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
17	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B, T axes
18	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
22	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
23	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
24	B	Power On Board	JANCD-XCT01	Yaskawa	1	1	
25	C	SERVOPACK	CACR-UP130AAB	Yaskawa	1	1	
26	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
27	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
28	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
29	C	Power Supply Unit	JZRCR-XPU05B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 " Programming Pendant" is ordered.

Recommended Spare Parts of XRC for UP200

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR20 20A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	ATDR30 30A	GOULD	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AA	Yaskawa	1	1	For U axis
16	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	2	For S, L axes
17	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
18	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-UP130AABY18	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRCR-XPU05B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 " Programming Pendant" is ordered.

#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP130R

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR30 30A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	LPJ-40SP 40A	BUSSMAN	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AA	Yaskawa	1	1	For U axis
16	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	2	For S, L axes
17	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
18	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B, T axes
19	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
20	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
21	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
22	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
23	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
24	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
25	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
26	C	SERVOPACK	CACR-UP130AABY18	Yaskawa	1	1	
27	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
28	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
29	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
30	C	Power Supply Unit	JZRCR-XPU10B	Yaskawa	1	1	
31	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.31 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for UP130RL

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR30 30A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	LPJ-40SP 40A	BUSSMAN	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	2	For S, U, L axes
16	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
17	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B, T axes
18	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
22	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
23	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
24	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
25	C	SERVOPACK	CACR-UP130AABY21	Yaskawa	1	1	
26	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
27	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
28	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
29	C	Power Supply Unit	JZRCR-XPU10B	Yaskawa	1	1	
30	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.30 " Programming Pendant" is ordered.



#### 4.4 Recommended Spare Parts

Recommended Spare Parts of XRC for SR200X, SK300X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR30 30A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	LPJ-40SP	BUSSMAN	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	3	For S, L, U axes
16	B	Amplifier	JUSP-WS30AAY13	Yaskawa	1	3	For R, B, T axes
17	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
18	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
19	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
20	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
21	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
22	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
23	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
24	C	SERVOPACK	CACR-SK300AAB	Yaskawa	1	1	
25	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
26	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
27	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
28	C	Power Supply Unit	JZRCR-XPU10B	Yaskawa	1	1	
29	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.29 “ Programming Pendant” is ordered.



Recommended Spare Parts of XRC for SP100X

No	Rank	Name	Type	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	In-panel Fan on upper part of Servo	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Power Supply Fuse	ATDR30 30A	GOULD	3	3	Not used when transformer not provided
6	A	Power Supply Fuse	LPJ-40SP	BUSSMAN	3	6	
7	A	Control Power Supply Fuse	218005 5A 250V	LITTEL	10	2	
8	A	DC24V Fuse	2183.15 3.15A 250V	LITTEL	10	2	
9	A	Control Power Supply Fuse in Power Supply Unit	326010 10A	LITTEL	2	2	
10	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
11	A	Control Relay	LY2 DC24V	Omron	3	3	
12	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
13	B	Control Power Supply Unit	JUSP-RCP01AAC	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01	Yaskawa	1	1	
15	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	3	For S, L, U axes
16	B	Amplifier	JUSP-WS30AAY13	Yaskawa	1	1	For T axis
17	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
18	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
19	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
20	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
21	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
22	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
23	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
24	C	SERVOPACK	CACR-SP100AAB	Yaskawa	1	1	
25	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
26	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
27	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
28	C	Power Supply Unit	JZRCR-XPU10B	Yaskawa	1	1	
29	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.29 " Programming Pendant" is ordered.

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#### 4.4 Recommended Spare Parts

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# YASNAC XRC INSTRUCTIONS

## SUPPLEMENTARY FOR NORTH AMERICAN (ANSI/RIA) STANDARD

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YASKAWA

Specifications are subject to change without notice  
for ongoing product modifications and improvements.

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# YASNAC XRC INSTRUCTIONS

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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.



YASKAWA

MANUAL NO. RE-CTO-A203 



## MANDATORY

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



## CAUTION

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

---

## NOTES FOR SAFE OPERATION

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

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



### WARNING

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



### CAUTION

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



### MANDATORY

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



### PROHIBITED

Must never be performed.

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



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



## WARNING

- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.

When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned off.

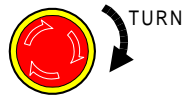
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



Emergency Stop Button

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

Injury may result from unintentional or unexpected manipulator motion.



Release of Emergency Stop

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

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

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

Improper or unintended manipulator operation may result in injury.

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

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



## CAUTION

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

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

- Read and understand the Explanation of the Alarm Display in the Setup Manual before operating the manipulator.

## 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.

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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# Setup • Diagnosis



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# 1 Outline of Setting and Diagnosis



## WARNING

- Various settings control system compatibility and manipulator performance characteristics. Exercise caution when changing settings that can result in improper manipulator operation. Personal injury and/or equipment damage may result if incorrect settings are applied by the user.
- Observe the following precautions to safeguard system settings:
  - Maintain supervisory control of user functions.
  - Retain floppy disk backups of control settings each time settings are changed.

The XRC controller for the Motoman industrial robot provides a full range of advanced and practical functions. It can meet the industry demands for more flexible and more sophisticated robotics systems. The following must be performed to create a more powerful system.

- Home Position Calibration
- Second Home Position
- IO Status Display
- Time Setting

Making these settings optimizes the system to perform to its maximum potential in the chosen application.



These functions can be operated in the teach mode.



## 2 Security System

### 2.1 Protection Through Security Mode Settings

The XRC modes setting are protected by a security system. The system allows operation and modification of settings according to operator clearance. Be sure operators have the correct level of training for each level to which they are granted access.

#### 2.1.1 Security Mode

There are three security modes. Editing mode and management mode require a user ID. The user ID consists of numbers and letters, and contains no less than 4 and no more than 8 characters. (Significant numbers and signs: "0 to 9", "-", ".".

Security Mode Descriptions

Security Mode	Explanation
Operation Mode	This mode allows basic operation of the robot (stopping, starting, etc.) for people operating the robot work on the line.
Editing Mode	This mode allows the operator to teach and edit jobs and robot settings.
Management Mode	This mode allows those authorized to set up and maintain robot system: parameters, system time and modifying user IDs.

## 2.1 Protection Through Security Mode Settings

Menu & Security Mode			
Top Menu	Sub Menu	Allowed Security Mode	
		DISPLAY	EDIT
JOB	JOB	Operation	Edit
	SELECT JOB	Operation	Operation
	CREATE NEW JOB	Edit	Edit
	MASTER JOB	Operation	Edit
	JOB CAPACITY	Operation	-
VARIABLE	BYTE	Operation	Edit
	INTEGER	Operation	Edit
	DOUBLE	Operation	Edit
	REAL	Operation	Edit
	POSITION (ROBOT)	Operation	Edit
	POSITION (BASE)	Operation	Edit
	POSITION (ST)	Operation	Edit
IN/OUT	EXTERNAL INPUT	Operation	-
	EXTERNAL OUTPUT	Operation	-
	UNIVERSAL INPUT	Operation	-
	UNIVERSAL OUTPUT	Operation	-
	SPECIFIC INPUT	Edit	-
	SPECIFIC OUTPUT	Edit	-
	RIN	Edit	-
	REGISTER	Edit	-
	AUXILIARY RELAY	Edit	-
	CONTROL INPUT	Edit	-
	ANALOG OUTPUT	Edit	-
	SV POWER STATUS	Edit	-
	LADDER PROGRAM	Management	Management
	I/O ALARM	Management	Management
I/O MESSAGE	Management	Management	

## Menu &amp; Security Mode

Top Menu	Sub Menu	Allowed Security Mode	
		DISPLA	EDIT
ROBOT	CURRENT POSITION	Operation	-
	COMMAND POSITION	Operation	-
	SERVO MONITOR	Management	-
	OPE ORIGIN POS	Operation	Edit
	SECOND HOME POS	Operation	Edit
	DROP AMOUNT	Management	Management
	POWER ON/OFF POS	Operation	-
	TOOL	Edit	Edit
	INTERFERENCE	Management	Management
	USER COORDINATE	Edit	Edit
	HOME POSITION	Management	Management
	MANIPULATOR TYPE	Management	-
	ANALOG MONITOR	Management	Management
	OVERRUN&S-SENSOR	Edit	Edit
	LIMIT RELEASE	Edit	Management
ARM CONTROL	Management	Management	
SYSTEM INFO	MONITORING TIME	Operation	Management
	ALARM HISTOR	Operation	Management
	I/O MSG HISTORY	Operation	Management
	VERSION	Operation	-
FD/PC CAR	LOAD	Edit	-
	SAVE	Operation	-
	VERIFY	Operation	-
	DELETE	Operation	-
	FORMAT	Operation	Operation
	DEVICE	Operation	Operation



## 2.1 Protection Through Security Mode Settings

Menu & Security Mode			
Top Menu	Sub Menu	Allowed Security Mode	
		DISPLA	EDIT
PARAMETER	S1CxG	Management	Management
	S2C	Management	Management
	S3C	Management	Management
	S4C	Management	Management
	A1P	Management	Management
	A2P	Management	Management
	A3P	Management	Management
	RS	Management	Management
	S1E	Management	Management
	S2E	Management	Management
	S3E	Management	Management
	S4E	Management	Management
	SETUP	TEACHING COND	Edit
OPERATE COND		Management	Management
DATE/TIME		Management	Management
GRP COMBINATION		Management	Management
SET WORD		Edit	Edit
RESERVE JOB NAME		Edit	Edit
USER ID		Edit	Edit
SET SPEED		Management	Management

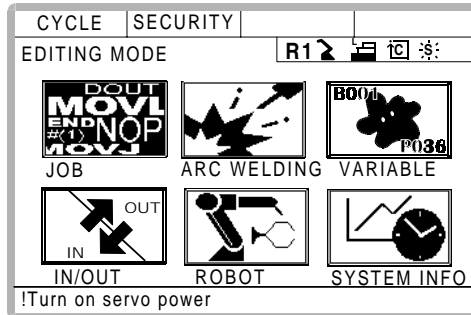
## Modification of Security Mode

### Operation

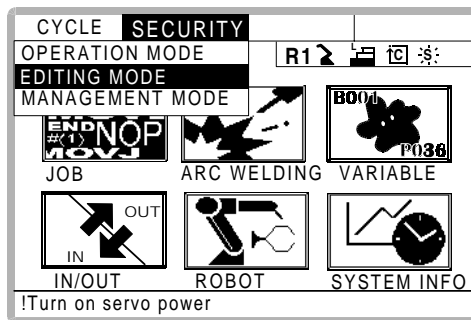
Select {SECURITY} under the top menu \*1 → select the desired mode \*2 → Input the user ID → Press [ENTER] \*3

### Explanation

\*1 The current security mode is displayed in menu title of the top menu.



\*2 When the selected security mode is a higher level than the current settings, a user ID must be input.



At the factory, the following below user ID number is preset.

- Editing Mode:[00000000]
- Management Mode:[99999999]

\*3 The input user ID is compared with the user ID of the selected security mode. When the correct user ID is entered, the operation mode is changed.

## 2.1.2 User ID

User ID is requested when Editing Mode or Management Mode is operated.  
User ID must be between 4 characters and 8, and they must be numbers and symbols (“0~9”, “-” and “.”).

### ■ Changing a User I

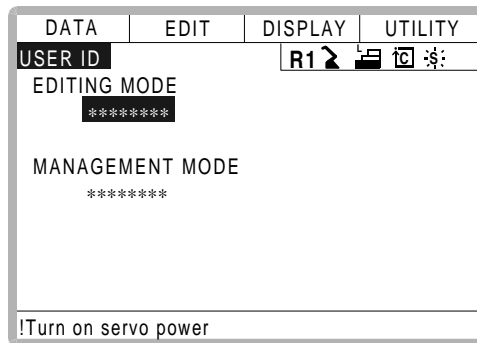
In order to change the user ID, the XRC must be in Editing Mode or Management Mode.  
Higher security modes can make changes to lower security modes.

#### Operation

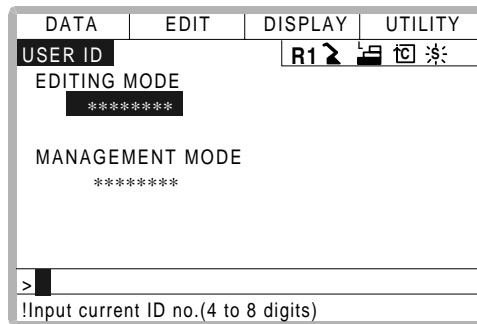
Select {SETUP} under the top menu ➔ Select {USER ID}<sup>\*1</sup> ➔ Select the desired ID<sup>\*2</sup>  
➔ Input current ID and press [Enter]<sup>\*3</sup> ➔ Input new ID and press [Enter]<sup>\*4</sup>

#### Explanation

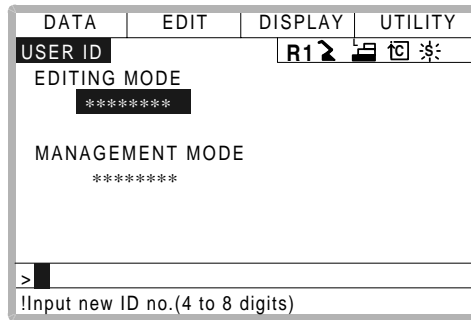
<sup>\*1</sup> User ID registration display is shown.



<sup>\*2</sup> The character input line is displayed, and the message "Input current ID no. (4 to 8 digits)" is displayed.



- \*3** When the correct user ID is entered, a new ID is requested to be input. "Input new ID no.(4 to 8 digits)" is displayed.



- \*4** User ID is changed.

---

## 2.1 Protection Through Security Mode Settings

---

## 3 System Setup

### 3.1 Home Position Calibration



#### WARNING

- Before operating the manipulator, check that the SERVO ON lamp goes out when the emergency stop buttons on the playback panel and programming pendant are pressed.

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency.

- Always set the teach lock before starting to teach.

Failure to observe this warning may result in injury when operating 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.

- Prior to performing the following operations, be sure that no one is in the working envelope of the manipulator, and be sure that you are in a safe place when:

- Turning the power on to the XRC.
- Moving the manipulator with the programming pendant.
- Running check operations.
- Performing automatic operations.

Injury may result from contact with the manipulator if persons enter the working envelope of the manipulator.

- Always press the emergency stop button immediately if there are problems.

Emergency stop buttons are located at the upper right corner of the XRC playback panel and on the upper right of the programming pendant.



### CAUTION

- Perform the following inspection procedures prior to teaching the manipulator. If problems are found, correct them immediately, and be sure that all other necessary tasks have been performed.

- Check for problems in manipulator movement.
- Check for damage to the insulation and sheathing of external wires.
- Always return the programming pendant to its hook on the XRC cabinet after use.

If the programming pendant is inadvertently left on the manipulator, a fixture, or on the floor, the manipulator or a tool could collide with it during manipulator movement, possibly causing injury or equipment damage.

### 3.1.1 Home Position Calibration



Teaching and playback are not possible before home position calibration is complete. In a system with two or more manipulators, the home position of all the manipulators must be calibrated before starting teaching or playback.

Home position calibration is an operation in which the home position and encoder zero position coincide. Although this operation is performed prior to shipment at the factory, the following cases require this operation to be performed again.

- Change in the combination of the manipulator and XRC
- Replacement of the motor or encoder
- Clearing stored memory (by replacement of XCP01 board, weak battery, etc.)
- Home position deviation caused by hitting the manipulator against a workpiece, etc.

To calibrate the home position, move the manipulator to the home position using the axis keys. There are two operations for home position calibration:

- All the axes can be moved at the same time
- Axes can be moved individually

If the absolute data of the home position is already known, set the absolute data again after completing home position registration.



### Home Position

The home position is the pulse value "0" for each axis. The relative values between the home position and the geometry position are set to parameters. The relative values are specified as an angle in units of 1/1000°, and vary for different manipulator types. See " 3.1.3 Home Position of the Robot ".

## 3.1.2 Calibrating Operation

### ■ Registering All Axes at On Time

#### Operation

Select {ROBOT} under the top menu ➔ Select {HOME POSITION}<sup>\*1</sup> ➔ Select {DISPLAY} under the menu<sup>\*2</sup> ➔ Select the desired control group ➔ Select {EDIT} under the menu<sup>\*3</sup> ➔ Select {SELECT ALL AXES} <sup>\*4</sup> ➔ Select "YES" <sup>\*5</sup>

#### Explanation

<sup>\*1</sup> The home position calibration display is shown.

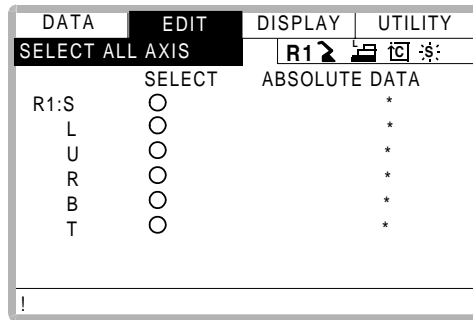
DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		R1	ABSOLUTE DATA
	SELECT		
R1:S	<input checked="" type="radio"/>		*
L	<input type="radio"/>		*
U	<input type="radio"/>		*
R	<input type="radio"/>		*
B	<input type="radio"/>		*
T	<input type="radio"/>		*

<sup>\*2</sup> The pull down menu appears.

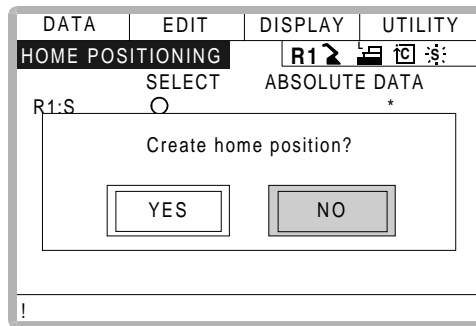
DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		ROBOT1	
	SELECT	STATION1	
R1:S	<input checked="" type="radio"/>		*
L	<input type="radio"/>		*
U	<input type="radio"/>		*
R	<input type="radio"/>		*
B	<input type="radio"/>		*
T	<input type="radio"/>		*



\*3 The pull down menu appears.



\*4 The confirmation dialog is displayed.



\*5 Displayed position data of all axes are registered as home position. When "NO" is selected, the registration will be canceled.

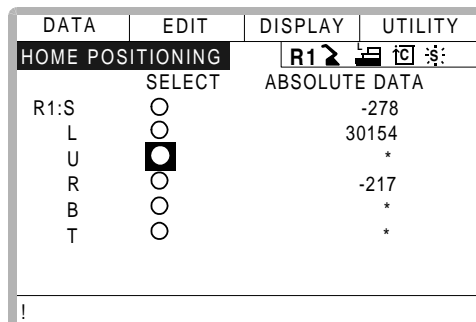
## ■ Registering Individual Axes

### Operation

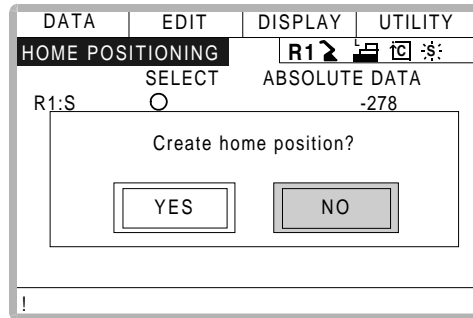
Select {ROBOT} under the top menu ➔ Select {HOME POSITION} ➔ Select {DISPLAY} under the menu ➔ Select the desired control group\*1 ➔ Select the axis to be registered\*2 ➔ Select "YES" \*3

### Explanation

\*1 In the same way shown in Explanation \*1,\*2 in "Registering all axes at once", the home calibration display and select control group are shown.



- \*2 The confirmation dialog is displayed.



- \*3 Displayed position data of axis are registered as home position.  
When "NO" is selected, the registration will be canceled.

## ■ Changing the Absolute Data

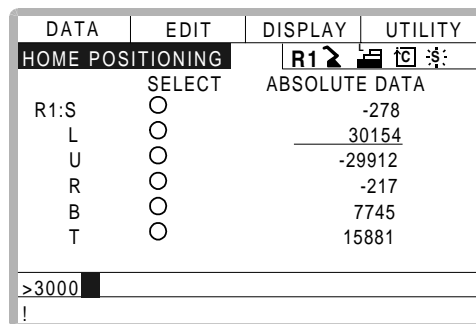
To change the absolute data of the axis when home position calibration is completed, perform the following:

### Operation

Select {ROBOT} under the top menu ➔ Select {HOME POSITIONING} ➔ Select {DISPLAY} ➔ Select the desired control group \*1 ➔ Select the absolute data to be registered \*2 ➔ Enter the absolute data using the number keys ➔ Press [ENTER] \*3

### Explanation

- \*1 By the same way shown in Explanation \*1,\*2 in "Registering all axes at once", the home calibration display and select control group are shown.
- \*2 The number input buffer line is shown.



- \*3 Absolute data are modified.

## ■ Clearing Absolute Data





### Operation

Select {ROBOT} under the top menu ➔ Select {HOME POSITION}<sup>\*1</sup> ➔ Select {DATA} under the menu ➔ Select {CLEAR ALL DATA}<sup>\*2</sup>

### Explanation

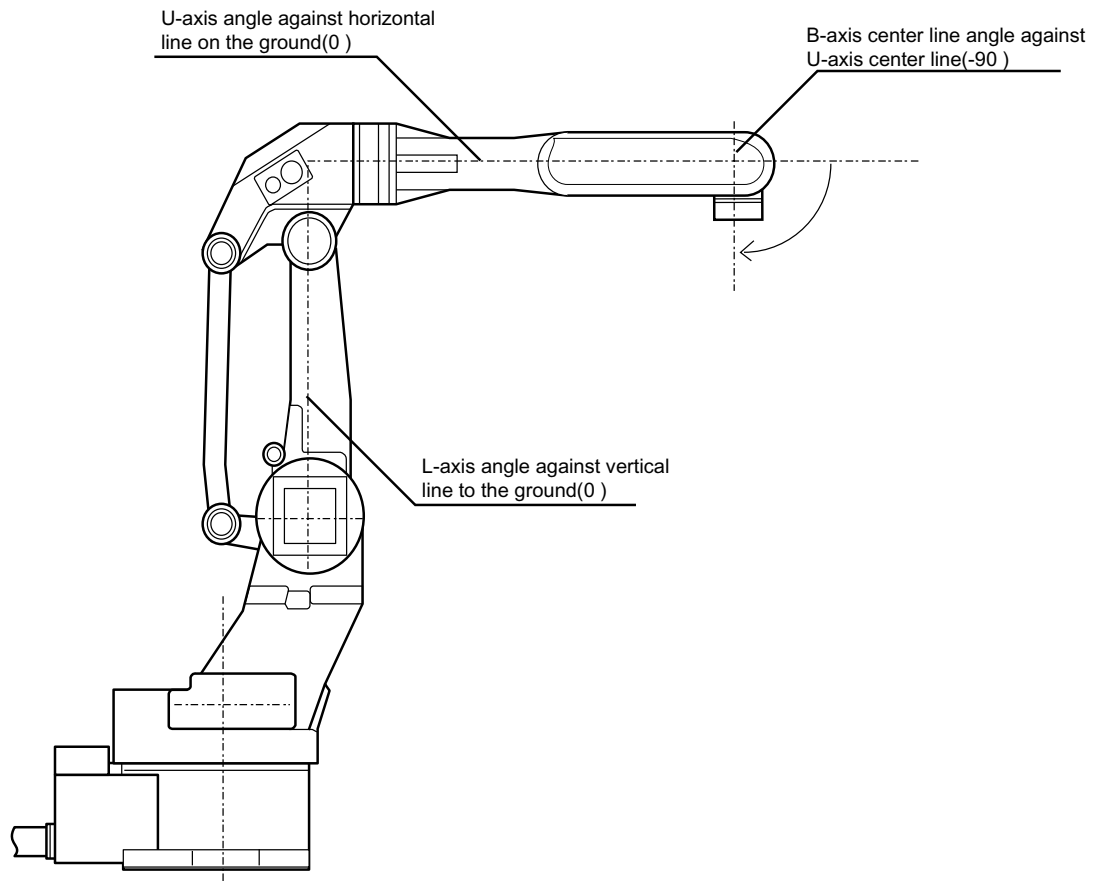
<sup>\*1</sup> In the same way shown in Explanation <sup>\*1</sup>,<sup>\*2</sup> in "Registering all axes at once", the home calibration display and select control group are shown.

<sup>\*2</sup> The all absolute data are cleared.

DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		R1    	
	SELECT	ABSOLUTE DATA	
R1:S	<input type="radio"/>		*
L	<input type="radio"/>		*
U	<input type="radio"/>		*
R	<input type="radio"/>		*
B	<input type="radio"/>		*
T	<input type="radio"/>		*
!			

### 3.1.3 Home Position of the Robot

In case of UP6, the home position are as follows.



Other manipulator models have different positions. Always consult the documentation for the correct manipulator model.

## 3.2 Specified Point



### WARNING

- Be aware of safety hazards when performing the position confirmation of the specified point.

Abnormality of the PG system may be a cause for alarm. The manipulator may operate in an unexpected manner, and there is a risk of damage to equipment or injury to personnel.

- Before operating the manipulator, check that the SERVO ON lamp goes out when the emergency stop buttons on the playback panel and programming pendant are pressed.

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency.

- Always set the teach lock before starting to teach.

Failure to observe this warning may result in injury when operating 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.

- Prior to performing the following operations, be sure that no one is in the working envelope of the manipulator, and be sure that you are in a safe place when:

- Turning the power on to the XRC.
- Moving the manipulator with the programming pendant.
- Running check operations.
- Performing automatic operations.

Injury may result from contact with the manipulator if persons enter the working envelope of the manipulator.

- Always press the emergency stop button immediately if there are problems.

Emergency stop buttons are located at the upper right corner of the XRC playback panel and at the upper right of the programming pendant.



## CAUTION

- Perform the following inspection procedures prior to teaching the manipulator. If problems are found, correct them immediately, and be sure that all other necessary tasks have been performed.
  - Check for problems in manipulator movement.
  - Check for damage to the insulation and sheathing of external wires.
  - Always return the programming pendant to its hook on the XRC cabinet after use.

If the programming pendant is inadvertently left on the manipulator, a fixture, or on the floor, the manipulator or a tool could collide with it during manipulator movement, possibly causing injury or equipment damage.

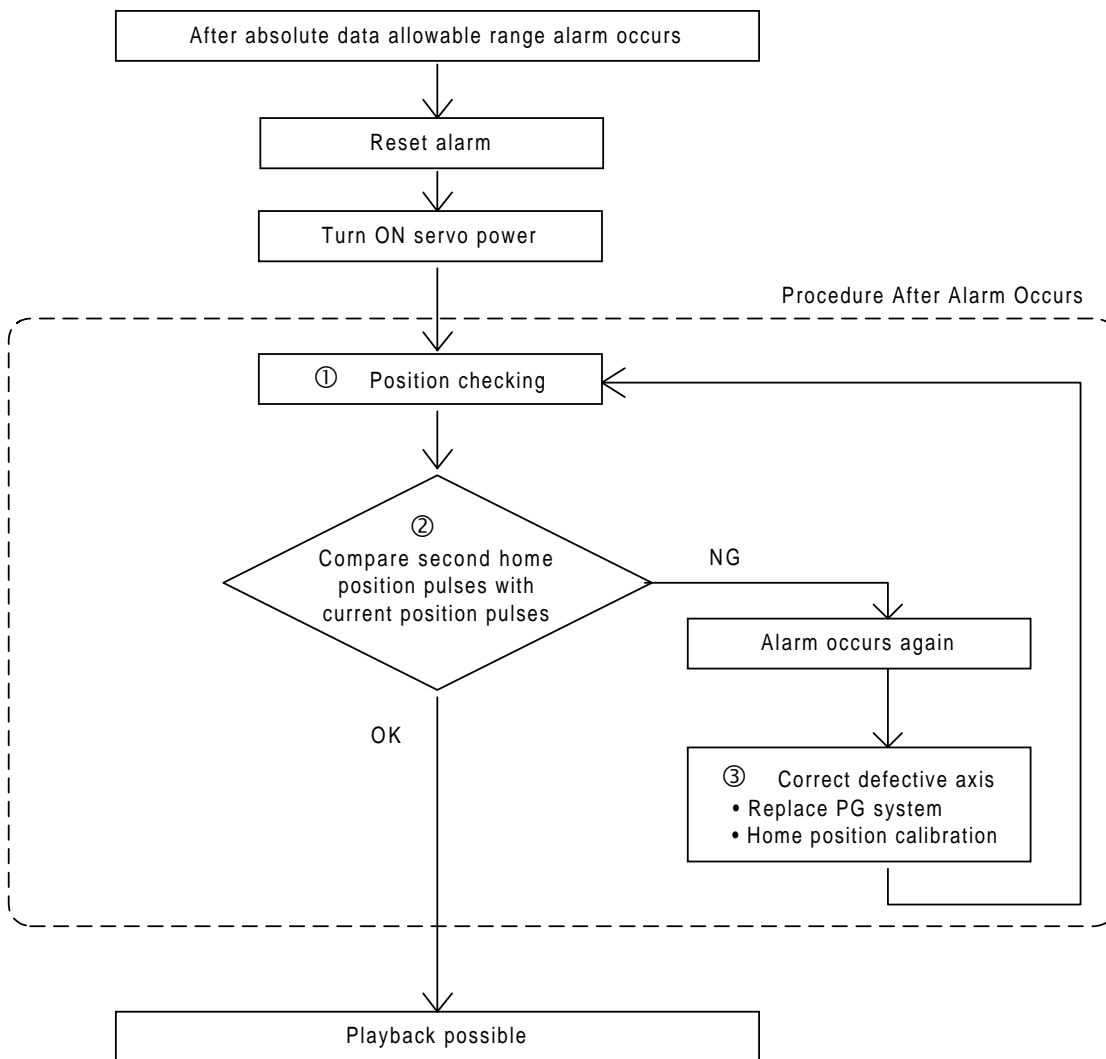
### 3.2.1 Purpose of Position Check Operation

If the absolute number of rotation detected at power on does not match the data stored in the absolute encoder the last time the power was turned off, an alarm is issued when the controller power is turned on.

There are two possible causes of this alarm:

- Error in the PG system
- The manipulator was moved after the power was turned OFF.

If there is an error with the PG system, the manipulator may stall when playback is started. If the absolute data allowable range error alarm has occurred, playback and test runs will not function and the position must be checked.



#### ① Position Check

If the absolute data allowable range alarm occurs, move to the specified point using the axis keys and check the position. Playback, test runs, and other operation will not function.

### ② Pulse Difference Check

The pulse number at the specified point is compared with that at the current position. If the difference is within the allowable range, playback is enabled. If not, the error alarm occurs again.

- The allowable range is the number of pulses per rotation of the motor (PPR data).
- The initial value of the specified point is the home position (where all axes are at pulse 0). The specified point can be changed. For details, refer to " 3.2 Specified Point ".

### ③ Alarm Occurrence

If the error alarm occurs again, there may be an error in the PG system. Check the system. After adjusting the erroneous axis, calibrate the home position of the axis, then check the position again.

#### NOTE

- Home position calibration of all the axes at the same time enables playback operations without having to check the position.
- Sometimes in a system with a manipulator that has no brake, it is possible to enable playback without position checking after the absolute data allowable range error alarm occurs. However, as a rule, always check the position.  
Under the above special conditions, the manipulator moves as follows:  
After starting, the manipulator moves at low speed (1/10 of the maximum speed) to the step indicated by the cursor. If it is stopped and restarted during this motion, the low speed setting is retained until the step at cursor is reached. Regardless of cycle setting, the manipulator stops after the cursor step is reached. Starting the manipulator again then moves it at the programmed speed and cycle of the job.

## 3.2.2 Specified Point Setting

Apart from the normal home position of the manipulator, the specified point can be set up as a check point for absolute data. Use the following steps to set the specified point.

If two or more manipulators or stations are controlled by one control panel, the specified point must be set for each manipulator or station.

#### Operation




Select {ROBOT} under the top menu ➡ Select {SECOND HOME POS}<sup>\*1</sup> ➡ Press the page key <sup>\*2</sup> ➡ Press the axis keys<sup>\*3</sup> ➡ Press [MODIFY] and [ENTER]<sup>\*4</sup>

#### Explanation

- <sup>\*1</sup> The specified point display is shown.  
The message "Available to move to any modify specified point" is shown.




## 3.2 Specified Point

DATA	EDIT	DISPLAY	UTILITY
<b>SPECIFIED POINT</b>		R1	  
	SPECIFIED	CURRENT	DIFFERENCE
R1:S	0	0	0
L	0	0	0
U	0	0	0
R	0	0	0
B	0	0	0
T	0	0	0

!Available to move to any modify specified point

- \*2 The group axes by which the specified point is set is selected when there are two or more group axes.
- \*3 Move the manipulator to the new specified point.
- \*4 The specified point is modified.

### 3.2.3 Procedure After an Alarm

**WARNING**

- Be aware of safety hazards when performing the position confirmation of the specified point.


Abnormality of the PG system may be cause for alarm. The manipulator may operate in an unexpected manner, and there is a risk of damage to equipment or injury.

If the absolute data allowable range alarm occurs, perform the followings

- Reset the alarm
- Turn Servo power on

and confirm the specified point. After the confirmation, if the PG is found to be the cause of the alarm, perform the necessary operation, such as replacing the PG, etc.

The robot position data when turning power off and on are shown in "Power ON/OFF Position Display".

 **NOTE** Refer to " 5.6 Position Data When Power is Turned ON/OFF " for details on the "Power ON/OFF Position Display".

**Operation**

Select {ROBOT} under the top menu ➔ Select {SECOND HOME POS}<sup>\*1</sup> ➔ Press the page <sup>\*2</sup> ➔ Press [FWD]<sup>\*3</sup> ➔ Select {DATA} under the menu ➔ Select {CONFIRM POSITION}<sup>\*4</sup>

**Explanation**

- \*1 The specified point display is shown.
- \*2 The group axes by which the specified point is set is selected when there are two or more group axes.
- \*3 Move the manipulator to the new specified point. The robot moving speed is set as selected manual operation speed.
- \*4 The message "Home position checked" is shown.  
Pulse data of specified point and current pulse data are compared. If the compared error is in allowed band, playback operation can be done.  
If the error is beyond the allowed band, the alarm occurs again.

## 3.3 Setting the Controller Clock




The clock inside of the XRC controller can be set.

**Operation**

Select {SETUP} under the top menu ➔ Select {DATE/TIME}<sup>\*1</sup> ➔ Select "DATE" or "CLOCK"<sup>\*2</sup> ➔ Input the new date or time <sup>\*3</sup> ➔ Press [ENTER]<sup>\*4</sup>

**Explanation**

- \*1 The date and time set display is shown.

DATA	EDIT	DISPLAY	UTILITY
DATE/CLOCK SET		R1	   :
DATE		1998 . 10 . 20	
CLOCK		10 : 20	
!			

- \*2 The input buffer line is displayed.

### 3.4 Setting Play Speed

- \*3 For instance, to make the date May 1, 1998, input [1998.5.1]. To set the time at exactly ten o'clock, enter [10.00].


> 1998.5.1

- \*4 Date and time are modified.

DATA	EDIT	DISPLAY	UTILITY
DATE/CLOCK SET		R1	⏪ ⏩ ⏴ ⏵ ⏶ ⏷
DATE	1998 . 05 . 01		
CLOCK	10 : 20		

## 3.4 Setting Play Speed


### Operation

Select {SETUP} under the top menu → Select {SET SPEED} \*1 → Press the page key  \*2 → Select "JOINT" or "LNR/CIR" \*3 → Select desired speed value \*4 → input the speed value → Press [ENTER]

### Explanation

- \*1 The play speed display is shown.

DATA	EDIT	DISPLAY	UTILITY
SPEED SET		R1	⏪ ⏩ ⏴ ⏵ ⏶ ⏷
JOINT	R1:1	0.78 %	
	2	1.56 %	
	3	3.12 %	
	4	6.25 %	
	5	12.50 %	
	6	25.00 %	
	7	50.00 %	
	8	100.00 %	

- \*2 When two or more manipulators and stations exist in the system, the control group is changed by the page key .

- \*3 The type of speed alternately changes from “JOINT” to “LNR/CIR”.

DATA	EDIT	DISPLAY	UTILITY
SPEED SET		R1	⏪ ⏩ ⏴ ⏵ ⏶ ⏷
LNR/CIR	R1:1	66 cm/min	
	2	138 cm/min	
	3	276 cm/min	
	4	558 cm/min	
	5	1122 cm/min	
	6	2250 cm/min	
	7	4500 cm/min	
	8	9000 cm/min	

- \*4 The input buffer line is displayed.

- \*5 The speed value is modified.

DATA	EDIT	DISPLAY	UTILITY
SPEED SET		R1	⏪ ⏩ ⏴ ⏵ ⏶ ⏷
JOINT	R1:1	0.78 %	
	2	1.56 %	
	3	3.12 %	
	4	40.00 %	
	5	12.50 %	
	6	25.00 %	
	7	50.00 %	
	8	100.00 %	

## 3.5 All Limits Releasing



### CAUTION

- To operate the manipulator with all limits released, pay extra attention to the operating environment around you.

When all limits are released, the manipulator or equipment may be damaged.

The following limits can be released by the operation explained in the following.

Limit Type	Contents
Mechanical Limit	Limit for checking manipulator's working envelope
L-U Interference	Limit for checking L- and U-axes interference area
Software Limit	Every axis soft limit for checking manipulator's working envelope
Cube Interference	Limit for checking cube interference area set by user



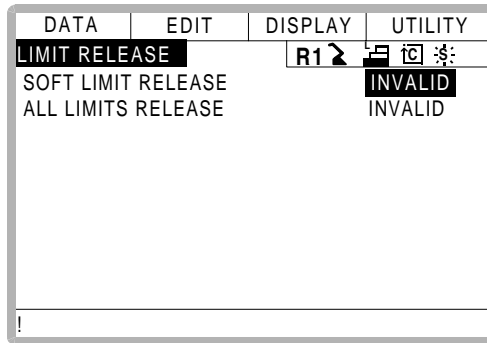
If the security mode is not at management mode, all limits releasing is not allowed. Refer to " 2 Security System " for details about security modes.

#### Operation

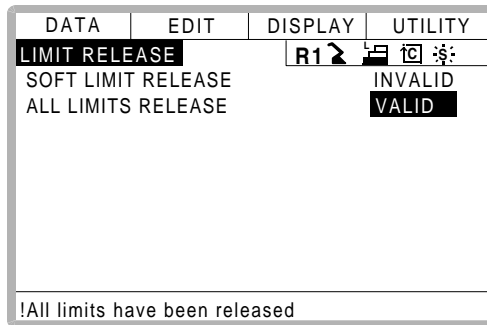
Select {ROBOT} under the top menu ➔ Select {LIMIT RELEASE}<sup>\*1</sup> ➔ Select "ALL LIMITS RELEASE"<sup>\*2</sup>

#### Explanation

<sup>\*1</sup> The limit release display is shown.



- \*2 “VALID” and “INVALID” are displayed alternately every time [SELECT] is pressed. When all limits release is changed to “VALID”, the message “All limits have been released” is displayed. When the setting changes to “INVALID”, the message “All limits release has been canceled” is displayed for three seconds.



## 3.6 Overrun / Shock Sensor Releasing



### CAUTION

- To operate the manipulator with overrun released or with shock sensor released, pay extra attention to the operating environment around you.

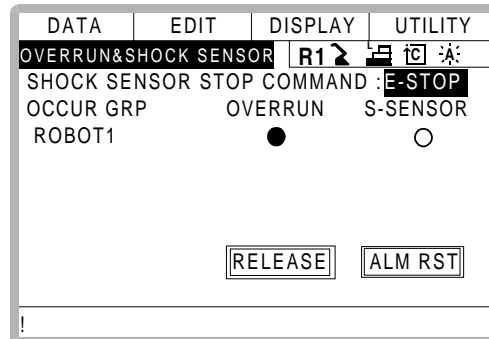
If the manipulator stops by overrun detection or shock sensor detection, release the overrun or shock sensor by the following procedure and move the manipulator using the axis keys.

#### Operation

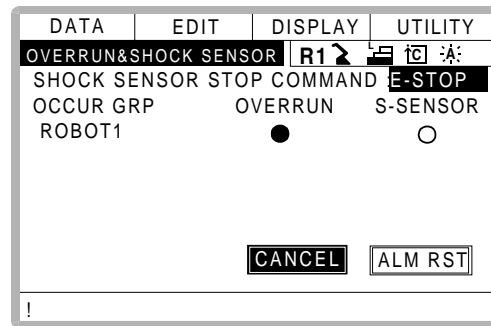
Select {ROBOT} under the top menu ➔ Select {OVERRUN & S-SENSOR} <sup>\*1</sup> ➔  
Select "RELEASE" <sup>\*2</sup> ➔ Select "ALM RST" <sup>\*3</sup>

#### Explanation

- <sup>\*1</sup> The overrun & shock sensor release display is shown.  
The stopping condition when the shock sensor is detected can be selected "EMERGENCY STOP" or "HOLD" at the "SHOCK SENSOR STOP COMMAND". "E-STOP" and "HOLD" are displayed alternately every time [SELECT] is pressed.



- <sup>\*2</sup> "●" is displayed at the control group which detects overrun or shock sensor. If "RELEASE" is selected, overrun or shock sensor is released and "CANCEL" is displayed.



- \*3 Alarm is reset and manipulator can be moved using the axis keys.

#### NOTE

- During overrun or shock sensor releasing, the manipulator can be moved using the axis keys with low speed or inching motion only.
- After overrun or shock sensor releasing, if “CANCEL” is selected or the display is changed to the other one, overrun or shock sensor releasing is canceled.

## 3.7 Interference Area

### 3.7.1 Interference Area

The interference area is a function that prevents interference between multiple manipulators or the manipulator and peripheral devices. The area can be set up to 24 area. There are two types of interference areas, as follows:

- Cubic Interference Area
- Axis Interference Area

The XRC judges whether the tool center point of the manipulator is inside or outside this area, and outputs this status as a signal.

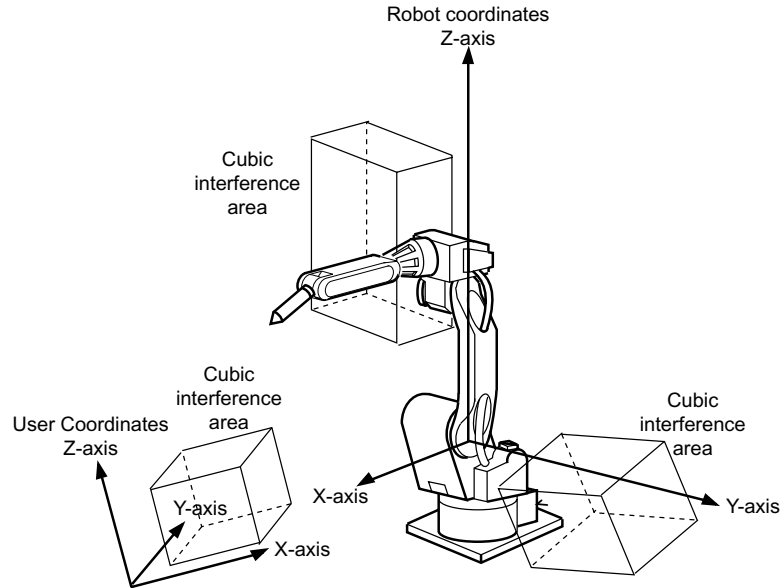
If the tool center point of the manipulator is inside the area, the interference 1 inside signal or interference 2 inside signal come on and the manipulator automatically decelerates to a stop. The manipulator stands by until these signals are turned off, whereupon it automatically restarts.



### 3.7.2 Cubic Interference Area

#### ■ Cubic Interference Area

This area is a rectangular parallelepiped which is parallel to the base coordinate system, robot coordinate system, or user coordinate system. The XRC judges whether the current position of the manipulator's tool center point is inside or outside this area, and outputs this information as a signal. The cubic interference areas can be set, parallel to the base coordinate system or user coordinate system.

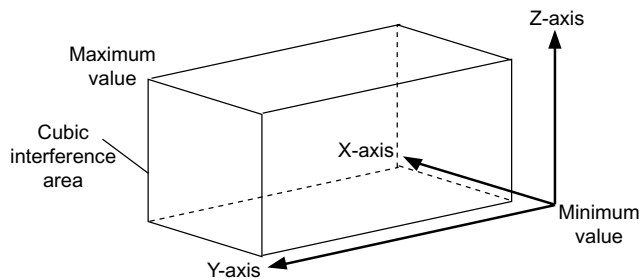


#### ■ Setting Method

There are three ways to set cubic interference areas, as described in the following:

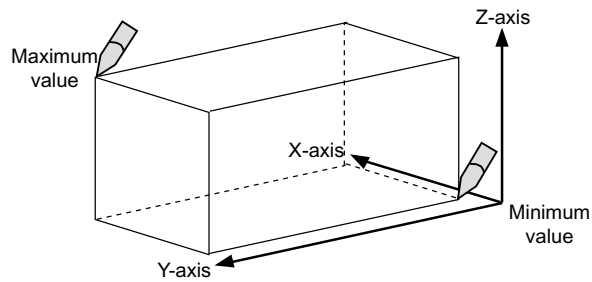
##### Number Input of Cube Coordinates

Enter the maximum and minimum values for the cube coordinates.



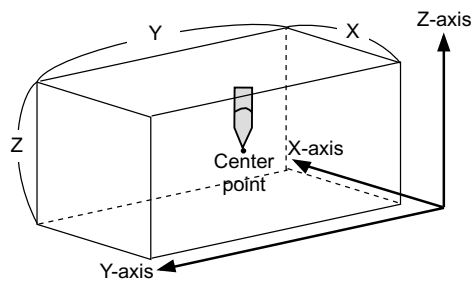
##### Teaching Corner

Move the manipulator at the maximum and minimum value positions of the cube corner using the axis keys.



### Number Input of the Side of Cube and Teaching Center

After entering the lengths of the three faces of the cube (axial length) using the number keys, move the manipulator to the center point of the cube using the axis keys.



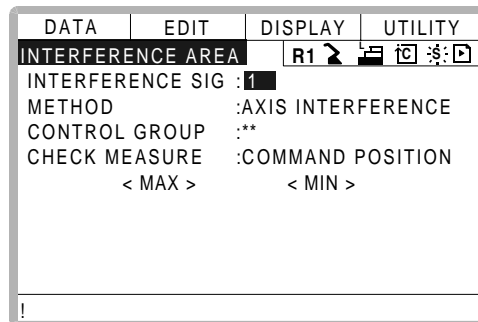
### ■ Setting Operation


#### Operation

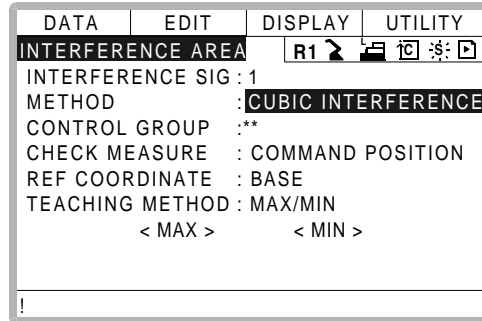
Select {ROBOT} under the top menu ➔ Select {INTERFERENCE}\*<sup>1</sup> ➔ Select the desired cube number\*<sup>2</sup> ➔ Select "METHOD" \*<sup>3</sup> ➔ Select "CONTROL GROUP"\*<sup>4</sup> ➔ Select "REF COORDINATES" \*<sup>5</sup> ➔ Select "CHECK MEASURE"\*<sup>6</sup>

#### Explanation

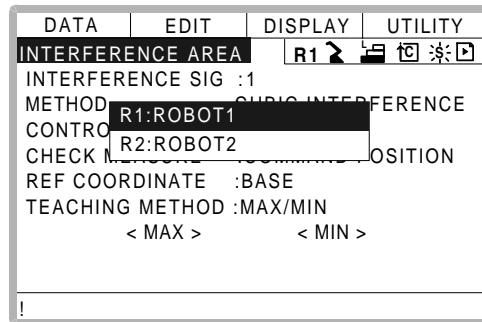
\*<sup>1</sup> The cubic interference area display is shown.



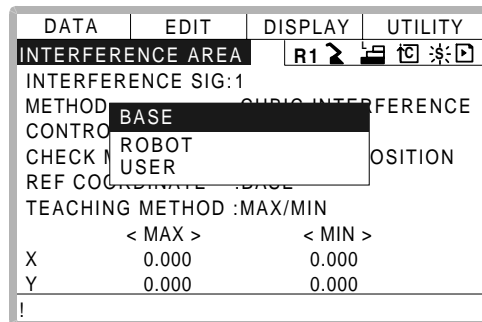
- \*2 Select the desired cube number using the page key  or by number input.  
The method for number input is as follows: Move cursor to "INTERFERENCE SIG" and press [ENTER] to display the number input line. Input desired signal number and press [ENTER].
- \*3 "AXIS INTERFERENCE" and "CUBIC INTERFERENCE" are displayed alternately every time [SELECT] is pressed. If "CUBIC INTERFERENCE" is selected, the display is changed.






- \*4 The selection dialog is displayed. Select desired control group.



- \*5 The selection dialog is displayed. Select desired coordinate.  
If the user coordinates are selected, the number input line is displayed. Input the user coordinate number and press [ENTER].



- \*6 Each time [SELECT] is pressed, "COMMAND POSITION" and "FEEDBACK POSITION" alternate.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	  
INTERFERENCE SIG : 1			
METHOD :			
CONTROL GROUP : **			
REF COORDINATE : BASE			
TEACHING METHOD : MAX/MIN			
CHECK MEASURE		COMMAND POSITION	
< MAX >		< MIN >	
!			



To stop the manipulator movement using the interference signal (use the cube interference signal for mutual interference between robots), set CHECK MEASURE to "COMMAND POSITION".

When set to the "FEEDBACK POSITION", the manipulator decelerates to a stop after entering the interference area.

When informing an external unit of the actual manipulator position, use the "FEEDBACK POSITION" setting so the timing of the output signal is more accurate.




## Number Input of Cube Coordinates

### Operation




Select "METHOD"\*1 → input number for "MAX" and "MIN" data and press [Enter] \*2

### Explanation

- \*1 Each time [SELECT] is pressed, "MAX/MIN" and "CENTER POS" alternate.  
Select "MAX/MIN".

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	  
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD :		MAX/MIN	
< MAX >		< MIN >	
X	0.000	0.000	
Y	0.000	0.000	
!			

- \*2 The cubic interference area is set.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	  
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD :		MAX/MIN	
< MAX >		< MIN >	
X	100.000	0.000	
Y	50.000	0.000	
!			

## Teaching Corner

### Operation

Select "METHOD"\*1 ➡ Press [MODIFY]\*2 ➡ Move the cursor to "<MAX>" or "<MIN>"\*3 ➡ Move the manipulator using the axis keys \*4 ➡ Press [ENTER]\*5

### Explanation

- \*1 Each time [SELECT] is pressed, "MAX/MIN" and "CENTER POS" alternate. Select "MAX/MIN".
- \*2 The message "Teach max./min. position" is displayed.

DATA	EDIT	DISPLAY	UTILITY
<b>INTERFERENCE AREA</b>		R1	
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD : MAX/MIN			
	<b>&lt; MAX &gt;</b>	< MIN >	
X	0.000	0.000	
Y	0.000	0.000	
!Teach max./min. position			

- \*3 Move cursor to "<MAX>" for changing maximum value and move cursor to "<MIN>" for changing minimum value. The cursor moves to only either "<MIN>" or "<MAX>" at this time. The cursor moves freely when this operation is canceled by pressing [CANCEL].
- \*4 Move the manipulator to the maximum or minimum position of the cube using the axis keys.
- \*5 The cubic interference area is registered.

DATA	EDIT	DISPLAY	UTILITY
<b>INTERFERENCE AREA</b>		R1	
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD : MAX/MIN			
	<b>&lt; MAX &gt;</b>	< MIN >	
X	100.000	0.000	
Y	50.000	0.000	
!			

## Number Input of the Side of Cube and Teaching Center

### Operation

Select "METHOD"\*1 → Input data for length of the cube and press [ENTER]\*2 →  
Press [MODIFY]\*3 → Move the manipulator using the axis keys \*4 → Press [Enter]\*5

### Explanation

- \*1 Each time [SELECT] is pressed, "MAX/MIN" and "CENTER POS" alternate.  
Select "CENTER POS".

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	☰ ☱ ☲ ☳ ☴ ☵ ☶ ☷
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD : CENTER POS			
	< MAX >	< MIN >	< LENGTH >
X	0.000	0.000	0.000
Y	0.000	0.000	0.000
!			

- \*2 The length is set.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	☰ ☱ ☲ ☳ ☴ ☵ ☶ ☷
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD : CENTER POS			
	< MAX >	< MIN >	< LENGTH >
X	0.000	0.000	0.000
Y	0.000	0.000	50.000
!			

- \*3 The message "Move to center point and teach" is displayed.  
The cursor moves to only either "<MIN>" or "<MAX>" at this time. The cursor moves freely when this operation is canceled by pressing [CANCEL].

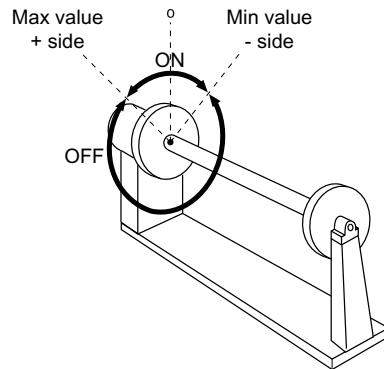
DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	☰ ☱ ☲ ☳ ☴ ☵ ☶ ☷
INTERFERENCE SIG : 1			
METHOD : CUBIC INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
REF COORDINATE : BASE			
TEACHING METHOD : CENTER POS			
	< MAX >	< MIN >	< LENGTH >
X	0.000	0.000	0.000
Y	0.000	0.000	50.000
!Move to center point and teach			

- \*4 Move the manipulator to the center point of the cube using the axis keys.  
\*5 The current position is registered as the center point of the cube.

### 3.7.3 Axis Interference Area

#### ■ Axis Interference Area

The axis interference area is a function that judges the current position of the each axis and outputs a signal. Once the maximum and minimum values have been set at the plus and minus sides of the axis to define the operating range, a signal indicating whether the current position of the axis is inside or outside this range is output. (ON: inside, OFF: outside)



Axis Interference Signal for Station Axis

#### ■ Setting Operation

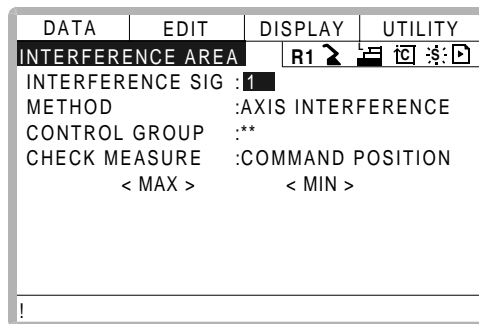
##### Number Input of Axis Data


###### Operation

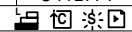
Select {ROBOT} under the top menu ➡ Select {INTERFERENCE}<sup>\*1</sup> ➡ Select the desired interference signal number<sup>\*2</sup> ➡ Select "METHOD"<sup>\*3</sup> ➡ Select "CONTROL GROUP"<sup>\*4</sup> ➡ Select "CHECK MEASURE"<sup>\*5</sup> ➡ Input data for desired axis and press [Enter]<sup>\*6</sup>

###### Explanation

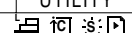
<sup>\*1</sup> The cubic interference area display is shown.



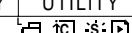
- \*2 Select the desired interference signal number using the page key  or by number input.  
The method for number input is as follows: Move cursor to "INTERFERENCE SIG" and press [ENTER] to display the number input line. Input desired signal number and press [ENTER].
- \*3 "AXIS INTERFERENCE" and "CUBIC INTERFERENCE" are displayed alternately every time [SELECT] is pressed. Select "AXIS INTERFERENCE".
- \*4 The selection dialog is displayed. Select desired control group.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	
INTERFERENCE SIG:1			
METHOD : AXIS INTERFERENCE			
CONTROL R1:ROBOT1			
CHECK ME R2:ROBOT2			
		< MAX >	< MIN >
!			

- \*5 Each time [SELECT] is pressed, "COMMAND POSITION" and "FEEDBACK POSITION" alternate.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	
INTERFERENCE SIG : 1			
METHOD : AXIS INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : FEEDBACK POSITION			
		< MAX >	< MIN >
S	0	0	
L	0	0	
U	0	0	
R	0	0	
!			

- \*6 The interference area is set.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	
INTERFERENCE SIG : 1			
METHOD : AXIS INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : FEEDBACK POSITION			
		< MAX >	< MIN >
S	300	0	
L	0	0	
U	0	0	
R	0	0	
!			



## Setting Axis Data by Moving Manipulator Using the Axis Key

### Operation

Select {ROBOT} under the top menu ➔ Select {INTERFERENCE} ➔ Select the desired interference signal number ➔ Select "METHOD" ➔ Select "CONTROL GROUP"\*1 ➔ Press [MODIFY] \*2 ➔ Move the manipulator using the axis keys \*3 ➔ Press [ENTER]\*4

### Explanation

- \*1 Operate in the same way as shown in Explanation \*1~\*4 in "Number Input of Axis Data".
- \*2 Move cursor to "<MAX>" for changing maximum value and move cursor to "<MIN>" for changing minimum value. The cursor moves to only either "<MIN>" or "<MAX>" at this time. The cursor moves freely when this operation is canceled by pressing [CANCEL].

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	⏏ ⏏ ⏏ ⏏ ⏏ ⏏
INTERFERENCE SIG : 1			
METHOD : AXIS INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
	< MAX >	< MIN >	
S	0	0	
L	0	0	
U	0	0	
R	0	0	
!			

- \*3 Move the manipulator to the desired position using the axis keys.

- \*4 The axis interference area is registered.


DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	⏏ ⏏ ⏏ ⏏ ⏏ ⏏
INTERFERENCE SIG : 1			
METHOD : AXIS INTERFERENCE			
CONTROL GROUP : R1			
CHECK MEASURE : COMMAND POSITION			
	< MAX >	< MIN >	
S	510	0	
L	1004	0	
U	213	0	
R	10	0	
!			

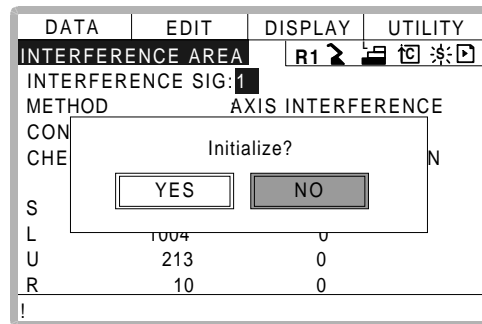
### 3.7.4 Clearing Interference Area Data

#### Operation

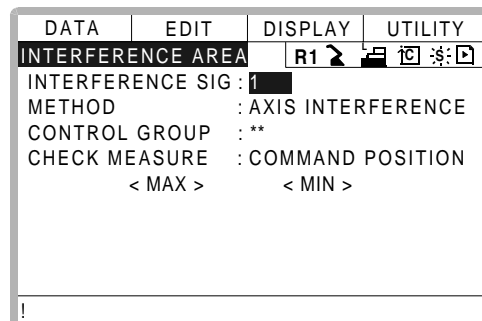
Select interference signal for clearing \*1 → Select {DATA} under the menu → Select {CLEAR DATA} \*2 → Select "YES" \*3

#### Explanation

- \*1 Select the desired signal number for clearing using the page key  or by number input.  
The method for number input is as follows: Move cursor to the signal number and press [ENTER] to display the number input line. Input desired signal number and press [ENTER].
- \*2 The confirmation dialog is displayed.



- \*3 All the data of the signal are cleared.



## 3.8 Operation Origin Point Setting


### 3.8.1 What is the Operation Origin Point?

The Operation Origin Point is a reference point for manipulator operations. It prevents interference with peripheral devices by ensuring that the manipulator is always within a set range as a precondition for operations such as starting the line. The manipulator can be moved to the set operation origin point by operation from the programming pendant, or by signal input from an external device. When the manipulator is in the vicinity of the operation origin point, the operation origin point signal turns ON.

### 3.8.2 Setting Operation Origin Point


#### ■ Operation Origin Point Display


##### Operation

Select {ROBOT} under the top menu ➡ Select {OPE ORIGIN POS}<sup>\*1</sup> ➡ Press the page key  <sup>\*2</sup>

##### Explanation

<sup>\*1</sup> Operation origin point display is shown. For spot application or handling application.

DATA	EDIT	DISPLAY	UTILITY
OPERATION ORIGIN		R1	
[APPL 1]	HOME POS	CUR POS	
S	0	2240	
L	0	32	
U	0	342	
R	0	-21	
B	0	0	
T	0	-3239	
!			

<sup>\*2</sup> When two or more manipulators and stations exist in the system, the control group is changed using the page key 

#### ■ Registering/Changing the Operation Origin Point

##### Operation

Press the axis keys in the operation origin point display<sup>\*1</sup> ➡ Press [MODIFY] and [ENTER]<sup>\*2</sup>

##### Explanation

<sup>\*1</sup> Move the manipulator to the new operation origin point.

\*2 New operation origin point is set.

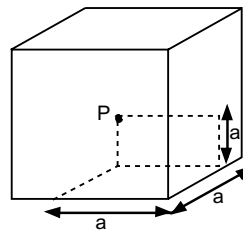
### NOTE

When the operation origin point is changed, the operation origin cube is automatically set as cube 24~22 in the base coordinate system.

- The cube 24 is for ROBOT1
- The cube 23 is for ROBOT2
- The cube 22 is for ROBOT3

The operation origin cube is a cube like the one shown in the figure below; the length of its sides is determined by a parameter setting made by the user (units:  $\mu\text{m}$ ). By changing this parameter setting, the size of the cube can be changed.

S3C412: The operation origin cube length of its sides(  $\mu\text{m}$ )



Specify whether "COMMAND POSITION" or "FEEDBACK POSITION" is to be set to the operation origin cube signal's CHECK MEASURE in the interference area settings. "COMMAND POSITION" is the default setting.

## ■ Returning to the Operation Origin Point

### In the teach mode

#### Operation

Press [FWD] in the operation origin point display <sup>\*1</sup>

#### Explanation

- \*1 The manipulator moves to the new operation origin point. During movement, the message "Manipulator is moving to operation origin point" is shown. The moving speed is the selected manual operation speed.

### In the play mode

When the operation origin point return signal is input (detected at leading edge), the tool center point of the manipulator is moved to the operation origin point using the same operation as the teach mode. However, the speed for this is set in the parameters.

## ■ Output of the Operation Origin Point Signal

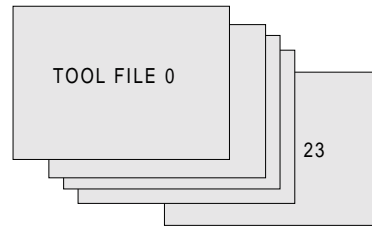
This signal is output any time the current position of the tool center point of the manipulator is checked and found to be within the operation origin cube.

## 3.9 Tool Data Setting

### 3.9.1 Registering Tool Files

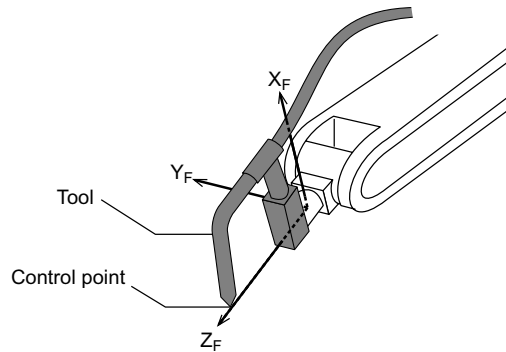
#### ■ Number of Tool Files

There are 24 tool files numbered 0 to 23. Each file is called as a tool file.



#### ■ Registering Coordinate Data

When the number input operation is used for registering the tool file, input the control point of the tool on the flange coordinates.



#### Operation

Select {ROBOT} under the top menu ➔ Select {TOOL}<sup>\*1</sup> ➔ Select the desired tool number<sup>\*2</sup> ➔ Select the desired coordinate axis to modify<sup>\*3</sup> ➔ Input the tool data ➔ Press [ENTER]<sup>\*4</sup>

#### Explanation

<sup>\*1</sup> The tool list display is shown. When the tool extension function is valid, the list is shown. When the tool extension function is invalid, the coordinate display is shown.



#### Tool File Extension Function

Normally, one robot uses one kind of tool file. The tool file extension function can change many tool files to be used by one robot. Use the following parameter to set this function.  
S2C261: TOOL NO. SWITCHING (1: enabled, 0: disabled)  
For more details, refer to "Concurrent I/O Parameter".

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL COORDINATE</b>		R1	
NO.	NAME		
00	[TORCH1 ]		
01	[TORCH2 ]		
02	[ ]		
03	[ ]		
04	[ ]		
05	[ ]		
06	[ ]		
07	[ ]		
!			

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>		R1	
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

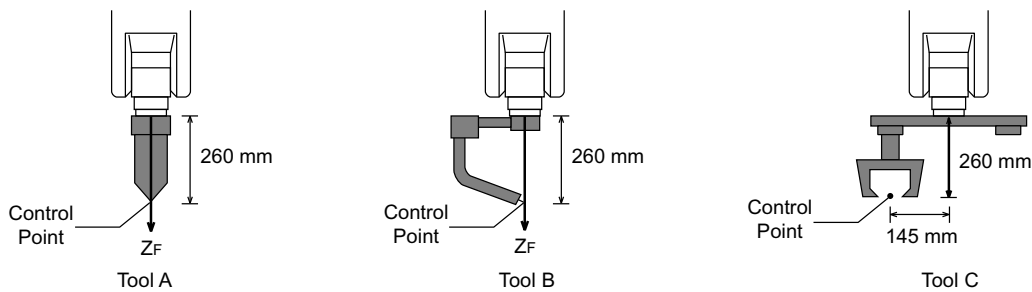
- \*2 When the tool list display is shown, move the cursor and press [SELECT]. The coordinate display of the selected tool is shown. If the tool coordinate display is shown, press the page key to select the desired tool.  
To switch the tool list display and the tool coordinate display, press {DISPLAY} → {LIST} or {DISPLAY} → {COORDINATE DATA}.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>		<b>LIST</b>	
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
!			

- \*3 The number input line is displayed.  
\*4 The tool data is registered.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>			
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	<b>260.000</b> mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		

<Setting Example>

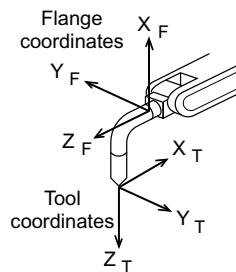


Case of Tool A, B				Case of Tool C			
X	0.000 mm	Rx	0.00 deg.	X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.	Y	145.000 mm	Ry	0.00 deg.
Z	<b>260.000</b> mm	Rz	0.00 deg.	Z	<b>260.000</b> mm	Rz	0.00 deg.

### ■ Registering Tool Pose

The tool pose data is angle data which shows the relation between the flange coordinates and the tool coordinates. The angle when the flange coordinates are rotated to meet to the tool coordinates becomes an input value. Clockwise toward the arrow is the positive direction. Register in the order of Rz → Ry → Rx.

The following, register Rz=90, Ry=90, Rx=0



**Operation**

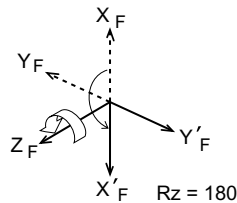
Select {ROBOT} under the top menu ➔ Select {TOOL} ➔ Select the desired tool number <sup>\*1</sup> ➔ Select the desired coordinate axis to modify <sup>\*2</sup> ➔ Input the tool pose data <sup>\*3</sup> ➔ Press [ENTER] <sup>\*4</sup>

**Explanation**

<sup>\*1</sup> In the same way shown in Explanation <sup>\*1</sup>, <sup>\*2</sup> in "Registering coordinate data", the desired tool coordinate display is shown.

<sup>\*2</sup> First, select Rz.

<sup>\*3</sup> Input rotation angle around  $Z_F$  of the flange coordinates.

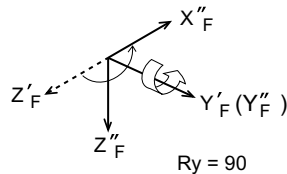


X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	180.00 deg.

<sup>\*4</sup> The rotation angle of Rz is registered.

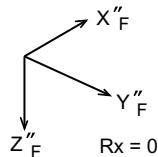
In the same way, register the angle of Ry, Rx.

Ry must be the input rotation angle around  $Y_F$  flange coordinates.



X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	90.00 deg.
Z	0.000 mm	Rz	180.00 deg.

Rx must be the input rotation angle around  $X_F$  of flange coordinates.



X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	90.00 deg.
Z	0.000 mm	Rz	180.00 deg.

**NOTE**

If tool data is registered in the tool file by tool calibration, the old data will be deleted.

### ■ Setting the Tool Load Information

The tool load information includes weight, a center of gravity position, and moment of inertia at the center of gravity of the tool installed at the flange.



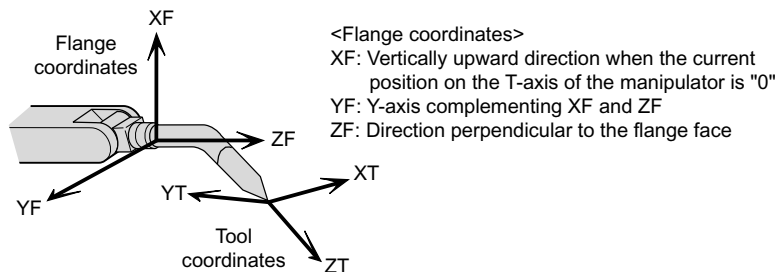


For more details on the tool load information, refer to 3.11.3 “Tool Load Information Setting.”

### 3.9.2 Tool Calibration

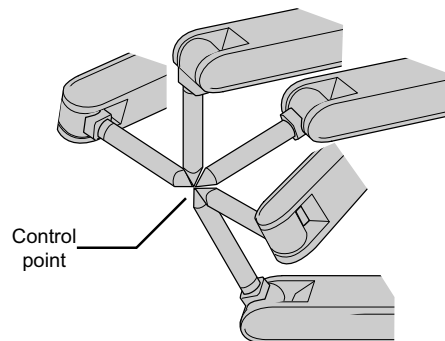
#### ■ Tool Calibration

To ensure that the manipulator can perform interpolation operations such as linear and circular interpolation correctly, accurate dimensional information on tools such as torches, tools, and guns must be registered and the position of the tool center point must be defined. Tool calibration is a function that enables this dimensional information to be registered easily and accurately. When this function is used, the tool center point is automatically calculated and registered in the tool file. What is registered in tool calibration is the coordinates of the tool center point in the flange coordinates.



#### ■ Teaching

In order to perform tool calibration, five different poses (TC1 to 5) must be taught with the tool center point as the reference point. The tool dimensions are automatically calculated on the basis of these five points.



Each pose must be arbitrary. Accuracy may decrease when pose setting is rotated in a constant direction.



There are 24 tool files numbered 0 to 23. In a basic system with one manipulator and one tool, the tool file for tool No.0 is used. If there is more than one tool, for example when using a multihand, use the tool numbers in the order 0, 1, 2, etc.



Tool pose data is not registered in tool calibration. For details on how to register pose data, refer to the preceding clause " Registering Tool Pose ".

### Operation

Select {ROBOT} under the top menu ➔ Select {TOOL} ➔ Select the desired tool number <sup>\*1</sup> ➔ Select {UTILITY} under the menu ➔ Select {CALIBRATION} <sup>\*2</sup> ➔ Select the robot <sup>\*3</sup> ➔ Select "POSITION" <sup>\*4</sup> ➔ Move the manipulator using the axis key ➔ Press [MODIFY] ➔ Press [MODIFY] and [ENTER] <sup>\*5</sup> ➔ Select "COMPLETE" <sup>\*6</sup>

### Explanation

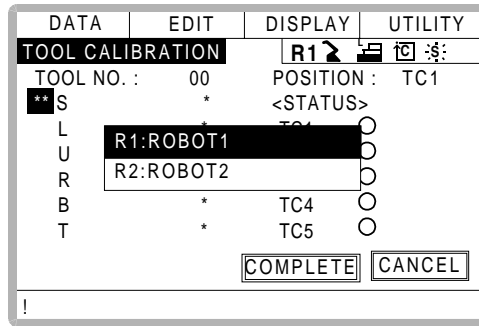
- <sup>\*1</sup> In the same way shown in Explanation <sup>\*1</sup>, <sup>\*2</sup> in " Registering Coordinate Data ", the desired tool coordinate display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>			
TOOL NO. : 00			
NAME : TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		

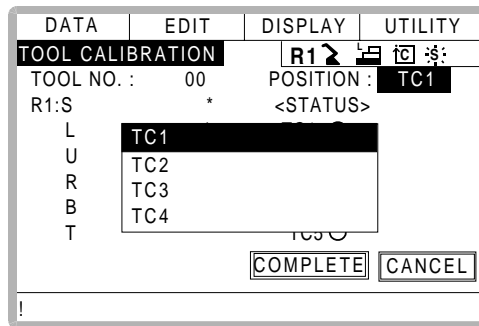
- <sup>\*2</sup> The tool calibration setting display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL CALIBRATION</b>			
TOOL NO. : 00		POSITION :	TC1
**S	*	<STATUS>	
L	*	TC1	<input type="radio"/>
U	*	TC2	<input type="radio"/>
R	*	TC3	<input type="radio"/>
B	*	TC4	<input type="radio"/>
T	*	TC5	<input type="radio"/>
		COMPLETE	CANCEL

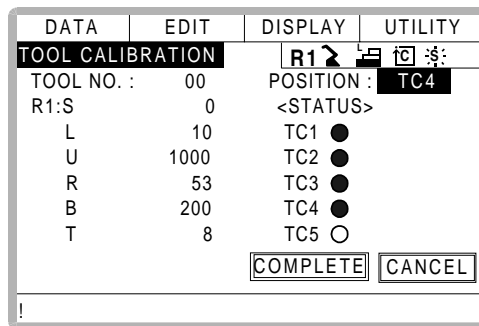
- <sup>\*3</sup> Select the robot to calibrate. (When the robot has already been selected or there is only one of robot, this operation should not be performed.) Select "\*\*\*" in the tool calibration setting display and select the robot in the displayed selection dialog.



\*4 The selection dialog is displayed. Select the teaching point for calibration.



\*5 Taught position is registered.  
Repeat \*4~\*5 operation to teach TC1 to TC5.  
● indicates that teaching is completed and ○ indicates that it is not completed.



To check the taught positions, call up the required display among TC1 to TC5 and press [FWD]. The manipulator moves to the set position.  
If there is a difference between the current position of the manipulator and the displayed position data, "TC□" next to "POSITION" in the display flashes.

\*6 Calibration data is registered in the tool file. Once calibration is completed, the tool coordinate display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>			
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	300.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

## ■ Clearing Calibration Data

Before the calibration of a new tool, clear the robot information and calibration data.

### Operation

Select {DATA} under the menu ➔ Select {CLEAR DATA}\*1 ➔ Select "YES"\*2

### Explanation

\*1 The confirmation dialog is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>TOOL CALIBRATION</b>			
TOOL NO. : 00		POSITION : TC5	
R1:S 0		<STATUS>	
Clear data?			
<input type="button" value="YES"/>		<input type="button" value="NO"/>	
<input type="button" value="COMPLETE"/>		<input type="button" value="CANCEL"/>	
!			

\*2 All data is cleared.

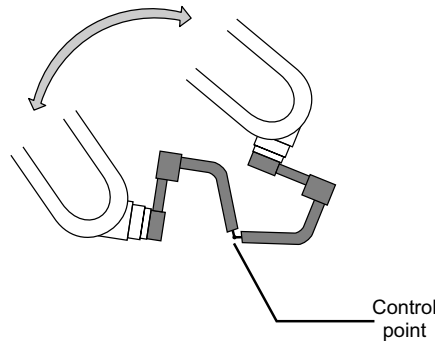
DATA	EDIT	DISPLAY	UTILITY
<b>TOOL CALIBRATION</b>			
TOOL NO. : 00		POSITION : TC1	
**:S *		<STATUS>	
L	*	TC1	<input type="radio"/>
U	*	TC2	<input type="radio"/>
R	*	TC3	<input type="radio"/>
B	*	TC4	<input type="radio"/>
T	*	TC5	<input type="radio"/>
<input type="button" value="COMPLETE"/>		<input type="button" value="CANCEL"/>	
!			



Only tool coordinate data are calculated using tool calibration. If tool pose data is required, input the data number in the tool coordinate display. Refer to " Registering Tool Pose " for the operation.

### ■ Checking the Tool Center Point

After registering the tool file, check if the tool center point is correctly registered by performing a TCP fixed operation like the one shown below, in any coordinate system other than the joint coordinates.

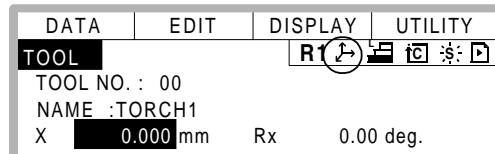



#### Operation

Press [COORD] <sup>\*1</sup> → Select desired tool number <sup>\*2</sup> → Move the R, B, or T axes using the axis key <sup>\*3</sup>

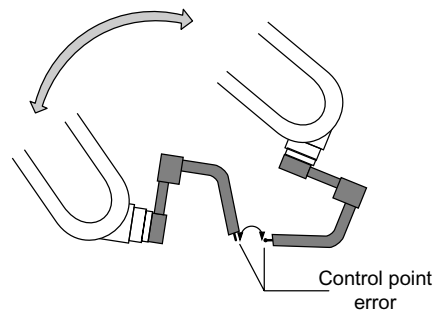
#### Explanation

<sup>\*1</sup> Select any coordinate type except ↗ "JOINT" by pressing [COORD].



<sup>\*2</sup> Show the tool coordinate display of the desired tool by pressing the page key  selecting it in the tool list.

<sup>\*3</sup> By pressing the axis keys for the R, B, and T axes, change the manipulator pose without changing the tool center point position.  
If this operation shows a large tool center point error, adjust the tool data.



For details on TCP fixed operation, see the Operator's Manual (Application)

### 3.9.3 Automatic Measurement of the Tool Load and the Center of Gravity

#### ■ What is the Automatic Measurement of the Tool Load and the Center of Gravity?

With this function, the user can register the load of tool and the position of the tools center of gravity.

The tool load and the position of it's center of gravity are measured and registered in a tool file.

#### NOTE

This function is available for the models listed below. Contact your Yaskawa representative for information on other models.

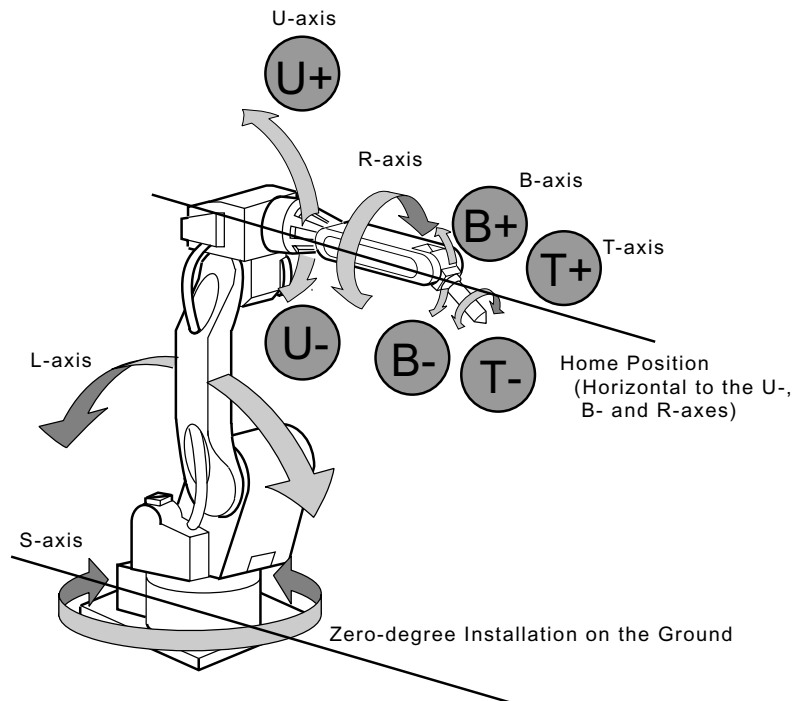
Applicable models: MOTOMAN UP6, SK16X, SK45X, and UP130

This function can be used where the manipulator is installed level on the ground.

For the conditions required for manipulator installation, refer to 3.11 "ARM Control".

#### ■ Measurement of the Tool Load and the Center of Gravity


To measure the tool load and the center of gravity, move the manipulator to it's home position (horizontal to the U-, B- and R-axes) and operate the U-, B- and R-axes.



#### NOTE

To measure the tool load or the center of gravity, remove the cables or wires connected to the tool. Otherwise, the measurements may not be correct.

**Operation**





Select {ROBOT} under the top menu ➔ Select {TOOL} <sup>\*1</sup> ➔ Select the desired tool number <sup>\*2</sup> ➔ Select {UTILITY} under the menu ➔ Select {W.GRAV.POS MEASURE} <sup>\*3</sup> ➔ Press the page  <sup>\*4</sup> ➔ Press [NEXT] <sup>\*5</sup> ➔ Press [NEXT] again <sup>\*6</sup> ➔ Select "REGISTER" <sup>\*7</sup>





**Explanation**


<sup>\*1</sup> The tool list display is shown. The tool list is called up only when the file extension function is valid. If the file extension function is invalid, the tool coordinates is shown.



**Tool File Extension Function**  
 Use the following parameter to set the Tool File Extension Function.  
 S2C261: TOOL NO. SWITCHING  
 "0": Tool switching prohibited.  
 "1": Can change 24 kinds of tools numbering from 0 to 23.





DATA	EDIT	DISPLAY	UTILITY
<b>TOOL COORDINATE</b>    			
NO.	NAME		
00	[TORCH1 ]		
01	[TORCH2 ]		
02	[ ]		
03	[ ]		
04	[ ]		
05	[ ]		
06	[ ]		
07	[ ]		
!			


DATA	EDIT	DISPLAY	UTILITY
<b>TOOL</b>    			
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

- \*2 Move the cursor to the desired number in the tool list and press [SELECT]. The tool coordinates of the selected number is shown. In the tool coordinates, change the desired number by pressing the page key . To alternate between the tool list and the tool coordinates, select {DISPLAY} and {LIST}, or {DISPLAY} and {COORDINATE VALUE} under the menu.

DATA	EDIT	DISPLAY	UTILITY
TOOL		LIST	
TOOL NO. : 00			
NAME : TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

- \*3 The display for the automatic measurement of the tool load and the center of gravity is shown.

DATA	EDIT	DISPLAY	UTILITY
W.GRAV.POS MEASURE		R1	   
TOOL : 00			
R1:W	*.*** kg	< STATUS >	
		HOME	<input type="radio"/>
Xg	*.*** mm	U	<input type="radio"/>
Yg	*.*** mm	B	<input type="radio"/>
Zg	*.*** mm	T(1)	<input type="radio"/>
		T(2)	<input type="radio"/>
		REGISTER	CANCEL
!			

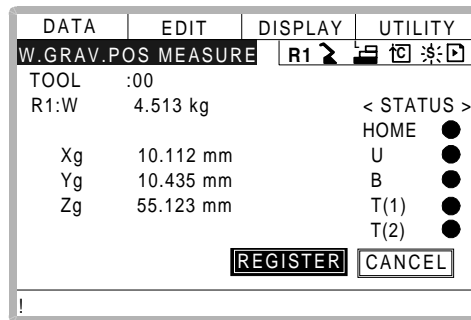
- \*4 In a system with several manipulators or stations, use the page key  to change the group to be controlled.
- \*5 Press [NEXT] once, and the manipulator moves to the home position (horizontal to the U-, B- and R-axes).
- \*6 Press [NEXT] again, and measurement starts. Keep the button pressed until measurement is completed. The manipulator moves in the order listed below. Once measurement is completed, "O" changes to "●".
- ① Measurement of the U-axis: U-axis home position + 4.5 degrees → -4.5 degrees
  - ② Measurement of the B-axis: B-axis home position + 4.5 degrees → -4.5 degrees
  - ③ First measurement of the T-axis: T-axis home position + 4.5 degrees → -4.5 degrees
  - ④ Second measurement of the T-axis: T-axis home position +60 degrees → + 4.5 degrees → -4.5 degrees



**NOTE**

- The speed during measurement automatically changes to “Medium”.
- During measurement, “HOME” or “U” blinks on the screen.
- During measurement, the [NEXT] button has to be kept pressed. If the button is released during measurement or if it is released before “O” changes into “●”, measurement is interrupted and the following message appears.  
“Stopped measurement”  
Measurement starts again from the first home position.

When all measurements are completed or when all the “O” marks have changed into “●”, the measurements are displayed on the screen.



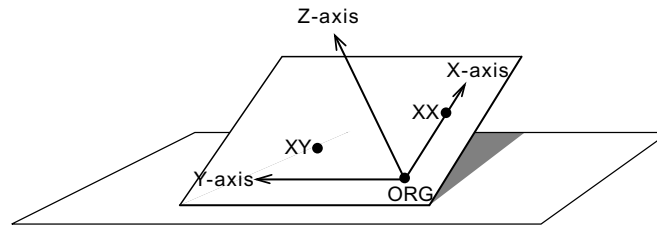
- \*7** The measurements are registered in the tool file, and the tool coordinates are shown. Select “CANCEL” to call up the tool coordinates without registering the measurements in the tool file.

## 3.10 User Coordinates Setting

### 3.10.1 User Coordinates

#### ■ Definition of User Coordinates

User coordinates are defined by three points that have been taught to the manipulator through axis operations. These three defining points are ORG, XX, and XY, as shown in the diagram below. These three points of positional data are registered in a user coordinate file.



User coordinate definition point

ORG: Home position

XX: Point on the X-axis

XY: Point on the Y-axis

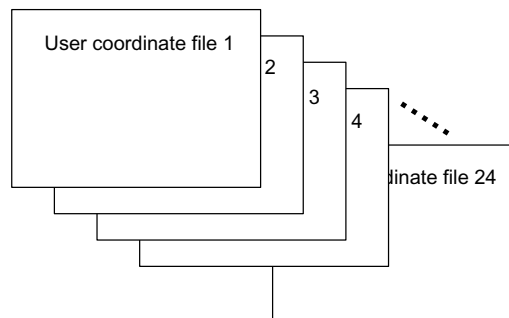
ORG is the home position, and XX is a point on the X-axis. XY is a point on the Y-axis side of the user coordinates that has been taught, and the directions of Y- and Z-axes are determined by point XY.

#### NOTE

It is important that the two points ORG and XX be taught accurately.

#### ■ User Coordinates File

Up to 24 kinds of user coordinates can be registered. Each coordinate has a user coordinate No. and is called a user coordinate file.



### 3.10.2 User Coordinates Setting

#### ■ Selecting User Coordinates File

##### Operation

Select {ROBOT} under the top menu ➔ Select {USER COORDINATE}\*1 ➔ Select desired user coordinate number\*2

##### Explanation

\*1 The user coordinate list display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>			
NO.	SET	NAME	
00	●	[WORK1 ]	
01	●	[WORK2 ]	
02	○	[ ]	
03	○	[ ]	
04	○	[ ]	
05	○	[ ]	
06	○	[ ]	
07	○	[ ]	

● indicates that the user coordinates is completed to set and ○ indicates that it is not completed.

To check the position of the user coordinates select {DISPLAY} → {COORDINATE DATA}. The user coordinate display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>			
USER COORD NO.: 01			
NAME :WORK2			
X	50.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	30.000 mm	Rz	0.00 deg.

\*2 Select the desired user coordinate number for setting in the user coordinate list display. The user coordinate teaching display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>			
USER COORD NO.: 03		TOOL	:00
**S	*	SET POS.	<b>ORG</b>
L	*	<STATUS>	
U	*	○ :ORG	
R	*	○ :XX	
B	*	○ :XY	
T	*		
		<b>COMPLETE</b>	<b>CANCEL</b>

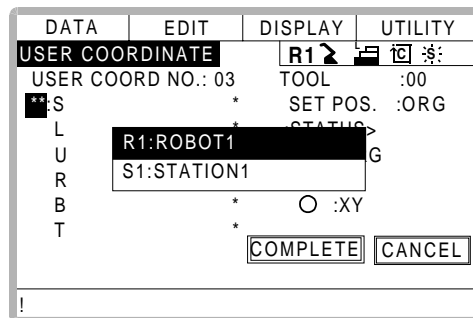
## ■ Teaching User Coordinates

### Operation

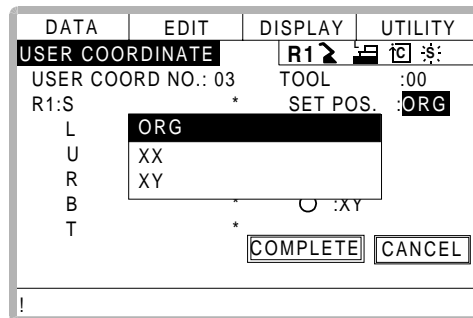
Select the robot<sup>\*1</sup> → Select "SET POS"<sup>\*2</sup> → Move the manipulator using the axis key  
 → Press [MODIFY] and [ENTER]<sup>\*3</sup> → Select "COMPLETE"<sup>\*4</sup>

### Explanation

- \*1** Select the robot for teaching user coordinates. (When the robot has already been selected or there is only one robot, this operation should not be performed.) Select "\*" in the user coordinates setting display and select the robot in the displayed selection dialog. The robot is registered.



- \*2** The selection dialog is displayed. Select the teaching point.



- \*3** Taught position is registered.  
 Repeat \*2~\*3 operation to teach ORG, XX and XY.  
 ● indicates that teaching is completed and ○ indicates that it is not completed.



### 3.10 User Coordinates Setting

To check the taught positions, call up the required display among ORG to XY and press [FWD]. The manipulator moves to the set position.

If there is a difference between the current position of the manipulator and the displayed position data, "ORG", "XX", or "XY" flashes.

- \*4 User coordinates are registered in the file. Once the user coordinate setting is completed, the user coordinate list display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>		R1	☰ ☱ ☲ ☳
NO.	SET	NAME	
00	●	[WORK1 ]	
01	●	[WORK2 ]	
02	○	[ ]	
03	●	[WORK3 ]	
04	○	[ ]	
05	○	[ ]	
06	○	[ ]	
07	○	[ ]	

### ■ Clearing User Coordinates

#### Operation

Select {DATA} under the menu ➔ Select {CLEAR DATA} \*1 ➔ Select "YES"\*2

#### Explanation

- \*1 The confirmation dialog is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>		R1	☰ ☱ ☲ ☳
USER COORD NO.: 03		TOOL	:00
R1:S	0	SET POS.	XY
L	Clear data? <input type="button" value="YES"/> <input type="button" value="NO"/>		
U			
R			
B			
T			
		<input type="button" value="COMPLETE"/>	<input type="button" value="CANCEL"/>

- \*2 All data is cleared.

DATA	EDIT	DISPLAY	UTILITY
<b>USER COORDINATE</b>		R1	☰ ☱ ☲ ☳
USER COORD NO.: 03		TOOL	:00
R1:S	*	SET POS.	ORG
L	*	<STATUS>	
U	*	○ :ORG	
R	*	○ :XX	
B	*	○ :XY	
T	*		
		<input type="button" value="COMPLETE"/>	<input type="button" value="CANCEL"/>

## 3.11 ARM Control

### 3.11.1 ARM Control

In XRC, the operation performance of the robot which satisfies various demands on the production site such as the improvement of the path accuracy and the cycle time shortening is achieved by adopting the ARM (Advanced Robot Motion) control which Yaskawa Electric Co., Ltd. originally developed.

The moment of inertia and the gravity moment etc. of each axis are calculated in the ARM control, and XRC controls robot motion according to it. It is necessary to set the Robot setup condition and the tool load information to request these accurately.

The robot setup condition is robot installation angle relative to ground and the weight and a center of gravity position of the load installed at each part of robot, etc.

The tool load information is weight, a center of gravity position, and moment of inertia at the center of gravity, of the tool installed at the flange.

It is necessary to set these information correctly to do a better operation control by the ARM control.

### 3.11.2 ARM CONTROL Display

In ARM CONTROL display, the robot setup condition etc. are set.



#### CAUTION

- Set the robot setup condition exactly.

Set the robot setup condition very noting of mistake the unit, the value or the positive and negative of number.

An appropriate operation control cannot be done, decrease the speed reducer longevity, or occur the alarm when these are not correctly set.

- Confirm the operation path of robot of each job when you change setting.

Set the robot setup condition when you basically set up the robot.

Confirm the operation path of robot of each job afterwards when you change the setting unavoidably.

Injury or damage to machinery may result by collision between tool and jig because the operation path might be changed slightly when the setting about the ARM control is changed.

## ■ Robot Setup Condition

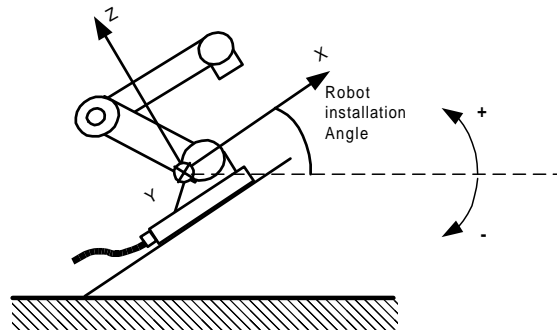
It is necessary to set the following robot setup condition to execute the ARM control appropriately.

- Robot installation angle
- S-head payload
- U-arm payload

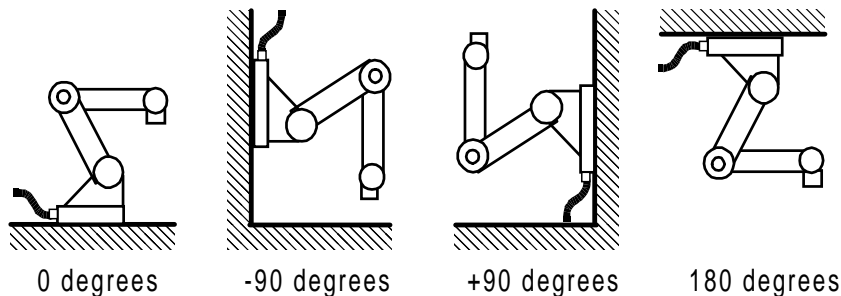
### Robot installation angle

The angle of the manipulator installed relative to ground is set in ANGLE REL. TO GROUND to calculate the gravity moment which loads to each axis of the manipulator.

The robot installation angle sets how much X axis of the robot coordinates has inclined with the earth around Y axis of the robot coordinates. The direction of + in the U axis operation from the home position posture of the manipulator becomes direction of + of the robot installation angle. Therefore, the robot installation angle for a vertical downward wall mount specification becomes -90 degrees.



<Example>



Because the gravity moment which loads to each axis can't be calculated correctly when this value is not correctly set, it can not be possible to control the manipulator appropriately. Set the value correctly. Especially, note the direction “+” or “-”.



Only rotation angle around Y axis of the robot coordinates can be set in the robot installation angle.

Contact YASKAWA representative when robots is installed to incline Y axis of the robot coordinates relative to ground.

## S-head payload

Set the mass and the center of gravity position roughly when the equipment such as transformer is installed at the S-head.

It is not necessary to set these value when there is no installed load at the S-head.

### WEIGHT (Unit:kg)

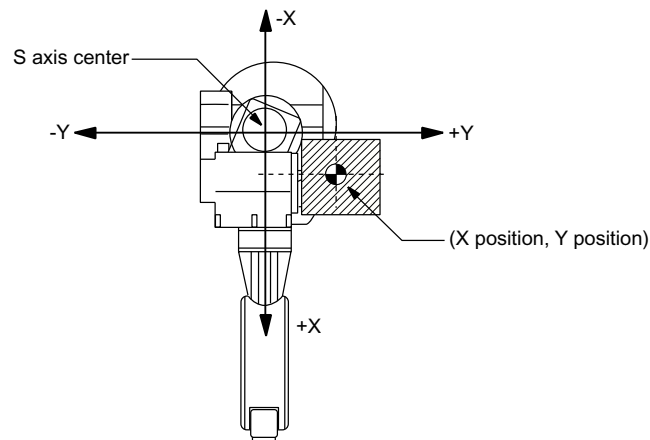
The weight of the installed load is set.

Set a little large value though it does not care by a rough value. (Rase to a unit in each 0.5 to 1kg)

### X (From S-Axis). Y (From S-Axis) (unit: mm)

The center of gravity position of the installed load is set by the distance in the direction of X and the direction of Y from S axis center here. It does not care by a rough value.

The direction of X and Y applies to the robot coordinates. The value is set by a negative number when the position is in “-” direction.



Load at S-head (Top View)

## U-arm payload

Set the weight and the center of gravity position roughly when the equipment such as the wire supplying motors is installed on U arm.

A standard value is set when shipping from the factory.

Set the weight in “0” if there is no installing equipment on U arm.

### WEIGHT (Unit:kg)

The weight of the installing load is set here.

Set a little large value though it does not care by a rough value. (Rase to a unit in each 0.5 to 1kg)

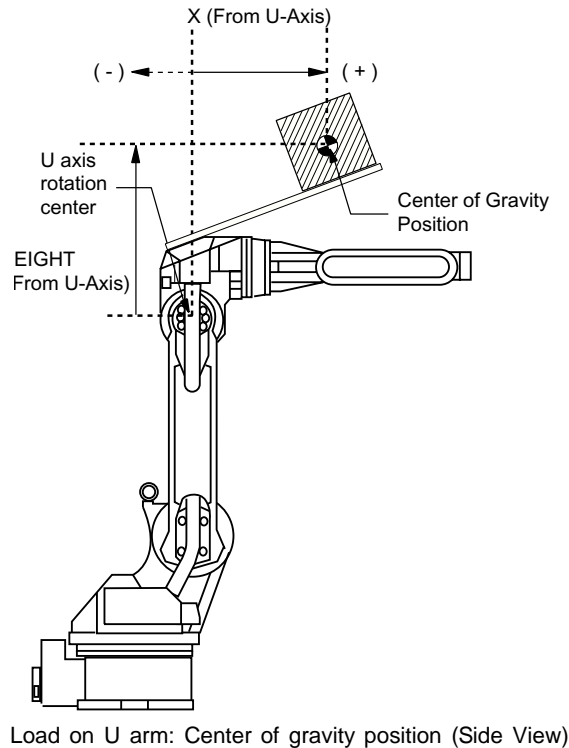
### X (From U-Axis). HEIGHT (From U-Axis) (unit: mm)

The center of gravity position of the load installed is set here. It does not care by a rough value.

X (From U-Axis) is horizontal distance from U axis rotation center to the center of gravity position of the load. Set negative number when there is mass side in the back from U axis rotation center.




HEIGHT (From U-Axis) is height of the vertical direction from U axis rotation center to the center of gravity position of the load.



■ Setting

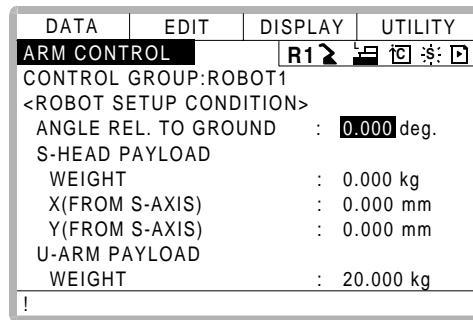
**NOTE** ARM CONTROL display is shown only when the security mode is set as management mode.

**Operation**

Select {ROBOT} under the top menu ➔ Select {ARM CONTROL}<sup>\*1</sup> ➔ Press the page key <sup>\*2</sup> ➔ Select the desired item ➔ Input the value and press [ENTER]

**Explanation**

\*1 ARM CONTROL display is shown.



- \*2 Select the desired group axis when there are two or more group axes.

### 3.11.3 Tool Load Information Setting



## CAUTION

- Set the tool load information correctly.

The speed reducer longevity might decrease or the alarm might occur when the tool load information is not set correctly.

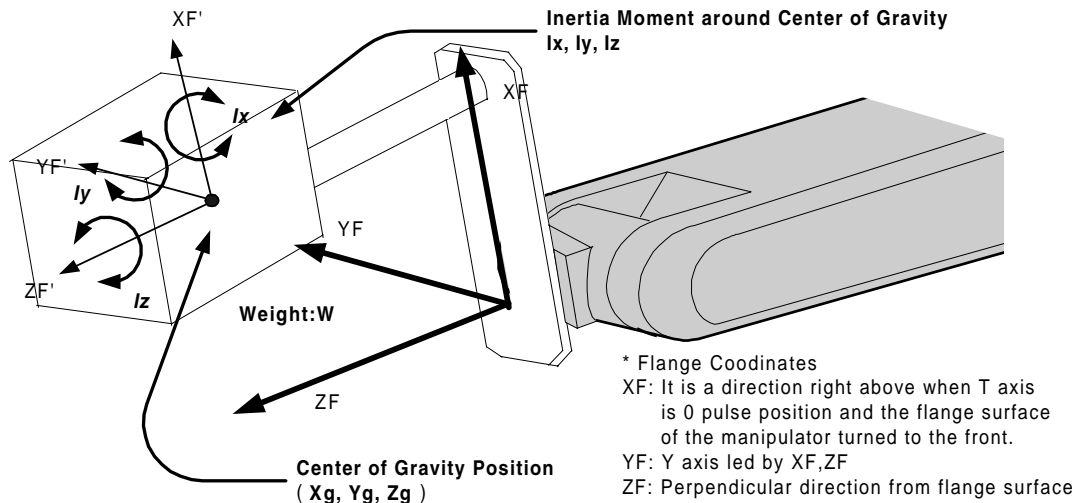
- Confirm the operation path of robot of each job which uses the tool file after the tool load information is changed.

Set the tool load information basically before teaching the job after the tool is installed. Confirm the operation path of each job which uses the tool file when the tool load information is changed after teaching, unavoidably.

Injury or damage to machinery may result by collision between tool and jig because the operation path might be changed slightly when the tool load information is changed.

## ■ Tool Load Information

Tool load information includes weight, a center of gravity position, and moment of inertia at the center of gravity of the tool installed at the flange. These are registered in the tool file.



## ■ How to Calculate Tool Load Information

### Weight: W (Unit:kg)

The total weight of the installing tool is set.

Set a little large value though it does not care by a rough value. Raise to a unit in each 0.5 to 1kg for small or middle robot and raise to a unit in each 1 to 5kg for large robot.

### Center of gravity: xg, yg, zg (Unit: mm)

The center of gravity position of the installed tool is set as the position in the flange coordinates.

It does not care by setting a rough value because it is usually difficult to get a strict center of gravity position. Presume and set a center of gravity position roughly from outline of the tool. Set the value when the center of gravity position of the installed tool is clear from specifications etc.

### moment of inertia at the center of gravity: Ix, Iy, Iz (Unit: kg.m<sup>2</sup>)

It is an moment of inertia of the tool at the center of gravity position.

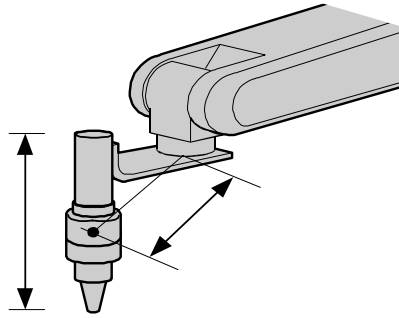
The value is calculated around each axis of the coordinates which is in parallel to the flange coordinates and whichever original position is the center of gravity position of the tool.

Set a large value though it does not care by a rough value.

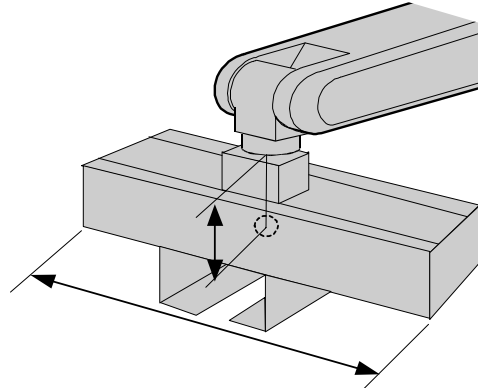
This setting is used to calculate the moment of inertia which loads to each axis of the manipulator. However, the moment of inertia at the center of gravity need not usually set because this data is small enough to the moment of inertia calculated from weight and the center of gravity position.

Only when the moment of inertia of the tool is large (The size of the tool is, as a standard, in

case of about twice or more the distance from the flange to the center of gravity position), this setting is needed.



The size of the tool is not too big.  
Setting the inertia moment at center of gravity is not necessary.



The size of the tool is big enough.  
Setting the inertia moment at center of gravity is necessary.

Rough value of the moment of inertia at the center of gravity can be calculated by followings methods.

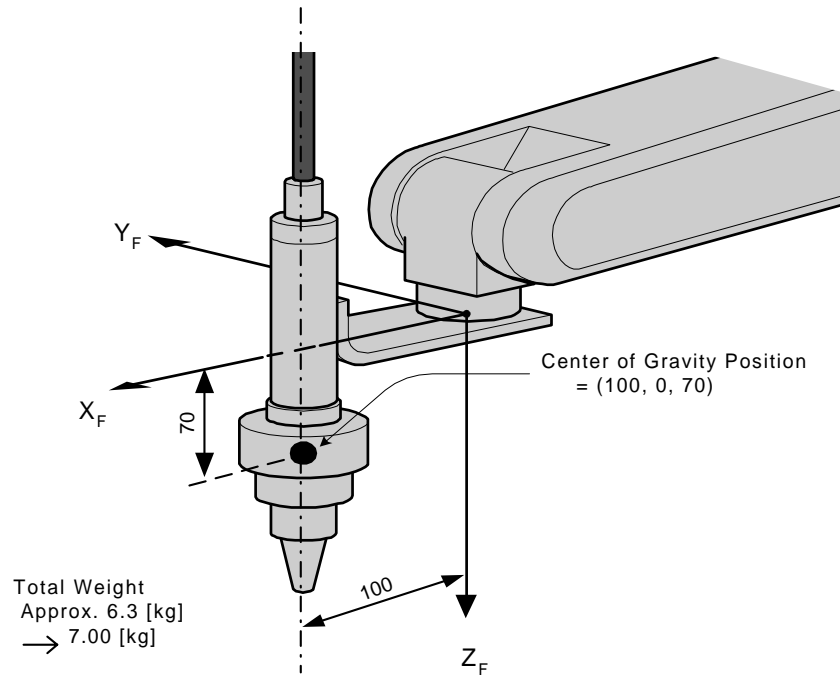
- Method to approximate the entire tool in hexahedron or cylinder.
- Method to calculate from each weight and center of gravity position of plural mass.

Refer to the following setting examples for details.

## &lt;Example1&gt;

In the example of sealing gun of the figure below, it is assumed that there is center of gravity in the position where inclined to head from the center a little, and sets the center of gravity position on the flange coordinates.

There is no problem even if the moment of inertia at the center of gravity is not set because the size of the gun is not too large.



## &lt;Setting&gt;

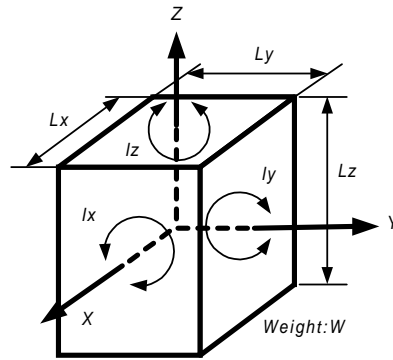
- W : 7.000 kg
- Xg : 100.000 mm
- Yg : 0.000 mm
- Zg : 70.000 mm
- Ix : 0.000 kg.m<sup>2</sup>
- Iy : 0.000 kg.m<sup>2</sup>
- Iz : 0.000 kg.m<sup>2</sup>



• The own moment of inertia calculation for hexahedron and cylinder

The own moment of inertia of hexahedron and cylinder can be calculated by the next expression when the center of gravity is at the center.

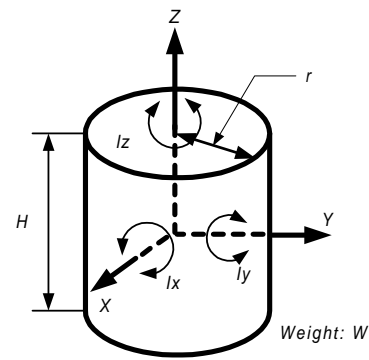
Refer the expression when the calculation of the moment of inertia at the center of gravity.



$$I_x = \frac{Ly^2 + Lz^2}{12} * W$$

$$I_y = \frac{Lx^2 + Lz^2}{12} * W$$

$$I_z = \frac{Lx^2 + Ly^2}{12} * W$$



$$I_x = I_y = \frac{3r^2 + H^2}{12} * W$$

$$I_z = \frac{r^2}{2} * W$$

\* Unit of Weight : [kg]

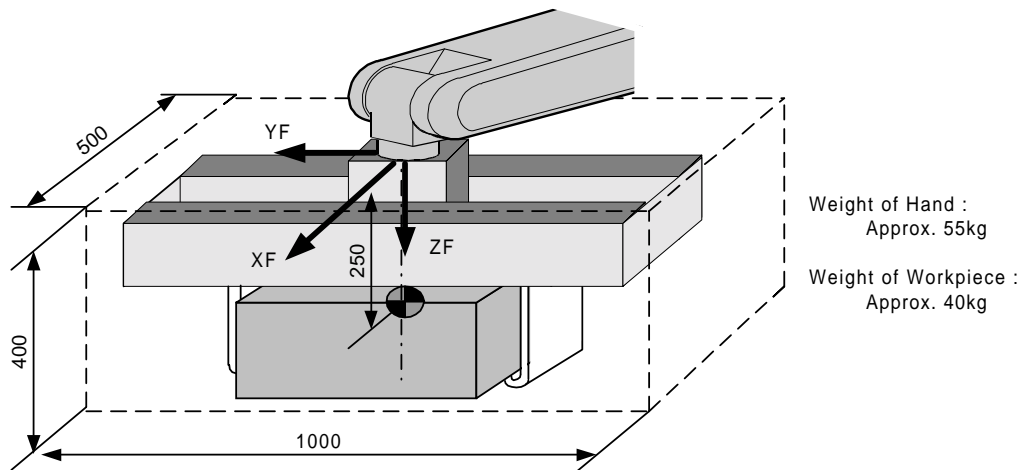
\* Unit of Length : [m]

\* Unit of  $I_x, I_y, I_z$  : [kg.m<sup>2</sup>]

## &lt;Example 2&gt;

It is necessary to set the moment of inertia at the center of gravity when the entire size of the tool and workpiece is large enough comparing with the distance from the flange to the center of gravity position.

Calculate the moment of inertia at the center of gravity roughly from the expression (Refer to the above-mentioned supplement: "The own moment of inertia calculation for hexahedron and cylinder"), by approximating the entire tool in the shape of the hexahedron or the cylinder. If the weight of held workpiece is greatly different like in the handling usage etc, it is more effective to set tool load information on each workpiece and to switch the tool on each step according to the held workpiece. Set the tool load information in the state to hold the heaviest workpiece when the tool is not switched.



Weight:  $W = 55 + 40 = 95$   
= approx. 100[kg]

Center of gravity: Position at flange right under 250mm almost  
(Xg, Yg, Zg) = (0,0,250)

Moment of inertia at the center of gravity:

The hexahedron of 0.500 x 0.400 x 1.000[m] which encloses the entire hand + workpiece is assumed.

By the expression to calculate the own moment of inertia of hexahedron,

$$I_x = (L_y^2 * L_z^2 / 12) * W = ((0.400^2 + 1.000^2) / 12) * 100 = 9.667 = \text{approx. } 10.000$$

$$I_y = (L_x^2 * L_z^2 / 12) * W = ((0.500^2 + 0.400^2) / 12) * 100 = 3.417 = \text{approx. } 3.500$$

$$I_z = (L_x^2 * L_y^2 / 12) * W = ((0.500^2 + 1.000^2) / 12) * 100 = 10.417$$

## &lt;Setting&gt;

- W : 100.000 kg
- Xg : 0.000 mm
- Yg : 0.000 mm
- Zg : 250.000 mm
- Ix : 10.000 kg.m<sup>2</sup>
- Iy : 3.500 kg.m<sup>2</sup>
- Iz : 10.500 kg.m<sup>2</sup>



- How to calculate "Center of gravity position" and "moment of inertia at center of gravity" for plural mass.

The center of gravity position and the moment of inertia at the center of gravity of the entire tool can be calculated by the weight and the center of gravity position of each mass when the tool can be thought that the tool consists of two or more big mass like the twin gun system etc.

1. Divide the tool into some parts as the weight and the center of gravity position can be roughly presumed. It is not necessary to divide in detail. The tool is approximated in construction of rough parts.
2. Calculate the weight and the center of gravity position of the each parts on flange coordinates. It does not care by a rough value. Calculate the own moments of inertia of the big parts. (If parts are small, it is not necessary to calculate the own moments of inertia. Refer to above-mentioned supplement: "The own moment of inertia calculation for hexahedron and cylinder" for how to calculate the own moment of inertia.)

$w_i$ : Weight of the  $i$ -th parts [kg]

$(x_i, y_i, z_i)$ : Center of gravity of the  $i$ -th parts (On flange coordinates) [mm]

$I_{cx_i}, I_{cy_i}, I_{cz_i}$ : Own moments of inertia of the  $i$ -th parts [ $\text{kg}\cdot\text{m}^2$ ]

3. The center of gravity position of the entire tool is calculated by the next expression.

$$x_g = \{w_1 * x_1 + w_2 * x_2 + \dots + w_i * x_i\} / (w_1 + w_2 + \dots + w_i)$$

$$y_g = \{w_1 * y_1 + w_2 * y_2 + \dots + w_i * y_i\} / (w_1 + w_2 + \dots + w_i)$$

$$z_g = \{w_1 * z_1 + w_2 * z_2 + \dots + w_i * z_i\} / (w_1 + w_2 + \dots + w_i)$$

4. The moment of inertia at the center of gravity position of the entire tool is calculated by the next expression.

$$I_x = \{w_1 * ((y_1 - y_g)^2 + (z_1 - z_g)^2) * 10^{-6} + I_{cx1}\}$$

$$+ \{w_2 * ((y_2 - y_g)^2 + (z_2 - z_g)^2) * 10^{-6} + I_{cx2}\}$$

.....

$$+ \{w_i * ((y_i - y_g)^2 + (z_i - z_g)^2) * 10^{-6} + I_{cx_i}\}$$

$$I_y = \{w_1 * ((x_1 - x_g)^2 + (z_1 - z_g)^2) * 10^{-6} + I_{cy1}\}$$

$$+ \{w_2 * ((x_2 - x_g)^2 + (z_2 - z_g)^2) * 10^{-6} + I_{cy2}\}$$

.....

$$+ \{w_i * ((x_i - x_g)^2 + (z_i - z_g)^2) * 10^{-6} + I_{cy_i}\}$$

$$I_z = \{w_1 * ((x_1 - x_g)^2 + (y_1 - y_g)^2) * 10^{-6} + I_{cz1}\}$$

$$+ \{w_2 * ((x_2 - x_g)^2 + (y_2 - y_g)^2) * 10^{-6} + I_{cz2}\}$$

.....

$$+ \{w_i * ((x_i - x_g)^2 + (y_i - y_g)^2) * 10^{-6} + I_{cz_i}\}$$

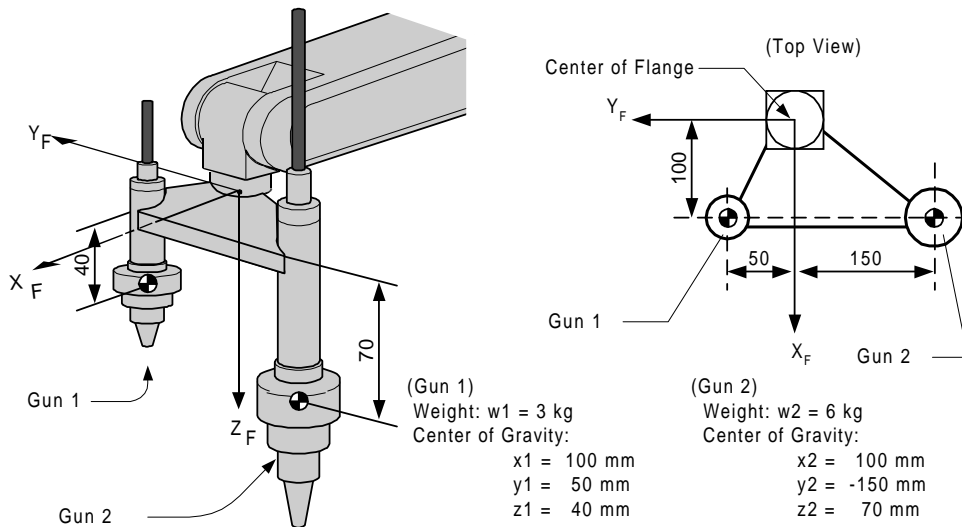


## &lt;Example 3&gt;

When there is two or more big mass like the twin gun system like the figure below,

1. Set the center of gravity position when the center of gravity position of the entire tool is roughly understood, and set the moment of inertia at the center of gravity calculated by approximating the entire tool in the shape of hexahedron or cylinder. (It is enough in this setting usually)
2. Or, when weight in each mass and the center of gravity position are understood, the center of gravity position and the moment of inertia at the center of gravity of the entire tool can be calculated. (Refer to above-mentioned supplement: "How to calculate "Center of gravity position" and "moment of inertia at the center of gravity" for plural mass").

How by the method of 2 to calculate the value is shown here.



$$\begin{aligned} \text{Weight: } W &= w_1 + w_2 \\ &= 3 + 6 = 9 = \text{approx. } 10[\text{kg}] \end{aligned}$$

$$\begin{aligned} \text{Center of gravity } X_g &= (w_1 * x_1 + w_2 * x_2) / (w_1 + w_2) \\ &= (3 * 100 + 6 * 100) / (3+6) = 100.0 [\text{mm}] \\ Y_g &= (3 * 50 + 6 * (-150)) / (3+6) = -83.333 [\text{mm}] \\ Z_g &= (3 * 40 + 6 * 70) / (3+6) = 60.0 [\text{mm}] \end{aligned}$$

The moment of inertia at the center of gravity position:

$$\begin{aligned} I_x &= \{ w_1 * ((y_1 - Y_g)^2 + (z_1 - Z_g)^2) * 10^{-6} + I_{cx1} \} \\ &+ \{ w_2 * ((y_2 - Y_g)^2 + (z_2 - Z_g)^2) * 10^{-6} + I_{cx2} \} \\ &= 3 * ((50 - (-83))^2 + (40 - 60)^2) * 10^{-6} \\ &+ 6 * (((-150) - (-83))^2 + (70 - 60)^2) * 10^{-6} \\ &= 0.082 = \text{approx. } 0.100 \\ I_y &= 3 * ((100 - 100)^2 + (40 - 60)^2) * 10^{-6} \\ &+ 6 * ((100 - 100)^2 + (70 - 60)^2) * 10^{-6} \\ &= 0.002 = \text{approx. } 0.010 \\ I_z &= 3 * ((100 - 100)^2 + (50 - (-83))^2) * 10^{-6} \\ &+ 6 * ((100 - 100)^2 + ((-150) - (-83))^2) * 10^{-6} \\ &= 0.080 = \text{approx. } 0.100 \end{aligned}$$

\* Here, the own moment of inertia (Icxi, Icyi, Icz) of the gun is disregarded, because each gun are smaller enough than the entire tool.

<Setting>

- W : 10.000 kg
- Xg : 100.000 mm
- Yg : -83.333 mm
- Zg : 60.000 mm
- lx : 0.100 kg.m<sup>2</sup>
- ly : 0.010 kg.m<sup>2</sup>
- lz : 0.100 kg.m<sup>2</sup>

## ■ Tool load Information registering

Tool load Information is registered in the tool file.

### Operation


Select {ROBOT} under the top menu ➔ Select {TOOL}<sup>\*1</sup> ➔ Select the desired tool number<sup>\*2</sup> ➔ Select the desired item to register and input the value<sup>\*3</sup> ➔ Press [ENTER]<sup>\*4</sup>

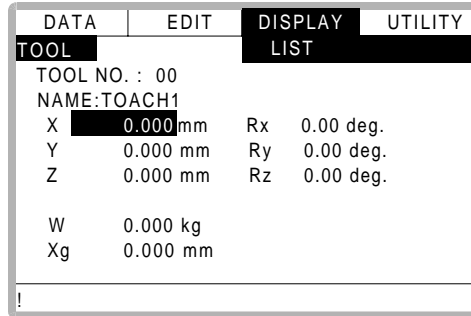
### Explanation

- <sup>\*1</sup> The tool list display is shown. Only when the file expansion function is valid, the tool list display is shown. When the file expansion function is invalid, the tool coordinates display is shown.

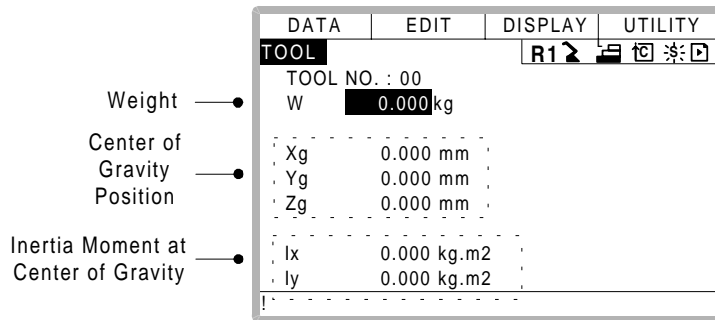
DATA	EDIT	DISPLAY	UTILITY
TOOL COORDINATE		R1	☰ ☱ ☲ ☳
NO.	NAME		
00	[TORCH1 ]		
01	[TORCH2 ]		
02	[ ]		
03	[ ]		
04	[ ]		
05	[ ]		
06	[ ]		
07	[ ]		
!			

DATA	EDIT	DISPLAY	UTILITY
TOOL		R1	☰ ☱ ☲ ☳ ☴ ☵ ☶ ☷
TOOL NO. : 00			
NAME:TOACH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

- \*2** Move the cursor to the number of the desired tool, and press [SELECT] in the tool list display. The tool coordinates display of the selected number is shown. Select the desired number with page key  in the tool coordinates display. Select { DISPLAY } → { LIST } or { DISPLAY } → { COORDINATE DATA } under the menu in order to switch between the tool list display and the tool coordinates display.



- \*3** The display can be scrolled by the cursor. The menu enters the state of a numeric input if the cursor is on the desired item to register and the [SELECT] is pressed.



- \*4** The input value is registered. The servo power is automatically turned off when editing the value during the servo power turned on, and the message "Servo off by changing data " is displayed for three seconds.



- When the data setting is not done

It is considered that data is not set correctly in tool load information in the following cases.

- When the weight (W) is "0".
- When the center of gravity position (Xg, Yg, Zg) are all "0".

In these cases, the robot is controlled by using the standard parameter value (Differ in each robot model) which were set when shipping.

Standard Value.....Weight : W = Payload

Center of gravity position:

(Xg, Yg, Zg) = (0, 0, Allowed value of B axis for rated

payload)

In this case, when an actual tool load is not too heavy, the manipulator can't be performed enough.

Moreover, when the tool which an actual tool center of gravity position greatly offsets in X direction or Y direction is installed the generated moment by the tool cannot be compensated.

- Switch of the tool file

In case that two or more tool files are used, Information on an effective tool file is referred for tool load information used by the ARM control at that time in according to switch tool file.

Set the same value of tool load information in each tool file when the tool file is switched to change only tool center point (when neither the weight nor the center of gravity position of the entire tool installed in the flange is changed).

Moreover, set tool load information to the corresponding tool file respectively when total weight and the center of gravity position etc. of the tool is changed (when the system which exchange the tool by automatic tool changer).

---

## 3.12 Shock Detection Function

### 3.12.1 Shock Detection Function

The shock detection function is a function to decrease damage because of the collision by instantaneously detecting the shock and stopping the manipulator without any external sensor when the tool or the manipulator collide with peripherals.

When the shock is detected either in teach mode and in play mode, the manipulator is stopped instantaneously.



This function cannot do away with the damage to peripherals completely. Moreover, this function does not guarantee safety to the person. Prepare the safety measures such as the safety fence etc. Refer to "MOTOMAN Setup Manual" for the safety measures in detail.

Injury or damage to machinery may result by collision with the manipulator.



**NOTE** This function is equipped with the undermentioned model.  
Applicable models: Motoman UP6, SK16X, UP20, SK45X, UP50, UP130

### 3.12.2 Shock Detection Function Setting

The shock detection function is set not to mis-detect the shock even if operating by the ratings load with the maximum speed when shipping from the factory. If tool load information is set correctly, the detection sensitivity can be improved. Moreover, it is possible to set the lower sensitivity of detection only for a specific section where the contact work etc. The sensitivity of detection is set by setting the detection level.

#### ■ Shock Detection Level Setting

The shock detection level is set in the shock detection level file.

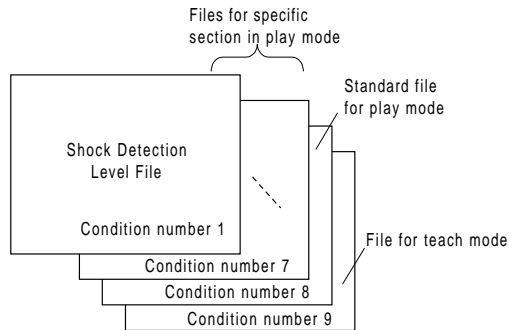
The shock detection set file are nine condition files as following figure.

Condition number 1 to 7 are used when the detection level is changed in a specific section in play mode.

Condition number 8 is a file used as standard in play mode. This function is operated by the detection level set in this file when playback operation.

Condition number 9 is a file for teach mode. The shock is detected by the detection level set in this file when the robot is operated in teach mode.

The detection level is changed by the SHCKSET instruction. After this instruction is executed, the shock will be detected by the detection level of the specified file when the condition number is specified at SHCKSET instruction. The detection level is returned to standard level when the SHCKRST instruction is executed.



The detection level of condition number 8 which is a standard file in play mode is adopted in play mode excluding the range between SHCKSET and SHCKRST in the job.

## Method of Shock Detection Level File Setting

### Operation

Select {ROBOT} under the top menu ➔ Select {SHOCK SENS LEVEL}<sup>\*1</sup> ➔ Select the desired condition number ➔ Select the desired item and set it

### Explanation

\*1 The shock detection level display is shown.

	DATA	EDIT	DISPLAY	UTILITY
①	SHOCK DETECTION LVL R1			
	DETECTION MODE: PLAY			
②	COND. NO. : 8 (STANDARD)			
		FUNC.	MAX.DISTURBANCE	DETECTION LVL
	R1	VALID	80	100
	R2	VALID	80	100
	S1	VALID	80	100
	S2	VALID	80	100
③	S3	VALID	80	100
	!			
				④
				⑤

#### ①Detection Mode

The shock detection mode is indicated.


#### ②Condition Number (1 to 9)

1 to 7: For changing detection level in play mode

8 : For standard detection level in play mode

9 : For detection level in teach mode

Do either of the following operations to display the desired condition number.  
When the desired condition number is input with a numeric key and the [ENTER] is pressed after the cursor is moved on the condition number and [SELECT] is pressed, the file of the selected condition number is displayed.

When page key  is pressed the condition number file is changed.

#### ③Function Select

VALID/INVALID of the shock detection function is specified here. The shock detection function is specified by each manipulator or each station axes which has this function.

The cursor is moved to the robot or the station axis which is desired to change the function "VALID" or "INVALID" and [SELECT] is pressed. "VALID" and "INVALID" is changed alternately whenever [SELECT] is pressed. The change of "VALID" or "INVALID" is effective for all the condition number files.

#### ④Max. Disturbance Force

The maximum disturbance force to the manipulator when the manipulator is moved in play back operation or axis operation is shown here.

Refer to this value when the detection level in (5) is input.

The maximum disturbance force can be cleared by setting in menu {DATA} → {CLEAR MAX VALUE}.

#### ⑤Detection Level (Level range: 1 to 500)

The shock detection level is specified here. Bigger value than the maximum disturbance force should be set.

The value (The detection level:100) not mis-detected the shock even if robot is operated at the maximum speed is set when shipping from the factory.

To change "Detection level", move the cursor to the robot or the station axis which is desired to change to appear the numeric input status and press [SELECT] moreover input the value by a numeric key and press [ENTER]. Set the level to small value to raise the detection sensitivity or set the level to large value to lower sensitivity.

#### NOTE

Set the level 20% or more greatly than the maximum disturbance force for the mis-detection prevention when the manipulator works.

Instantly stopping the manipulator by mis-detection may become a factor to damage the speed reducer or the tool.

<Example>

When the maximum disturbance force is 80, set the detection level 96 or more.

#### NOTE

"Detection level" can be changed only when the security mode is set as management mode.

## ■ Tool load Information Setting

To be the more accurate shock detection, the tool load information is set in the tool file.



Refer to " 3.11.3 Tool Load Information Setting " for details concerning the tool load information setting.

### Method of the Tool load Information Setting

#### Operation

Select {ROBOT} under the top menu ➡ Select {TOOL}<sup>\*1</sup> ➡ Select the desired tool number<sup>\*2</sup> ➡ Select the desired item and set it

#### Explanation

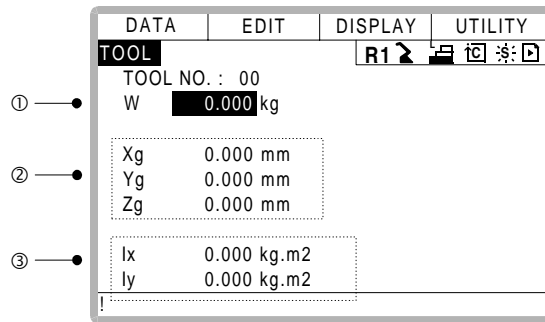
- <sup>\*1</sup> Tool list display is shown. Only when the file expansion function is valid, the tool list display is shown. When the file expansion function is invalid, the tool coordinates display is shown.

DATA	EDIT	DISPLAY	UTILITY
TOOL COORDINATE		R1	
NO.	NAME		
00	[TORCH1	]	
01	[TORCH2	]	
02	[	]	
03	[	]	
04	[	]	
05	[	]	
06	[	]	
07	[	]	
!			

DATA	EDIT	DISPLAY	UTILITY
TOOL		R1	
TOOL NO. : 00			
NAME :TORCH1			
X	0.000	mm	Rx 0.00 deg.
Y	0.000	mm	Ry 0.00 deg.
Z	0.000	mm	Rz 0.00 deg.
W	0.000 kg		
Xg	0.000 mm		
!			

- <sup>\*2</sup> Move the cursor to the number of the desired tool and press [ENTER] in the tool list display. The tool coordinates display of the selected number is shown. Select the desired number with page key in the tool coordinates display. Select { DISPLAY} → { LIST} or { DISPLAY} → {COORDINATE DATA} under the menu in order to switch between the tool list display and the tool coordinates display. The tool coordinates display is scrolled by the cursor.





①Weight

This is total weight of the installed tool.

Input weight by a numeric key and press [ENTER] after the numeric input status is appeared by moving the cursor and pressing [SELECT].

②Center of Gravity Position

This is center of gravity position of the installed tool. The value are specified by the coordinates value on each axis of the flange coordinates. Input the center of gravity position by a numeric key and press [ENTER] after the numeric input status is appeared by moving the cursor and pressing [SELECT].

③Moment of inertia at the Center of Gravity

This is Moment of inertia of the tool at the Center of Gravity in (2). The values are specified around each axis of the coordinates that are in parallel to the flange coordinates and where the original point is the center of gravity position.

Input the moment of inertia by numeric key and press [ENTER] after the numeric input status is appeared by moving the cursor and pressing [SELECT].

■ Instruction of Shock Detection Function

**SHCKSET instruction**

The SHCKSET instruction changes the shock detection level to the value set in the shock detection level file during play back operation.

The additional items of the SHCKSET instruction are as follows.

SHCKSET R1 SSL#(1)  
           |          |  
           ①          ②

①Robot / Station Setting

The robot or the station axis which is desired to change the shock detection level is specified. If nothing is specified, the detection level of the control group of the job to which this instruction is registered is changed.

However, if the job is coordinated job, the detection level of the slave axis group is changed.

### ② Shock Detection Level File (1 to 7)

The shock detection level file number is specified here. The detection level value when playback operation is set in the file. The detection level is changed by the condition of the file set here.

### SHCKRST instruction

The shock detection level changed by the SHCKSET instruction is reset and returned to the detection level of the standard (value set in condition number 8) by the SHCKRST instruction. The additional item of the SHCKRST instruction is as follows.

```
SHCKRST R1
          |
          ①
```

### ① Robot / Station Setting

The robot or the station axis which is desired to reset the shock detection level is specified here. If nothing is specified, the detection level of the control group of the job to which this instruction is registered is changed.

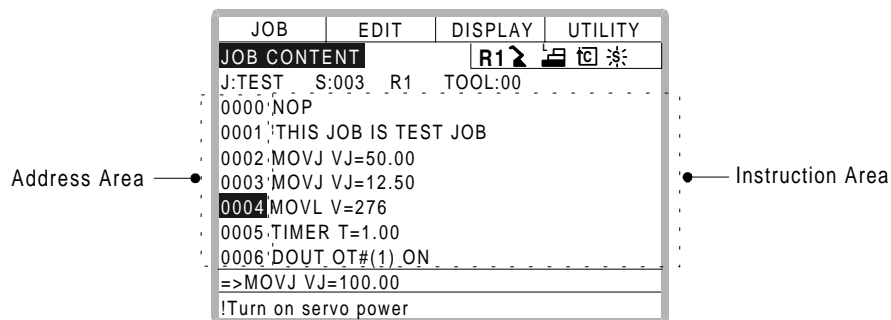
However, if the job is coordinated job, the detection level of the slave axis group is changed.

### Instruction Registration

The instruction is registered when the cursor is in the address area in the job content display in teach mode.

#### Operation

Select {JOB} under the top menu ➡ Select {JOB} ➡ Move the cursor in the address area



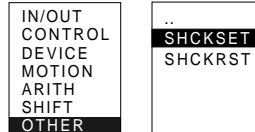
## SHCKSET

### Operation

Move the cursor to the line just before the location where SHCKSET instruction is desired to register ➡ Press [INFORM LIST]<sup>\*1</sup> ➡ Select SHCKSET instruction <sup>\*2</sup> ➡ Change the value of additional item and numerical data <sup>\*3</sup> ➡ Press [ADD] and [ENTER]<sup>\*4</sup>

### Explanation

\*1 The inform list dialog is shown.



\*2 SHCKSET instruction is displayed in the input buffer line.

```
=> SHCKSET SSL#(1)
```

\*3 < When register as it is >

Operate \*4 procedure when the instruction the input buffer line as it is should be registered.

< When add or change the additional item >

- When the shock detection level file is changed, move the cursor to the shock detection level file number, and increase or decrease the file number by pressing about [SHIFT] and the cursor key simultaneously.

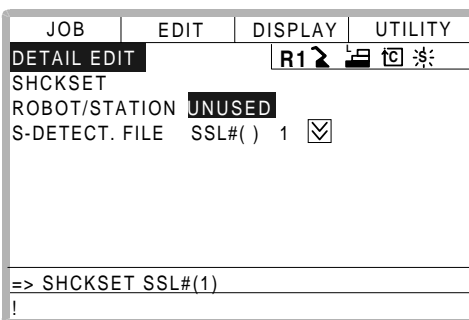
```
=> SHCKSET SSL#(2)
```

When the value is input with the numerical key, press [SELECT] to display the input buffer line.

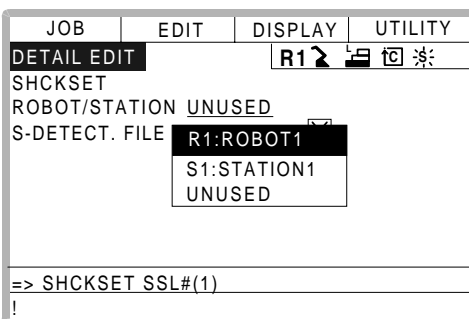
```
=>SHCKSET SSL#(1)
>Shock_sens_file_no.=
```

And press [ENTER] to change the number in the input buffer line.

- When robot/station specification is added, move the cursor to the instruction in the input buffer line and press [SELECT] to show the detail edit display.



Move the cursor to "UNUSED" of "ROBOT/STATION", and press [SELECT]. The selection dialog is shown. Move the cursor to added robot or station and press [SELECT].



When the addition of robot/station ends, press [ENTER]. The detail edit display shuts and the job content display is shown.

- \*4 The instruction displayed in the input buffer line is registered.

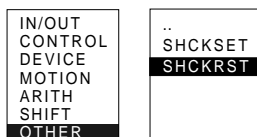
## SHCKRST

### Operation

Move the cursor to the line just before the location where SHCKRST instruction is desired to register ➡ Press [INFORM LIST]\*1 ➡ Select SHCKRST instruction \*2 ➡ Change the value of additional ite \*3 ➡ Press [ADD] and [ENTER]\*4

### Explanation

- \*1 The inform list dialog is shown.

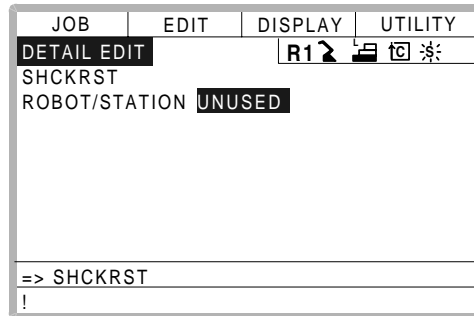


**\*2** SHCKRST instruction is displayed in the input buffer line.

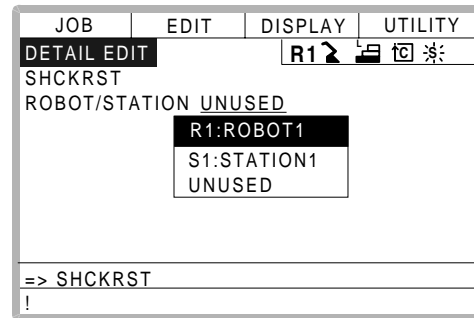


**\*3** < When register as it is >  
Operate \*4 procedure when the instruction the input buffer line as it is should be registered.

< When add or change the additional item >  
When robot/station specification is added, move the cursor to the instruction in the input buffer line and press [SELECT] to show the detail edit display.



Move the cursor to "UNUSED" of "ROBOT/STATION", and press [SELECT]. The selection dialog is shown. Move the cursor to added robot or station and press [SELECT].

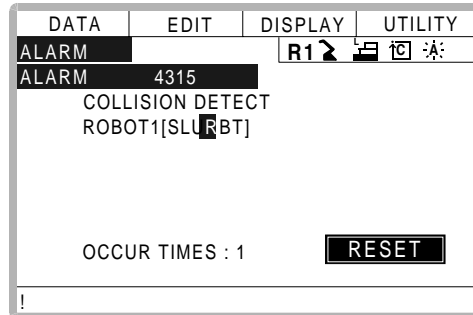


When the addition of the robot/the station ends, press [ENTER]. The detail edit display shuts and the job content display is shown.

**\*4** The instruction displayed in the input buffer line is registered.

## ■ Reset Shock detected

When the tool and the manipulator are collided with peripherals and it is detected by the shock detection function, the manipulator is stopped instantaneously with alarm output. At this time, the shock detection alarm is displayed.



The shock detection alarm in teach mode and play mode can be reset by the following operation.

### Operation

Press [SELECT]<sup>\*1</sup> ➔ Operation after resetting the detection status<sup>\*2</sup>

### Explanation

- \*1 The alarm is reset when "RESET" is selected on the alarm display, and the shock detection status is released.
- \*2 In teach mode, the JOG operation of the manipulator becomes possible again after resetting. In play mode, confirm the damage after moving the manipulator to the safety position once with teach mode though the playback operation is possible after resetting.



When manipulator was stopped instantaneously while having contact with the object and the detection alarm is tried to reset on the alarm display, the situation in which the alarm cannot be reset might be occurred because the collision might be detected again after resetting.

In this case, set the collision detection function "INVALID" with the shock detection level file or enlarge the detection level in teach mode and move the manipulator to safety position.

### 3.12.3 Alarm List

Alarm Number	Message	Cause	Remedy
4315	COLLISION DETECT Robot/Station [Axis Data]	<ul style="list-style-type: none"><li>• A collision from interference between robot and peripheral device etc. was detected.</li><li>• The collision was mis-detected by the normal movement of the robot, because the detection level was small.</li></ul>	<ul style="list-style-type: none"><li>• Remove the object after resetting the alarm or move the robot to the safety position.</li><li>• When the alarm cannot be reset because the robot comes in contact with the object, invalidate this function in the collision detection level set file or enlarge the detection level and move the robot to the safety position.</li><li>• Enlarge the detection level so as not to mis-detect the collision detection by the normal movement of the robot. Moreover, set accurate information of the weight of the tool.</li></ul>

## 3.13 Instruction Level Setting

### 3.13.1 Setting Contents

#### ■ Instruction Set

There are three instruction sets that can be used when registering the instructions for the robot language (INFORM II): the subset instruction set, the standard instruction set, and the expanded instruction set.

#### Subset Instruction Set

The instructions displayed in the instruction list are limited to just those that are most frequently used, reducing the number of instructions that can be registered. Since few instructions are displayed, selection and input are simple.

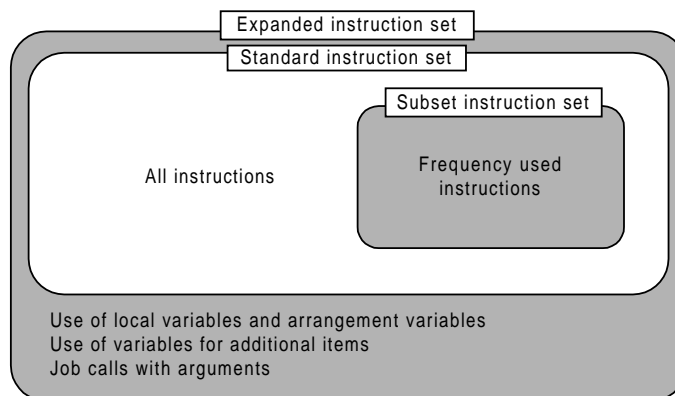
#### Standard Instruction Set / Expanded Instruction Set

All the INFORM II instructions can be used. The number of additional items to be used in each instruction differ in the standard instruction set and expansion instruction set.

In the standard instruction set, the following functions cannot be used. However, operation becomes easier because the number of data items decreases when registering an instruction.

- Use of local variables and arrangement variables
- Use of variables for additional items (Example: MOVJ = 1000)

When instructions are executed, for example during playback, all the instructions can be executed regardless of the instruction set used.

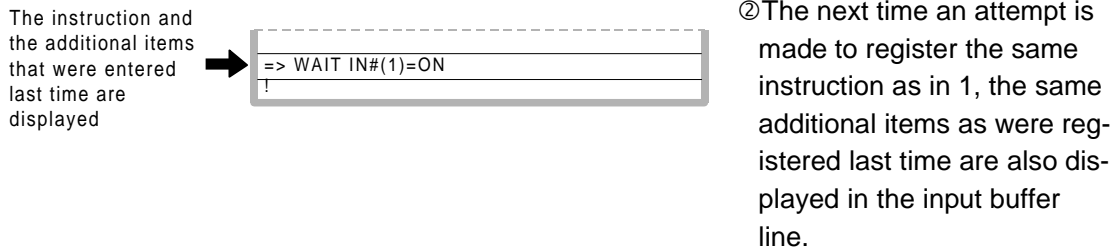




### ■ Learning Function

When an instruction is entered from the instruction list, the additional items that were entered last time are also displayed. This function can simplify instruction input.

To register the same additional items as those in the former operation, register them without changing.



### 3.13.2 Setting Instruction Set Level Operation

#### Operation

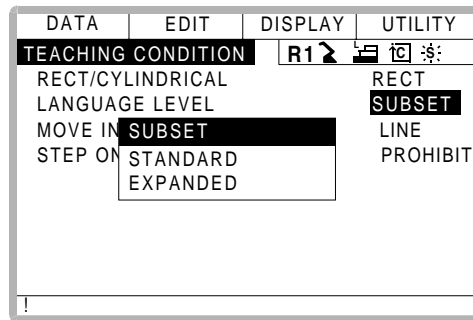
Select {SETUP} under the top menu → Select {TEACHIG COND}\*1 → Select “LANGUAGE LEVEL”\*2 → Select desired language level \*3

#### Explanation

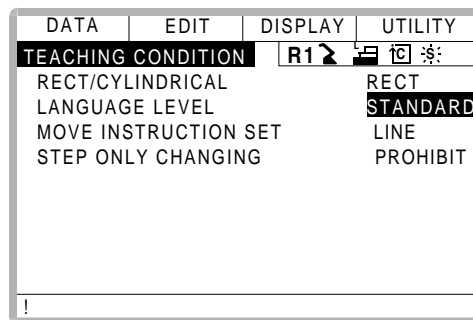
\*1 The teaching condition display is shown.

DATA	EDIT	DISPLAY	UTILITY
TEACHING CONDITION	R1	↘	⏏ ⏪ ⏩ ⏹
RECT/CYLINDRICAL			RECT
LANGUAGE LEVEL			SUBSET
MOVE INSTRUCTION SET			LINE
STEP ONLY CHANGING			PROHIBIT

\*2 The selection dialog is displayed.



\*3 Language level is set.



## 3.14 Number Key Customize Function

### 3.14.1 What is the Number Key Customize Function?

With this function, the user can change the function of an application that has been allocated to the number keys of the programming pendant.

Since any frequently used operation can be allocated to a number keys on the programming pendant, decreasing the number of key operations reduces the teaching time.



The Number Key Customize Function is only valid when the security mode is set to the management mode.

### 3.14.2 Allocatable Functions

There are two allocation methods as follows:

- Key Allocation (EACH)
- Key Allocation (SIM)

### ■ Key Allocation (EACH)

With key allocation (EACH), the manipulator operates according to the allocated function when the number key is pressed. The following shows the functions that can be allocated.

Function	Description
Manufacturer allocation	Allocated by Yaskawa. Allocating another function invalidates the function allocated by the manufacturer.
Instruction allocation	Allocates any instructions assigned by the user.
Job call allocation	Allocates job call instructions (CALL instructions). The jobs to be called are only those registered in the reserved job names. (Specify it by the registration No.)
Display allocation	Allocates any displays assigned by the user. It functions the same as the reserved display call function.

### ■ Key Allocation (SIM)

With key allocation (SIM), the manipulator operates according to the allocated function when the [INTERLOCK] and the number key are pressed at the same time. The following shows the functions that can be allocated.

Function	Description
Alternate output allocation	Turns ON/OFF the specified general output signal when [INTERLOCK] and the allocated number key are pressed at the same time.
Momentary output allocation	Turns ON the specified general output signal when [INTERLOCK] and the allocated number key are pressed at the same time.
Pulse output allocation	Turns ON the specified output signal only for the specified period when [INTERLOCK] and the allocated number key are pressed at the same time.
Group output allocation (4-bit/8-bit)	Sends the specified output to the specified general group output signals when [INTERLOCK] and the allocated number key are pressed at the same time.
Analog output allocation	Sends the specified voltage to the specified output port when [INTERLOCK] and the allocated number key are pressed at the same time.
Analog incremental output allocation	Sends the voltage increased by the specified value to the specified output port when [INTERLOCK] and the allocated number key are pressed at the same time.



In a system for multiple applications, a number key can be allocated for each application.

### 3.14.3 Allocating an Operation

#### Allocation Display

##### Operation

Select {SETUP} under the menu ➔ Select {KEY ALLOCATION}\*<sup>1</sup> ➔ Select {DIS-PLAY}\*<sup>2</sup> ➔ Select {ALLOCATE SIM. KEY} \*<sup>3</sup>

##### Explanation


\*<sup>1</sup> The key allocation (EACH) display is shown.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH)		R1	☰ ☱ ☲ ☳
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- MAKER			
. MAKER			
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

\*<sup>2</sup> The pull-down menu is displayed. To call up the key allocation (SIM) display, select {ALLOCATE SIM. KEY}.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EAC		ALLOCATE EACH KEY	
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- MAKER			
. MAKER			
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

\*<sup>3</sup> The key allocation (SIM) display is shown.

In a system multiple applications, press the page key  to change the display to the allocation display for each application.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(SIM)		R1	☰ ☱ ☲ ☳
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- MAKER			
. MAKER			
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

### ■ Instruction Allocation

Use this function in the key allocation (EACH) display.

#### Operation

Move the cursor to "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
 Select "INSTRUCTION"<sup>\*2</sup>

#### Explanation

\*1 The selection dialog box is shown.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH) R1			
APPLI.NO.:1			
KEY	FUNCTION	ALLOCATION CONTENT	
-	MAKER	MAKER	
.	MAKER	INSTRUCTION	
0	MAKER	JOB CALL	
1	MAKER	DISPLAY	
2	MAKER		
3	MAKER		
4	MAKER		
!			

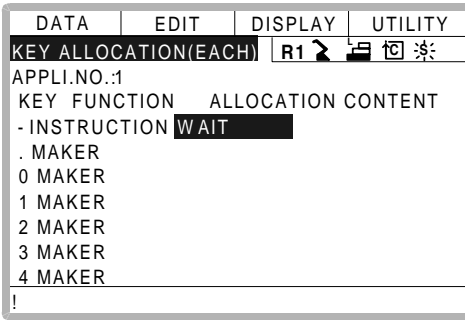
\*2 The instruction is displayed in the "ALLOCATION CONTENT".

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH) R1			
APPLI.NO.:1			
KEY	FUNCTION	ALLOCATION CONTENT	
-	INSTRUCTION	DOUT	
.	MAKER		
0	MAKER		
1	MAKER		
2	MAKER		
3	MAKER		
4	MAKER		
!			

To change the instruction, move the cursor to the instruction and press [SELECT]. Then the instruction group list dialog box is displayed. Select the group containing the instruction to be changed.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH) R1			
APPLI.NO.:1			
KEY	FUNCTION	ALLOCATION CONTENT	
-	INSTRUCTION	DOUT	IN/OUT
.	MAKER	CONTROL	
0	MAKER	DEVICE	
1	MAKER	MOTION	
2	MAKER	ARITH	
3	MAKER	SHIFT	
4	MAKER	OTHER	
!			

When the instruction list dialog box is displayed, select the instruction to be changed.



## ■ Job Call Allocation

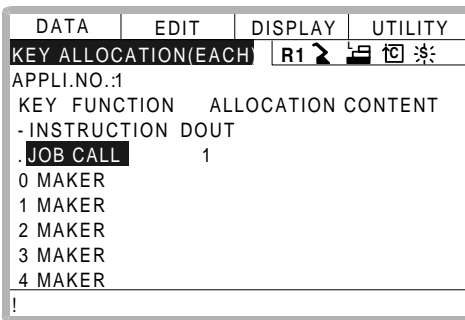
Use this function in the key allocation (EACH) display.

### Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
Select "JOB CALL"<sup>\*2</sup>

### Explanation

- \*1 The selection dialog box is displayed.
- \*2 The reserved job registration No. is displayed in the "ALLOCATION CONTENT" (reserved job registration No.: 1 to 10).



To change the reserved job registration No., move the cursor to the No. and press [SELECT]. Numeric values can now be entered. Input the number to be changed, and press [ENTER].

## ■ Display Allocation

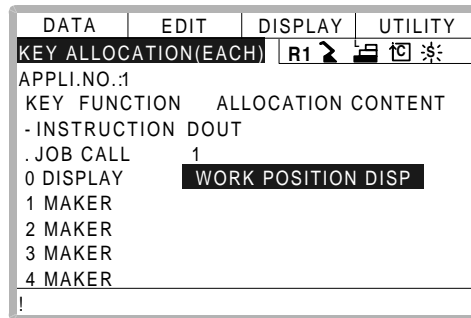
Use this function is used in the key allocation (EACH) display.

### Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
 Select "DISPLAY" ➡ Move the cursor to "ALLOCATION CONTENT" ➡ Press  
 [SELECT]<sup>\*2</sup> ➡ Input the name of the reserved display and press [ENTER]<sup>\*3</sup> ➡ Open the  
 display for allocation ➡ Press [INTERLOCK] and the allocated key at the same time<sup>\*4</sup>

### Explanation

- \*1 The selection dialog box is displayed.
- \*2 The character input status is entered.
- \*3 The reserved name input to the "ALLOCATION CONTENT" is displayed.



- \*4 A message "Reserved display registered" is displayed, and the display is registered.



The display allocation functions the same as the reserved display call function. Only one display can be allocated to a key.

## ■ Alternate Output Allocation

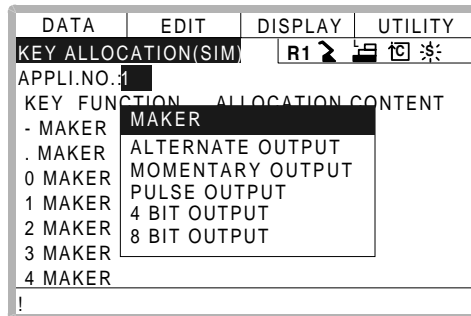
Use this function is used in the key allocation (SIM) display.

### Operation

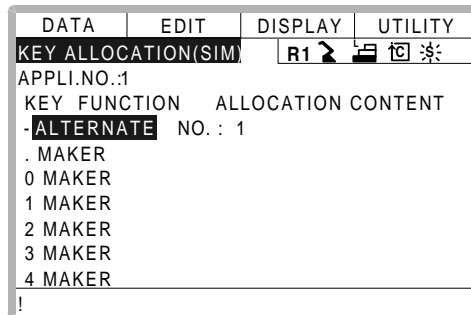
Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
Select "ALTERNATE OUTPUT"<sup>\*2</sup>

### Explanation

\*1 The selection dialog box is displayed.



\*2 The output No. is displayed in the "ALLOCATION CONTENT".



To change the output No., move the cursor to the No. and press [SELECT]. Numeric values can now be entered. Input the number to be changed, and press [ENTER].

## ■ Momentary Output Allocation

Use this function in the key allocation (SIM) display.

### Operation

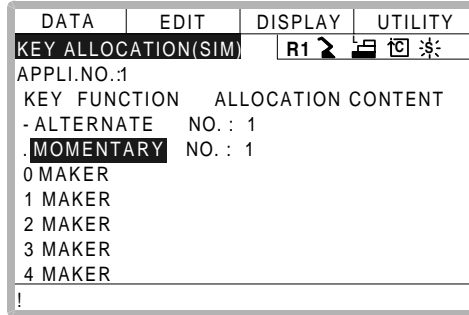
Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
Select "MOMENTARY OUTPUT"<sup>\*2</sup>

### Explanation

\*1 The selection dialog box is displayed.



\*2 The output No. is displayed in the “ALLOCATION CONTENT”.



To change the output No., move the cursor to the No. and press [SELECT]. Numeric values can now be entered. Input the number to be changed, and press [ENTER].

## ■ Pulse Output Allocation

Use this function in the key allocation (SIM) display.

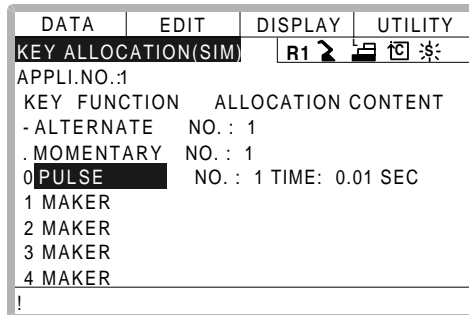
### Operation

Move the cursor to the “FUNCTION” of the key to be allocated ➡ Press [SELECT]\*1 ➡  
 Select “PULSE OUTPUT”\*2

### Explanation

\*1 The selection dialog box is displayed.

\*2 The output No. and output time are displayed in the “ALLOCATION CONTENT”.



To change the output No. or output time, move the cursor to the No. or time and press [SELECT]. Numeric values can now be entered. Input the number or time to be changed, and press [ENTER].

## ■ Group (4-bit/8-bit) Output Allocation

Use this function in the key allocation (SIM) display.

### Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
Select "4 BIT OUTPUT" or "8 BIT OUTPUT"<sup>\*2</sup>

### Explanation

\*1 The selection dialog box is displayed.

\*2 The output No. and output value are displayed in the "ALLOCATION CONTENT".

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(SIM)		R1	☰ ☲ ☱ ☴
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- ALTERNATE	NO. : 1		
. MOMENTARY	NO. : 1		
0 PULSE	NO. : 1 TIME: 0.01 SEC		
1 4BIT OUTPUT	NO. : 1 OUT : 0		
2 MAKER			
3 MAKER			
4 MAKER			
!			

To change the output No. or output value, move the cursor to the No. or value and press [SELECT]. Numeric values can now be entered. Input the number or value to be changed, and press [ENTER].

## ■ Analog Output Allocation

Use this function in the key allocation (SIM) display.

### Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]<sup>\*1</sup> ➡  
Select "ANALOG OUTPUT"<sup>\*2</sup>

### Explanation

\*1 The selection dialog box is displayed.

\*2 The output port number and the output voltage value are displayed in the "ALLOCATION CONTENT".

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(SIM)		R1	☰ ☲ ☱ ☴
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- ALTERNATE	NO. : 1		
. MOMENTARY	NO. : 1		
0 PULSE	NO. : 1 TIME: 0.01 SEC		
1 4BIT OUTPUT	NO. : 1 OUT : 0		
2 ANALOG OUT	NO. : 1 OUT : 0.00		
3 MAKER			
4 MAKER			
!			

To change the output port No. or output voltage value, move the cursor to the No. or voltage value and press [SELECT]. Numeric values can now be entered. Input the number or voltage value to be changed, and press [ENTER].

### ■ Analog Incremental Output Allocation

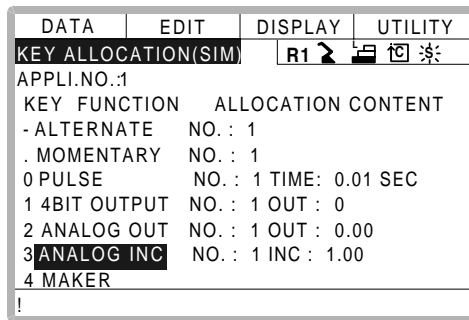
Use this function in the key allocation (SIM) display.

#### Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]\*1 ➡  
 Select "ANALOG INC OUTPUT"\*2

#### Explanation

- \*1 The selection dialog box is displayed.
- \*2 The output port No. and incremental value are displayed in the "ALLOCATION CONTENT".



To change the output port No. or incremental value, move the cursor to the No. or incremental value and press [SELECT]. Numeric values can now be entered. Input the number or incremental value to be changed, and press [ENTER].

### 3.14.4 Allocation of I/O Control Instructions

With key allocation (SIM), output control instructions can be allocated to the number keys that have been allocated one of the following I/O controls key allocation (EACH).

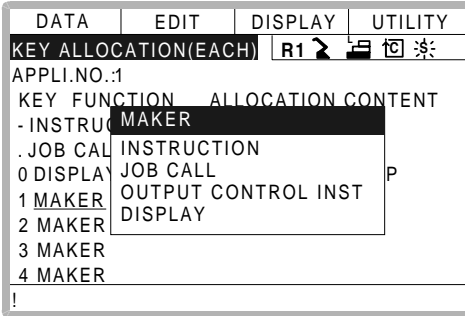
Function	Output Control Instruction To Be Allocated
Alternate output allocation	DOUT OT# (No.) ON
Momentary output allocation	
Pulse output allocation	PULSE OT# (No.) T = output time
Group output allocation (4-bit)	DOUT OGH (No.) output value
Group output allocation (8-bit)	DOUT OG# (No.) output value
Analog output allocation	AOUT AO# (No.) output voltage value

**Operation**

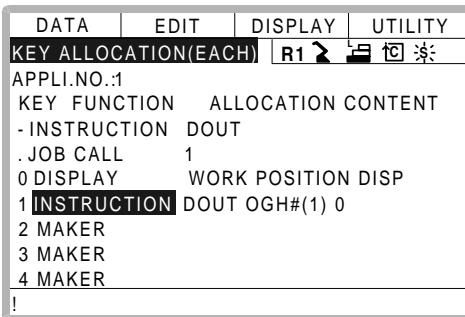
Move the cursor to the "FUNCTION" of the key that has been allocated with I/O control with key allocation (SIM) → Press [SELECT] \*1 → Select "OUTPUT CONTROL INST"\*2

**Explanation**

\*1 The selection dialog box is displayed.



\*2 The instruction corresponding to the I/O control allocated by key allocation (SIM) is displayed in the "ALLOCATION CONTENT".



The allocated instruction changes automatically when "ALLOCATION CONTENT" is changed by key allocation (SIM).

Even if the I/O control allocation is changed to the default setting allocated by the manufacturer, the settings for key allocation (EACH) remain the same.

### 3.14.5 Execution of Allocation

#### ■ Executing the Instruction/Output Control Allocation

##### Operation

Press the key allocated for instruction allocation or output control allocation <sup>\*1</sup> ➔ Press [INSERT] and [ENTER] <sup>\*2</sup>

##### Explanation

<sup>\*1</sup> The allocated instruction is displayed in the input buffer line.

```
=> WAIT IN#(1) =ON
```

<sup>\*2</sup> The instruction displayed in the input buffer line is registered.

#### ■ Executing the Job Call Allocation

##### Operation

Press the key allocated for the job call allocation <sup>\*1</sup> ➔ Press [INSERT] and [ENTER] <sup>\*2</sup>

##### Explanation

<sup>\*1</sup> The CALL instruction is displayed in the input buffer line.

```
=> CALL JOB: ARCON
```



<sup>\*2</sup> The CALL instruction displayed in the input buffer line is registered.

#### ■ Executing the Display Allocation

##### Operation

Press the key allocated for the display allocation <sup>\*1</sup>

##### Explanation

<sup>\*1</sup> The allocated display is shown. At the same time, the reserved display key  lights up. Press the allocated key again to turn off the reserved display key  return to the previous display.

#### ■ Executing the I/O Control Allocation

##### Operation

Press [INTERLOCK] and the key allocated for I/O control allocation at the same time <sup>\*1</sup>

##### Explanation

<sup>\*1</sup> Allocated functions are executed.

## 3.15 Changing the Output Status

The status of external output signals can be changed from the programming pendant by using either of the following two methods.

- On the universal output status display (see " 5.2.2 Universal Output ")
- On the relay on display

The method that uses the relay on display, which is described here, simplifies the operation for changing the status of signals that are used frequently.

**NOTE** A maximum of 16 output signals can be displayed on the relay on display and they must be set in advance with parameter settings S2C213 to S2C228.

### Operation

Select {IN/OUT} under the top menu ➔ Select {RELAY ON}<sup>\*1</sup> ➔ Select the desired signal for changing<sup>\*2</sup> ➔ Press [INTER LOCK]+[SELECT]<sup>\*3</sup>

### Explanation

<sup>\*1</sup> The relay on display is shown.

DATA	EDIT	DISPLAY	UTILITY
RELAY ON		R1	[ ] [ ] [ ] [ ]
OUTPUT NO.	STATUS	NAME	
OUT#010	●	[HAND1 ]	
OUT#008	○	[ ] ]	
OUT#014	○	[ ] ]	
OUT#009	●	[ ] ]	

<sup>\*2</sup> Select the status (○ or ●) of the desired signal to change.

---

### 3.15 Changing the Output Status

---

\*3 The status is changed. (●: status ON, ○: status OFF)

DATA	EDIT	DISPLAY	UTILITY
RELAY ON		R1	⏏ ⏏ ⏏ ⏏
OUTPUT NO.	STATUS	NAME	
OUT#010	●	[HAND1	]
OUT#008	○	[	]
OUT#014	○	[	]
OUT#009	●	[	]



It is also possible to turn the relevant external output signal on only for the duration that [INTER LOCK]+[SELECT] are pressed. This selection is made in advance by setting the parameters S2C229 ~ 244 to "1".

## 3.16 Temporary Release of Soft Limits

The switches that are set to detect the working envelope of the manipulator are called limit switches. The operating range is monitored by the software in order to stop motion before these limit switches are reached. These software limits are called "soft limits." The operating range of the manipulator is controlled by the following two soft limits.

- Maximum working range for each axis
- Cubic operation area set parallel to the robot coordinate system

These soft limits are continually monitored by the system. When it is detected that the manipulator (tool center point) has reached a soft limit, the manipulator automatically stops.

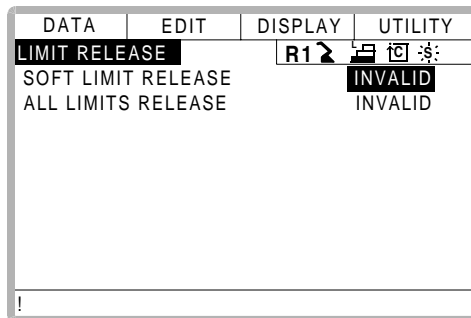
When the manipulator is stopped at a soft limit, temporarily release the soft limit by following the procedure below, then move the manipulator away from that which exceeded the soft limit.

### Operation

Select {ROBOT} under the top menu → Select {LIMIT RELEASE}<sup>\*1</sup> → Select "SOFT LIMIT RELEASE"<sup>\*2</sup>

### Explanation

<sup>\*1</sup> The limit release display is shown.



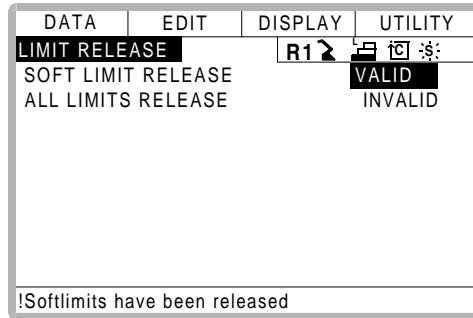


---

### 3.16 Temporary Release of Soft Limits

---

- \*2 Each time [SELECT] is pressed, "VALID" and "INVALID" alternate. When "SOFT LIMIT RELEASE" is set to "VALID," the message "Soft limits have been released" is displayed.



When "SOFT LIMIT RELEASE" is set to "INVALID," the message "Soft limits have been released" is displayed for three seconds.



The teaching data cannot be entered while releasing software limit.

## 3.17 File Initialize

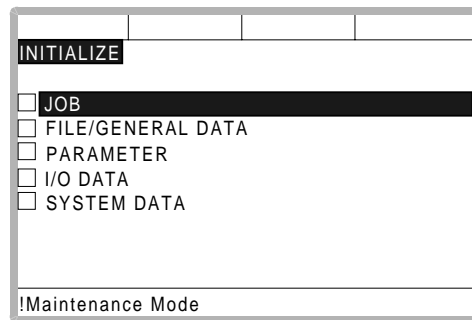
### 3.17.1 Initialize Job File

#### Operation

Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Change the security mode to management mode ➡ Select {FILE} under the top menu ➡ Select {INITIALIZE} <sup>\*1</sup> ➡ Select "JOB" <sup>\*2</sup> ➡ Select "YES" <sup>\*3</sup>

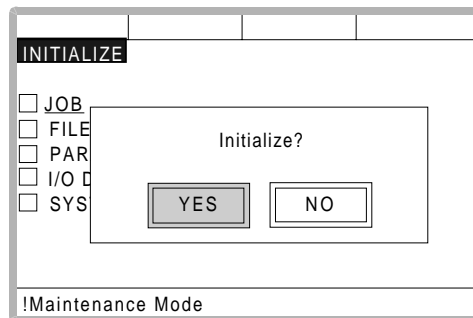
#### Explanation

<sup>\*1</sup> Initializing objects are shown.



Item marked by ■ can not be selected.

<sup>\*2</sup> The confirmation dialog is displayed.



<sup>\*3</sup> Job data is initialized.

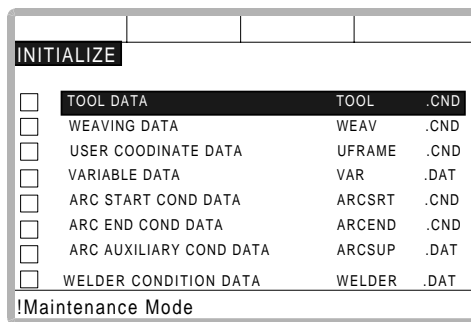
### 3.17.2 Initialize Data File

**Operation**

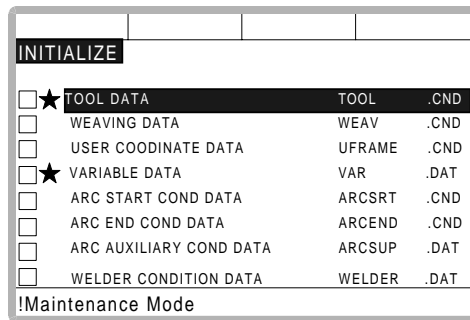
Turn the power supply ON while pressing [TOP MENU] simultaneously → Change the security mode to management mode → Select {FILE} under the top menu → Select {INITIALIZE} → Select {FILE/GENERAL DATA} \*1 → Select data file for initializing \*2 → Press [ENTER] \*3 → Select "YES" \*4

**Explanation**

\*1 Data files are shown.

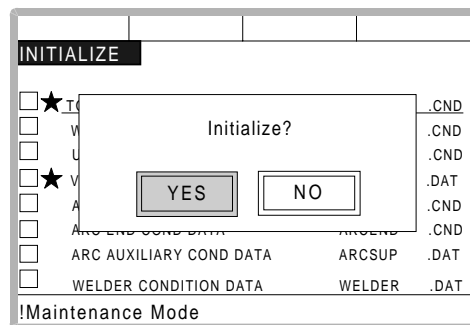


\*2 The selected data file is marked with "★".



File/Data marked by ■ can not be selected.

\*3 The confirmation dialog is displayed.



\*4 Selected data file is initialized.

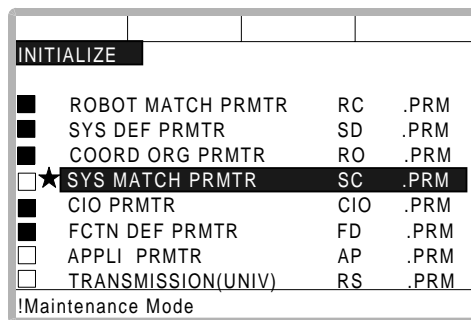
### 3.17.3 Initialize Parameter File

#### Operation

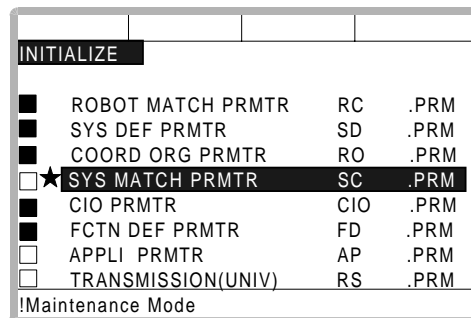
Turn the power supply ON while pressing [TOP MENU] simultaneously → Change the security mode to management mode → Select {FILE} under the top menu → Select {INITIALIZE} → Select {PARAMETER} \*1 → Select parameter for initializing \*2 → Press [ENTE] \*3 → Select "YES" \*4

#### Explanation

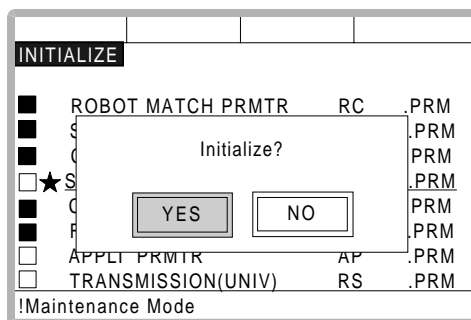
\*1 Parameters are shown.



\*2 The selected parameter is marked with "★".



\*3 The confirmation dialog is displayed



\*4 Selected parameter is initialized.

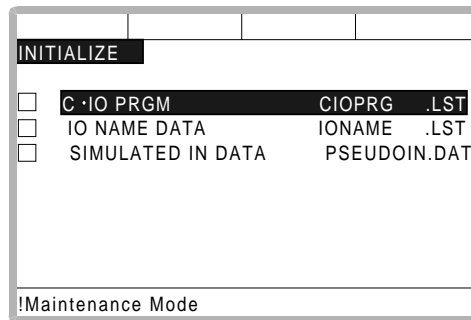
### 3.17.4 Initializing I/O Data

#### Operation

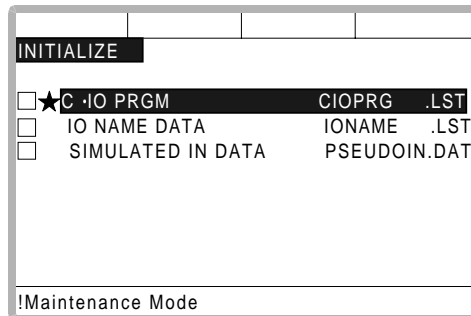
Turn the power supply ON while pressing [TOP MENU] simultaneously ➔ Change the security mode to management mode ➔ Select {FILE} under the top menu ➔ Select {INITIALIZE} ➔ Select {I/O DATA} \*1 ➔ Select data for initializing \*2 ➔ Press [ENTER]\*3 ➔ Select "YES" \*4

#### Explanation

\*1 The I/O data is shown.

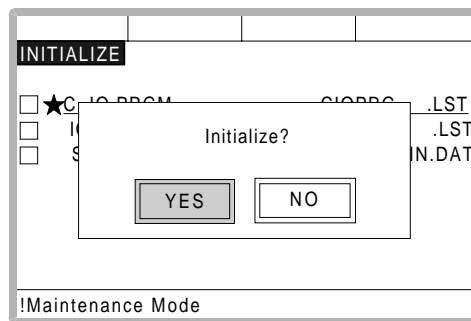


\*2 The selected data is marked with "★".



Parameters marked by ■ can not be selected.

\*3 The confirmation dialog box is displayed.



\*4 The selected data is initialized.

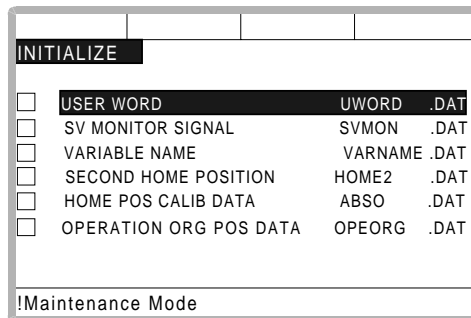
## 3.17.5 Initializing System Data

### Operation

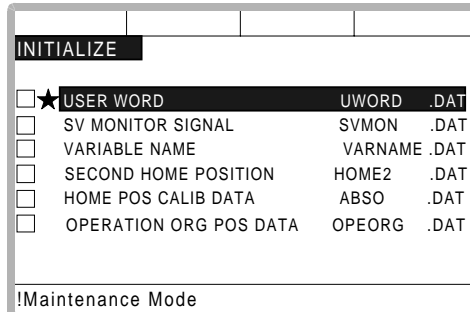
Turn the power supply ON while pressing [TOP MENU] simultaneously → Change the security mode to management mode → Select {FILE} under the top menu → Select {INITIALIZE} → Select {SYSTEM DATA} → Select the parameter to be initialized \*2 → Press [ENTER] \*3 → Select "YES" \*4

### Explanation

\*1 The system data is shown.

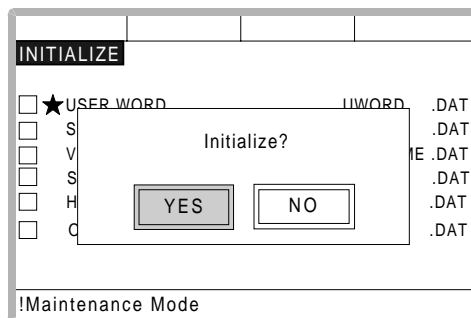


\*2 The selected data is marked with "★".



Parameter marked by ■ can not be selected.

\*3 The confirmation dialog box is displayed.



\*4 The selected data is initialized.

---

### 3.17 File Initialize

---

## 4 Modification of System Configuration

### 4.1 Addition of I/O Modules

For addition of I/O modules, turn the power supply off.



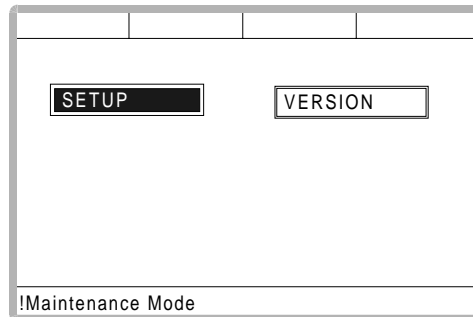
The additional operation must be done in the management mode.  
In operation mode or editing mode, only confirmation of status setting is possible.

#### Operation

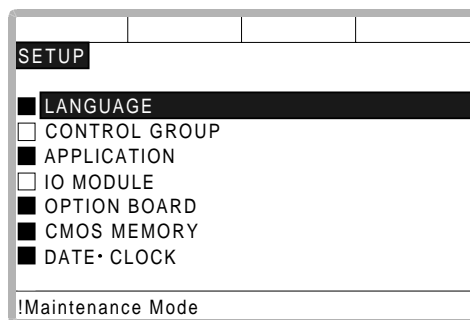
Turn the power supply ON while pressing [TOP MENU] simultaneously → Select {SYSTEM} under the top menu \*1 → Select {SETUP} \*2 → Select {IO MODULE} \*3 → Confirm the status of mounted I/O module \*4 → Press [ENTER] \*5 → Press [ENTER] \*6 → Select "YES" \*7

#### Explanation

\*1 System display is shown.



\*2 The setup display is shown.



Item marked by ■ can not be set.



---

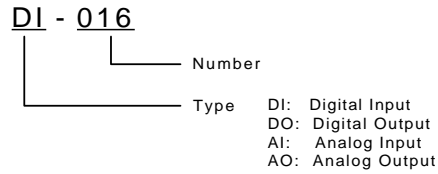
## 4.1 Addition of I/O Modules

---

- \*3** The current status of the mounted I/O module is displayed.

IO MODULE	
ST#01	DI-008 DO-008 AI-002 AO-002
ST#02	DI-016 DO-016
ST#03	NONE
ST#04	NONE
ST#05	NONE
ST#06	NONE
ST#07	NONE
ST#08	NONE
!Maintenance Mode	

- \*4** Confirm that each station (ST#) is the correct status.



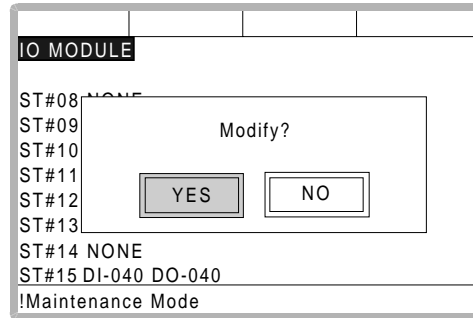
- \*5** The status of the mounted I/O module for the rest of the stations appears. Confirm them.



If the slot display is different, check the status again. If the status is correct, the I/O module may be defective. Contact your Yaskawa representative.

IO MODULE	
ST#08	NONE
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	

- \*6 The confirmation dialog is shown.



- \*7 The system parameters are then set automatically according to the current mounted hardware status. The procedure for the addition of the I/O module is complete.

## 4.2 Addition of Base and Station Axis

For addition of base and station axis, mount all hardware correctly and then execute maintenance mode.



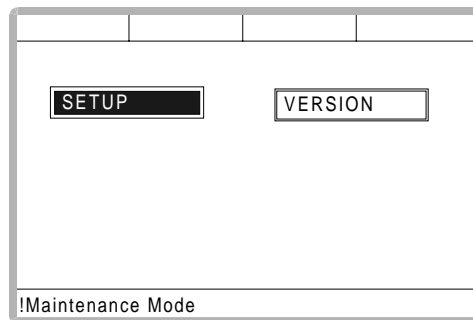
The additional operation must be done in the management mode. In operation mode or editing mode, only confirmation of status setting is possible.

### Operation

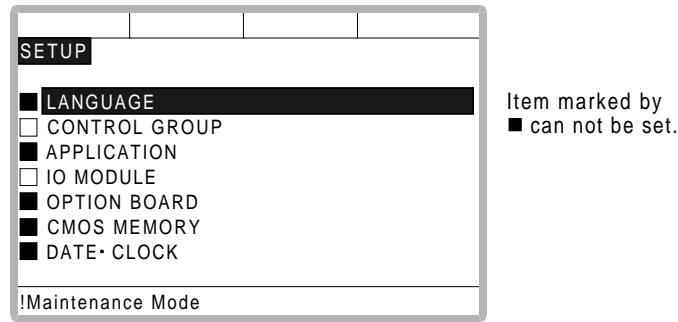
Turn the power supply ON while pressing [TOP MENU] simultaneously → Select {SYSTEM} under the top menu \*1 → Select {SETUP} \*2 → Select {CONTROL GROUP} \*3 (Display moves to the control group display.)

### Explanation

- \*1 The system display is shown.



\*2 The setup display is shown.



\*3 The display moves to the control group display shown in the followings pages.

The following items must be set for base and station axes.

### -TYPE

Select one in the type list.

In case of base axis (B1,B2,B3)

Select one of RECT-X, -Y, -Z, -XY, -XZ, -YZ or -XYZ.

In case of station axis (S1,S2,S3,S4,S5,S6)

Select one of TURN-1, -2.

In case of other type, select one of UNIV-1, -2, -3, -4, -5, -6

### -CONNECTION

In the connection display, specify the SERVOPACK which is connected with each axis group and the contactor which is used for the SERVOPACK.

### -AXIS TYPE

Select one in the axis type list.

In case of TURN-\* type

No need to select (The axis type is set as TURN type.)

In case of RECT-\* type

Select BALL-SCREW type or RACK & PINION type.

In case of UNIV-\* type

Select BALL-SCREW type, RACK & PINION type or TURN type.

### -MECHANICAL SPECIFICATION

If axis type is ball-screw type, set the following items.

MOTION RANGE (+) [mm]

MOTION RANGE (-) [mm]

REDUCTION RATIO (numerator)

REDUCTION RATIO (denominator)

BALL-SCREW PITCH [mm/r]

If axis type is rack & pinion type, set the following items.

MOTION RANGE (+) [mm]  
 MOTION RANGE (-) [mm]  
 REDUCTION RATIO (numerator)  
 REDUCTION RATIO (denominator)  
 PINION DIAMETER [mm]

If axis type is turn type, set the following items.

MOTION RANGE (+) [deg]  
 MOTION RANGE (-) [deg]  
 REDUCTION RATIO (numerator)  
 REDUCTION RATIO (denominator)  
 OFFSET (1st and 2nd axis) [mm]

#### -MOTOR SPECIFICATION

Set the following items.

MOTOR  
 SERVO AMP  
 CONVERTER  
 ROTATION DIRECTION [NORMAL/REVERSE]  
 MAX. RPM [rpm]  
 ACCELERATION SPEED [sec]  
 INERTIA RATIO

\* Select MOTOR, AMPLIFIER and CONVERTER from each type's list.

## 4.2.1 Base Axis Setting

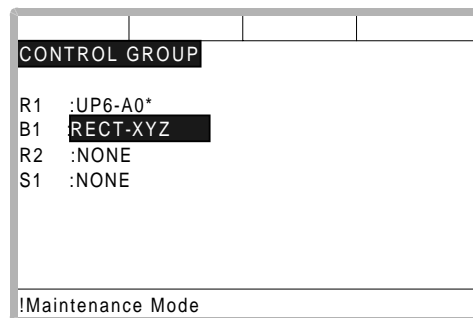
First, select control group type

### Operation

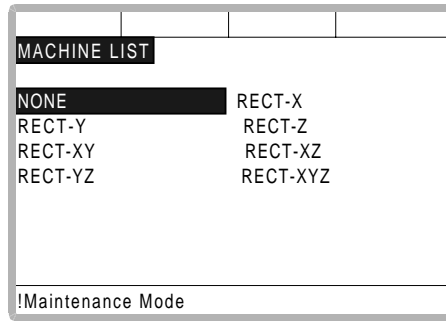
Confirm the type of control group in control group display<sup>\*1</sup> → Select type of control group for changing<sup>\*2</sup> → Select one in the machine list<sup>\*3</sup> → Press [ENTER] in control group display

### Explanation

<sup>\*1</sup> The control group display is shown.



\*2 Machine type selection display is shown.



RECT-X :TRAVEL X-AXIS BASE  
 RECT-Y :TRAVEL Y-AXIS BASE  
 RECT-Z :TRAVEL Z-AXIS BASE  
 RECT-XY :TRAVEL XY-AXIS BASE  
 RECT-XZ :TRAVEL XZ-AXIS BASE  
 RECT-YZ :TRAVEL YZ-AXIS BASE  
 RECT-XYZ:TRAVEL XYZ-AXIS BASE  
 (See following pages)

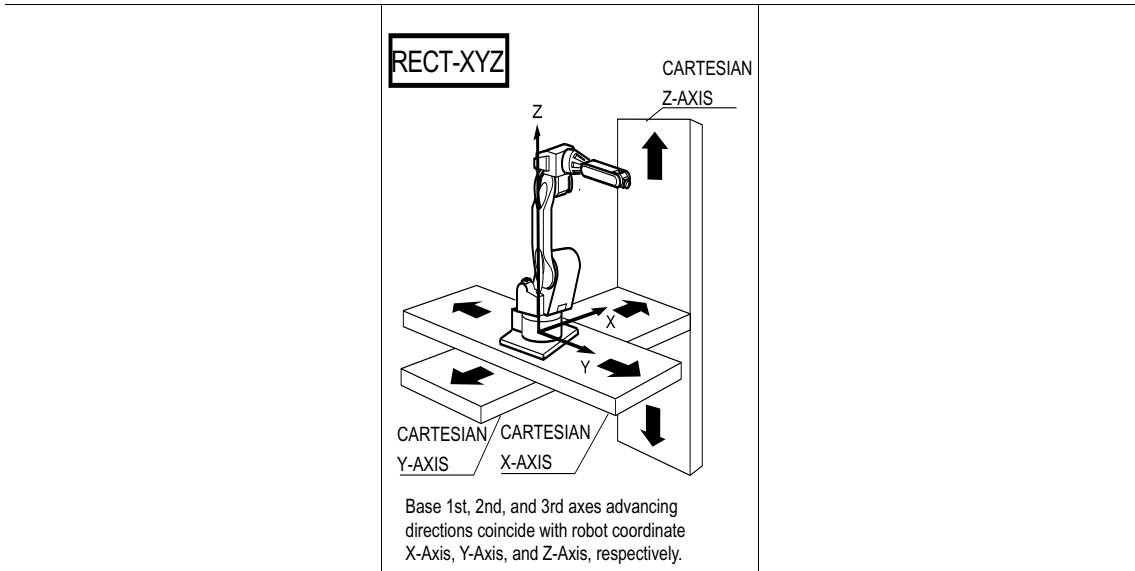
\*3 After the type selection, the display returns to control group display.

\*4 The display moves to the connection display.

Direction of Base Axis

<p><b>RECT-X</b></p> <p>Base axis advancing direction coincides with robot coordinate X-Axis.</p>	<p><b>RECT-Y</b></p> <p>Base axis advancing direction coincides with robot coordinate Y-Axis.</p>	<p><b>RECT-Z</b></p> <p>Base axis advancing direction coincides with robot coordinate Z-Axis.</p>
<p><b>RECT-XY</b></p> <p>Base 1st and 2nd axes advancing directions coincide with robot coordinate X-Axis and Y-Axis, respectively.</p>	<p><b>RECT-YZ</b></p> <p>Base 1st and 2nd axes advancing directions coincide with robot coordinate Y-Axis and Z-Axis, respectively.</p>	<p><b>RECT-XZ</b></p> <p>Base 1st and 2nd axes advancing directions coincide with robot coordinate X-Axis and Z-Axis, respectively.</p>

Direction of Base Axis



In the connection display, the SERVOPACK which is connected with each control group, and the contactor which is used for the SERVOPACK, are specified.

**Operation**

Confirm type of each control group in the connection display<sup>\*1</sup> → Select connection item of desired control group<sup>\*2</sup> → Select desired item → Press [ENTER] in the connection display<sup>\*3</sup>

**Explanation**

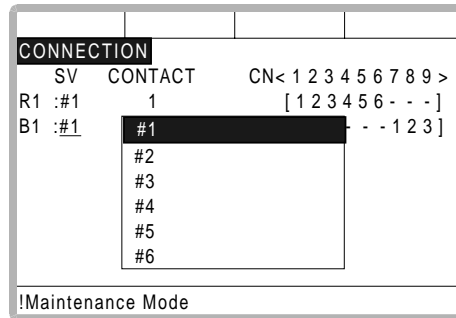
\*1 The connection status of each control group is shown.

CONNECTION			
SV	CONTACT	CN	< 1 2 3 4 5 6 7 8 9 >
R1 :#1	1		[ 1 2 3 4 5 6 - - - ]
B1 :#1	2		[ - - - - - 1 2 3 ]

!Maintenance Mode

→ Control group which is set as "NONE" in the control group display is not shown.

- \*2** The items which can be set are shown.  
When the item is selected the display returns to the connection display.



It is possible to change freely the connection between each axis of each control group and each connector (CN) of a SERVOPACK. The number in [ ] means axis number, and it indicates the connector number to which each axis connects.

The example above meaning is as follows,

R1(Robot)

- 1st axis → 1CN (SERVOPACK #1, 1st contactor is used)
- 2nd axis → 2CN (SERVOPACK #1, 1st contactor is used)
- 3rd axis → 3CN (SERVOPACK #1, 1st contactor is used)
- 4th axis → 4CN (SERVOPACK #1, 1st contactor is used)
- 5th axis → 5CN (SERVOPACK #1, 1st contactor is used)
- 6th axis → 6CN (SERVOPACK #1, 1st contactor is used)

B1(Base)

- 1st axis → 7CN (SERVOPACK #1, 2nd contactor is used)
- 2nd axis → 8CN (SERVOPACK #1, 2nd contactor is used)
- 3rd axis → 9CN (SERVOPACK #1, 2nd contactor is used)

- \*3** The setting in the connection display is completed and the display moves to the axes form display.

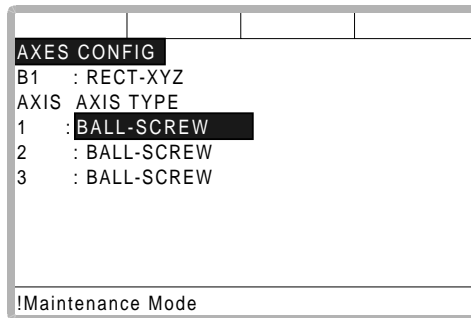
In the axes configuration display, the axis type and motor type are specified.

### Operation

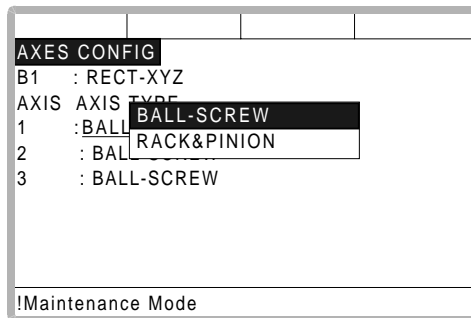
Confirm axis type of each axis in the axes configuration display <sup>\*1</sup> → Select desired axis <sup>\*2</sup> → Select desired axis type → Press [ENTER] in the axes configuration display <sup>\*3</sup>

### Explanation

<sup>\*1</sup> The axis type of each axis is shown.



<sup>\*2</sup> The axis type which can be set is shown.



The traveling axis of ball-screw type should be selected as "BALL-SCREW," the one of rack & pinion type should be selected as "RACK & PINION." Then the display returns to the axes configuration display.

<sup>\*3</sup> The setting in the axes configuration display is completed and the display moves to the mechanical specification display.



In the mechanical specification display, mechanical data are specified.

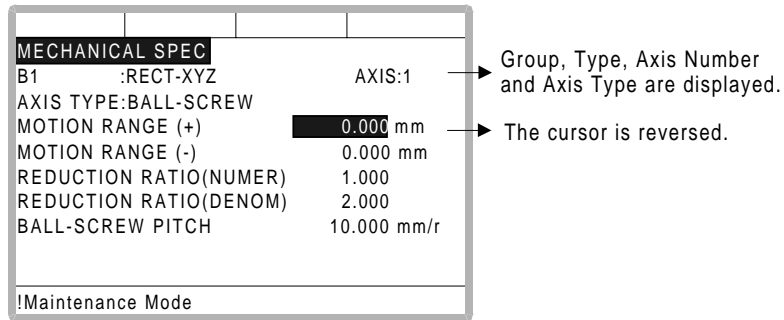
**Operation**

Confirm specification of each axis in the mechanical specification display<sup>\*1</sup> → Select desired item → Input the value → Press [ENTER] <sup>\*2</sup>

**Explanation**

<sup>\*1</sup> The mechanical specification is shown.

The mechanical specification display (In case of BALL-SCREW type)

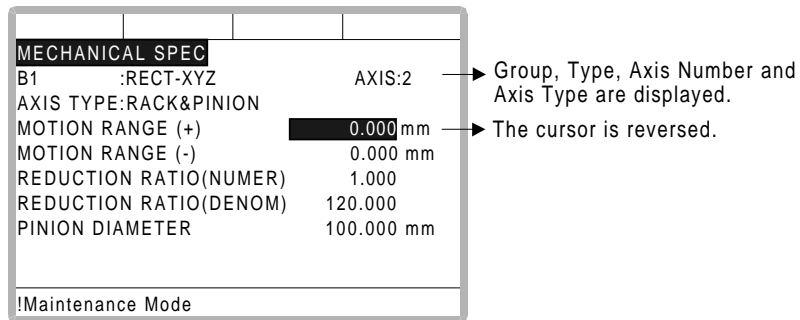


MOTION RANGE :Input maximum moving position (+ direction and - direction) from origin point. (Unit: mm)

REDUCTIONRATIO :Input the numerator and the denominator.  
 <e.g.> If the reduction ratio is 1/2, the numerator should be set as 1.0 and the denominator should be set as 2.0.

BALL-SCREW PITCH :Input the traveling length when the ball-screw rotates once. (Unit: mm/r)

The mechanical specification display (In case of RACK & PINION type)



MOTION RANGE :Input maximum moving position (+ direction and - direction) from origin point. (Unit: mm)

REDUCTIONRATIO :Input the numerator and the denominator.  
 <e.g.> If the reduction ratio is 1/120, the numerator should be set as 1.0 and the denominator should be set as 120.0.

PINION DIAMETER :Input the diameter of a pinion. (Unit: mm)

- \*2** After this setting, the display moves to the next axis. Set them for all axes.  
When [ENTER] is pressed in the mechanical specification display for last axis the setting in the mechanical specification display is completed and the display moves to the motor specification display.

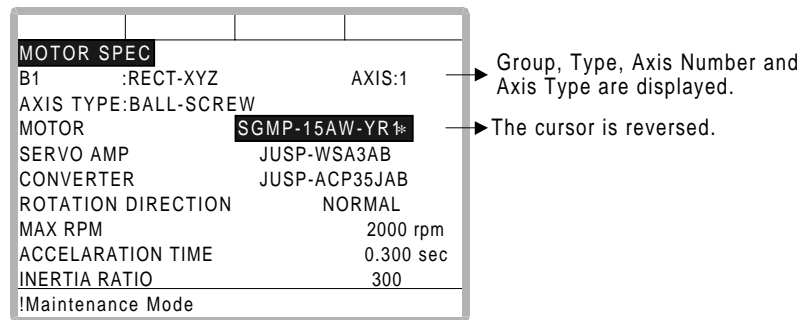
In the motor specification display, motor data are specified.

### Operation

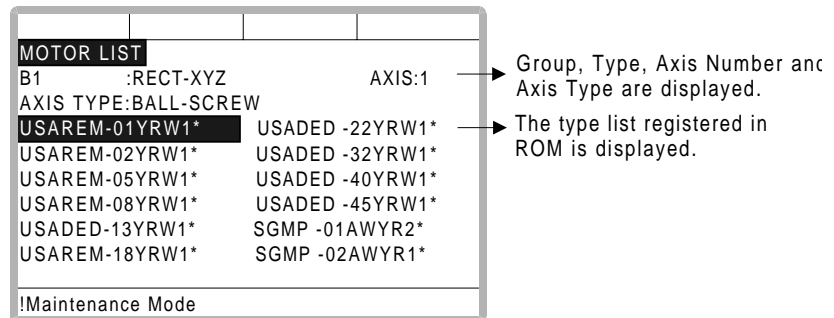
Confirm specification of each axis in the motor specification display<sup>\*1</sup> → Select desired item<sup>\*2</sup> → Input the value and press [ENTER] (Or move cursor to alternative and press [ENTER].)<sup>\*3</sup>

### Explanation

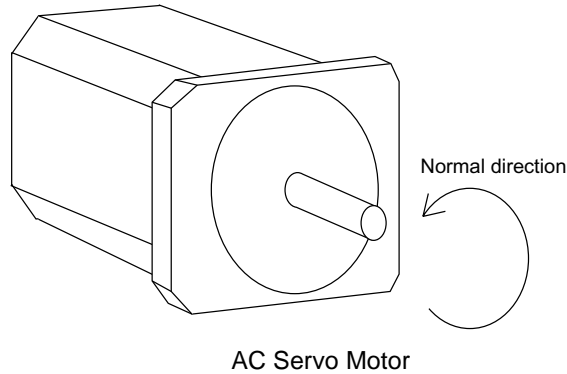
- \*1** The motor specification of each axis is shown.



- \*2** When an item which is input by number is selected the number input buffer line is displayed.  
When MOTOR (or SERVO AMP or CONVERTER) is selected, the list of MOTO (SERVO AMP,or CONVERTER) is shown.

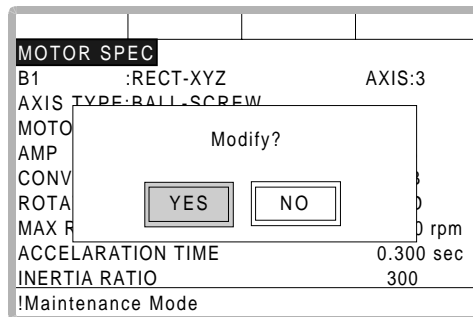


ROTATION DIRECTION: Set the rotation direction to which the current pulse data is increased. (The counterclockwise view from the loaded side is positioned normal.)



- MAX. RPM : Input maximum rotation speed of a motor. (Unit: mm)  
ACCELERATION SPEED: Input time between 0.01 and 1.00 to reach maximum speed from stopping status at 100% JOINT motion. (Unit: sec)  
INERTIA RATIO : "300" when in case of traveling axis or " 0" when in case of rotation axis is set as initial value.  
But if the following phenomenon occurs in motion, deal with the followed procedure.  
<Phenomenon1> During motion, the axis moves unsteady on advance direction.  
→ Confirm the motion with increasing this ratio in each 100.  
<Phenomenon2> during pause, the motor makes a lot of noise.  
→ Confirm the motion with decreasing this ratio in each 100.

- \*3** After this motor specification setting, the display moves to the next axis. Set them for all axes.  
When [ENTER] is pressed at the motor specification display for last axis, the setting in this display is completed and the confirmation dialog is shown.



If "YES" is selected, the system parameter is modified automatically.

The addition of the base axis setting is complete.



## CAUTION

If the control group construction is changed by addition a base axis or station axis, the internal data of the job file are also changed so that the job file data should be initialized. Initialize the job file data with the procedure "File Initialize" in this manual after changing the construction.

When the data, for example motion range, must be changed after the addition of a base axis or station axis, the change can be done with the same procedure shown above.

In that case, the control group construction is not changed so the job file data should not be initialized.

### 4.2.2 Station Axis Settin

#### Operation

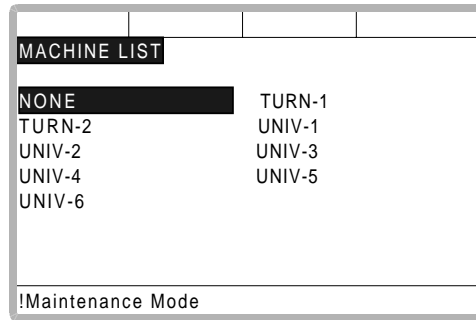
Confirm the type of control group in control group display <sup>\*1</sup> → Select type of control group for changing <sup>\*2</sup> → Select desired type in the type list <sup>\*3</sup> → Press [ENTER] in control group display <sup>\*4</sup>

#### Explanation

<sup>\*1</sup> The control group display is shown.

CONTROL GROUP	
R1	:UP6-A0*
B1	:NONE
R2	:NONE
S1	TURN-2
S2	:NONE
!Maintenance Mode	

\*2 Type selection display is shown.

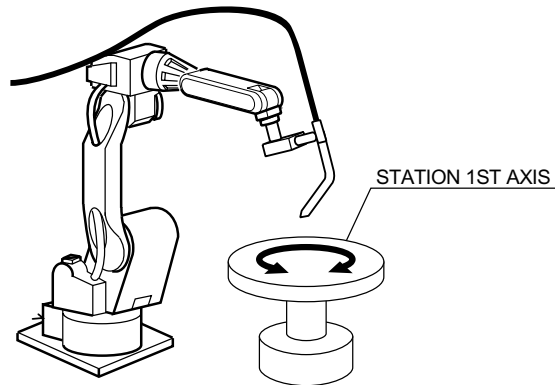


TURN-1:TURN 1 AXIS STATION  
TURN-2:TURN 2 AXES STATION  
UNIV-1:UNIVERSAL 1 AXIS STATION  
UNIV-2:UNIVERSAL 2 AXES STATION  
.....

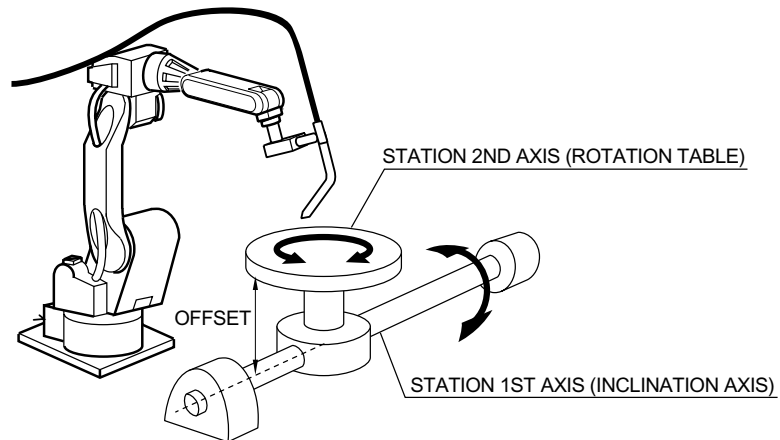
\*3 After the type selection, the display returns to control group display.

When the station type is not "TURN-1" and "TURN-2" (like a traveling axis) "UNIVERSAL" should be selected. When "UNIVERSAL" is selected, interpolation motion (linear, circular, etc.) is not supported.

### TURN-1



### TURN-2



If the number of axes is set beyond 27, error occurs.

- \*4 The setting in the control group display is completed and the display moves to the connection display.

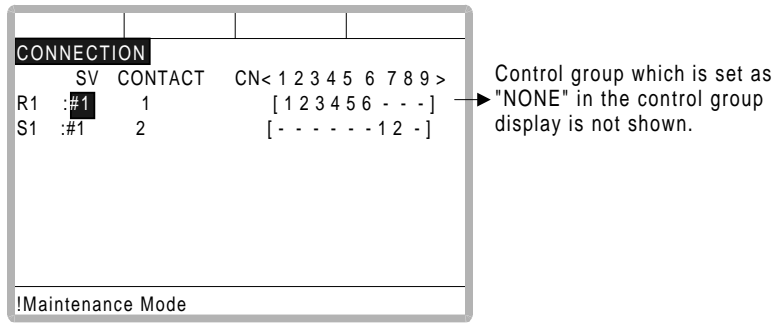
In the connection display, the SERVOPACK which is connected with each control group and the contactor which is used for the SERVOPACK are specified.

**Operation**

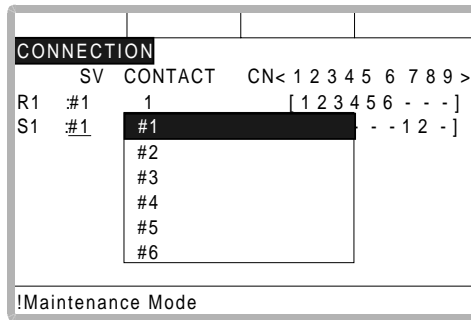
Confirm type of each control group in the connection display\*1 → Select connection item of desired control group\*2 → Select desired item → Press [ENTER] in the connection display\*3

**Explanation**

- \*1 Connection status of each control group is shown.



- \*2 The items which can be set are shown.



It is possible to freely change the connection between each axis of each control group and each connector (CN) of a SERVOPACK. The number in [ ] is the axis number, and it indicates the connector number to which each axis connects.

The example above means the following:

R1(Robot)

- 1st axis → 1CN (SERVOPACK #1, 1st contactor is used)
- 2nd axis → 2CN (SERVOPACK #1, 1st contactor is used)
- 3rd axis → 3CN (SERVOPACK #1, 1st contactor is used)
- 4th axis → 4CN (SERVOPACK #1, 1st contactor is used)
- 5th axis → 5CN (SERVOPACK #1, 1st contactor is used)
- 6th axis → 6CN (SERVOPACK #1, 1st contactor is used)

---

## 4.2 Addition of Base and Station Axis

---

S1(Station)

1st axis → 7CN (SERVOPACK #1, 2nd contactor is used)

2nd axis → 8CN (SERVOPACK #1, 2nd contactor is used)

3rd axis → 9CN (SERVOPACK #1, 2nd contactor is used)

The setting in the connection display is completed and the display moves to the axes form display.

In the axes form display, the axis type and motor type are specified.

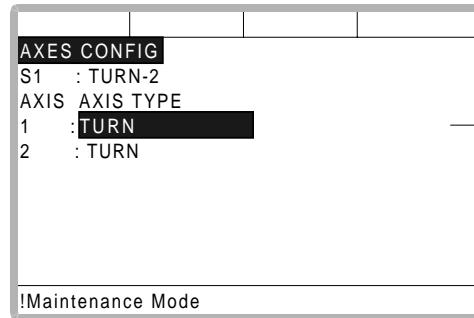
### Operation

Confirm axis type of each axis in the axes form display <sup>\*1</sup> → Select desired axis <sup>\*2</sup> →  
Select desired axis type → Press [ENTER] in the axes form display <sup>\*3</sup>

### Explanation

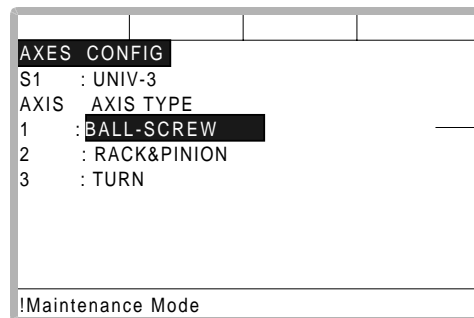
<sup>\*1</sup> The axis type of each axis is shown.

The axes form display (In case of TURN type)



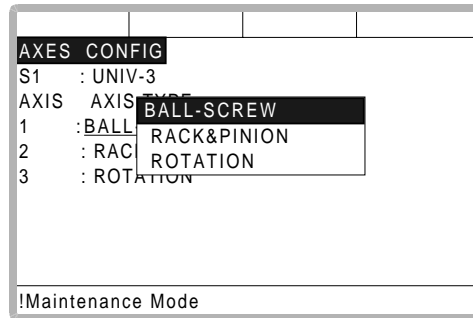
→ When axis type is "TURN-\*" the axis type can not be changed.

The axes form display (In case of UNIVERSAL type)



→ BALL-SCREW :TRAVEL  
(BALL-SCREW)  
RACK&PINION:TRAVEL  
(RACK&PINION)  
TURN :TURN

\*2 The axis types which can be set are shown.



The traveling axis for the ball-screw type should be selected as "BALL-SCREW," the one for rack & pinion type should be selected as "RACK & PINION." Then the display returns to the axes form display.

\*3 The setting in the axes form display is completed and the display moves to the mechanical specification display.

In the mechanical specification display, mechanical data are specified.

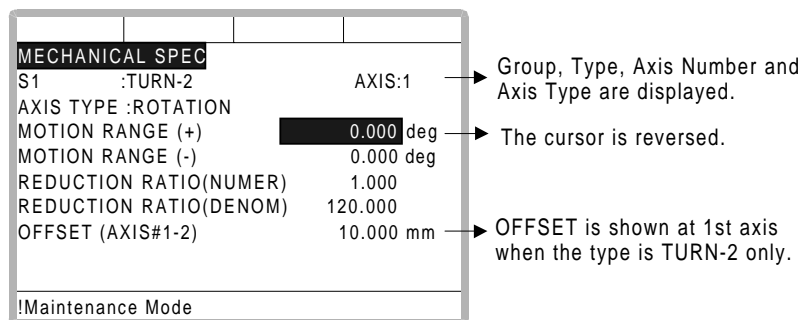
### Operation

Confirm specification of each axis in the mechanical specification display \*1 → Select desired item → Input the value → Press [ENTER] \*2

### Explanation

\*1 The mechanical specification is shown.

The mechanical specification display (In case of ROTATION type)



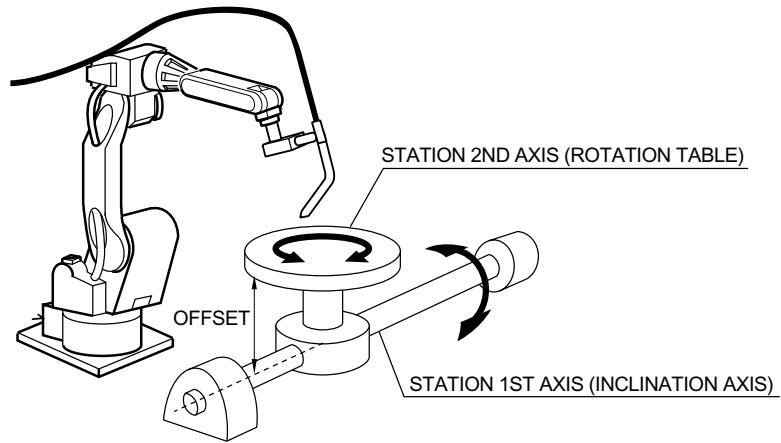
MOTION RANGE :Input maximum moving position (+ direction and - direction) from origin point. (Unit: deg)

REDUCTION RATIO :Input the numerator and the denominator.  
<e.g.> If the reduction ratio is 1/120, the numerator should be set as 1.0 and the denominator should be set as 120.0.

OFFSET :Offset should be specified at "TURN-2" type only.  
input length between the center of bending axis (1st axis) and the turning table (2nd axis). (Unit: mm)



**TURN-2**



The mechanical specification display (In case of BALL-SCREW type)

MECHANICAL SPEC		
S1	:UNIV-3	AXIS:1
AXIS TYPE:BALL-SCREW		
MOTION RANGE (+)		0.000 mm
MOTION RANGE (-)		0.000 mm
REDUCTION RATIO(NUMER)		1.000
REDUCTION RATIO(DENOM)		2.000
BALL-SCREW PITCH		10.000 mm/r
!Maintenance Mode		

Group, Type, Axis Number and Axis Type are displayed.

The cursor is reversed.

**MOTION RANGE** :Input maximum moving position (+ direction and - direction) from origin point. (Unit: mm)

**REDUCTIONRATIO** :Input the numerator and the denominator.  
 <e.g.> If the reduction ratio is 1/2, the numerator should be set as 1.0 and the denominator should be set as 2.0.

**BALL-SCREW PITCH** :Input the traveling length when the ball-screw rotates once. (Unit: mm/r)

The mechanical specification display (In case of RACK&PINION type)

MECHANICAL SPEC		
S1	:UNIV-3	AXIS:2
AXIS TYPE :RACK&PINION		
MOTION RANGE (+)		0.000 mm
MOTION RANGE (-)		0.000 mm
REDUCTION RATIO(NUMER)		1.000
REDUCTION RATIO(DENOM)		120.000
PINION DIAMETER		100.000 mm
!Maintenance Mode		

Group, Type, Axis Number and Axis Type are displayed.

The cursor is reversed.

**MOTION RANGE** :Input maximum moving position (+ direction and - direction) from origin point. (Unit: mm)

REDUCTION RATIO :Input the numerator and the denominator.  
 <e.g.> If the reduction ratio is 1/120, the numerator should be set as 1.0 and the denominator should be set as 120.0.

PINION DIAMETER :Input the diameter of a pinion. (Unit: mm)

- \*2** After this setting, the display moves to the next axis. Set them for all axes.  
 When [ENTER] is pressed in the mechanical specification display for the last axis, the setting in the mechanical specification display is completed and the display moves to the motor specification display.

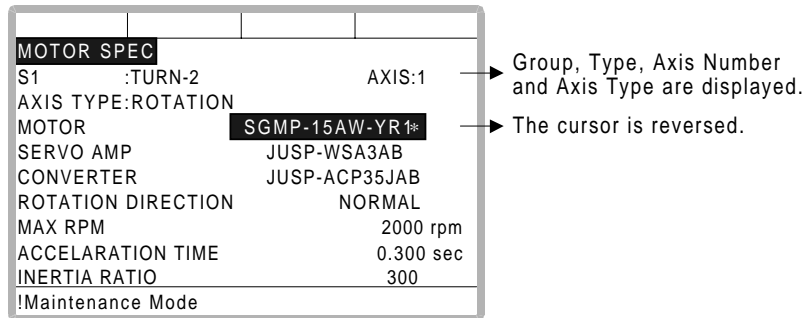
In the motor specification display, motor data are specified.

### Operation

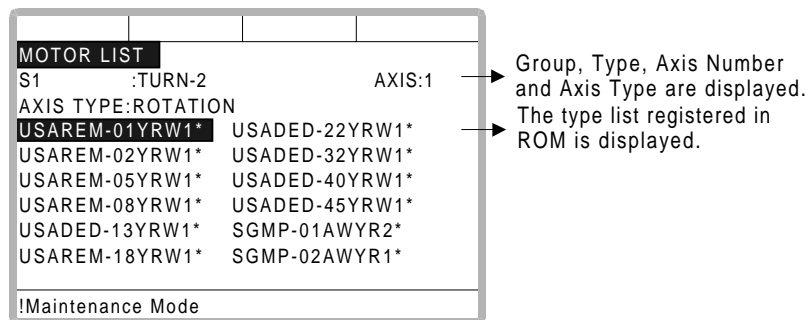
Confirm specification of each axis in the motor specification display<sup>\*1</sup> → Select desired item<sup>\*2</sup> → Input the value → Press [ENTER] in the motor specification display<sup>\*3</sup>

### Explanation

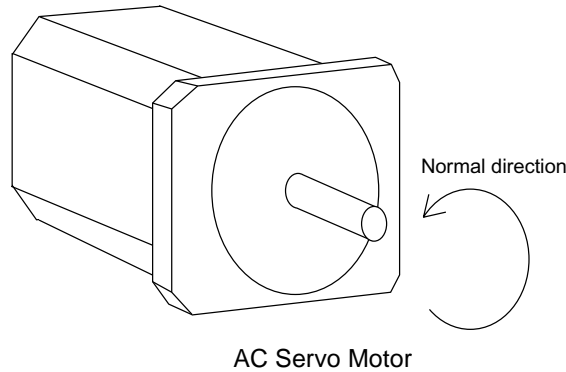
- \*1** The motor specification of each axis is shown.



- \*2** When an item which is input by number is selected, the number input buffer line is displayed.  
 And when MOTOR (or SERVO AMP or CONVERTER) is selected the list of MOTOR (SERVO AMP or CONVERTER) is shown.

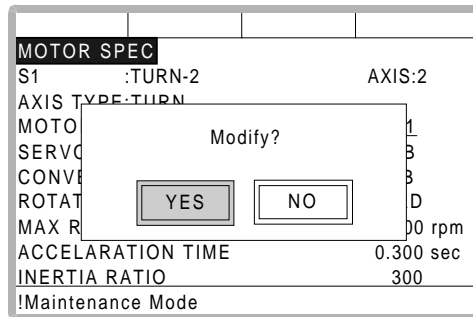


ROTATION DIRECTION : Set the rotation direction to which the current pulse data is increased. (The counterclockwise from view from the loaded side is positioned normal.)



- MAX. RPM : Input maximum rotation speed of a motor. (Unit: mm)  
ACCELERATION SPEED: Input time between 0.01 and 1.00 to reach maximum speed from stopping status at 100% JOINT motion. (Unit: sec)  
INERTIA RATIO : "300" when in case of traveling axis or "0" when in case of rotation axis is set as initial value.  
But if the following phenomenon occurs in motion, deal with the followed procedure.  
<Phenomenon1> During motion, the axis moves unsteady on advance direction.  
→ Confirm the motion with increasing this ratio in each 100.  
<Phenomenon2> During pause, the motor makes a lot of noise.  
→ Confirm the motion with decreasing this ratio in each 100.

- \*3** After this motor specification setting, the display moves to the next axis. Set them for all axes.  
When [ENTER] is pressed at the motor specification display for the last axis, the setting in this display is completed and the confirmation dialog is shown.



If "YES" is selected, the system parameters are modified automatically.

Then addition of the station axis setting is complete.



## CAUTION

If the control group construction is changed by addition of a base axis or station axis, the internal data of the job file are also changed so that the job file data should be initialized. Initialize the job file data with procedure "File Initialize" in this manual after changing the construction.

When the data, motion range for example, should be changed after the addition of a base axis or station axis, the change can be done in the same procedure as shown above.

In that case, the control group construction is not changed so the job file data should not be initialized.

---

## 4.2 Addition of Base and Station Axis

---

## 5 System Diagnosis

### 5.1 System Version

It is possible to check the system CPU version information as follows.

#### Operation

Select {SYSTEM INFO} under the top menu ➔ Select {VERSION} \*1

#### Explanation

\*1 Version number display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>VERSION</b>			
SYSTEM :X1.00A(US)-00			
PARAM :1.00			
MODEL :UP130-C000			
APPLI :ARC WELD			
CPU	SYSTEM ROM	BOOT ROM	
XCP01	1.00	1.00	
XCP02#1-0	----	----	
XCP02#1-1	----	----	
!			

### 5.2 Input/Output Status

#### 5.2.1 Universal Input

The status of input signal from the external can be confirmed.

#### ■ Universal Input Display

#### Operation

Select {IN/OUT} under the top menu ➔ Select {UNIVERSAL INPUT} \*1

**Explanation**

\*1 Universal input display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL INPUT</b>			
NO.		7654 3210	
#001X		0111_1011	
#002X		0000_0000	
#003X		0000_0000	
#004X		1111_0000	
#005X		0000_0000	
#006X		0000_1010	
#007X		0000_0000	
#008X		0000_0000	
!			

■ Universal Input Detailed Display

**Operation**

Select {DISPLAY} under the menu ➡ Select {DETAIL} \*1

**Explanation**

\*1 Universal input detailed display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL INPUT</b>			
GROUP	IG#01	123:DEC. 7b:HEX.	
IN#001	#0010	● [ ██████████ ]	
IN#002	#0011	● [ ]	
IN#003	#0012	○ [ ]	
IN#004	#0013	● [ ]	
IN#005	#0014	● [ ]	
IN#006	#0015	● [ ]	
IN#007	#0016	● [ ]	
IN#008	#0017	○ [ ]	
!			

## 5.2.2 Universal Output

The status of the output signal set by the output instruction can be confirmed and modified.

■ Universal Output Display

**Operation**

Select {IN/OUT} under the top menu ➡ Select {UNIVERSAL OUTPUT} \*1

**Explanation**

\*1 Universal output display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL OUTPUT</b>			
NO.	7654 3210		
#101X	0111_1011		
#102X	0000_0000		
#103X	0000_0000		
#104X	1111_0000		
#105X	0000_0000		
#106X	0000_1010		
#107X	0000_0000		
#108X	0000_0000		

## ■ Universal Output Detailed Display

**Operation**

Select {DISPLAY} under the menu ➔ Select {DETAIL} \*1

**Explanation**

\*1 Universal output detailed display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL OUTPUT</b>			
GROUP	OG#01	123:DEC. 7b:HEX.	
OUT#001 #1010	●	[	]
OUT#002 #1011	●	[	]
OUT#003 #1012	○	[	]
OUT#004 #1013	●	[	]
OUT#005 #1014	●	[	]
OUT#006 #1015	●	[	]
OUT#007 #1016	●	[	]
OUT#008 #1017	○	[	]

## ■ Modify the Output Status

**Operation**

Select the desired output signal number \*1 ➔ Press [INTER LOCK] + [SELECT] \*2

**Explanation**

- \*1 Select the status of the desired output signal, "○" or "●," in the universal output detailed display.
- \*2 The status is changed. ( ●:ON status, ○:OFF status)



DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL OUTPUT</b>			
GROUP	OG#01	122:DEC.	7a:HEX.
OUT#001 #1010	●	[	]
OUT#002 #1011	●	[	]
OUT#003 #1012	○	[	]
OUT#004 #1013	●	[	]
OUT#005 #1014	●	[	]
OUT#006 #1015	●	[	]
OUT#007 #1016	●	[	]
OUT#008 #1017	○	[	]
!			

### ■ Modify the Signal Name

The name of the universal input or output signal can be modified. The name can be modified in two ways.

#### Direct Modify on the Detailed Display

##### Operation

Select the desired output signal number in the detailed display. <sup>\*1</sup> → Input the signal name <sup>\*2</sup> → Press [ENTER] <sup>\*3</sup>

##### Explanation

<sup>\*1</sup> Character input line is displayed.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL INPUT</b>			
GROUP	IG#01	123:DEC.	7b:HEX.
IN#001 #0010	●	[	]
IN#002 #0011	●	[	]
IN#003 #0012	○	[	]
IN#004 #0013	●	[	]
IN#005 #0014	●	[	]
IN#006 #0015	●	[	]
IN#007 #0016	●	[	]
>			
!			

<sup>\*2</sup> If the signal name has already been registered, the current name is displayed on the input line.

If you wish to change the name, delete the characters on the input line by pressing [CANCEL], and then input a new name.

IN#007 #0016	○	[	]
>TEST SIGNAL			
!			

\*3 New signal name is registered.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT		R1	123:DEC. 7b:HEX.
GROUP	IG#01		
IN#001 #0010	●	[ TEST SIGNAL ]	
IN#002 #0011	●	[ ]	
IN#003 #0012	○	[ ]	
IN#004 #0013	●	[ ]	
IN#005 #0014	●	[ ]	
IN#006 #0015	●	[ ]	
IN#007 #0016	●	[ ]	
IN#008 #0017	○	[ ]	

## Modify from the Menu

### Operation

Select the desired output signal number in the detailed display. ➔ Select {EDIT} under the menu \*1 ➔ Select {RENAME} \*2 ➔ Input the signal name ➔ Press [ENTER] \*3

### Explanation

\*1 The pull-down menu is shown.

DATA	EDIT	DISPLAY	UTILITY
SEARCH		R1	123:DEC. 7b:HEX.
RENAME			
IN#001 #0010	●	[ TEST SIGNAL ]	
IN#002 #0011	●	[ ]	
IN#003 #0012	○	[ ]	
IN#004 #0013	●	[ ]	
IN#005 #0014	●	[ ]	
IN#006 #0015	●	[ ]	
IN#007 #0016	●	[ ]	
IN#008 #0017	○	[ ]	

\*2 Character input line is displayed.

\*3 New signal name is registered.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT		R1	123:DEC. 7b:HEX.
GROUP	IG#01		
IN#001 #0010	●	[ TEST SIGNAL ]	
IN#002 #0011	●	[ ]	
IN#003 #0012	○	[ ]	
IN#004 #0013	●	[ ]	
IN#005 #0014	●	[ ]	
IN#006 #0015	●	[ ]	
IN#007 #0016	●	[ ]	
IN#008 #0017	○	[ ]	

## ■ Search the Signal Number

The signal number can be searched in the following two ways.

### Direct Search on the Detailed Display

#### Operation

Select the signal number in the detailed display. <sup>\*1</sup> → Input the signal number <sup>\*2</sup> →  
Press [ENTER] <sup>\*3</sup>

#### Explanation

<sup>\*1</sup> Number input line is displayed.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL INPUT</b>		R1	123:DEC. 7b:HEX.
GROUP	IG#01		[TEST SIGNAL ]
IN#001	#0010	●	[ ]
IN#002	#0011	●	[ ]
IN#003	#0012	○	[ ]
IN#004	#0013	●	[ ]
IN#005	#0014	●	[ ]
IN#006	#0015	●	[ ]
IN#007	#0016	○	[ ]
>			
!			

<sup>\*2</sup> Input the signal number in the number input line.

IN#007	#0016	○	[ ]
>0060			
!			

<sup>\*3</sup> The page where the signal number exists is displayed.

DATA	EDIT	DISPLAY	UTILITY
<b>UNIVERSAL INPUT</b>		R1	128:DEC. 80:HEX.
GROUP	IG#06		[ ]
IN#041	#0060	○	[ ]
IN#042	#0061	○	[ ]
IN#043	#0062	○	[ ]
IN#044	#0063	○	[ ]
IN#045	#0064	○	[ ]
IN#046	#0065	○	[ ]
IN#047	#0066	○	[ ]
IN#048	#0067	●	[ ]
!			

## Search from the Menu

### Operation

Select the signal number in the detailed display. ➡ Select {EDIT} under the menu <sup>\*1</sup> ➡  
 Select {SEARCH} <sup>\*2</sup> ➡ Input the signal number ➡ Press [ENTER] <sup>\*3</sup>

### Explanation

<sup>\*1</sup> The pull-down menu is shown.

DATA	EDIT	DISPLAY	UTILITY
SEARCH		R1	123:DEC. 7b:HEX.
RENAME			
IN#001 #0010	●	[	]
IN#002 #0011	○	[	]
IN#003 #0012	○	[	]
IN#004 #0013	●	[	]
IN#005 #0014	●	[	]
IN#006 #0015	●	[	]
IN#007 #0016	●	[	]
IN#008 #0017	○	[	]
!			

<sup>\*2</sup> Character input line is displayed.

<sup>\*3</sup> Input the signal number in the number input line and press [ENTER]. The page where the signal number exists is displayed.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT		R1	128:DEC. 80:HEX.
GROUP	IG#06		
IN#041 #0060	○	[	]
IN#042 #0061	○	[	]
IN#043 #0062	○	[	]
IN#044 #0063	○	[	]
IN#045 #0064	○	[	]
IN#046 #0065	○	[	]
IN#047 #0066	○	[	]
IN#048 #0067	●	[	]
!			

### 5.2.3 Specific Input

#### ■ Specific Input Display

**Operation**

Select {IN/OUT} under the top menu ➔ Select {SPECIFIC INPUT}\*1

**Explanation**

\*1 Specific input display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>SPECIFIED INPUT</b>		R1	☰ ☱ ☲ ☳
NO.	7654 3210		
#401X	0111_1011		
#402X	0000_0000		
#403X	0000_0000		
#404X	1111_0000		
#405X	0000_0000		
#406X	0000_1010		
#407X	0000_0000		
#408X	0000_0000		

#### ■ Specific Input Detailed Display

**Operation**

Select {DISPLAY} under the menu ➔ Select {DETAIL}\*1

**Explanation**

\*1 Specific input detailed display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>SPECIFIED INPUT</b>		R1	☰ ☱ ☲ ☳
GROUP		123:DEC. 7b:HEX.	
SIN#001 #4010	●	SYSTEM ALM REQ	
SIN#002 #4011	●	SYSTEM MSG REQ	
SIN#003 #4012	○	USER ALM REQ	
SIN#004 #4013	●	USER MSG REQ	
SIN#005 #4014	●	ALM/ERR RESET	
SIN#006 #4015	●		
SIN#007 #4016	●	SPEED LIMIT	
SIN#008 #4017	○		

## 5.2.4 Specific Output

### ■ Specific Output Display

#### Operation

Select {IN/OUT} under the top menu ➔ Select {SPECIFIC OUTPUT}\*1

#### Explanation

\*1 Specific output display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>SPECIFIED OUTPUT</b>		R1	☰ ☒ ⌂ ⌚
NO.	7654 3210		
#501X	0111_1011		
#502X	0000_0000		
#503X	0000_0000		
#504X	1111_0000		
#505X	0000_0000		
#506X	0000_1010		
#507X	0000_0000		
#508X	0000_0000		
!			

### ■ Specific Output Detailed Display

#### Operation

Select {DISPLAY} under the menu ➔ Select {DETAIL}\*1

#### Explanation

\*1 Specific output detailed display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>SPECIFIED OUTPUT</b>		R1	☰ ☒ ⌂ ⌚
GROUP		123:DEC. 7b:HEX.	
SOUT#001	#5010	● MAJOR ALM OCCUR	
SOUT#002	#5011	● MINOR ALM OCCUR	
SOUT#003	#5012	○ SYSTEM ALM OCCUR	
SOUT#004	#5013	● USER ALM OCCUR	
SOUT#005	#5014	● ERROR OCCUR	
SOUT#006	#5015	● MEMORY BTRY WEAK	
SOUT#007	#5016	● ENCDR BTRY WEAK	
SOUT#008	#5017	○	
!			

## 5.2.5 RIN INPUT

### ■ RIN INPUT Display

#### Operation

Select {IN/OUT} under the top menu ➔ Select {RIN}\*1

#### Explanation

\*1 RIN input display is shown.

DATA	EDIT	DISPLAY	UTILITY
RIN INPUT		R1	☰ ☲ ☱ ☴
RIN#001	<input type="radio"/>		DIRECT IN1
RIN#002	<input type="radio"/>		DIRECT IN2
RIN#003	<input type="radio"/>		DIRECT IN3
RIN#004	<input type="radio"/>		DIRECT IN4
!			

## 5.3 System Monitoring Time

### 5.3.1 System Monitoring Time Display

The status of system operation, e.g. power supply time, can be checked.

#### Operation

Select {SYSTEM INFO} → Select {MONITORING TIME} \*1

#### Explanation

\*1 The system monitoring time display is shown.

	DATA	EDIT	DISPLAY	UTILITY
	<b>SYS MONITORING TIME</b> R1			
①	CONTROL POWER TIME	(1998/07/06 10:00 ~)		
	2 3 8 5 : 4 2 ' 0 2			
②	SERVO POWER TIME	(1998/07/06 10:30 ~)		
	2 3 8 0 : 1 0 ' 1 2			
③	PLAYBACK TIME	(1998/10/22 11:12 ~)		
	2 2 1 0 : 0 0 ' 2 0			
④	MOVING TIME	(1998/10/22 15:30 ~)		
	1 8 7 5 : 1 5 ' 3 0			
⑤	OPERATING TIME	(1998/10/22 16:12 ~)		
	!			

#### ①CONTROL POWER TIME

Displays the cumulative time that the main power supply has been ON.

#### ②SERVO POWER TIME

Displays the cumulative time that the servo power supply has been ON.

#### ③PLAYBACK TIME

Displays the cumulative time during which playback was executed.

#### ④MOVING TIME


Displays the cumulative time that the manipulator was in motion.





#### ⑤OPERATING TIME





Displays the cumulative time spent in operation. For example, if the manipulator is used for arc welding, it displays the amount of time spent in arc welding; if the manipulator is used for handling, it displays the time spent in handling.











### 5.3.2 Individual Display of the System Monitoring Time

If the page  is pressed, servo power time by each robot axis, playback time, moving time and operating time by each application, is individually displayed.

DATA	EDIT	DISPLAY	UTILITY
<b>SERVO POWER TIME</b>		R1	   
ROBOT1			(1998/07/06 10:00~)
	2 3 8 5 : 4 2 ' 0 2		
STATION1			(1998/08/03 10:00~)
	2 6 2 : 3 7 ' 0 2		

DATA	EDIT	DISPLAY	UTILITY
<b>PLAYBACK TIME</b>		R1	   
ROBOT1			(1998/07/06 10:00~)
	2 3 8 5 : 4 2 ' 0 2		
STATION1			(1998/08/03 10:00~)
	2 6 2 : 3 7 ' 0 2		

DATA	EDIT	DISPLAY	UTILITY
<b>MOVING TIME</b>		R1	   
ROBOT1			(1998/07/06 10:00~)
	2 3 8 5 : 4 2 ' 0 2		
STATION1			(1998/08/03 10:00~)
	2 6 2 : 3 7 ' 0 2		

DATA	EDIT	DISPLAY	UTILITY
<b>OPERATING TIME</b>		R1	   
APPL11			(1998/07/06 10:00~)
	2 3 8 5 : 4 2 ' 0 2		
APPL12			(1998/08/03 10:00~)
	2 6 2 : 3 7 ' 0 2		



The total axes times here are not always the same as the time in the system monitoring time display because these displays show time as seen from the individual axes.

### 5.3.3 Clearing the System Monitoring Time

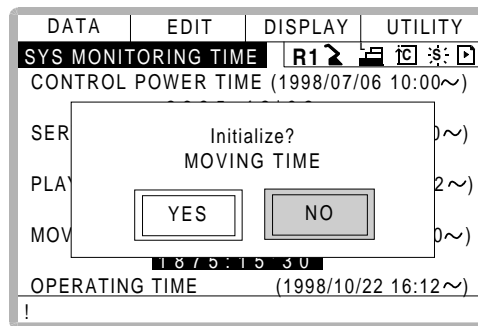
System monitoring times can be cleared and set back to 0 by following procedure. These operations can be performed in the system monitoring time display, or in the individual displays.

#### Operation

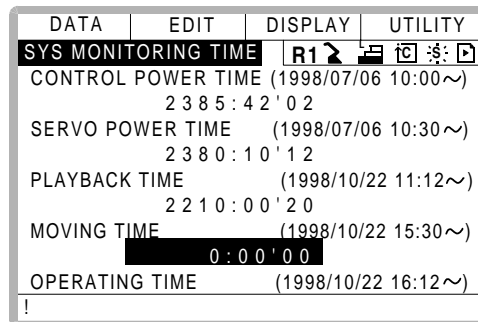
Select the time to be cleared \*1 → Select "YE" \*2

#### Explanation

\*1 Confirmation dialog is displayed.



\*2 The cumulative time value at the cursor line is reset to 0, and a new time measurement begins.




## 5.4 Alarm History

### 5.4.1 Alarm History Display

There are five types of alarm list displays: the "MAJOR ALARM DISPLAY," the "MINOR ALARM DISPLAY," the "USER ALARM(SYSTEM) DISPLAY," the "USER ALARM(USER) DISPLAY," and the "OFF-LINE DISPLAY." Each display shows the alarm code and the date and time.


#### Operation

Select {SYSTEM INFO} under the top menu → Select {ALARM HISTORY}\*<sup>1</sup> → Press the page key  to change the display\*<sup>2</sup>

#### Explanation

\*<sup>1</sup> The alarm history display is shown.

DATA	EDIT	DISPLAY	UTILITY
MAJOR ALARM			
CODE	DATE	CLOCK	
01 1030	1998/05/12	12:00	
02 0060	1998/06/15	15:25	
03			
04			
05			
MEMORY ERROR(PARAMETER FILE)			
[5]			
JOB:TEST0001 LINE:0010 STEP:010			
!			

\*<sup>2</sup> Each time the page key  is pressed, the display changes "MAJOR ALARM" → "MINOR ALARM" → "USER ALARM(SYSTEM)" → "USER ALARM(USER)" → "OFF-LINE."

### 5.4.2 Clearing the Alarm History

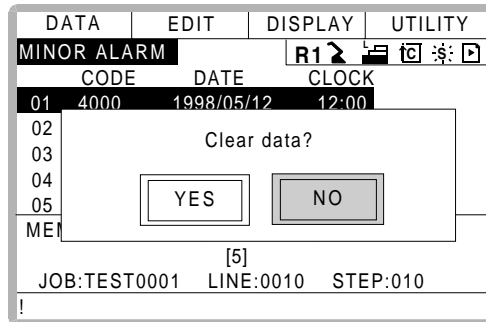
The history of the minor alarms and the user alarms (system and user) can be cleared.

#### Operation

Display the alarm history display to be cleared → Select {DATA} under the menu → Select {CLEAR HISTORY}\*<sup>1</sup> → Select "YES" \*<sup>2</sup>

**Explanation**

- \*1 The confirmation dialog is displayed.



- \*2 The alarm history displayed is reset.

## 5.5 I/O Message History

### 5.5.1 I/O Message History Display

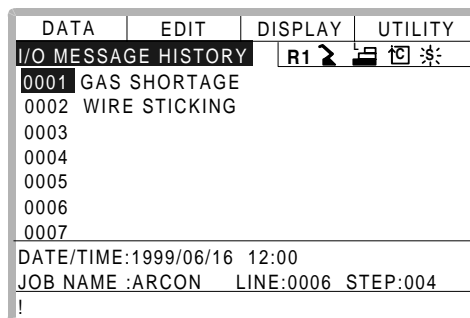
The I/O message history display shows the date and time, job name, line number, and step number of the I/O message that appeared on the screen.

**Operation**

Select {SYSTEM INFO} under the top menu ➔ Select {I/O MSG HISTORY} \*1

**Explanation**

- \*1 The I/O message history display is shown.



Press [SELECT], and numeric values can now be entered. Input the history number, and press [ENTER]. The search for the input history number begins, and the I/O message that appeared on the screen is displayed.

## ■ Search

Use the following operation to search for the I/O message history.

### Operation

Select {EDIT} under the menu → Select {SEARCH}<sup>\*1</sup> → Input the history No. → Press [ENTER]<sup>\*2</sup>

### Explanation

\*1 Character input line is displayed.

\*2 The search for the input history number begins, and the I/O message is displayed.

## 5.5.2 Clearing the I/O Message History

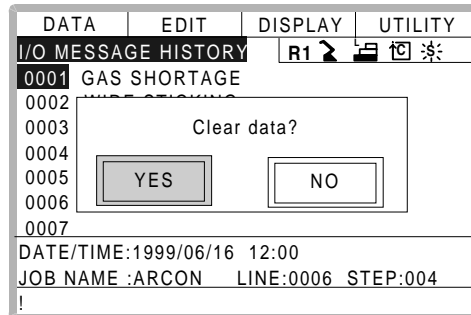
Use the following operation to clear the I/O message history.

### Operation

Select {DATA} under the menu → Select {CLEAR HISTORY}<sup>\*1</sup> → Select "YES"<sup>\*2</sup>

### Explanation

\*1 The confirmation dialog box is displayed.



\*2 The displayed I/O message history is cleared.

## 5.6 Position Data When Power is Turned ON/OFF

### 5.6.1 Power ON/OFF Position Display

The Power ON/OFF position display shows the position of the manipulator when power was turned off the last time, the current position of the manipulator when power was later turned on, and the amount of difference between the two positions. When alarm 4107, "OUT OF RANGE (ABSODATA)" occurs, the error value of the faulty axes can be verified in this display.

#### Operation

Select {ROBOT} under the top menu ➔ Select {POWER ON/OFF POS}<sup>\*1</sup>

#### Explanation

<sup>\*1</sup> The power ON/OFF position display is shown.

DATA	EDIT	DISPLAY	UTILITY
<b>POWER ON/OFF POSITION</b>			
		R1	⏏ ⏏ ⏏ ⏏
	OFF POS	ON POS	DIFFERENCE
R1:S	4775	4120	665
L	8225	8225	0
U	960	960	0
R	-336	-336	0
B	-202	-203	1
T	-10	-11	1
!			

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5.6 Position Data When Power is Turned ON/OFF

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# Hardware





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## 6 YASNAC XRC Specification

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### WARNING

- Before operating the manipulator, check that the SERVO ON lamp goes out when the emergency stop buttons on the playback panel and programming pendant are pressed.

Injury or damage to machinery may result if the manipulator cannot be stopped in case of an emergency. The emergency stop buttons are attached on upper-right of the playback panel and right of the programming pendant.

- Always set the teach lock before starting teaching.

Failure to observe this caution may result in injury from inadvertent operation of the playback panel.

- Observe the following precautions when performing teaching operations within the working envelope of the manipulator:
  - Always view the manipulator from the front.
  - Always follow the predetermined operating procedure.
  - Always have an escape plan in mind in case the manipulator comes toward you unexpectedly.
  - Ensure that you have a place to retreat to in case of emergency.

Improper or unintentional manipulator operation can result in injury.

- Prior to performing the following operations, be sure that there is no one within the working envelope of the manipulator, and be sure that you are in a safe place yourself.
  - Turning the power ON to the YASNAC XRC.
  - Moving the manipulator with the programming pendant.
  - Running check operation.
  - Performing automatic operation.

Injury may result from collision with the manipulator to anyone entering the working envelope of the manipulator.



## CAUTION

- Perform the following inspection procedures prior to performing teaching operations. If problems are found, correct them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to the insulation and sheathing of external wires.
- Always return the programming pendant to its specified position after use.

If the programming pendant is inadvertently left on the manipulator, fixture, or on the floor, the manipulator or a tool could collide with it during manipulator movement, possibly causing injuries or equipment damage.

## 6.1 Specification List

Controller	
Configuration	Free-standing, enclosed type
Dimensions	Refer to following
Cooling System	Indirect cooling
Ambient Temperature	0°C to + 45°C (During operation) -10°C to + 60°C (During transit and storage)
Relative Humidity	90%RH max. (non-condensing)
Power Supply	3-phase, 200/220 VAC(+10% to -15%) at 50/60Hz(2 Hz)
Grounding	Grounding resistance: 100 Ω or less Exclusive grounding
Digital I/O	Specific signal (hardware) 12 inputs and 2 outputs General signals (standard, max.) 40 inputs and 40 outputs
Positioning System	By serial communication (absolute encoder)
Drive Unit	SERVOPACK for AC servomotors
Acceleration/ Deceleration	Software servo control
Programming Capacity	5000 steps, 7000 instructions (including steps)
Playback Panel*1	
Dimensions	190(W) × 120(H) × 50(D) mm
Buttons Provided	Mode change Start / Hold, Emergency stop

\*1 An optional remote playback panel is available

Dimensions	UP6, SK16X 470(W) × 760(H) × 320(D) mm
	SK45X 550(W) × 860(H) × 420(D) mm
	UP130 650(W) × 860(H) × 420(D) mm

## 6.2 Function List

Programming Pendant Operation	Coordinate System	Joint, Rectangular/Cylindrical, Tool, User Coordinates
	Modification of Teaching Points	Adding, Deleting, Correcting (Robot axes and external axes respectively can be corrected.)
	Inching Operation	Possible
	Locus Confirmation	Forward/Reverse step, Continuous feeding
	Speed Adjustment	Fine adjustment possible during operating or pausing
	Timer Setting	Possible every 0.01 s
	Short-cut Function	Direct-open function, Screen reservation function
	Interface	RS-232 × 1 port for FC 1/FC2 (At Programming Pendant)
	Application	Arc welding, Spot welding, Handling, General, Others
Safety Feature	Essential Measures	JIS (Japanese Industrial Standard)
	Running Speed Limit	User definable
	Deadman Switch	3 position type. Servo power can be turned on at the mid position only. (Located on programming pendant)
	Collision proof Frames	S-axis frame (doughnut-sector), Cubic frame (user coordinate)
	Self-Diagnosis	Classifies error and two types of alarms (major and minor) and displays the data
	User Alarm Display	Possible to display alarm messages for peripheral device
	Machine Lock	Test-run of peripheral devices without robot motion
	Door Interlock	A door can be opened only when a circuit breaker is off.
Maintenance Function	Operation Time Display	Control power-on time, Servo power-on time, Playback time, Operation time, Work time
	Alarm Display	Alarm message and previous alarm records
	I/O Diagnosis	Simulated enabled/disabled output possible
	T.C.P. Calibration	Automatically calibrates parameters for end effectors using a master jig

Programing Functions	Programming	Interactive programming
	Language	Robot language: INFORM II
	Robot Motion Control	Joint coordinates, Linear/Circular interpolations, Tool coordinates
	Speed Setting	Percentage for joint coordinates, 0.1mm/s units for interpolations, Angular velocity for T.C.P.fixed motion
	Program Control Instructions	Jumps, Calls, Timer, Robot stop, Execution of some instructions during robot motion
	Operation Instructions	Preparing the operation instructions for each application (Arc-ON, Arc-OFF, etc.)
	Variable	Global variable, Local variable
	Variable Type	Byte type, Integer type, Double precision type, Real number type, Position type
	I/O Instructions	Discrete I/O, Pattern I/O processing

## 6.3 Programming Pendant

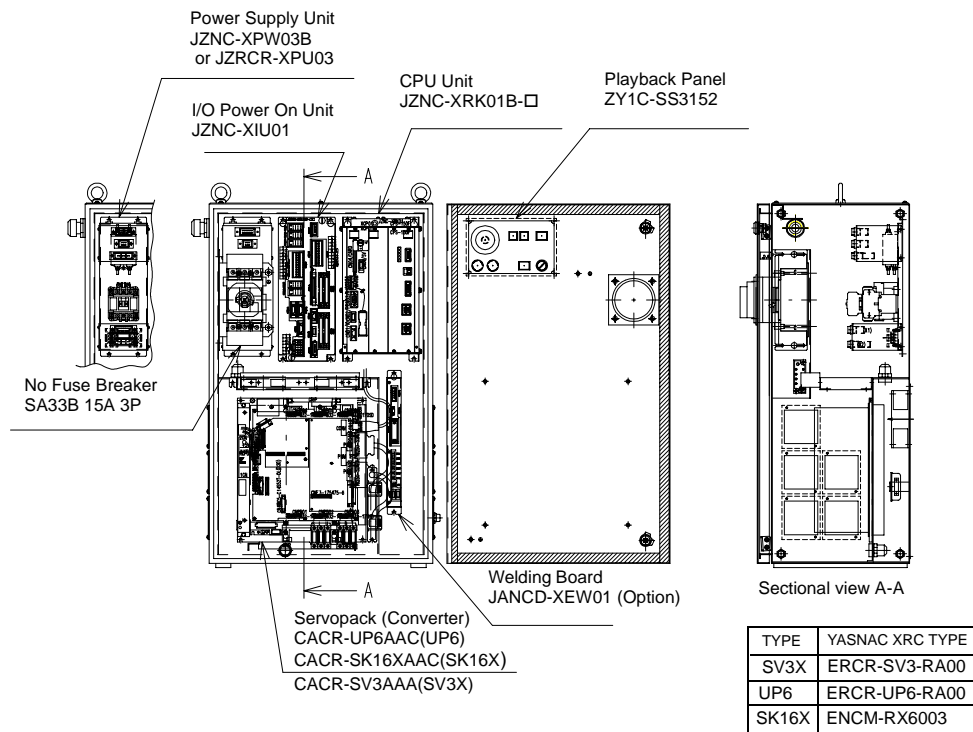
Material	Reinforced thermoplastic enclosure with a detachable suspending strap
Dimensions	200(W) × 348(H) × 61.8(D) mm
Displayed Units	40 characters 12 lines
	Multilingual function (English, Japanese, Hankul)
	Backlight
Others	3 position deadman switch, RS-232C × 1 port

## 6.4 Equipment Configuration

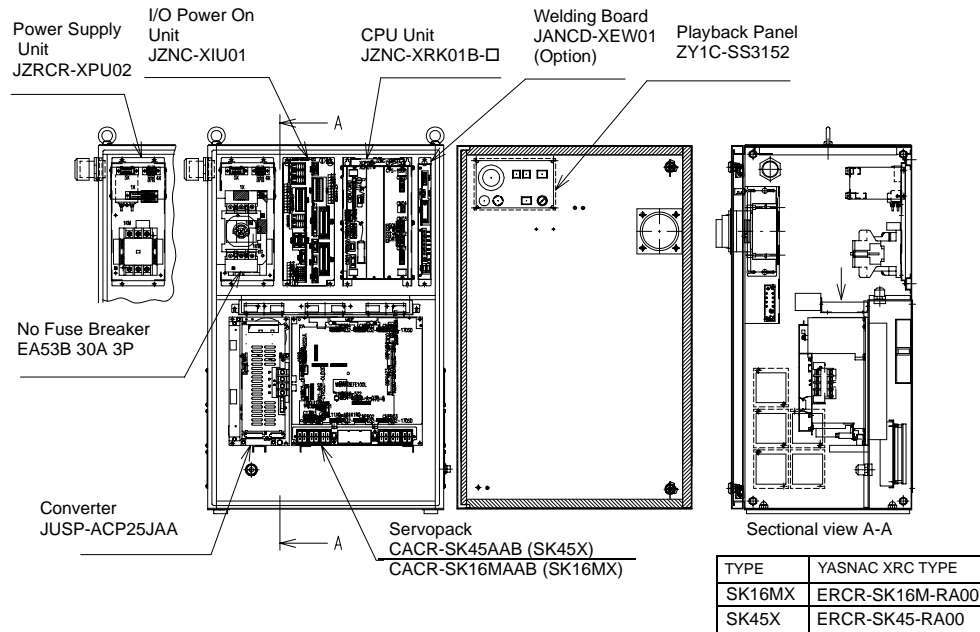
The XRC is comprised of individual units and modules (circuit boards). Malfunctioning components can generally be easily repaired after a failure by replacing a unit or a module. This section outlines the XRC equipment configuration.

### 6.4.1 Arrangement of Units and Circuit Boards

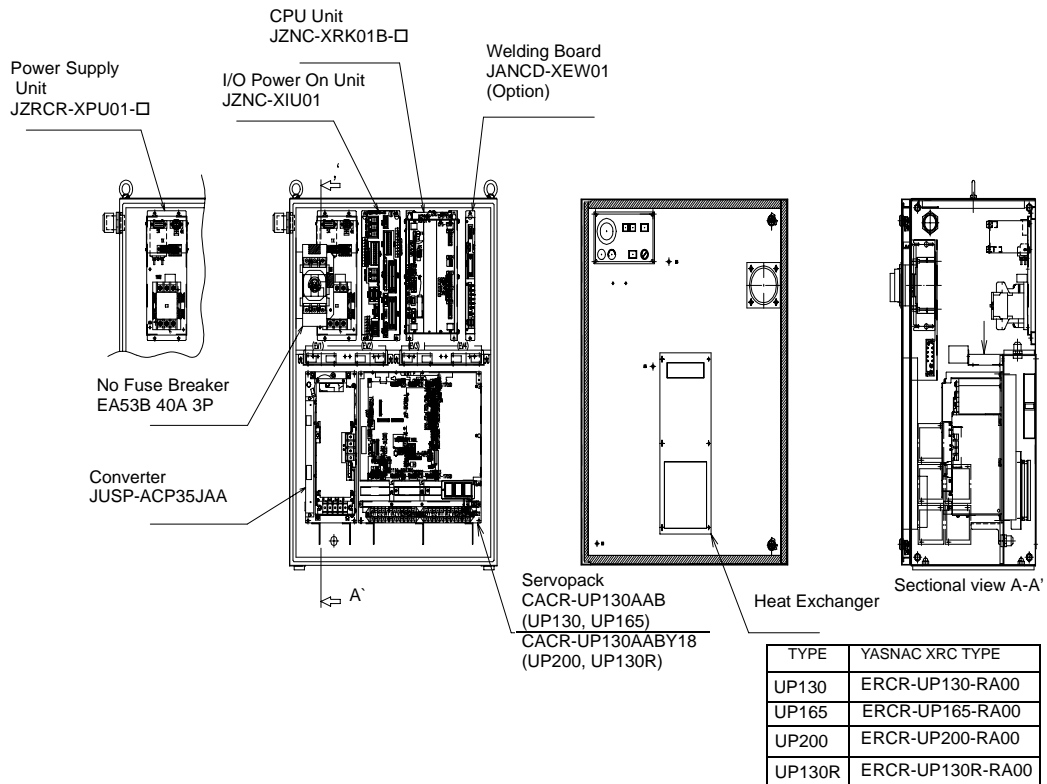
#### ■ Configuration



SV3X, UP6, SK16X Configuration



SK16MX, SK45X Configuration



UP130, UP165, UP200, UP130R Configuration

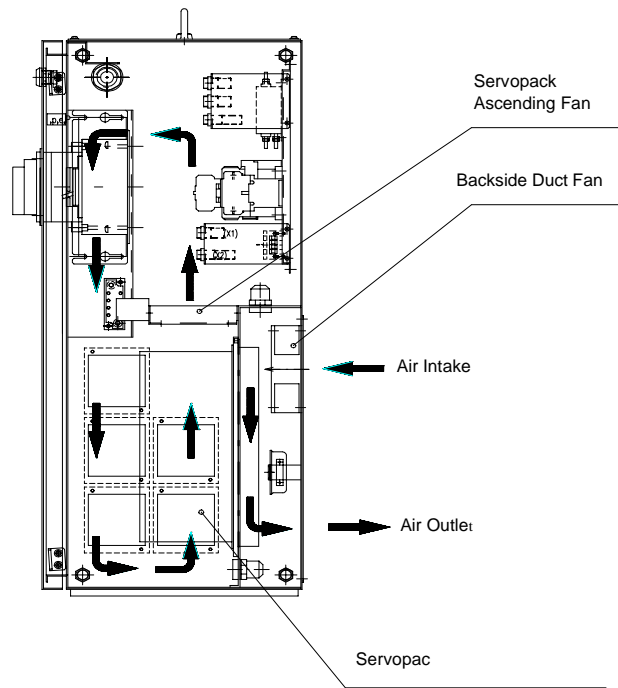


■ Location

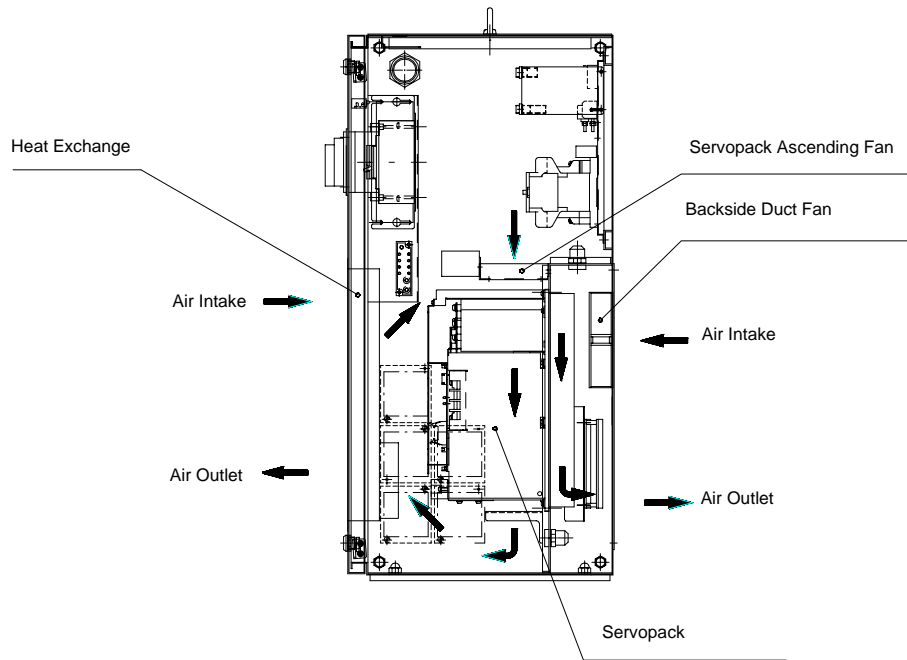
Section	Unit	
Door	Playback panel(ZY1C-SS3125)	
	Heat exchange board (Large type of robot)	
Front section	Servopack (CACR- €□□□□AA□□) (Large robot type uses separated converter type.)	Control circuit board (JASP-WRCA01)
		Control power supply (JUSP-RCP01AAB)
		Converter (JUSP-ACP□□JAA)
		Amplifier (JUSP-WS□□AA)
	I/O, TU unit (JZNC-XIU01)	
	CPU Rack (JZNC-XRK01B-□)	System control circuit board (JANCD-XCP01)
		CPU power supply (CPS-150F)
Power Supply unit (JZNC-XPW03B, JZRCR-XP □□)		

### 6.4.2 Cooling System of the Controller Interior

The backside duct fan draws in air from the air intake and expels it from the air outlet to cool the Servopack. The servopack ascending fan circulates the air to keep temperature even throughout the interior of the XRC. The XRC for large robots is equipped with a heat exchanger on the door to cool the interior of the XRC.



Cooling Configuration (Small type)



Cooling Configuration (Large type)

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## 6.4 Equipment Configuration

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## 7 Description of Units and Circuit Boards

Refer to XRC 2001 Supplement, section 2, for description of units and circuit boards.



# 8 Inspections

## 8.1 Regular Inspections



### CAUTION

- Do not touch the cooling fan or other equipment while the power is turned ON.

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

Carry out the following inspections.

Inspection Equipment	Inspection Item	Inspection Frequency	Comments
XRC Controller	Check that the doors are completely closed.	Daily	
	Check for gaps or damage to the sealed construction.	Monthly	
Servo ascending fan and backside duct fan	Check operation	As required	While power ON
Heat exchange fan (Inside, Outside) (Large type only)	Check operation	As required	While servo ON
Emergency stop button	Check operation	As required	While servo ON
Deadman switch	Check operation	As required	On teach mode
Battery	Confirm battery alarm or message is displayed or not	As required	

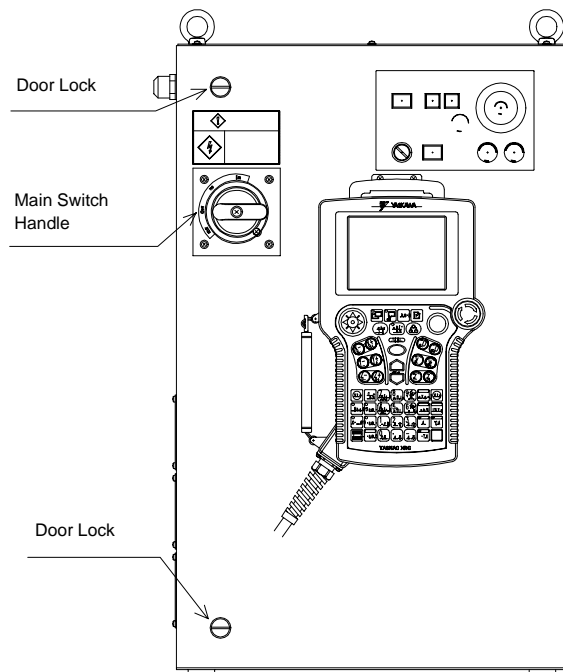
## 8.2 XRC Inspections

### 8.2.1 Checking if the Doors are Firmly Closed

- The YASNAC XRC has a fully sealed construction, designed to keep external air containing oil mist out of the XRC.

Be sure to keep the XRC doors fully closed at all times, even when the controller is not operating.

- Open or close the two locks in each door with the minus driver when opening or closing the doors for maintenance after the main power is turned off. (CW: Open, CCW: Close)  
Make sure push the door closed and turn the door lock with the driver. When the door is closed, turn the door lock until the door clicks.



YASNAC XRC Front View

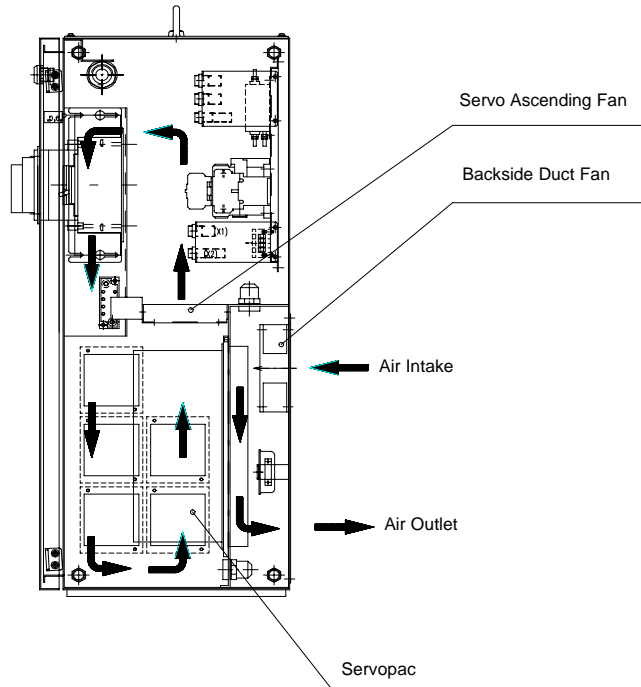
### 8.2.2 Checking for Gaps or Damage in the Sealed Construction Section

- Open the door and check that the seal around the door is undamaged.
- Check that the inside of the XRC is not excessively dirty. If it is dirty, determine the cause, take measures to correct the problem and immediately clean up the dirt.
- Fully close each door lock and check that no excessive gaps exist around the edge of the door.

## 8.3 Cooling Fan Inspections

Inspect the cooling fans as required. A defective fan can cause the XRC to malfunction because of excessive high temperatures inside.

The servo ascending fan and backside duct fan normally operate while the power is turned ON. Check if the fans are operating correctly by visual inspection and by feeling air moving into the air inlet and from the outlet.



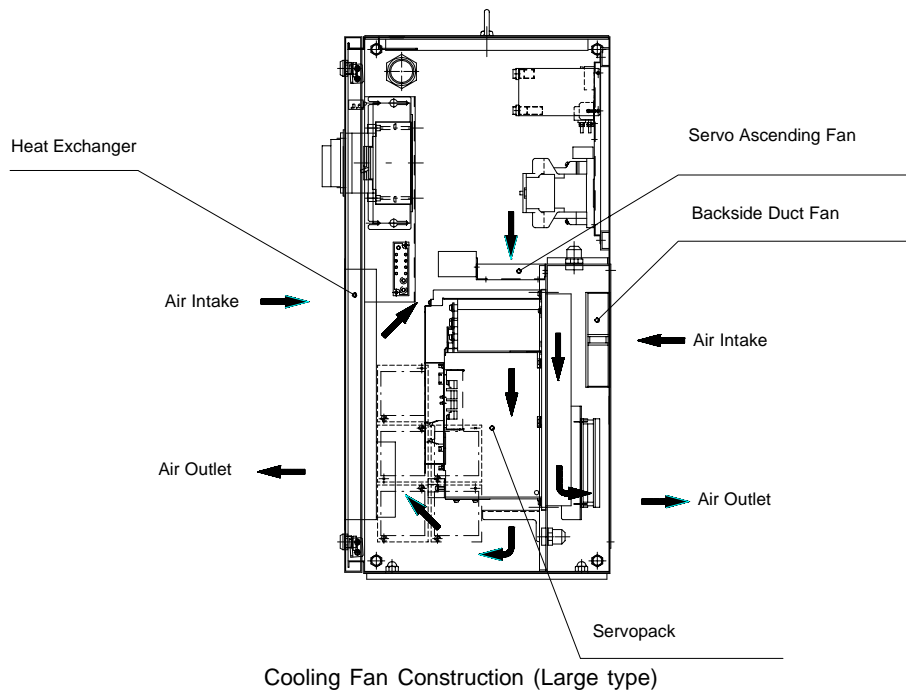
Cooling Fan Construction (Small type)



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## 8.4 Emergency Stop Button Inspections

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## 8.4 Emergency Stop Button Inspections

The emergency stop buttons are located on both the playback panel and the programming pendant. Confirm the servo power is off by pressing the emergency stop button on the playback panel after the servo ON button, before the robot is operated.

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## 8.5 Deadman Switch Inspections

The programming pendant is equipped with a three-position deadman switch. Perform the following operation to confirm the deadman switch operates.

1. Press [TEACH] on the playback panel to switch to teach mode. The [TEACH] lamp lights.



2. Press [SERVO ON READY] on the playback panel. The [SERVO ON READY] lamp blinks.



3. Press [TEACH LOCK] on the programming pendant. The [TEACH LOCK] LED blinks.



4. When the deadman switch is grasped lightly, the servo power is turned ON. When the deadman switch is grasped firmly or released, the servo power is turned OFF.



If the [SERVO ON READY] lamp does not light in previous operation (2), check the following:

- The emergency stop button on the playback panel is pressed.
- The emergency stop button on the programming pendant is pressed.
- The emergency stop signal is input from external.

If the servo is not turned on in a previous operation (4), check the following:

- The overrun LS is operating.
- If a major alarm is occurring.

## 8.6 Battery Inspections

The XRC has a battery that backs up the important program files for user data in the CMOS memory.

A battery alarm indicates when a battery has expired and must be replaced. The programming pendant display and the message "Memory battery weak" appears at the bottom of the display.

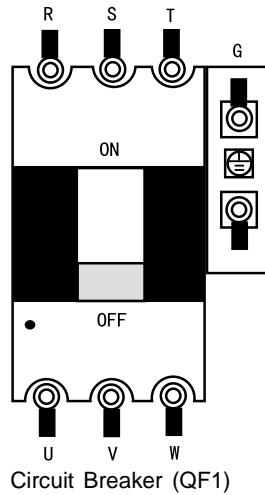
The way to replace the battery is described in "9.1.1 Replacing Parts of the CPU Rack".

## 8.7 Power Supply Voltage Confirmation

Check the voltage of R, S, T terminal of the circuit breaker (QF1) with an electric tester.

Power Supply Voltage Confirmation

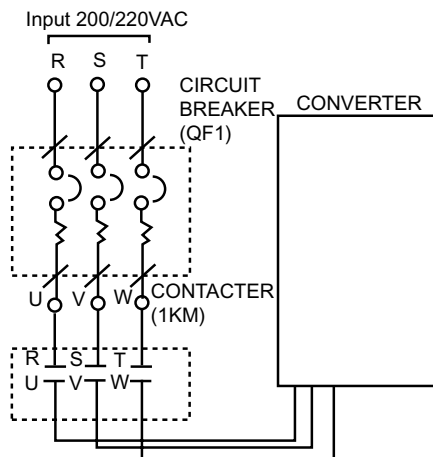
Measuring Items	Terminals	Correct Value
Correlate voltage	Between R and S, S and T, R and T	200 to 220V (+10%, -15%)
Voltage between earth (S phase ground)	Between R and G, T and G	200 to 220V (+10%, -15%)
	Between S and G	About 0V



## 8.8 Open Phase Check

Open Phase Check List

Check Item	Contents
Lead Cable Check	Confirm if the lead cable for the power supply is wired as shown in the following. If the wiring is wrong or broken, repair it.
Input Power Supply Check	Check the open phase voltage of input power supply with an electric tester. (Normal value: 200-220V (+10%, -15%))
Circuit Breaker (QF1) Check	Turn on the control power supply and check the open phase voltage of "U,V,W" of the circuit breaker (QF1) with an electric tester. If abnormal, replace the circuit breaker (QF1).



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## 8.8 Open Phase Check

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## 9 Replacing Parts

### 9.1 Replacing XRC Parts



#### WARNING

- Turn OFF the power supply before opening the XRC doors.

Failure to observe this warning may result in electric shock.

- After turning OFF the power supply, wait at least 5 minutes before replacing a servopack or power supply unit. Do not touch any terminals during this period.

Failure to observe this warning may result in electric shock.



#### CAUTION

- To prevent anyone inadvertently turning ON the power supply during maintenance, put up a warning sign such as "DO NOT TURN ON THE POWER" at the primary power supply (knife switch, wiring circuit breaker, etc.) and at the YASNAC XRC and related controllers and use accepted lockout/tagout procedures.

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

- Do not touch the regeneration resistors. They are very hot.

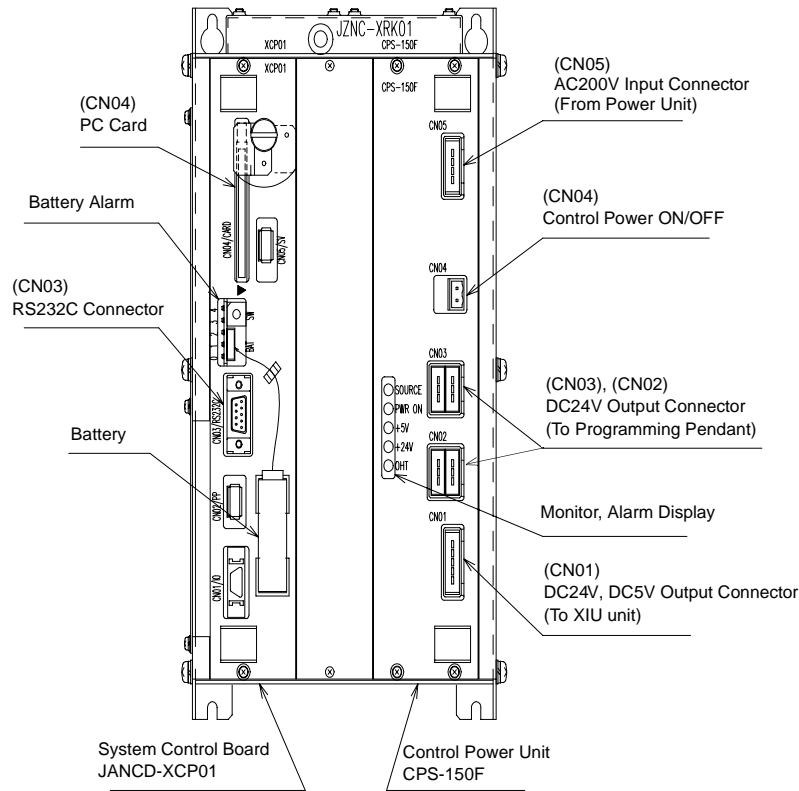
Failure to observe this caution may result in burn injuries.

- After maintenance is completed, carefully check that no tools are left inside the YASNAC XRC and that the doors are securely closed.

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

## 9.1.1 Replacing Parts of the CPU Rack

CPU rack (JZNC-XRK01B-□) is comprised of the control power supply unit, the rack for the various circuit boards and system control boards.



CPU Rack Configuration (JZNC-XRK01B-□)

### ■ Replacing the Battery

Replace the battery within 40 hours if a battery alarm occurs. If it is within 30 minute after turning on the electricity after the power was turned off for more than 2 days, replace the battery immediately.

(The battery alarms appear on the programing pendant display and LED on the system control board is turned on.)

### Replacement Procedure

1. Disconnect the battery connector (BAT) and remove the battery.
2. Mount the new battery and connect the battery connector.



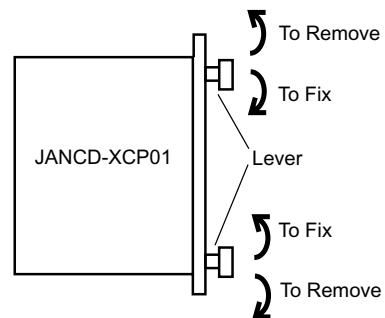
Although the CMOS memory is backed up by super capacitor, the battery must be replaced as soon as the battery alarm occurs. The job data and other data may be lost if the battery is left for more than 40 hours.

## ■ Replacing the JANCD-XCP01 Circuit Board

Turn off the power before replacing a circuit board.

### Replacement Procedure

1. Disconnect all cables connected to the circuit board.
2. Undo 2 screws fixing the circuit board and rack.
3. Spread the levers attached to the upper and lower side of circuit board up and down respectively and pull out the circuit board forward



4. Pull out the circuit board from the rack.
5. Insert a new circuit board into the slot of the rack with the levers spread.
6. Push the board until it is placed in the same position of other boards.
7. Tighten upper and lower screws.
8. Connect all disconnected cables.



The JANCD-XCP01 circuit board contains important file data for the user programs, which is backed up by the battery. Incorrect operations can cause this stored file data to be lost. When the JANCD-XCP01 circuit board is replaced, initialize the JANCD-XCP01 circuit board and load the CMOS file.



■ Replacing the Control Power Unit (CPS-150F)



**CAUTION**

- After turning OFF the power supply, wait at least 5 minutes before replacing a control power unit. Do not touch any terminals during this period. Confirm all monitor lights are turned off.

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

**Replacement Procedure**

1. Disconnect all cables connected to the control power unit.
2. Undo four upper and lower screws attaching the control power unit and the rack. (two screws on each side).
3. Pull out the control power unit from the rack holding the lever which is attached at the upper and lower side.
4. Insert the new control power unit in to the slot of the rack.
5. Push the new control power unit until it is placed in the same position of other boards.
6. Tighten upper and lower screws.
7. Connect all disconnected cables.

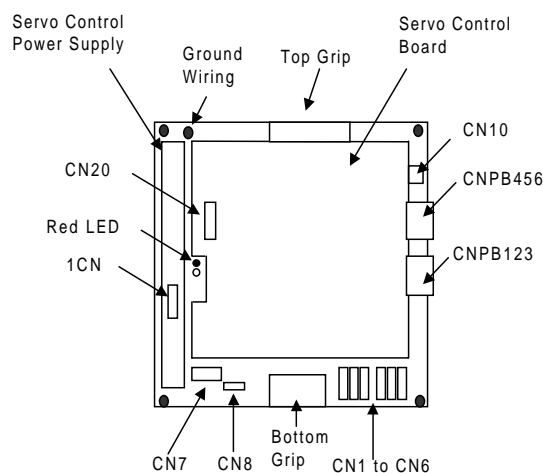
## 9.1.2 Replacing the Servopack

There are two kinds of Servopacks depending on capacity.

Type	Manipulator
Integrated Type	SV3X, UP6, SK16X
Separated Type	SK16MX, SK45X, UP130, UP165, UP200, UP130R

### Replacement Procedure (Integrated Type)

1. Turn OFF the primary power supply and wait at least 5 minutes before replacing. Do not touch any terminals during this period.
2. Verify that the Servopack CHARGE lamp (red LED) is unlit.
3. Disconnect all the cables connected externally to the Servopack.
  - ① Main circuit power supply connector (CN7)
  - ② Regenerative resistor connector (CN8)
  - ③ Servo control power supply connector (1CN)
  - ④ Cables connected externally to the servo control board
    - PG cable connectors (CNPB123, CNPB456)
    - Communications cable connector (CN10)
    - Power ON signal cable connector (CN20)
    - Motor cable connectors (CN1 to CN6)
4. Remove the ground wiring connected to the Servopack.
5. Remove the four screws in the four corners of the Servopack.
6. With the top and bottom grips, pull out the Servopack.
7. Install the new Servopack and reconnect the connectors in the reverse order of that listed above.



Configuration of Servopack (SV3X, UP6, SK16X)

## Replacement Procedure (Separated Type)

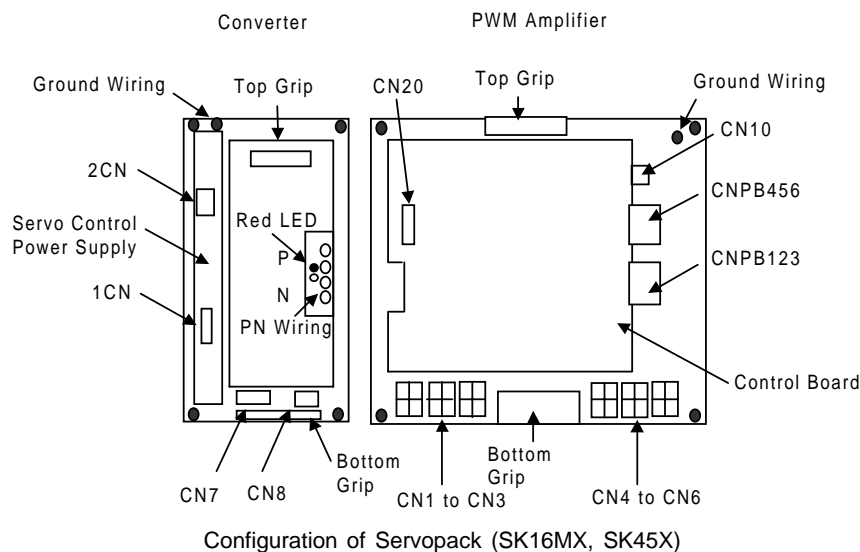
### a) SK16MX, SK45X

#### • How to Replace Converter

1. Turn OFF the primary power supply and wait at least 5 minutes before replacing. Do not touch any terminals during this period.
2. Verify that the converter CHARGE lamp (red LED) is unlit.
3. Disconnect all the cables connected externally to the converter.
  - ① Main circuit power supply connector (CN7)
  - ② Regenerative resistor connector (CN8)
  - ③ Servo control power supply connectors (1CN and 2CN)
  - ④ PN power supply terminals (P×1, N×1)
4. Remove the ground wiring connected to the converter.
5. Remove the four screws in the four corners of the converter.
6. With the top and bottom grips, pull out the converter.
7. Install the new converter and reconnect the connectors in the reverse order of that listed above.

#### • How to Replace PWM Amplifier

1. Turn OFF the primary power supply and wait at least 5 minutes before replacing. Do not touch any terminals during this period.
2. Verify that the converter CHARGE lamp (red LED) is unlit.
3. Disconnect all the cables connected externally to the control board.
  - ① PG cable connectors (CNPB123, CNPB456)
  - ② Communication cable connector (CN10)
  - ③ Power ON signal cable connector (CN20)
  - ④ Motor cable connectors (CN1 to CN6)
4. Remove the ground wiring connected to the PWM amplifier.
5. Remove the four screws in the four corners of the PWM amplifier.
6. With the top and bottom grips, pull out the PWM amplifier.
7. Install the new PWM amplifier and reconnect the connectors in the reverse order of that listed above.



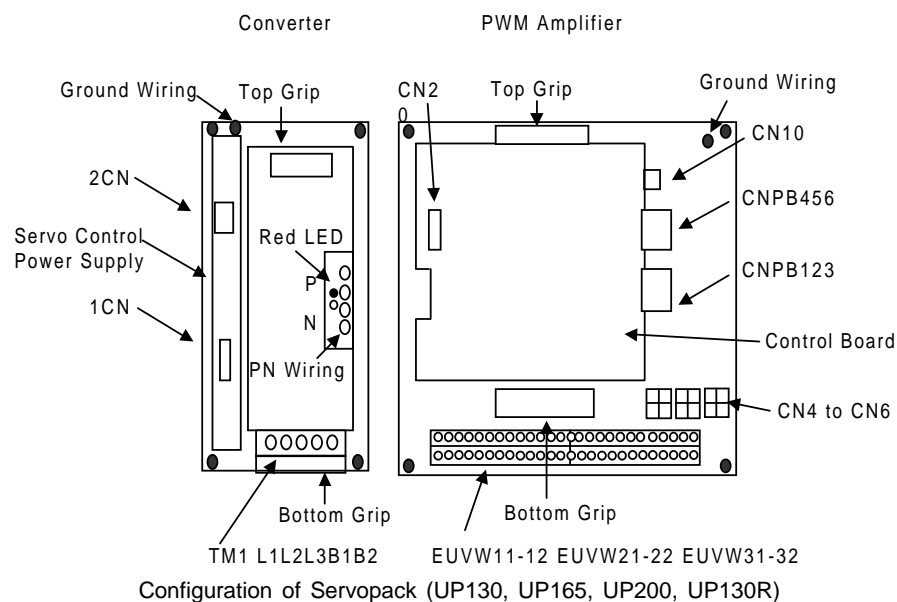
## b) UP130, UP165, UP200, UP130R

## • How to Replace Converter

1. Turn OFF the primary power supply and wait at least 5 minutes before replacing. Do not touch any terminals during this period.
2. Verify that the converter CHARGE lamp (red LED) is unlit.
3. Disconnect all the cables connected externally to the converter.
  - ① Main circuit power supply terminals (TM1: L1, L2, L3)
  - ② Regenerative resistor terminals (TM1: B1, B2)
  - ③ Servo control power supply connectors (1CN and 2CN)
  - ④ PN power supply terminals (P×2, N×2)
4. Remove the ground wiring connected to the converter.
5. Remove the four screws in the four corners of the converter.
6. With the top and bottom grips, pull out the converter.
7. Install the new converter and reconnect the connectors in the reverse order of that listed above.

## • How to Replace PWM Amplifier

1. Turn OFF the primary power supply and wait at least 5 minutes before replacing. Do not touch any terminals during this period.
2. Verify that the converter CHARGE lamp (red LED) is unlit.
3. Disconnect all the cables connected externally to the control board.
  - ① PG cable connectors (CNPB123, CNPB456)
  - ② Communication cable connector (CN10)
  - ③ Power ON signal cable connector (CN20)
  - ④ Motor cable terminal (EUVW), motor cable connectors (CN4 to CN6)
4. Remove the ground wiring connected to the PWM amplifier.
5. Remove the four screws in the four corners of the PWM amplifier.
6. With the top and bottom grips, pull out the PWM amplifier.
7. Install the new PWM amplifier and reconnect the connectors in the reverse order of that listed above.

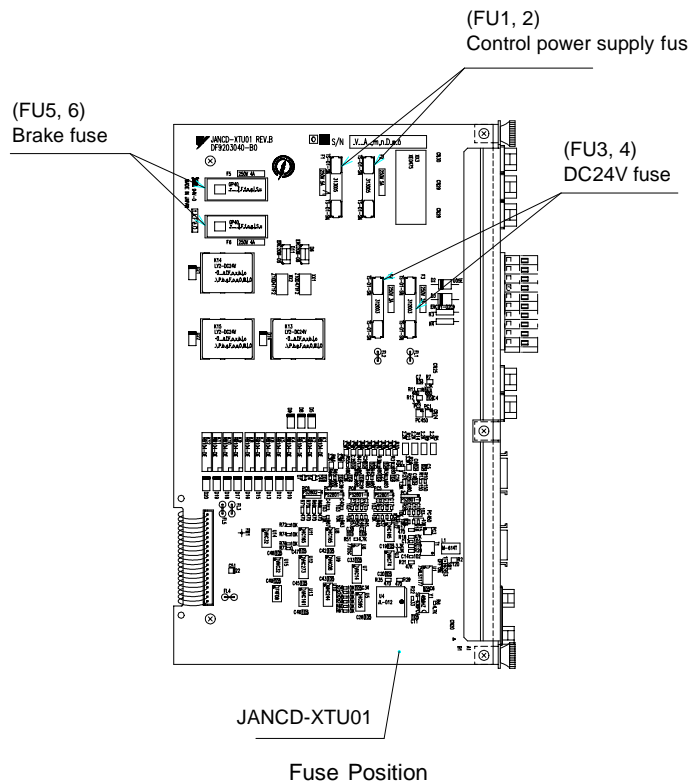


### 9.1.3 Replacing the parts of I/O Power-on Unit

#### ■ Checking and Replacing Fuses

The types of fuses on the I/O power-on unit (JZNC-XIU01) and power-on unit (JANCD-XTU01) are as follows.

Parts No.	Fuse Name	Specification
FU1, 2	Control Power Supply Fuse	250V, 5A, Time Lag Fuse (Std.: 313005, 250V, 5A (LITTEL))
FU3, 4	DC24V Fuse	250V, 3A Rapid Cut Fuse (Std.: 312003 250V, 3A (LITTEL))
FU5, 6	Brake Fuse	GP40, 4.0A, 250V (Daito Tsushin)



If a fuse appears to be blown (see “10.2 Alarm Message List”), remove each fuse shown above and check the continuity with an electric tester. If the fuse is blown, replace it with the same type of fuse (supplied).

**NOTE** Determine and correct the cause of the blown fuse. If the problem is uncorrected, the fuse may blow again.

## 9.2 YASNAC XRC Parts List

YASNAC XRC Parts List

No.	Name	Model	Comment
1	Servopack	*1	6 Axis type
2	CPU rack	JZNC-XRK01B-□	
	Backboard	JANCD-XBB01	
	System control circuit board	JANCD-XCP01	
	High speed serial interface circuit board	JANCD-XIF03	
	Control power supply	CPS-150F	
3	I/O Power-on unit	JZNC-XIU01	
	Power-on circuit board	JANCD-XTU01	
	Specific I/O circuit board	JANCD-XIO01	
	General I/O circuit board	JANCD-XIO02	
4	Power supply unit	*2	
5	Playback panel	ZY1C-SS3152	
6	Servo ascending fan	3610PS-22T-B30-B00	
7	Backside duct fan	4715PS-22T-B30-B00	Small capacity
		5915PS-22T-B30-B00	Large capacity
8	Heat exchanger	YD5-1042A	Large capacity only
9	Contactor circuit board fuse	313005, 5A, 250V	Time lag fuse
		312003, 3A, 250V	Rapid cut fuse
		GP40, 4.0A, 250V	Alarm fuse
10	Contactor circuit board relay	LY2 DC24V	
11	Battery	ER6VC3N 3.6V	

\*1 The type of the servopack depends on the robot model. For details, see the " Table. Servopack List (Small Capacity) ", " Table. Servopack List (Large Capacity) ".

\*2 The type of the power supply unit depends on the robot model. For detail, see the " Table. Power Supply Unit List ".

Servopack List (Small Capacity)

Component		SV3X	UP6	SK16X
		Type	Type	Type
Servopack		CACR-SV3AAA	CACR-UP6AAC	CACR-SK16AAC
Converter		JUSP-ACP05JAA	JUSP-ACP05JAA	JUSP-ACP05JAA
Amplifier	S	JUSP-WS02AA	JUSP-WS05AAY17	JUSP-WS10AAY17
	L	JUSP-WS02AA	JUSP-WS10AAY17	JUSP-WS10AAY17
	U	JUSP-WS01AA	JUSP-WS05AAY17	JUSP-WS10AAY17
	R	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS02AA
	B	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS02AA
	T	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS02AA
Servo control circuit board		JASP-WRCA01	JASP-WRCA01	JASP-WRCA01
Control power supply		JUSP-RCP01AAB	JUSP-RCP01AAB	JUSP-RCP01AAB

Servopack List (Large Capacity)

Component		SK16MX	SK45X	UP130, UP165
		Type	Type	Type
Servopack		CACR-UP16MAAB	CACR-SK45AAB	CACR-SV130AAB
Amplifier	S	JUSP-WS30AA	JUSP-WS30AA	JUSP-WS60AA
	L	JUSP-WS20AA	JUSP-WS20AA	JUSP-WS60AA
	U	JUSP-WS20AA	JUSP-WS20AA	JUSP-WS60AA
	R	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS20AAY13
	B	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS15AAY13
	T	JUSP-WS02AA	JUSP-WS10AA	JUSP-WS15AAY13
Servo control circuit board		JASP-WRCA01	JASP-WRCA01	JASP-WRCA01
Converter		JUSP-ACP35JAA	JUSP-ACP25JAA	JUSP-ACP35JAA
Control power supply		JUSP-RCP01AAB	JUSP-RCP01AAB	JUSP-RCP01AAB

Servopack List (Large Capacity)

Component		UP200, UP130R	
		Type	
Servopack		CACR-UP130AABY18	
Amplifier	S	JUSP-WS60AAY18	
	L	JUSP-WS60AAY18	
	U	JUSP-WS60AA	
	R	JUSP-WS20AAY13	
	B	JUSP-WS15AAY13	
	T	JUSP-WS15AAY13	
	Servo control circuit board		JASP-WRCA01
Converter		JUSP-ACP35JAA	
Control power supply		JUSP-RCP01AAB	

Power Supply Unit List

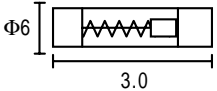
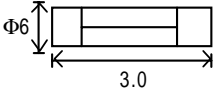
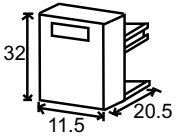
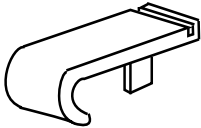
Type	Robot Type
JZNC-XPW03B or JZRRCR-XPU03	SV3X, UP6, SK16X
JZRRCR-XPU02	SK16MX, SK45X
JZRRCR-XPU01-□	UP130, UP165, UP200, UP130R



## 9.3 Supplied Parts List

The supplied parts of YASNAC XRC is as follows.

Parts No.1 to 3 are used for fuse for replacement and No.4 is used as a tool for connecting the I/O.

No	Parts Name	Dimensions	Pcs	Model	Application
1	5A Glass-Tube fuse		2	313005 5A 250V (LITTEL)	JANCD-XTU01 FU1, 2
2	3A Glass-Tube fuse		2	312003 3A 250V (LITTEL)	JANCD-XTU01 FU3, 4
3	4.0A Alarm fuse		2	GP40 4.0A 250V (Daito Tsushin)	JANCD-XTU01 FU5, 6
4	WAGO Connector wiring tool		2	231-131 (WAGO)	JANCD-XI001 CN05, 06 JANCD-XTU01 CN26, 27 CPS-150F CN04

## 9.4 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the XRC. The spare parts list for the XRC is shown below. Product performance can not be guaranteed when using spare parts from any company other than Yaskawa. To buy the spare parts which are ranked B or C, inform the manufacturing number (or order number) of XRC to Yaskawa representative. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts
- Rank B: Parts for which replacement may be necessary as a result of frequent operation
- Rank C: Drive unit



For replacing parts in Rank B or Rank C, contact your Yaskawa representative.

Recommended Spare Parts of XRC for SV3X

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
6	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
7	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
8	A	Control Relay	LY2 DC24V	Omron	3	3	
9	B	Convertor	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
12	B	Amplifier	JUSP-WS02AA	Yaskawa	1	2	For S,L axes
13	B	Amplifier	JUSP-WS01AA	Yaskawa	1	1	For U axis
14	B	Amplifier	JUSP-WSA5AA	Yaskawa	1	3	For R,B,T axes
15	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
16	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
17	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
18	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
19	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
20	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
21	C	Servopack	CACR-SV3AAA	Yaskawa	1	1	
22	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
23	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
24	C	Power Unit	JZRCR-XPU03	Yaskawa	1	1	
25	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.25 " Programming Pendant" is ordered.

## 9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP6

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
6	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
7	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
8	A	Control Relay	LY2 DC24V	Omron	3	3	
9	B	Convertor	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
12	B	Amplifier	JUSP-WS05AAY17	Yaskawa	1	2	For S,U axes
13	B	Amplifier	JUSP-WS10AAY17	Yaskawa	1	1	For L axis
14	B	Amplifier	JUSP-WS01AA	Yaskawa	1	3	For R,B,T axes
15	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
16	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
17	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
18	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
19	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
20	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
21	C	Servopack	CACR-UP6AAC	Yaskawa	1	1	
22	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
23	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
24	C	Power Unit	JZRCR-XPU03	Yaskawa	1	1	
25	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.25 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for SK16X

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	4715PS-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	
5	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
6	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
7	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
8	A	Control Relay	LY2 DC24V	Omron	3	3	
9	B	Convertor	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
12	B	Amplifier	JUSP-WS10AAY17	Yaskawa	1	3	For S,U axes
13	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For L axis
14	B	Control Power Unit	CPS-150F	Yaskawa	1	1	For R,B,T axes
15	B	System Control Board	JANCD-XCP01	Fuji Electric Hi-Tech	1	1	For CPU Unit
16	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
17	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
18	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
19	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
20	C	Servopack	CACR-SK16AAC	Yaskawa	1	1	
21	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
22	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
23	C	Power Unit	JZRCR-XPU03	Yaskawa	1	1	
24	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.24 "Programming Pendant" is ordered.

## 9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for SK16MX

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
6	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
7	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
8	A	Control Relay	LY2 DC24V	Omron	3	3	
9	B	Convertor	JUSP-ACP25JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
12	B	Amplifier	JUSP-WS30AA	Yaskawa	1	1	For S axis
13	B	Amplifier	JUSP-WS20AA	Yaskawa	1	2	For L,U axes
14	B	Amplifier	JUSP-WS02AA	Yaskawa	1	3	For R,B,T axes
15	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
16	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
17	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
18	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
19	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
20	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
21	C	Servopack	CACR-SK16MAAB	Yaskawa	1	1	
22	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
23	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
24	C	Power Unit	JZRCR-XPU02	Yaskawa	1	1	
25	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.25 " Programming Pendant" is ordered.

Recommended Spare Parts of XRC for SK45X

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	3	3	
5	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
6	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
7	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
8	A	Control Relay	LY2 DC24V	Omron	3	3	
9	B	Convertor	JUSP-ACP25JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
12	B	Amplifier	JUSP-WS30AA	Yaskawa	1	1	For S,U axes
13	B	Amplifier	JUSP-WS20AA	Yaskawa	1	2	For L axis
14	B	Amplifier	JUSP-WS10AA	Yaskawa	1	3	For R,B,T axes
15	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
16	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
17	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
18	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
19	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
20	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
21	C	Servopack	CACR-SK45AAB	Yaskawa	1	1	
22	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
23	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
24	C	Power Unit	JZRRCR-XPU02	Yaskawa	1	1	
25	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.25 " Programming Pendant" is ordered.

## 9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP130, UP165

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	
5	A	Heat Exchanger Fan	4710PS-22T-B30	Littel fuse	2	2	
6	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
7	A	24VDC Fuse	312003 3A 250V	Daito Communication Apparatus	10	2	
8	A	Brake Fuse	GP40 4.0A 250V	Omron	10	2	
9	A	Control Relay	LY2 DC24V	Yaskawa	3	3	
10	B	Convertor	JUSP-ACP35JAA	SANRITZ	1	1	
11	B	Control Power Unit	JUSP-RCP01AAB	Yaskawa	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
13	B	Amplifier	JUSP-WS60AA	Yaskawa	1	3	For S,L,U axes
14	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
15	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B,T axes
16	B	Capacitor Unit	JUSP-WC662A	Yaskawa	1	1	
17	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
18	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
19	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
20	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
21	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
22	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
23	C	Servopack	CACR-UP130AAB	Yaskawa	1	1	
24	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
26	C	Power Unit	JZRCR-XPU01-2S	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 " Programming Pendant" is ordered.

Recommended Spare Parts of XRC for UP200, UP130R

No	Rank	Name	Type	Mfr.	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	2	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	
5	A	Heat Exchanger Fan	4710PS-22T-B30	Minebea	2	2	
6	A	Control Power Fuse	313005 5A 250V	Littel fuse	10	2	
7	A	24VDC Fuse	312003 3A 250V	Littel fuse	10	2	
8	A	Brake Fuse	GP40 4.0A 250V	Daito Communication Apparatus	10	2	
9	A	Control Relay	LY2 DC24V	Omron	3	3	
10	B	Convertor	JUSP-ACP35JAA	Yaskawa	1	1	
11	B	Control Power Unit	JUSP-RCP01AAB	SANRITZ	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01	Yaskawa	1	1	
13	B	Amplifier	JUSP-WS60AAY18	Yaskawa	1	2	For S,L axes
14	B	Amplifier	JUSP-WS60AA	Yaskawa	1	1	For U axis
15	B	Amplifier	JUSP-WS20AAY13	Yaskawa	1	1	For R axis
16	B	Amplifier	JUSP-WS15AAY13	Yaskawa	1	2	For B,T axes
17	B	Capacitor Unit	JUSP-WC662A	Yaskawa	1	1	
18	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
19	B	System Control Board	JANCD-XCP01	Yaskawa	1	1	
20	B	Communication Board	JANCD-XIF03	Yaskawa	1	1	
21	B	Specific I/O Board	JANCD-XIO01	Yaskawa	1	1	
22	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
23	B	Power On Board	JANCD-XTU01	Yaskawa	1	1	
24	C	Servopack	CACR-UP130AABY18	Yaskawa	1	1	
25	C	CPU Unit	JZNC-XRK01B-1	Yaskawa	1	1	
26	C	I/O Power On Unit	JZNC-XIU01	Yaskawa	1	1	
27	C	Power Unit	JZRCR-XPU01-2S	Yaskawa	1	1	
28	C	Programming Pendant	JZNC-XPP02	Yaskawa	1	1	With Cable 8m

\*Specify application (Arc, General, Spot, Handling) of key sheet when No.28 " Programming Pendant" is ordered.



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## 9.4 Recommended Spare Parts

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# Alarm • Error



# 10 Alarm

## 10.1 Outline of Alarm

When the alarm of level 0-3(major alarm) occurs, the servo power supply is interrupted.

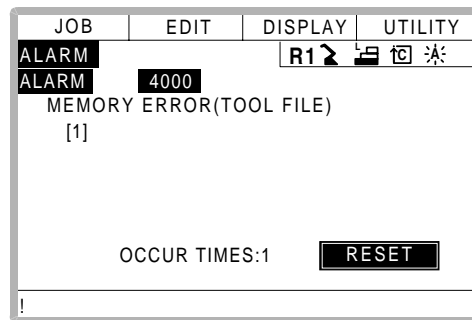
Alarm Code classification.

Alarm Code	Alarm Level	Alarm Reset Method
0□□□	Level 0 (Major alarm) (Off line alarm: Initial diagnosis/ Hardware diagnosis alarm)	It is not possible to reset by [RESET] under the alarm display or the specific I/O signal (Alarm reset). Turn off the main power supply and correct the cause of the alarm. Then turn on the main power supply again.
1□□□ - 3□□□	Level 1-3 (Major alarm)	It is not possible to reset by [RESET] under the alarm display or the specific I/O signal (Alarm reset). Turn off the main power supply and correct the cause of the alarm. Then turn on a main power supply again.
4□□□ - 8□□□	Level 4-8 (Minor alarm)	After correcting the cause, it is possible to reset by [RESET] under the alarm display or the specific I/O signal (Alarm reset).
9□□□	Level 9 (Minor alarm) (I/O Alarm)	After correcting the cause that the specific input signal for the system or user alarm request is input, it is possible to reset by [RESET] under the alarm display or the specific I/O signal (Alarm reset).

## 10.2 Alarm Display

### 10.2.1 Displaying/Releasing Alarm

If an alarm occurs during operation, the manipulator stops immediately, the alarm/error lamp on the playback panel lights and the alarm display appears on the programming pendant indicating that the machine was stopped by an alarm.



If more than one alarm occurs simultaneously, the first four alarms are displayed. The fifth and subsequent alarms are not displayed, but they can be checked on the alarm history display. The following operations are available in the alarm status: display change, mode change, alarm reset, and emergency stop. If the display is changed to the other during alarm occurrence, the alarm display can be shown again by selecting {SYSTEM INFO} and {ALARM} under the menu.

Release

Alarms are classified by minor and major alarms.

Minor Alarms

#### Operation

Press [SELECT] <sup>\*1</sup>

#### Explanation

- <sup>\*1</sup> Select [RESET] under the alarm display to release the alarm status. When using an external input signal, turn on the "ALARM RESET" setting.

Major Alarms

#### Operation

Turn off the main power supply and remove the cause of the alarm <sup>\*1</sup>

#### Explanation

- <sup>\*1</sup> If a severe alarm, such as hardware failure occurs, servo power is automatically shut off and the manipulator stops. If releasing does not work, turn off the main power and correct the cause of the alarm.

## 10.2.2 Special Alarm Display

### (1) Sub Data

Sub data such as data for the axis where the alarm occurred, may also be displayed for some alarms.

- Decimal data

Without signs: 0 to 65535

With signs: -32768 to 32767

- Binary data

The alarm occurrence data becomes "1."

With 8 bits: 0000\_0001

With 16 bits: 00000001\_00000001

- Axis data

The axis where the alarm occurred is highlighted.

With robot axis: Robots [ S **L** U R B T ] to 3

With base axis: Robots [ **1** 2 3 ] to 3

With station axis: Stations [ 1 **2** 3 ] to 6

- XYZ coordinate data

The coordinates when the alarm occurred are highlighted.

[ **X** Y Z ]

[ X Y Z **Tx** Ty Tz ]

- 123 data

The data for the alarm that occurred is highlighted.

[ **1** 2 3 ]

- Control group data

The control group where the alarm occurred is highlighted.

[ **R1** R2 S1 S2 S3 ]

### (2) Multiple Servopack System

In a system using more than one Servopack, the number of the Servopack where the alarm occurred is also displayed. The S1 switch of the WRCA01 board shows the Servopack number.

SV#1: Servopack 1 (WRCA01 board S1 switch: 0)

SV#2: Servopack 2 (WRCA01 board S1 switch: 1)

SV#3: Servopack 3 (WRCA01 board S1 switch: 2)

SV#4: Servopack 4 (WRCA01 board S1 switch: 3)

SV#5: Servopack 5 (WRCA01 board S1 switch: 4)

SV#6: Servopack 6 (WRCA01 board S1 switch: 5)

(3) Independent Control Function (Optional)

In the independent control function (multi-task job), the tasks that were being done when the alarm occurred are also displayed.

TASK#0: Master-task job

TASK#1: Sub-task1 job (SUB1)

TASK#2: Sub-task2 job (SUB2)

TASK#3: Sub-task3 job (SUB3)

TASK#4: Sub-task4 job (SUB4)

TASK#5: Sub-task5 job (SUB5)

## 10.3 Alarm Message List



### CAUTION

Pay special attention when performing any repairs for system control circuit board "JANCD-XCP01". Personnel must be appropriately skilled in maintenance mode operation to carry out repairs.

JANCD-XCP01 back up very important file data for the user program with a battery. Careless operation may delete registered data. If repairs for JANCD-XCP01 are necessary, consult YASKAWA representative before performing any repairs.

Alarm Message List

Alarm Number	Message	Cause	Remedy
0010	CPU BOARD INSERTION ERROR [Decimal Data]	<ul style="list-style-type: none"> <li>• Insertion of the circuit board was not completed</li> <li>• Defective circuit board</li> </ul> <p>Data stands for error circuit board            10:XCP02 circuit board (#1-0)            11:XCP02 circuit board (#1-1)            12:XCP02 circuit board (#1-2)            20:XCP02 circuit board (#2-0)            21:XCP02 circuit board (#2-1)            22:XCP02 circuit board (#2-2)</p> <p>(Note)            XCP02 circuit board (#□-■)            □:Slot NO.            ■:0 →XCP02 circuit board (main)                1 →Sub-board1(connector CNSL side)                2 →Sub-board2(connector CNET side)</p>	<ul style="list-style-type: none"> <li>• Check whether the circuit board is correctly inserted.</li> <li>• Replace the circuit board.</li> </ul>
0020	CPU COMMUNICATION ERROR [Decimal Data]	<ul style="list-style-type: none"> <li>• Insertion of the circuit board was not completed</li> <li>• Defective circuit board</li> </ul> <p>Data stands for an error circuit board            10:XCP02 circuit board (#1-0)            11:XCP02 circuit board (#1-1)            12:XCP02 circuit board (#1-2)            20:XCP02 circuit board (#2-0)            21:XCP02 circuit board (#2-1)            22:XCP02 circuit board (#2-2)</p> <p>(Note)            XCP02 circuit board (# □-■)            □:Slot NO.            ■:0 →XCP02 circuit board (main)                1 →Sub-board1(connector CNSL side)                2 →Sub-board2(connector CNET side)</p>	<ul style="list-style-type: none"> <li>• Check whether the circuit board is correctly inserted.</li> <li>• Replace the circuit board.</li> </ul>



## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0021	COMMUNICATION ERROR(SERVO [Decimal Data])	<ul style="list-style-type: none"> <li>The connection of communication cable for servopack was not completed.</li> <li>The connection of communication cable for servopack was not cut.</li> <li>The connection of terminal connector was not completed.</li> <li>The terminal connector was unusual.</li> <li>The circuit board was out of order.</li> <li>(The terminal connector was equipped for a system).</li> </ul> <p>Data stands for an error circuit board            50:WRCA01 circuit board (#1            51:WRCA01 circuit board (#2            52:WRCA01 circuit board (#3            53:WRCA01 circuit board (#4            54:WRCA01 circuit board (#5            55:WRCA01 circuit board (#6</p> <p>(Note)            WRCA01 circuit board (# □)            The setting value of rotary switch on the WRCA01 circuit board is ( □ -1).</p>	<ul style="list-style-type: none"> <li>Check the connection of communication cable for servopack.</li> <li>(XCP01·CN05 - WRCA(#*)·CN10 cable, WRCA·CN10(#*) - WRCA CN10(#*) cable)</li> <li>Replace the communication connector for servopack.</li> <li>Check the connection of the terminal connector (WRCA·CN10(#*)).</li> <li>Replace the terminal connector.</li> <li>Replace the circuit board.</li> </ul>
0030	ROM ERROR [Decimal Data]	<p>An error was found by sum check of system program.</p> <p>Data stands for an error circuit board            1:XCP01 circuit board            2:XSP01 circuit board            10:XCP02 circuit board (#1-0)            11:XCP02 circuit board (#1-1)            12:XCP02 circuit board (#1-2)            20:XCP02 circuit board (#2-0)            21:XCP02 circuit board (#2-1)            22:XCP02 circuit board (#2-2)</p> <p>(Note)            XCP02 circuit board (#□ -■)            □:Slot NO.            ■:0 → XCP02 circuit board (main)              1 → Sub-board1(connector CNSL side)              2 → Sub-board2(connector CNET side)</p> <p>50:WRCA01 circuit board (#1            51:WRCA01 circuit board (#2            52:WRCA01 circuit board (#3            53:WRCA01 circuit board (#4            54:WRCA01 circuit board (#5            55:WRCA01 circuit board (#6</p> <p>(Note)            WRCA01 circuit board (# □)            The setting value of rotary switch on the WRCA01 circuit board is ( □ -1).</p>	<ul style="list-style-type: none"> <li>Replace the circuit board.</li> <li>When the XCP01 circuit board is replaced, consult YASKAWA representative.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
0040	MEMORY ERROR (CPU BOARD RAM) [Decimal Data]	<p>Memory (RAM) error</p> <p>Data stands for an error circuit board</p> <p>1:XCP01 circuit board 2:XSP01 circuit board 10:XCP02 circuit board (#1-0) 11:XCP02 circuit board (#1-1) 12:XCP02 circuit board (#1-2) 20:XCP02 circuit board (#2-0) 21:XCP02 circuit board (#2-1) 22:XCP02 circuit board (#2-2)</p> <p>(Note) XCP02 circuit board (#□ - ■) □:Slot NO. ■:0 → XCP02 circuit board (main 1 → Sub-board1(connector CNSL side) 2 → Sub-board2(connector CNET side)</p> <p>50:WRCA01 circuit board (#1) 51:WRCA01 circuit board (#2) 52:WRCA01 circuit board (#3) 53:WRCA01 circuit board (#4) 54:WRCA01 circuit board (#5) 55:WRCA01 circuit board (#6)</p> <p>(Note) WRCA01 circuit board (# □) The setting value of rotary switch on the WRCA01 circuit board is □ -1)</p>	<ul style="list-style-type: none"> <li>• Replace the circuit board.</li> <li>• When the XCP01 circuit board is replaced, consult a YASKAWA representative.</li> </ul>
0050	MEMORY ERROR(PCI-BUS COMMON RAM) [Decimal Data]	<p>A error occurred in PCI bus shared RAM of the CPU rack or shared RAM between circuit boards.</p> <p>Data stands for an error circuit board</p> <p>10:XCP02 circuit board (#1-0) 11:XCP02 circuit board (#1-1) 12:XCP02 circuit board (#1-2) 20:XCP02 circuit board (#2-0) 21:XCP02 circuit board (#2-1) 22:XCP02 circuit board (#2-2)</p> <p>(Note) XCP02 circuit board (# □ -■) □:Slot NO. ■:0 → XCP02 circuit board (main 1 → Sub-board1(connector CNSL side) 2 → Sub-board2(connector CNET side)</p>	Replace the circuit board.

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0060	COMMUNICATION ERROR(I/O MODULE) [Decimal Data]	<ul style="list-style-type: none"> <li>An error occurred in communication of I/O module.</li> <li>Defective I/O module</li> </ul> <p>Data stands for the error I/O module.</p> <p>1-15: I/O module connected with XCP01 circuit board</p> <p>17-31: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#1)</p> <p>33-47: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#2)</p> <p>49-63: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#3)</p> <p>65-79: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#4)</p> <p>81-95: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#5)</p> <p>97-111: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#6)</p> <p>(Note) WRCA01 circuit board (#□) The setting value of rotary switch on the WRCA circuit board is ( □ -1)</p>	<ul style="list-style-type: none"> <li>Check the connection of the communication cable for I/O module. (XCP01·CN01 - XIU01·CN03 cable, WRCA01(#*)·CN20 - XIU01·CN21 cable)</li> <li>Replace the communication connector for I/O module.</li> </ul>
0200	MEMORY ERROR (PARAMETER FILE) [Decimal Data]	<p>The parameter file was damaged.</p> <p>Data stands for the damaged parameter file.</p> <p>0:RC*, 1:RO*, 2:SV, 3:SVM, 4:SC, 5:SD*, 6:CIO*, 7:FD*, 8:AP, 9:RS, 10:SE, 11:RMS*, 12:AMC*, 13:SVP*, 14:MF*, 15:PCD*</p> <p>*:System parameter</p>	<ul style="list-style-type: none"> <li>Initialize the parameter file damaged on maintenance mode.</li> <li>Load the saved parameter file in the external memory unit.</li> </ul>
0210	MEMORY ERROR (SYSTEM CONFIG-DATA)	<p>The system configuration data information on setting system initialization was damaged.</p>	<p>Needs investigation.</p> <p>Consult a YASKAWA representative.</p>
0220	MEMORY ERROR (JOB MNG DATA)	<p>The job control data was damaged.</p>	<ul style="list-style-type: none"> <li>Initialize the job on maintenance mode</li> <li>The whole job data is deleted.</li> <li>Load the job saved on the external memory unit.</li> </ul>
0230	MEMORY ERROR (LADDER PRG FILE)	<p>The concurrent I/O ladder program was damaged.</p>	<ul style="list-style-type: none"> <li>Initialize the ladder program on maintenance mode.</li> <li>Load the ladder program saved on the external memory unit.</li> </ul>
0300	VERIFY ERROR (SYSTEM CONFIG-DATA) [Decimal Data]	<p>The system parameter was modified illegally.</p>	<p>Needs investigation.</p> <p>Consult a YASKAWA representative.</p>
0310	VERIFY ERROR (CMOS MEMORY SIZE)	<p>CMOS memory capacity on system setting was different than the current one.</p>	<p>Check the connection status of CMOS memory circuit board (XMM01) for expansion.</p>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
0320	VERIFY ERROR (I/O MODULE [Decimal Data])	<ul style="list-style-type: none"> <li>The status of the I/O module on initializing system or modifying was different than the current.</li> <li>The communication mode (16/17 bytes) does not coincide with the XIO01 due to replacement of the I/O module.</li> </ul> <p>Data stands for the I/O module.            1-15: I/O module connected with XCP01 circuit board            17-31: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#1            33-47: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#2            49-63: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#3            65-79: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#4            81-95: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#5            97-111: Contactor circuit board, speed detect circuit board connected with WRCA01 circuit board(#6</p> <p>(Note)            WRCA01 circuit board (# □)            The setting value of rotary switch on the WRCA01 circuit board is □ -1)</p>	<ul style="list-style-type: none"> <li>Check the I/O module is same as when it was initialized or modified.</li> <li>Modify the I/O module on maintenance mode.</li> <li>Verify the communication mode (16/17 bytes) of the new I/O module.</li> </ul>
0330	VERIFY ERROR (APPLICATION)	The application on system setting was different than AP parameter.	Change the AP parameter to the correct value.
0340	VERIFY ERROR (SENSOR FUNCTION)	<ul style="list-style-type: none"> <li>The sensor function on system initializing was different than the function of the sensor circuit board mounted now.</li> <li>The sensor setting on system setting was different than SE parameter.</li> </ul>	<ul style="list-style-type: none"> <li>Set the function of the sensor circuit board on maintenance mode again.</li> <li>Change SE parameter for the correct value.</li> </ul>

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0400	PARAMETER TRANSMISSION ERROR [Decimal Data]	<ul style="list-style-type: none"> <li>The connection of communication cable for servopack was not completed.</li> <li>The connection of communication cable for servopack was not cut.</li> <li>The connection of terminal connector is not completed.</li> <li>The terminal connector is unusual.</li> <li>The circuit board was out of order. (The terminal connector is equipped 1 for a system).</li> </ul> <p>Data stands for an error circuit board                      50:WRCA01 circuit board (#1                      51:WRCA01 circuit board (#2                      52:WRCA01 circuit board (#3                      53:WRCA01 circuit board (#4                      54:WRCA01 circuit board (#5                      55:WRCA01 circuit board (#6</p> <p>(Note)                      WRCA01 circuit board (#□)                      The setting value of rotary switch on the WRCA01 circuit board is (□ -1)</p>	<ul style="list-style-type: none"> <li>Check the connection of communication cable for servopack. (XCP01·CN05 - WRCA(#*)·CN10 cable, WRCA·CN10(#*) - WRCA·CN10(#* cable</li> <li>Replace the communication connector for servopack.</li> <li>Check the connection of the terminal connector (WRCA·CN10(#*)).</li> <li>Replace the terminal connector.</li> <li>Replace the circuit board.</li> </ul>
0410	MODE CHANGE ERROR [Decimal Data]	<p>An error occurred in process of change to normal operation mode.</p> <p>Data stands for an error circuit board                      10:XCP02 circuit board (#1-0)                      11:XCP02 circuit board (#1-1)                      12:XCP02 circuit board (#1-2)                      20:XCP02 circuit board (#2-0)                      21:XCP02 circuit board (#2-1)                      22:XCP02 circuit board (#2-2)</p> <p>(Note)                      XCP02 circuit board (# □ - ■)                      □:Slot NO.                      ■:0 → XCP02 circuit board (main)                      1 → Sub-board1(connector CNSL side)                      2 → Sub-board2(connector CNET side</p> <p>50:WRCA01 board (#1)                      51:WRCA01 board (#2)                      52:WRCA01 board (#3)                      53:WRCA01 board (#4)                      54:WRCA01 board (#5)                      55:WRCA01 board (#6)</p> <p>(Note)                      WRCA01 circuit board (# □)                      The setting value of rotary switch on WRCA01 circuit board is ( □ -1)</p>	<p>&lt;Data:10-21&gt;</p> <ul style="list-style-type: none"> <li>Insert the circuit board in the CPU rack fast.</li> <li>Replace the circuit board.</li> </ul> <p>&lt;Data:50-55&gt;</p> <ul style="list-style-type: none"> <li>Check the connection of communication cable for servopack. (XCP01·CN05 - WRCA(#*)·CN10 cable, WRCA·CN10(#*) - WRCA·CN10(#* cable</li> <li>Replace the communication connector for servopack.</li> <li>Check the connection of the terminal connector (WRCA·CN10(#*)).</li> <li>Replace the terminal connector.</li> <li>Replace the circuit board.</li> </ul>
0500	SEGMENT PROC NOT READY	<p>An error occurred in communication between XCP01 circuit board and WRCA01 circuit board.</p>	<ul style="list-style-type: none"> <li>Turn the power off then back on.</li> <li>If the error occurs again, contact your YASKAWA representative.</li> </ul>
0900	WATCHDOG TIMER ERROR (XCP01) [Decimal Data]	<p>An insertion error of the XCP01 circuit board or defective circuit board.</p>	<ul style="list-style-type: none"> <li>Insert the circuit board in the CPU rack fast.</li> <li>Replace the circuit board.</li> <li>If the error occurs again, contact your YASKAWA representative.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
0901	WATCHDOG TIMER ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or the circuit board failed.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0902	WATCHDOG TIMER ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0910	CPU ERROR(XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0911	CPU ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0912	CPU ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0920	BUS ERROR (XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0921	BUS ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0922	BUS ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0930	CPU HANG UP ERROR (XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0931	CPU HANG UP ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0932	CPU HANG UP ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0940	WATCHDOG TIMER ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0941	WATCHDOG TIMER ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA01#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0942	WATCHDOG TIMER ERROR (WRCA#3) [Decimal Data]	An insert error of the WRCA01#3 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0943	WATCHDOG TIMER ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0944	WATCHDOG TIMER ERROR (WRCA#5) [Decimal Data]	An insertion error of the WRCA01#5 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0945	WATCHDOG TIMER ERROR (WRCA#6) [Decimal Data]	An insertion error of the WRCA01#6 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0950	CPU ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

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Alarm Number	Message	Cause	Remedy
0951	CPU ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA0#21 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0952	CPU ERROR (WRCA#3) [Decimal Data]	An insertion error of the WRCA01#3 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0953	CPU ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0954	CPU ERROR (WRCA#5) [Decimal Data]	An insertion error of the WRCA01#5 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0955	CPU ERROR (WRCA#6) [Decimal Data]	An insertion error of the WRCA01#6 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0960	CPU HANG UP ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0961	CPU HANG UP ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA01#2 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0962	CPU HANG UP ERROR (WRCA#3) [Decimal Data]	An insertion error of the WRCA01#3 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
0963	CPU HANG UP ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>



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Alarm Message List			
Alarm Number	Message	Cause	Remedy
0964	CPU HANG UP ERROR (WRCA#5 [Decimal Data])	An insertion error of the WRCA01#5 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0965	CPU HANG UP ERROR (WRCA#6 [Decimal Data])	An insertion error of the WRCA01#6 circuit board or defective circuit board.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
0999	NMI ERROR [Decimal Data]	NMI (interruption CPU signal of unknown origin) occurred because of the motion error of hardware, circuit board and rack or control error of software.	<ul style="list-style-type: none"> <li>• Insert the circuit board in the CPU rack or the connector on the circuit board fast.</li> <li>• Replace the circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
1000	ROM ERROR (XCP01)	The error was found by sum check of system program for the XCP01 circuit board.	Replace the XCP01 circuit board (ROM).
1001	ROM ERROR(WRCA01) [Decimal Data]	The error was found by sum check of system program for the XCP01 circuit board.	Replace the WRCA circuit board (ROM).
1002	ROM ERROR (XFC01)	The error was found by sum check of system program for the XFC01 circuit board.	Replace the XFC01 circuit board (ROM).
1003	ROM (XCP02)	The error was found by sum check of system program for the XCP02 circuit board.	Replace the XCP02 circuit board (ROM).
1030	MEMORY ERROR (PARAMETER FILE) [Decimal Data]	The parameter file of CMOS memory was damaged. Data stands for the damaged parameter file. 0:RC*, 1:RO*, 2:SV,3:SVM, 4:SC, 5:SD*, 6:CIO*, 7:FD*, 8:AP, 9:RS, 10:SE, 11:RMS*, 12:AMC*, 13:SVP*, 14:MF*, 15:PCD* *:System paramete	<ul style="list-style-type: none"> <li>• Initialize the parameter file damaged on maintenance mode.</li> <li>• Load the saved parameter from the floppy disk and restore.</li> </ul>
1031	MEMORY ERROR (MOTION1) [Decimal Data]	The saved each file on CMOS memory used by motion instruction was damaged.	<ul style="list-style-type: none"> <li>• Initialize the file damaged on maintenance mode.</li> <li>• Load the saved file from the floppy disk and restore.</li> </ul>
1032	MEMORY ERROR (MOTION2) [Decimal Data]	<ul style="list-style-type: none"> <li>• The saved each file on XCP01 circuit board memory used by motion instruction was damaged.</li> <li>• An insertion error of the XCP01 circuit board or the circuit board failed.</li> </ul>	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• Insert the XCP01 circuit board in CPU rack fast.</li> <li>• Replace the XCP01 circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
1050	SET-UP PROCESS ERROR (SYSCON) [Decimal Data]	The error occurred in the setup process of system when the main power was turned on. 1: The set up of motion instruction was not completed. The set up of the WRCA01, XCP02 circuit board was not completed.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

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Alarm Number	Message	Cause	Remedy
1051	SETUP INITIALIZE ERROR (MOTION) [Decimal Data]	The error occurred in the setup process of motion instruction when the main power was turned on.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1100	SYSTEM ERROR C: □ B: □ C: □ [Decimal Data]	The alarm of unknown origin was detected by noise and control error.	<ul style="list-style-type: none"> <li>• Needs investigation. Consult a YASKAWA representative.</li> </ul>
1101	SYSTEM ERROR (SYSTEM1) [Decimal Data]	The error occurred in the control check of system.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1102	SYSTEM ERROR (SYSTEM2) [Decimal Data]	The error occurred in the control check of system.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1103	SYSTEM ERROR (EVENT) [Decimal Data]	The error occurred in the event data check of system.	<ul style="list-style-type: none"> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1104	SYSTEM ERROR (CIO) [Bit Pattern]	The error occurred in the I/O control check of system  Data stands for the cause of alarm. 0001_0000:Communication error with I/O module or setting error of I/O module	<ul style="list-style-type: none"> <li>• Check the connector, cable for transmission path of I/O signal(XCP01/I/O contactor unit, I/O module)</li> <li>• Reset the I/O module on maintenance mode.</li> <li>• Replace the XCP01, I/O contactor unit, I/O module.</li> </ul>
1105	SYSTEM ERROR (SERVO) [Decimal Data]	The error occurred in control check of th WACA01/WRCF01 circuit board.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1106	SYSTEM ERROR (SPEED MONITOR) [Decimal Data]	The error occurred in control check of th XFC01 circuit board.	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1200	HIGH TEMPERATURE (IN CNTL BOX)	The temperature in the controller raised abnormally.	Check whether interior fan of controller is working or not.
1201	OVERRUN LIMIT SWITCH RELEASED	Overrun recovery switch was operated on playback.	<ul style="list-style-type: none"> <li>• Don't operate the overrun recovery switch on playback.</li> <li>• It is thought that the overrun recovery switch is failed. Consult YASKAWA representative.</li> </ul>
1202	FAULT [Decimal Data]	CPU motion impossibility caused by 0 division etc. Data stands for the factor of alarm. 1:Calculation 2:Floating point	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
1203	SAFETY CIRCUIT ERROR (XCI01) [Binary Data]	The error occurred in the safe circuit processing of the XCI01 circuit board. 00000000_*****: CPU1 error *****_00000000: CPU2 error *: Data of 0 or 1	<ul style="list-style-type: none"> <li>• Turn the power off then back on.</li> <li>• Check the connection cable of the I/O contactor unit.</li> <li>• If the error occurs again, contact you Yaskawa representative.</li> </ul>

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1300	SERVO CPU SYN CHRONIZING ERROR	<p>The communication between the XCP01 circ board and the WRCA01 circuit board was abnormal.</p> <ul style="list-style-type: none"> <li>• The cable between the XCP01 circuit board and WRCA01 circuit board was defective.</li> <li>• The connection of the terminal connector was incomplete.</li> <li>• Defective XCP01 circuit board</li> <li>• Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of communication cable for servopack. (XCP01·CN05 - WRCA(#*)·CN10 cable, WRCA·CN10(#*) - WRCA·CN10(#*) cable)</li> <li>• Replace the communication cable for servopack.</li> <li>• Check the connection of the terminal connector (WRCA·CN10(#*)).</li> <li>• Replace the terminal connector.</li> <li>• Replace the XCP01 circuit board, WRCA01 circuit board.</li> </ul>
1301	COMMUNICATION ERROR (SERVO) [Decimal Data]	<p>The communication between the XCP01 circ board and the WRCA01 circuit board was abnormal.</p> <ul style="list-style-type: none"> <li>• The cable between the XCP01 circuit board and WRCA01 circuit board was defective.</li> <li>• The connection of the terminal connector was incomplete.</li> <li>• Defective XCP01 circuit board</li> <li>• Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of communication cable for servopack. (XCP01·CN05 - WRCA(#*)·CN10 cable, WRCA·CN10(#*) - WRCA·CN10(#*) cable)</li> <li>• Replace the communication cable for servopack.</li> <li>• Check the connection of the terminal connector (WRCA·CN10(#*)).</li> <li>• Replace the terminal connector.</li> <li>• Replace the XCP01 circuit board, WRCA01 circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
1302	COMMUNICATION ERROR (SERVO I/O) [Decimal Data]	<p>The communication between WRCA01 circuit board and the contactor unit (for I/O, robot, external axis) was abnormal.</p>	<ul style="list-style-type: none"> <li>• Check the connection for communication cable between the WRCA01 circuit board and contactor unit. (WRCA01(#*)·CN20 - XIU01·CN21 cable)</li> <li>• Replace the WRCA01 circuit board.</li> <li>• Replace the contactor unit.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
1303	ARITHMETIC ERROR (SERVO) [Decimal Data]	<p>The error occurred on check of interior control for the WRCA circuit board.</p>	<p>Needs investigation. Consult a YASKAWA representative.</p>
1304	EX-AXIS BOARD NOT INSTALLED	<ul style="list-style-type: none"> <li>• The system included the external axis, but the external axis circuit board (WRCF0 board) was not installed.</li> <li>• The system did not include the external axis, but the system with external axis was set.</li> <li>• Defective WRCF01 circuit board</li> <li>• Defective WRCA01 circuit board</li> </ul>	<p>&lt;The system with external axis&gt;</p> <ul style="list-style-type: none"> <li>• Check the installation of the external axis circuit board(WRCF01 board).</li> <li>• If the WRCF01 circuit board is installed, replace it.</li> </ul> <p>&lt;The system without external axis&gt;</p> <ul style="list-style-type: none"> <li>• Check the system is not included external axis.</li> <li>• Execute the system configuration again on system without external axis.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
1305	POWER ON UNIT NOT INSTALLED [Bit Pattern]	<ul style="list-style-type: none"> <li>The contactor unit was set on system configuration, but the contactor unit was not installed.</li> <li>The system was not installed contactor unit, but the system was set as though a contactor unit installed.</li> <li>Defective contactor unit</li> <li>Defective WRCA circuit board</li> </ul>	<p>&lt;The system with external axis&gt;</p> <ul style="list-style-type: none"> <li>Check the installation of the external axis circuit board(WRCF01 board).</li> <li>If the WRCF01 circuit board is installed, replace it.</li> </ul> <p>&lt;The system without external axis&gt;</p> <ul style="list-style-type: none"> <li>Check the system is not included external axis.</li> <li>Execute the system configuration again on system without external axis.</li> </ul>
1306	AMPLIFIER TYPE MISMATCH Robot/Static [Axis Data]	<ul style="list-style-type: none"> <li>The type of amplifier displayed by axis data was different than the type set by system configuration.</li> <li>The type of amplifier was not correct.</li> <li>The type of amplifier was different than the type set by system configuration.</li> <li>Defective amplifier</li> <li>Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Check the type of servopack displayed by axis data.</li> </ul> <p>&lt;Error in robot axis&gt;</p> <p>Check the type of servopack is same as described one on manual. If the type is not correct, replace it with correct servopack.</p> <p>&lt;Error in external axis&gt;</p> <p>Check the type of servopack set by system configuration is same as actual installed one. If set data by system configuration is correct, replace installed servopack with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>If the error occurs again, replace WRCA01 circuit board.</li> </ul>
1307	ENCORDER TYPE MISMATCH Robot/Static [Axis Data]	<p>The type of encoder displayed by axis data was different than the type set by system configuration.</p> <ul style="list-style-type: none"> <li>The type of encoder was not correct.</li> <li>The system configuration setting of encoder was not correct.</li> <li>Defective encoder</li> <li>Defective WRCA circuit board</li> </ul> <p>(Note) The encoder is accessories of motor, check the type of motor to check the type of encoder</p>	<ul style="list-style-type: none"> <li>Check the type of motor displayed by axis data.</li> </ul> <p>&lt;Error in robot axis&gt;</p> <p>Check that the type of motor is same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt;</p> <p>Check that the type of motor set by system configuration is same as actual installed one. If the set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>If the error occurs again, replace WRCA01 circuit board.</li> </ul>

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1308	OVER SPEED Robot/Station [Axis Data]	<p>The motor speed displayed by axis data exceeded allowable max speed.</p> <ul style="list-style-type: none"> <li>• The wiring of UVW wire of motor was not correct.</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of motor.</li> <li>• Check the robot motion on alarm and check whether external power is operated or not.</li> <li>• Check the connection of UVW wire of motor again. If the error is found, alter the connection.</li> <li>• Check the reoccurrence by reducing the teaching speed on alarm. There is a possibility that R,B,T axis move at a fast speed on liner interpolation according to teaching position. In this case, alter the teaching.</li> </ul> <p>&lt;Error in robot axis&gt;</p> <p>Check that the type of motor is same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt;</p> <p>Check that the type of motor set by system configuration is same as actual installed one. If the set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRC01 and/or WRCF01 circuit board.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
1309	OVERLOAD (CONTINU Robot/Statio [Axis Data])	<p>The motor torque displayed by axis data exceeded rated torque for a long time (a few seconds - a few minutes). It may have burned the motor.</p> <ul style="list-style-type: none"> <li>• The wrong wiring, the breaking of the UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• It interfered with an outside equipment.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause.</li> <li>• Check the connection of UVW wire of motor again. And check the breaking of the wire.</li> <li>• There is a possibility the robot moves by extra load. Check the motion status of robot again and reduce the teaching speed. Then confirm the reoccurrence.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is the same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is the same as the actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for axis where the error occurred.</li> </ul>

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
1310	OVERLOAD (MOMENT) Robot/Station [Axis Data]	<p>The motor torque displayed by axis data exceeded rated torque for a long time. It may have burned the motor.</p> <ul style="list-style-type: none"> <li>• The wrong wiring, the breaking of the wire UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• It interfered with an outside equipment.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause.</li> <li>• Check the connection of UVW wire of motor again. And check the breaking of the wire.</li> <li>• There is a possibility the robot moves by extra load. Check the motion status of robot again and reduce the teaching speed. Then confirm the reoccurrence.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is the same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is the same as the actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for axis where the error occurred.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
1311	AMPLIFIER OVER-LOAD (CONTINU Robot/Statio [Axis Data])	<p>The servopack (amplifier) current displayed by axis data exceeded rated current for a long time (a few seconds - a few minutes). It may have burned the servopack.</p> <ul style="list-style-type: none"> <li>• The wrong wiring, the breaking of the UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• It interfered with an outside equipment.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause.</li> <li>• Check the connection of UVW wire of motor again. And check the breaking of the wire.</li> <li>• There is a possibility the robot moves by extra load. Check the motion status of robot again and reduce the teaching speed. Then confirm the reoccurrence.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is the same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is the same as the actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for axis where the error occurred.</li> </ul>



## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
1312	AMPLIFIER OVER-LOAD (MOMENT) Robot/Station [Axis Data]	<p>The servopack (amplifier) current displayed by axis data exceeded rated current for a long time (a few seconds - a few minutes). It may have burned the servopack.</p> <ul style="list-style-type: none"> <li>• The wrong wiring, the breaking of the UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• It interfered with an outside equipment.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause.</li> <li>• Check the connection of UVW wire of motor again. And check the breaking of the wire.</li> <li>• There is a possibility the robot moves by extra load. Check the motion status of robot again and reduce the teaching speed. Then confirm the reoccurrence.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is the same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is the same as the actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for axis where the error occurred.</li> </ul>
1313	MOTOR ERROR Robot/Station [Axis Data]	<p>The motor was driven recklessly. This error occurred when the motor moved in reverse for the forward instruction.</p> <ul style="list-style-type: none"> <li>• Incorrect wiring of the UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of UVW wire of motor again.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is same as the one described in the manual. If the type is not correct, replace it with correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is same as actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
1314	SERVO TRACKING ERROR Robot/Statio [Axis Data]	<p>The servo deflection of the axis displayed by axis data became excessive, the robot was shifted from instructed motion position or tracks more than tolerance and operated</p> <ul style="list-style-type: none"> <li>• The wrong wiring, the breaking of the wire of UVW wire for the motor</li> <li>• The type of motor was not correct.</li> <li>• The motor was moved by external power.</li> <li>• It interfered with an outside equipment.</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause.</li> <li>• Check the connection of UVW wire of motor again. And check the breaking of the wire.</li> <li>• There is a possibility the robot moves by extra load. Check the motion status of robot again and reduce the teaching speed. Then confirm the reoccurrence.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is the same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is the same as the actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for axis where the error occurred.</li> </ul>
1315	POSITION ERROR Robot/Statio [Axis Data]	<p>The number of pulses generated by one rotation of the motor was not a regulated pulse numbers. There is a possibility the position was shifted. (But, if this alarm occurred simultaneously with the alarm related to the encoder, it was thought this alarm accompanied the encoder alarm.)</p> <ul style="list-style-type: none"> <li>• Noise of outside equipment</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Down of the power supply voltage for the encoder</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check whether there is a equipment generating loud noise.</li> <li>• Check the ground of controller is correct.</li> <li>• When the error occurred at external axis, set the ferrite core on the encoder cable for noise measure.</li> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the motor for axis occurred the error.</li> </ul>
1316	BROKEN PG LINE Robot/Statio [Axis Data]	<p>The break of the signal wire from encode (But, this alarm may accompany the position error alarm, the alarm related to the encoder.)</p> <ul style="list-style-type: none"> <li>• Noise of outside equipment</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Decrease of the power supply voltage for the encoder</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check the conduction of cable from the WRCA01, WRCF circuit board to the motor (encoder).</li> <li>• Check whether there is equipment generating loud noise.</li> <li>• Check the grounding of controller is correct.</li> <li>• If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the motor for the axis where the error occurred.</li> </ul>

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1317	SPEED WATCHER BOARD ERROR	<p>The error occurred in the speed detective circuit board.</p> <ul style="list-style-type: none"> <li>Defective speed detective circuit board</li> <li>Defective WRCA circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Turn the power off then back on.</li> <li>If the error occurs again, replace the speed detective circuit board and WRCA01 circuit board.</li> </ul>
1318	OVERVOLTAGE (CONVERTER) [Bit Pattern]	<p>The power supply voltage of direct current supplied to the amplifier of servopack exceeded 420V.</p> <ul style="list-style-type: none"> <li>The primary power supply voltage was too high.(220V,+10%)</li> <li>It was too much load.</li> <li>Defective convert</li> <li>Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Check the primary power supply (220V, +10%).</li> <li>Lower the teaching speed of the fore and aft steps for alarm occurrence step about 30% and check the reoccurrence. If th alarm doesn't reoccur, alter the load.</li> <li>If the error occurs again, replace the WRCA01 circuit board and the converter.</li> </ul>
1319	GROUND FAUL Robot/Station [Axis Data]	<p>One of U,V,W wires of the motor displayed on axis data was grounded at least.</p> <ul style="list-style-type: none"> <li>Defective the motor</li> <li>Ground fault of the motor, lead wire</li> <li>Defective WRCA01, WRCF01 circuit board</li> <li>Defective amplifier</li> </ul>	<p>This alarm does not occur by turning off the controlled power supply. But never fail to turn on the servo power supply after checking the motor grounding. There is a possibility the servopack is damaged when the servo turn-on and off is repeat ing ground fault status.</p> <ul style="list-style-type: none"> <li>Check the connection of the U,V,W,E wires of motor again.</li> <li>Remove the U,V,W,E wires of the motor from the terminal of the controller an check the conduction of U-E, V-E, W-E. If the wires are conducted, it's abnormal.</li> <li>In case an error is found by the above check, remove the connector of the motor side and check again. If the wires are conducted, it is thought to be a defective lead wire. Specify the error point and replace the lead wire.</li> <li>If the error is not caused by the lead wire, it is thought to be a defective motor.</li> <li>If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board.</li> <li>Replace the amplifier, motor for the axis where the error occurred.</li> </ul>
1320	OPEN PHASE (CONVERTER) [Bit Pattern]	<p>Any of the three-phase current for primary side power supply of servopack was open-phase.</p> <ul style="list-style-type: none"> <li>The wrong wiring of the primary side power supply connection.</li> <li>The decrease of the primary side powe supply voltage(170V or less)</li> <li>Defective WRCA01, WRCF01 circuit board</li> <li>Defective convert</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection of the primary side wiring R,S,T wires of servopack.</li> <li>Check that the power supply voltage is more than 170V.</li> <li>If the erro occurs again, replace the WRCA01,WRCF01 circuit board.</li> <li>Replace the converter for the axis where the error occurred.</li> </ul>

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Alarm Number	Message	Cause	Remedy
1321	OVERCURRENT (AMP) Robot/Static [Axis Data]	One of the U,V,W wires of the motor displayed on the axis data was grounded at least. <ul style="list-style-type: none"> <li>• Defective motor</li> <li>• Ground fault of the motor, lead wire</li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective amplifier</li> <li>• Overheating of amplifier</li> </ul>	This alarm does not occur by turning off the controlled power supply. But never fail to turn on the servo power supply after checking the motor grounding. There is a possibility the servopack is damaged when the servo turn-on and off is repeating ground fault status. <ul style="list-style-type: none"> <li>• Check the connection of the U,V,W,E wires of motor again.</li> <li>• Remove the U,V,W,E wires of the motor from the terminal of the controller and check the conduction of U-E, V-E, W-E. If the wires are conducted, it's abnormal.</li> <li>• In case an error is found by the above check, remove the connector of the motor side and check again. If the wires are conducted, it is thought to be a defective lead wire. Specify the error point and replace the lead wire.</li> <li>• If the error is not caused by the lead wire, it is thought to be a defective motor.</li> <li>• If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board.</li> <li>• Replace the amplifier, motor for the axis where the error occurred.</li> </ul>
1322	REGENERATIVE TROUBLE (CONVERTER) [Bit Pattern]	Because the resurrection energy on reducing the motor speed was too high, the resurrection circuit board didn't work. <ul style="list-style-type: none"> <li>• The load installed on robot was too heavy.</li> <li>• The primary side power supply voltage was too high.(242V or more)</li> <li>• Defective converter</li> <li>• Defective WRCA01, WRCF01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the load again. Lower the teaching speed of the fore and aft steps for alarm occurrence step about 30% and check the reoccurrence. If the alarm doesn't reoccur, alter the load.</li> <li>• Check the primary power supply(220V, +10%).</li> <li>• If the error occurs again, replace the WRCA01, WRCF01 circuit board.</li> <li>• Replace the converter for the axis where the error occurred.</li> </ul>
1323	INPUT POWER OVER VOLTAGE (CONV) [Bit Pattern]	The primary side power supply voltage of servopack was too high.(242V or more)	<ul style="list-style-type: none"> <li>• Check the primary power supply(220V, +10%).</li> <li>• If the error occurs again, replace the WRCA01 circuit board.</li> <li>• Replace the converter for the axis where the error occurred.</li> </ul>
1324	TEMPERATURE ERROR (CONVERTER) [Bit Pattern]	The temperature of servopack (converter) was too high.	<ul style="list-style-type: none"> <li>• Check whether the ambient temperature is too high or not.</li> <li>• Check the primary power supply(220V, +10%).</li> <li>• If the error occurs again, replace the WRCA01 circuit board.</li> <li>• Replace the converter for the axis where the error occurred.</li> </ul>

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1325	COMMUNICATION ERROR (ENCODER) Robot/Station [Axis Data]	The communication error between the encoder and the WRCA01 circuit board. <ul style="list-style-type: none"> <li>The wrong wiring of the encoder wire</li> <li>The type of motor was not correct.</li> <li>Defective WRCA01 circuit board</li> <li>Defective encoder</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection of the encoder displayed on axis data.</li> <li>Check whether there is equipment generating big noise around or not.</li> <li>Check the ground of controller is correct. &lt;Error in robot axis&gt; Check the type of motor is same as described one on manual. If the type is not correct, replace it with correct motor.</li> <li>&lt;Error in external axis&gt; Check the type of motor set by system configuration is same as actual installed one. If set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</li> <li>If the error occurs again, replace the WRCA01 circuit board.</li> </ul>
1326	DEFECTIVE ENCODER ABSOLUTE DATA Robot/Station [Axis Data]	The error occurred in the position detect circuit board of encoder.	<ul style="list-style-type: none"> <li>Turn the power off then back on.</li> <li>If the error occurs again, replace the motor(encoder for the axis where the error occurred).</li> </ul>
1327	ENCODER OVER SPEED Robot/Station [Axis Data]	<ul style="list-style-type: none"> <li>The control power supply was turned on when the encoder was rotating(400rpm or more). Turning on the control power supply can not be done when the motor is rotating.</li> <li>The no brake axes, R,B,T axis for SK6, freely fell when the servo power supply was turned off by emergency stop. When the power supply was turned back on this status, this alarm occurred.</li> <li>In case this alarm occurred in a stop state, it is thought that the encoder caused the error.</li> </ul>	<ul style="list-style-type: none"> <li>Check the timing of turning on the control power supply.</li> <li>If the error occurs when the control power supply is turned in a stopped state, replace the motor (encoder) displayed on axis data.</li> </ul>
1328	DEFECTIVE SERIAL ENCODER Robot/Station [Axis Data]	The internal parameter of the serial encode became abnormal. It is thought to be an error of the encoder.	Turn the power off then back on. If the phenomenon occurs again after repeating this operation several times, replace the motor (encoder) for the axis where the error occurred.
1329	DEFECTIVE SERIAL ENCODER COMMAND Robot/Station [Axis Data]	When the encoder backup error occurred, normally the controller automatically resets the data of the encoder. But, this was the case there was no response of the reset completion from the encoder. It is thought that the encoder was abnormal.	Turn the power off then back on. If the phenomenon occurs again after repeating this operation several times, replace the motor (encoder) for the axis where the error occurred.
1330	MICRO PROGRAM TRANSMIT ERROR Robot/Station [Axis Data]	Defective WRCA01 circuit board	Turn the power off then back on. If the phenomenon occurs again after repeating this operation several times, replace the WRCA01 circuit board for the axis where the error occurred.

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Alarm Number	Message	Cause	Remedy
1331	CURRENT FEED-BACK ERROR (U PHASE) Robot/Statio [Axis Data]	When the phase balance of the motor current was automatically adjusted, the read U phase current value was abnormal. • Defective WRCA01 circuit board • Defective amplifier	Turn the power off then back on. If the phenomenon occurs again after repeating this operation several times, replace the WRCA01 circuit board, amplifier for the axis where the error occurred.
1332	CURRENT FEED-BACK ERROR (V PHASE) Robot/Statio [Axis Data]	When the phase balance of the motor current was automatically adjusted, the read V phase current value was abnormal. • Defective WRCA01 circuit board • Defective amplifier	Turn the power off then back on. If the phenomenon occurs again after repeating this operation several times, replace the WRCA01 circuit board, amplifier for axis the error occurred.
1335	ENCODER NOT RESET Robot/Statio [Axis Data]	Reset was not completed though encoder backup error reset was requested. It may be possible that the battery is not connected with the encoder.	• Connect the battery with the encoder. Contact your YASKAWA representative because the breakdown of the encoder is thought when the alarm occurs again even if the battery is connected.
1336	XFC01 NOT INSTALLED	The speed monitoring board (XFC01) is not mounted although it has been specified.	Mount the speed monitoring board (XFC01).
1337	SPEED MONITOR LEVEL NOT SAME	The error occurred in the speed monitoring level signal (duplicated signal check).	• Check the connection cables of the I/O contactor unit. • Replace the WRCA01 board.
1338	SPEED MONITOR LEVEL ERROR	The error occurred in the speed monitoring level signal (signal error).	• Check the connection cables of the I/O contactor unit. • Replace the WRCA01 board.
1339	SPEED MONITOR LEVEL ERR (XFC01)	The error occurred in the speed monitoring level signal. • Disconnected cable between the I/O contactor unit and the XFC01 circuit board • Disconnected cable between the I/O contactor unit and the XCI01 circuit board • Defective I/O contactor unit • Defective XFC01 circuit board	• Check the cable connection between the I/O contactor unit and the XFC01 circuit board. • Check the cable connection between the I/O contactor unit and the XCI01 circuit board. • Replace the I/O contactor unit and the XFC01 circuit board. • If the error occurs again, contact you YASKAWA representative.
1340	BROKEN SPEE MONITOR LINE	The speed monitoring command cable is disconnected.	• Check the connection cable of the I/O contactor unit. • Replace the WRCA01 board.
1341	BROKEN SPEE MONITOR LINE (XFC01)	The error occurred in the speed monitoring level signal. • Disconnected cable between the I/O contactor unit and the XFC01 circuit board • Disconnected cable between the I/O contactor unit and the XCI01 circuit board • Defective I/O contactor unit • Defective XFC01 circuit board	• Check the cable connection between the I/O contactor unit and the XFC01 circuit board. • Check the cable connection between the I/O contactor unit and the XCI01 circuit board. • Replace the I/O contactor unit and the XFC01 circuit board. • If the error occurs again, contact you YASKAWA representative.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1342	OVER SPEED (XFC01) Robot/Station [Axis Data]	<p>The motor speed displayed in the axis data exceeded the allowable maximum motor speed.</p> <ul style="list-style-type: none"> <li>• Improper wiring of motor lines U, V and W.</li> <li>• Wrong type of motor was used.</li> <li>• Motor was moved by an external force.</li> <li>• Defective XFC01 circuit board</li> <li>• Defective motor (encoder)</li> </ul>	<ul style="list-style-type: none"> <li>• Check the motor wiring.</li> <li>• Check the robot movement when the alarm occurred to make sure that no external force has been applied.</li> <li>• Check the wiring of motor lines U, V and W.</li> <li>• Reduce the teaching speed from the speed when the alarm occurred to check if the same error will occur. With some taught postures, the R-, B-, or T-axis may operate at a high speed during linear interpolation. In this case, review the teaching.</li> </ul> <p>&lt;Error in robot axis&gt; Check that the type of motor is same as the one described in the manual. If the type is not correct, replace it with the correct motor.</p> <p>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is same as actual installed one. If the set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</p> <ul style="list-style-type: none"> <li>• If the error occurs again, replace the XFC01 circuit board.</li> </ul>
1343	COMMUNICATION ERROR (XFC01) Robot/Station [Axis Data]	<p>The communication error occurred between the WRCA01 and the XFC01 circuit board.</p> <ul style="list-style-type: none"> <li>• Faulty connection between the WRCA01 board and the XFC01 circuit board.</li> <li>• Defective WRCA01 board</li> <li>• Defective XFC01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection of the WRCA01 board and the XFC01 circuit board.</li> <li>• Replace the WRCA01 board and the XFC01 circuit board.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

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Alarm Number	Message	Cause	Remedy
1344	COMMUNICATION ERR (ENCODER) (XFC01) Robot/Statio [Axis Data]	The communication error occurred between the encoder and the XFC01 circuit board. <ul style="list-style-type: none"> <li>• Improper wiring of encoder cables</li> <li>• Noise from external devices</li> <li>• Incorrect motor type</li> <li>• Defective XFC01 circuit board</li> <li>• Defective encoder</li> </ul>	<ul style="list-style-type: none"> <li>• Check the encoder connection displayed in the axis data.</li> <li>• Check that there is no device generating excessive noise.</li> <li>• Check that the grounding of the control panel is correct. <ul style="list-style-type: none"> <li>&lt;Error in robot axis&gt; Check that the type of motor is same as the one described in the manual. If the type is not correct, replace it with the correct motor.</li> <li>&lt;Error in external axis&gt; Check that the type of motor set by system configuration is same as actual installed one. If the set data by system configuration is correct, replace installed motor with correct one. If set data by system configuration is not correct, set the correct system configuration.</li> </ul> </li> <li>• If the error occurs again, replace the XFC01 circuit board.</li> </ul>
4000	MEMORY ERROR (TOOL FILE) [Decimal Data]	The tool file of CMOS memory was damaged. The data stands for the file No.	Initialize the tool file in the maintenance mode. Load the saved tool file in the external memory unit and restore.
4001	MEMORY ERROR (USER COORD FILE)	The user coordinates file of CMOS memory was damaged. The data stands for the file No.	Initialize the user coordinates file in the maintenance mode. Load the saved user coordinates file in the external memory unit and restore.
4002	MEMORY ERROR (SV MON SIGNAL FILE)	The servo monitor signal file of CMOS memory was damaged.	Initialize the servo monitor signal file in the maintenance mode. Load the saved servo monitor signal file in the external memory unit and restore.
4003	MEMORY ERROR (WEAVING FILE)	The weaving condition file of CMOS memory was damaged.	Initialize the weaving condition file in the maintenance mode. Load the saved weaving condition file in the external memory unit and restore.
4004	MEMORY ERROR(HOME POS FILE)	The home position calibration file of CMOS memory was damaged.	Reset the home position calibration (absolute data) after reset the alarm. Load the home position calibration file (absolute data) in the external memory unit and restore.
4005	MEMORY ERROR (SPEC POINT DATA)	The specified point file of CMOS memory was damaged.	Load the specified point file in the external memory unit and restore.
4006	MEMORY ERROR (WELDER COND FILE) [Decimal Data]	The welder condition data file of CMOS memory was damaged. The data stands for the file No.	Initialize the welder condition data file in the maintenance mode. Load the saved welder condition data file in the external memory unit and restore.
4007	MEMORY ERR (ARC START COND FILE) [Decimal Data]	The arc start condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the arc start condition file in the maintenance mode. Load the saved arc start condition file in the external memory unit and restore.



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Alarm Number	Message	Cause	Remedy
4008	MEMORY ERROR (ARC END COND FILE) [Decimal Data]	The arc end condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the arc end condition file in the maintenance mode. Load the saved arc end condition file in the external memory unit and restore.
4009	MEMORY ERROR (ARC AUX COND FILE) [Decimal Data]	The welding condition assistance file of CMOS memory was damaged. The data stands for the file No.	Initialize the welding condition assistance file in the maintenance mode. Load the saved welding condition assistance file in the external memory unit and restore.
4010	MEMORY ERROR (COMARC COND FILE) [Decimal Data]	The COM-ARC condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the COM-ARC condition file in the maintenance mode. Load the saved COM-ARC condition file in the external memory unit and restore.
4012	MEMORY ERROR (LINK SERVOFLOAT) [Decimal Data]	The link servo float condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the link servo float condition file in the maintenance mode. Load the saved link servo float condition file in the external memory unit and restore.
4013	MEMORY ERROR (LINEAR SERVOFLOAT) [Decimal Data]	The linear servo float condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the linear servo float condition file in the maintenance mode. Load the saved linear servo float condition file in the external memory unit and restore.
4014	MEMORY ERROR (ROBOT CALIB FILE) [Decimal Data]	The robot calibration file of CMOS memory was damaged. The data stands for the file No.	Initialize the robot calibration file in the maintenance mode. Load the saved robot calibration file in the external memory unit and restore.
4017	MEMORY ERROR (WELDER USER-DEF FILE) [Decimal Data]	The welder user definition file of CMOS memory was damaged. The data stands for the file No.	Initialize the welder user definition file in the maintenance mode. Load the saved welder user definition file in the external memory unit and restore.
4018	MEMORY ERR (LADDER PRG FILE) [Decimal Data]	The ladder program file of CMOS memory was damaged.	Initialize the ladder program file in the maintenance mode. Load the saved ladder program file in the external memory unit and restore.
4020	MEMORY ERROR (OPERATION ORIGIN FILE) [Decimal Data]	The operation origin file of CMOS memory was damaged. The data stands for the file No.	Initialize the operation origin file in the maintenance mode.
4021	MEMORY ERROR (CONVEYOR COND FILE) [Decimal Data]	The conveyor condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the conveyor condition file in the maintenance mode. Load the saved conveyor condition file in the external memory unit and restore.
4028	MEMORY ERROR (SENSOR MON COND FILE) [Decimal Data]	The sensor monitoring condition file of CMOS memory was damaged. The data stands for the file No.	Initialize the sensor monitoring condition file in the maintenance mode. Load the saved sensor monitoring condition file in the external memory unit and restore.
4031	MEMORY ERROR (SPOT GUN COND FILE) [Decimal Data]	The spot gun condition data file of CMOS memory was damaged. The data stands for the file No.	Initialize the spot gun condition data file in the maintenance mode. Load the saved spot gun condition data file in the external memory unit and restore.
4032	MEM ERROR (SPOT WELDER COND FILE) [Decimal Data]	The spot welder condition data file of CMOS memory was damaged. The data stands for the file No.	Initialize the spot welder condition data file in the maintenance mode. Load the saved spot welder condition data file in the external memory unit and restore.

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Alarm Number	Message	Cause	Remedy
4033	MEMORY ERROR (GUN PRESSURE FILE) [Decimal Data]	The servo gun pressure file of CMOS memory was damaged. The data stands for the file No.	Initialize the servo gun pressure file in the maintenance mode. Load the saved servo gun pressure file in the external memory unit and restore.
4034	MEMORY ERROR (ANTICIPATION OT FILE) [Decimal Data]	The anticipation output file of CMOS memory was damaged. The data stands for the file No.	Initialize the anticipation output file in the maintenance mode. Load the saved anticipation output file in the external memory unit and restore.
4035	MEMORY ERROR (ANTICIPATION OG FILE) [Decimal Data]	The anticipation output file of CMOS memory was damaged. The data stands for the file No.	Initialize the anticipation output file in the maintenance mode. Load the saved anticipation output file in the external memory unit and restore.
4036	MEMORY ERROR (WEARING FILE) [Decimal Data]	The wearing file of CMOS memory was damaged. The data stands for the file No.	Initialize the wearing file in the maintenance mode. Load the saved wearing file in the external memory unit and restore.
4037	MEMORY ERROR (STROKE POSITION) [Decimal Data]	The stroke position file of CMOS memory was damaged. The data stands for the file No.	Initialize the stroke position file in the maintenance mode. Load the saved stroke position file in the external memory unit and restore.
4038	MEMORY ERROR (PRESSURE FILE) [Decimal Data]	The pressure file of CMOS memory was damaged. The data stands for the file No.	Initialize the pressure file in the maintenance mode. Load the saved pressure file in the external memory unit and restore.
4039	MEMORY ERROR (FORM CUT FILE) [Decimal Data]	The form cut file of the CMOS memory was damaged. The data stands for the file No.	Initialize the form cut file in the maintenance mode. Load the saved formcut file in the external memory unit and restore.
4040	MEMORY ERROR (SHOCK LEVEL FILE) [Decimal Data]	The shock level file of the CMOS memory was damaged. The data stands for the file No.	Initialize the shock level file in the maintenance mode. Load the saved shock level file in the external memory unit and restore.
4041	MEMORY ERROR (SPOT IO ALLOCATE FL) [Decimal Data]	The spot IO allocate file of the CMOS memory was damaged.	Initialize the spot IO allocate file in the maintenance mode. Load the saved spot IO allocate file in the external memory unit and restore.
4042	MEMORY ERROR (VISION FILE) [Decimal Data]	The vision file of the CMOS memory was damaged. The data stands for the file No.	Initialize the vision file in the maintenance mode. Load the saved vision file in the external memory unit and restore.
4043	MEMORY ERROR (VISION CALIBRATION) [Decimal Data]	The vision calibration of the CMOS memory was damaged. The data stands for the file No.	Initialize the vision calibration in the maintenance mode. Load the saved vision calibration in the external memory unit and restore.
4046	MEMORY ERROR (CONVEYOR CALIBRATION) [Decimal Data]	The conveyor calibration of the CMOS memory was damaged. The data stands for the file No.	Initialize the conveyor calibration in the maintenance mode. Load the saved conveyor calibration in the external memory unit and restore.
4100	OVERRUN IN ROBOT AXIS [Bit Pattern]	One of the robot axis overrun limit switches was operated.	Reset the overrun.
4101	OVERRUN IN EXTERNAL AXIS [Bit Pattern]	One of the external axis overrun limit switches was operated.	Reset the overrun.

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4102	SYSTEM DATA CHANGING [Decimal Data]	An attempt was made to change data which exerted the influence on the system and turned on the servo power supply. The data stands for the alarm factor. 1: System parameter change	Turn off the power once and back on.
4103	PARALLEL START INSTRUCTION ERROR [Decimal Data]	The error occurred in the independent control start operation. The data stands for alarm factor. 1: The sub task is being executed. The job was executed by instructed sub task, but another job was being started in the sub task. 2: The group axis is being used The job operated by other sub task used same group axis. 3: Multiple start of same job The job tried to start was executed by other sub task. 4: Master job unregistration Though master job was not registered, The attempt was made to execute PSTART SUB (job name omitted) 5: Synchronization instruction error When restarted by PSTART, synchronization instruction status of sub task under interruption was different than the status to restart. 6: The alarm is stopping The attempt was made to start sub task under stop by alarm.	1: Complete the sub task by PWAIT command. 2: Check that the job started and the timing of execution for start command again. 3: Check that the job started and the timing of execution for start command again. 4: Register the master job for sub task. 5: Check that the job started and the timing of execution for start command again. 6: Start after reset the alarm.
4104	WRONG EXECUTION OF LOAD INST [Decimal Data]	When the installation was executed, the error occurred in DCI function. The data stands for the alarm factor. Refer to the data transmission function manual for details.	Correct the error according to the data of the alarm factor after reset the alarm.
4105	WRONG EXECUTION OF SAVE INST [Decimal Data]	When the installation was executed, an error occurred in DCI function. The data stands for the alarm factor. Refer to the data transmission function manual for details.	Correct the error according to the data of the alarm factor after resetting the alarm.
4106	WRONG EXECUTION OF DELETE INST [Decimal Data]	When the installation was executed, the error occurred in DCI function. The data stands for the alarm factor. Refer to the data transmission function manual for details.	Correct the error according to the data of the alarm factor after resetting the alarm.
4107	OUT OF RANGE (ABSOLUTE DATA) Robot/Station [Axis Data]	The difference between the position of the power supply off and the power supply on exceeded tolerance for the robot / station.	Operate axis for robot / station to set the current value 0 position and check the original mark (arrow). If not matched, there is an error of PG system for the axis where the error occurred. Please check.
4109	DC 24V POWER SUPPLY FAILURE	The external 24V power supply was not output.	<ul style="list-style-type: none"> <li>• Check whether fuse for I/O contactor unit is cut or not.</li> <li>• Check the external 24V power supply.</li> <li>• Check the connection of communication cable for I/O module. (XCP0 ·CN01-XIU01 ·CN03 cable)</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
4110	SHOCK SENSOR ACTION [Bit Pattern]	The shock sensor was operated.	Check the factor of shock sensor operation.
4111	BRAKE FUSE BLOWN [Bit Pattern]	The brake fuse was melted.	Replace the fuse.
4112	DATA SENDING ERROR [Decimal Data]	When the data transmission function was used, the error occurred. The data stands for the alarm factor. 1:Retryover of NAK 2:Retryover of timeout in timer A 3:Retryover of mutual response error	Correct the error according to the data of the alarm factor after resetting the alarm.
4113	DATA RECEIVING ERROR [Decimal Data]	When the data transmission function was used, the error occurred. The data stands for the alarm factor. 1:Reception timeout (timer A) 2:Reception timeout (timer B) 3:Heading length is short. 4:Heading length is long. 5:The heading No. error. 6:The text length exceeds 256 characters.	Correct the error according to the data of the alarm factor after resetting the alarm.
4114	TRANSMISSION SYSTEM BLOCK [Decimal Data]	When the data transmission function was used, the error occurred. The data stands for the alarm factor. 1:Overrun error 2:Parity error 3:Flaming error 4:Transmission timeout (timer A) 5:Transmission timeout (timer B)	Correct the error according to the data of the alarm factor after resetting the alarm.
4116	TRANSMISSION SYSTEM ERROR [Decimal Data]	When the data transmission function was used, the error occurred. (Though the transmission procedure is correct, there is a reception that irrationality is caused in system. This error is mainly caused by PC breached the rule or abnormal communication.) The data stands for the alarm factor. 1:Received EOT when waiting ACK. 2:Received EOT when waiting ENQ. 3:Received EOT before last block reception 4:Received codes for except EOT after last block reception.	Correct the error according to the data of the alarm factor after resetting the alarm.
4117	SERVO POWER INPUT SIGNAL ERROR	It is thought that the CPU rack, circuit board was abnormal.	<ul style="list-style-type: none"> <li>• Check whether the setting is the same as the system or not (robot and external axis)</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4119	FAN ERROR (IN CONTROL BOX)	The axis was instructed to turn servo on and off separately.	Make the condition so as to be able to turn servo on and off after resetting the alarm.
4120	IMPOSSIBLE TO DISCONNECT SERVO [Control Group]	Some axes were instructed and cannot turn the servo on or off.	After resetting the alarm, adjust the axes so that the servo power can be turned on and off.

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4121	COOLING FAN 1 ERROR [Binary Data]	The number of revolutions of cooling fan 1 connected to the contactor unit was reduced.	After resetting the alarm, move the manipulator in the teach mode to a safe place. Contact your Yaskawa representative to replace the cooling fan 1.
4122	COOLING FAN 2 ERROR [Binary Data]	The number of revolutions of cooling fan 2 connected to the contactor unit was reduced.	After resetting the alarm, move the manipulator in the teach mode to a safe place. Contact your Yaskawa representative to replace the cooling fan 2.
4123	COOLING FAN 3 ERROR [Binary Data]	The number of revolutions of cooling fan 3 connected to the contactor unit was reduced.	After resetting the alarm, move the manipulator in the teach mode to a safe place. Contact your Yaskawa representative to replace the cooling fan 3.
4200	SYSTEM ERROR (FILE DATA) [Decimal Data]	When access to the file data was executed, the error occurred. (File edition, Operation of external memory unit)	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4201	SYSTE ERROR(JOB) [Decimal Data]	When access to the job was executed, the error occurred. (During robot is being playback and operation)	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4202	SYSTE ERROR(JOB) [Decimal Data]	When access to the job was executed, the error occurred. (Job edition, Operation of external memory unit)	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4203	SYSTEM ERROR (POSITION DATA) [Bit Pattern]	When access to the position data was executed, the error occurred. (During playback and operation)	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4204	SYSTEM ERROR (POSITION DATA) [Decimal Data]	When access to the position data was executed, the error occurred. (Job/position variable edition, Operation of external memory unit)	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4206	SYSTEM ERROR (TRANSMISSION) [Decimal Data]	When the data transmission function was used, the error occurred. The error of internal procedure for transmission system.	Needs investigation. Consult a YASKAWA representative.
4207	SYSTE ERROR(MOTION) [Decimal Data]	The system error occurred in MOTION.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• Turn the power off then back on.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

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Alarm Number	Message	Cause	Remedy
4208	SYSTEM ERROR (ARITH) [Decimal Data]	The system error occurred in ARITH.	<ul style="list-style-type: none"> <li>Reset the alarm and repeat the operation.</li> <li>Turn the power off then back on.</li> <li>If the error occurs again, contact your YASKAWA representative.</li> </ul>
4209	OFFLINE SYSTEM ERROR (ARITH) [Decimal Data]	The system error occurred in ARITH offline.	<ul style="list-style-type: none"> <li>Reset the alarm and repeat the operation.</li> <li>Turn the power off then back on.</li> <li>If the error occurs again, contact your YASKAWA representative.</li> </ul>
4220	SERVO POWER OFF FOR JOB [Control Group]	The servo power supply was not turned on for the job group axis which was to be operated.	Intercept the servo power supply once and turn on the servo power supply to the group axis to be operated.
4221	SERVO POWER OFF FOR JOB [Control Group]	The servo power supply was not turned on for the job group axis which was to be operated.	Intercept the servo power supply once and turn on the servo power supply to the group axis to be operated.
4222	SAFE CIRCUIT SIGNAL NOT SAME (XCI01) [Binary Data]	The error occurred in the safe circuit signal (I/O contactor unit). (Check the XCI01 circuit board duplication signal.)	<ul style="list-style-type: none"> <li>Check the safe circuit signal wiring of the cables connected to the I/O contactor unit.</li> <li>Replace the I/O contactor unit.</li> </ul>
4223	SAFE CIRCUIT SIGNAL NOT SAME (SV) [Decimal Data]	The error occurred in the safe circuit signal (I/O contactor unit). (Check the WRCA01 board duplication signal.)	<ul style="list-style-type: none"> <li>Check the safe circuit signal wiring of the cables connected to the I/O contactor unit.</li> <li>Replace the I/O contactor unit.</li> </ul>
4300	VERIFY ERROR (SERVO PARAMETER) [Decimal Data]	A mistake was found in the parameter related to servo control.	Needs investigation. Consult a YASKAWA representative.
4301	CONTACTOR ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>The contactor of the contactor unit was not turned ON at servo ON.</li> <li>While turning servo ON, the signal from the contactor was intercepted.</li> <li>The contactor signal was not intercepted at servo OFF (at emergency stop).</li> <li>While turning servo OFF (at emergency stop), the contactor signal was turned ON.</li> </ul> Reasons are as follows: <ul style="list-style-type: none"> <li>Defective contactor unit</li> <li>Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Turn servo ON again after resetting the alarm.</li> <li>If the error occurs again, replace the contactor unit, WRCA01 circuit board.</li> </ul>
4302	BRAKE CIRCUIT ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>The brake relay signal unit was not turned ON at servo ON.</li> <li>While turning servo ON, the brake relay signal was intercepted.</li> <li>The brake relay signal was not intercepted at servo OFF (at emergency stop).</li> <li>While turning servo OFF (at emergency stop), the brake relay signal was turned ON.</li> </ul> Reasons are as follows: <ul style="list-style-type: none"> <li>Defective contactor unit</li> <li>Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>Reset the alarm and turn servo ON again.</li> <li>If the error occurs again, replace the contactor unit, WRCA01 circuit board.</li> </ul>

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
4303	CONVERTER READY SIGNAL ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>• There was no response (servo ready signal) of charge completion from convertor at servo ON.</li> <li>• While turning servo ON, the servo ready signal was intercepted.</li> <li>• The servo ready signal was not intercepted at servo OFF (at emergency stop).</li> <li>• While turning servo OFF (at emergency stop), the servo ready signal was turned ON.</li> </ul> <p>Reasons are as follows:</p> <ul style="list-style-type: none"> <li>• Primary side power supply voltage was too low.</li> <li>• Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON.</li> <li>• Defective WRCA01,WRCF01 circuit board</li> <li>• Defective converter</li> </ul>	<ul style="list-style-type: none"> <li>• Reset the alarm and turn servo ON again.</li> <li>• Check the primary power supply voltage (220V+10%).</li> <li>• If the error occurs again, replace the WRCA01 circuit board, the converter.</li> </ul>
4304	CONVERTER INPUT POWER ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>• There was no response (ready 1 signal) of primary power supply input from convertor at servo ON.</li> <li>• While turning servo ON, the ready 1 signal was intercepted.</li> <li>• The ready 1 signal was not intercepted at servo OFF (at emergency stop).</li> <li>• While turning servo OFF (at emergency stop), the ready 1 signal was turned ON.</li> </ul> <p>Reasons are as follows:</p> <ul style="list-style-type: none"> <li>• Mistaken wiring of connection for primary side power supply.</li> <li>• The drop of primary side power supply (less than 170V).</li> <li>• Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON.</li> <li>• Defective WRCA01,WRCF01 circuit board</li> <li>• Defective converter</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection for primary side wiring R,S,T, wire.</li> <li>• Check that the power supply voltage is more than 170V.</li> <li>• If the error occurs again, replace the WRCA01 circuit board, WRCF01 circuit board, the converter.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
4305	CONVERTER CIRCUIT CHARGE ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>• There was no response (ready 2 signal) of charge completed from convertor at servo ON.</li> <li>• While turning servo ON, the ready 2 signal was intercepted.</li> <li>• The ready 2 signal was not intercepted at servo OFF (at emergency stop).</li> <li>• While turning servo OFF (at emergency stop), the ready 2 signal was turned ON. Reasons are as follows: <ul style="list-style-type: none"> <li>• Mistaken wiring of connection for primary side power supply.</li> <li>• The drop of primary side power supply (less than 170V).</li> <li>• Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON.</li> </ul> </li> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective converter</li> <li>• Defective amplifier (There is a possibility that power circuit was short-circuited internally.)</li> </ul>	<ul style="list-style-type: none"> <li>• Check that primary power supply is more than 170V.</li> <li>• Replace the amplifier.</li> <li>• If the error occurs again, replace the WRCA01 circuit board, WRCF01 circuit board, the converter.</li> </ul>
4306	AMPLIFIER READY SIGNAL ERROR [Bit Pattern]	<ul style="list-style-type: none"> <li>• There was no response (amp ready signal) of energizing completed from amplifier at servo ON.</li> <li>• While turning servo ON, the amp ready signal was intercepted.</li> <li>• The amp ready signal was not intercepted at servo OFF (at emergency stop).</li> <li>• While turning servo OFF (at emergency stop), the amp ready signal was turned ON. Reasons are as follows: <ul style="list-style-type: none"> <li>• Defective WRCA01, WRCF01 circuit board</li> <li>• Defective converter</li> <li>• Defective amplifier (There is a possibility that power circuit was short-circuited internally.)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Reset the alarm and turn servo ON again.</li> <li>• If the error occurs again, replace the WRCA01 circuit board, WRCF01 circuit board, the converter.</li> </ul>
4307	SERVO ON DEFECTIVE SPEED Robot/Station [Axis Data]	<ul style="list-style-type: none"> <li>• While encoder was rotating, the servo power supply was turned on. Impossible to turn on control power supply in the rotation</li> <li>• The no brake axes, R, B, T axis for SK6, freely fell when the servo power supply was turned off by emergency stop. When the servo control power supply was turned back on this status, this alarm occurred.</li> </ul>	Check the timing of turning on servo power supply again.



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Alarm Message List			
Alarm Number	Message	Cause	Remedy
4308	VOLTAGE DROP (CONVERTER) [Bit Pattern]	<ul style="list-style-type: none"> <li>• Direct current power supply voltage supplied to amplifier for servopack has become less than 143V.</li> </ul> Reason is follows: <ul style="list-style-type: none"> <li>• Primary power supply voltage was too low.</li> <li>• There was open phase.</li> <li>• Defective converter</li> <li>• Defective WRCA01 circuit board</li> </ul>	<ul style="list-style-type: none"> <li>• Check the connection for primary side wiring R,S,T, wire.</li> <li>• Check that power supply voltage is more than 170V.</li> <li>• If the error occurs again, replace the WRCA01, WRCF01 circuit board, the converter.</li> </ul>
4309	DEFECTIVE ENCODER INTERNAL DATA Robot/Station [Axis Data]	The internal parameter error for serial encoder. It is thought the encoder was abnormal.	<ul style="list-style-type: none"> <li>• Turn the power off then back on. If a phenomenon occurs again after repeating this operation several times, replace the motor (encoder) for axis occurred the error.</li> <li>• If the error occurs again, consult with a YASKAWA representative.</li> </ul>
4310	ENCODER OVER-HEAT Robot/Station [Axis Data]	The encoder has overheated to 100 degrees.	<ul style="list-style-type: none"> <li>• Check that the ambient temperature is not too high.</li> <li>• Check the load again.</li> <li>• Check the primary power supply voltage (220V+10%).</li> <li>• If the error occurs again, replace the WRCA01 circuit board, the encoder.</li> </ul>
4311	ENCODER BACK-UP ERROR Robot/Station [Axis Data]	<ul style="list-style-type: none"> <li>• Because backup power supply voltage for encoder decreased (less than 2.6V), position data of the encoder disappeared.</li> <li>• Whenever a new motor was used, this error occurred.</li> </ul>	<ul style="list-style-type: none"> <li>• Reset the alarm. Adjust the home position again.</li> <li>• Check the battery voltage for encoder. (more than 2.8V)</li> <li>• Replace the battery.</li> <li>• If the error occurs again, replace the encoder.</li> <li>• Because it is charged the backup condenser, don't turn off power supply for a few minutes.</li> </ul>
4312	ENCODER BATTERY ERROR Robot/Station [Axis Data]	Voltage of backup battery for encoder has decreased.(less than 2.8V) (In case leaving this voltage as it is, the backup error occurs and position data disappears.)	<ul style="list-style-type: none"> <li>• Check the battery voltage for encoder. (more than 2.8V)</li> <li>• Replace the battery.</li> </ul>
4313	SERIAL ENCODER OVER HEAT Robot/Station [Axis Data]	The encoder has overheated to 100 degrees.	<ul style="list-style-type: none"> <li>• Check that the ambient temperature is not too high.</li> <li>• Check the load again.</li> <li>• Check the primary power supply voltage (220V+10%).</li> <li>• If the error occurs again, replace the WRCA01 circuit board, the encoder.</li> </ul>
4314	SERIAL ENCODER BATTERY ERROR Robot/Station [Axis Data]	Voltage of backup battery for encoder has decreased.(less than 2.8V)(In case leaving this voltage as it is, the backup error occurs and position data disappears.	<ul style="list-style-type: none"> <li>• Check the battery voltage for encoder. (more than 2.8V)</li> <li>• Replace the battery.</li> </ul>

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Alarm Number	Message	Cause	Remedy
4315	COLLISION DETECT Robot/Statio [Axis Data]	<ul style="list-style-type: none"> <li>• A collision from interference between robot and peripheral device etc. was detected.</li> <li>• The collision was mis-detected by the normal movement of the robot, because the detection level was small.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove the object after resetting the alarm or move the robot to the safety position.</li> <li>• When the alarm cannot be reset because the robot comes in contact with the object, invalidate this function in the collision detection level set file or enlarge the detection level and move the robot to the safety position.</li> <li>• Enlarge the detection level so as not to mis-detect the collision detection by the normal movement of the robot. Moreover, set accurate information of the weight of the tool.</li> </ul>
4316	PRESSURE DATA LIMIT	The value of pressure in the "GUN PRES-SURE" file or the "PRESSURE" file exceeds the maximum pressure in the "GUN CONDI-TION" file.	Change the value of pressure in the "GUN PRESSURE" file or the "PRES-SURE" file below the maximum pressure.
4400	NOT READY (ARITH) [Decimal Data]	The operation process of motion control does not end in regulated time. Data (1-5) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4401	SEQUENCETASK CONTR ERROR [Decimal Data]	The error has occurred in job exec state-ment part. Data (1-255) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4402	UNDEFINED COM MAND(ARITH)	The instruction not defined was demanded of the path operation process.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4404	ARITHMETIC ERROR [Decimal Data]	The control error occurred in the path operation process. Data (1-8) stands for alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4405	SELECT ERROR (PARAMETER) [Decimal Data]	The control error occurred in the path operation process.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4406	GROUP AXIS CON- TROL ERROR [Decimal Data]	When operating cooperative control, the control error occurred in the path operation process. Data (1-12) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4407	TWO STEPS SAME POSITION (CIRC)	Among three taught points, there was the same point of two points or more.	Reset the alarm. Teach the different 3 points again.
4408	TWO STEPS SAME POSITION (SPLIN)	Among three taught points, there was the same point of two points or more.	Reset the alarm. Teach the different 3 points again.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
4409	TWO STEPS SAME POSITION (3 POINTS)	Among three taught points, there was the same point of two points or more. (User coordinates, robots calibration, etc.)	Reset the alarm. Teach the different 3 points again.
4410	TWO STEPS SAME POSITION (WEAV)	The weaving base point was the same as the wall point.	Reset the alarm. Teach the different 3 points again.
4411	TEACH ERRO (SPLINE)	It was not an equidistant distance between teaching points.	Teach again to be an even distance between teaching point
4412	IMPOSSIBLE LINEAR MOTION (L/U)	In case the form of L,U axis for start point and end point were different in interpolatio motion except MOJV, it was not possible to operate.	Make the form of L,U axis same and teach again.
4413	IMPOSSIBLE LINEAR MOTION (S/L)	In case the form of S, L axis for start point and end point were different in interpolatio motion except MOJV, it was not possible to operate.	Make the form of S, L axis the same and teach again.
4414	EXCESSIVE SEGMENT (LOW SPEED Robot/Station [Axis Data])	It exceeded rated speed of the motor at specified speed.	Reset the alarm. Reduce the speed of the step (Move instruction) occurred the alarm or change the robot pose.
4415	EXCESSIVE SEGMENT (HIGH SPEED) Robot/Station [Axis Data]	It exceeded rated speed of the motor at specified speed.	Reset the alarm. Reduce the speed of step (Move instruction) occurred the alarm or change the robot pose.
4416	PULSE LIMIT (MIN.) Robot/Station [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4417	PULSE LIMIT (MAX.) Robot/Station [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4418	CUBE LIMIT (MIN.) Robot/Station [XYZ]	The tool control point exceeded cube software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4419	CUBE LIMIT (MAX.) Robot/Station [XYZ]	The tool control point exceeded cube software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4420	SPECIAL SOFTLIMIT (MIN.) Robot/Station [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4421	SPECIAL SOFTLIMIT (MAX.) Robot/Station [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4422	MECHANICAL INTERFERENCE (MIN.) Robot/Station [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again.

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Alarm Number	Message	Cause	Remedy
4423	MECHANICAL INTERFERENCE (MAX.) Robot/Statio [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again.
4424	SPECIAL MECHANICAL INTRF (MIN.) Robot/Statio [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again
4425	SPECIAL MECHANICAL INTRF (MAX.) Robot/Statio [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again.
4426	PULSE MECHANICAL LIMIT (MIN.) Robot/Statio [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4427	PULSE MECHANICAL LIMIT (MAX.) Robot/Statio [Axis Data]	It exceeded pulse software limit.	Release the alarm and teach again according to the release method when software limit range is exceeded.
4428	SEGMENT CONTROL ERROR [Decimal Data]	The error occurred in data and the timing of the processing part where the operation part was controlled. Data (1-7) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4429	WRONG SPECIFIED CONTROL GROUP [Decimal Data]	The error occurs in information on the robot which uses for the job interpretation and the motion control. Data (1-9) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4430	CPU COMMUNICATION ERROR [Decimal Data]	When interrupting various circuit board from the XCP01 circuit board, interrupted boards were not prepared or didn't respond.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4431	JHM ERROR [Decimal Data]	The data was abnormal in the job control process.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4432	INSTRUCTION INTERPRETER ERROR [Decimal Data]	The error occurred in the job interpretation exec statement part. Data (1-128) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm. Select job and repeat the operation.</li> <li>• If the error occurs again, operate by th following procedure: <ul style="list-style-type: none"> <li>① Delete the command that caused the alarm and register again and start execution.</li> <li>② Delete the job that cause the alarm and register again and start execution.</li> </ul> </li> <li>• If the error occurs again, contact you YASKAWA representative.</li> </ul>
4433	UNDEFINED GLOBAL VARIABLE [Decimal Data]	The global variable range was undefined.	Needs investigation at YASKAWA. Consult a YASKAWA representative.

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4434	VAR-SCOREBOARD CONTROL ERROR [Decimal Data]	The error occurred in variable scoreboard control.	<ul style="list-style-type: none"> <li>• Reset the alarm. Select job and repeat the operation.</li> <li>• If the error occurs again, operate by the following procedure:               <ol style="list-style-type: none"> <li>① Delete the command that caused the alarm and register again and start execution.</li> <li>② Delete the job that cause the alarm and register again and start execution.</li> </ol> </li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>
4435	UNDEFINED LOCAL-VARIABLE [Bit Pattern]	The local variable was undefined.	Set the local variable used for sub header of job.
4436	LESS THAN 3 STEPS(CIRCULAR) [Decimal Data]	A circle step didn't contain a minimum of 3 consecutive points.	Reset the alarm. Teach at least 3 consecutive points for the circle step.
4437	LESS THAN 3 STEPS(SPLINE)	A spline interpolation designation step didn't contain a minimum of 3 consecutive points.	Reset the alarm. Teach at least 3 consecutive points for the spline interpolation designation step.
4438	UNDEFINED JOB [Decimal Data]	Job was not registered.	Reset the alarm and register job. Or Delete CALL, JUMP instruction caused the alarm.
4439	UNDEFINED LABEL [Decimal Data]	No labels existed in the currently executing job.	Reset the alarm and register job. Or Delete CALL, JUMP instruction occurred the alarm.
4440	UNDEFINED RETURN JOB [Decimal Data]	The job call stack contained no return.	Reset the alarm and start execution from the master job. Or delete RET instruction.
4441	LACK OF LOCAL-VARIABLE AREA [Decimal Data]	Too many local variables used in the job.	Reset the alarm and reduce the use number of the local variables
4442	LOCAL-VARIABLE CONTROL ERROR [Decimal Data]	When job was executed, the error occurred in control process of local variable. Data (1-4) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm. Select job and repeat the operation.</li> <li>• If the error occurs again, operate by following procedure:               <ol style="list-style-type: none"> <li>① Delete the command that caused the alarm and register again and start execution.</li> <li>② Delete the job that caused the alarm and register again and start execution.</li> </ol> </li> </ul>
4443	JOB CALL STACK ERROR [Decimal Data]	At the job CALL, RET, END instruction, when operating the job call stack, internal control data of inside was abnormal. Data (1-2) stands for the alarm factor.	<ul style="list-style-type: none"> <li>• Reset the alarm. Select the job again and repeat the operation.</li> <li>• If the error occurs again, contact your YASKAWA representative.</li> </ul>

## Alarm Message List

Alarm Number	Message	Cause	Remedy
4444	UNSUCCESSFUL FINE POSITIONING [Binary Data]	<ul style="list-style-type: none"> <li>When executing PL=0 or interrupting external servo, the servo deflection was not put within time.</li> <li>Excessive external force</li> <li>The servopack, the motor were abnormal.</li> </ul>	<ul style="list-style-type: none"> <li>Reset the alarm. In case an external force is affecting the robot, move the robot to remove the external force and repeat the operation.</li> <li>In case the phenomenon occurs again without any external force, try to insert the XCP01 circuit board again.</li> <li>If the error occurs again, contact you YASKAWA representative.</li> </ul>
4445	DATA PRESET ERROR [Decimal Data]	When the interpretation process section of job annulled the content of interpretation and started to interpret again, various kinds of data were attempted to be initialized. At the time, a disagreement of data occurred. Data (1-255) stands for the alarm factor.	<ul style="list-style-type: none"> <li>Reset the alarm. Select the job and repeat the operation.</li> <li>If the error occurs again, contact you YASKAWA representative.</li> </ul>
4446	OVER VARIABLE LIMIT [Decimal Data]	The range of the numerical value of the variable for storage destination was exceeded.	Increase the variable range at the storage destination or rewrite the job to bring the number of variables in range.
4447	DEFECTIVE TAUGHT POINT (CIRC)	A straight line linked the three points.	Reset the alarm and teach again.
4448	WEAVING CONTROL ERROR [Decimal Data]	<p>When executing the weaving motion control, the control error occurred in the path operation process.</p> <p>Data stands for the alarm factor.</p> <p>4:Weaving speed instruction was moving time instruction, moving time was less than 0.</p> <p>5:Weaving speed instruction was frequency instruction, frequency was less than 0.</p> <p>6:Weaving stopping time was negative</p> <p>7:Vertical direction distance at or horizontal direction distance was 0 in triangular wave, L type weaving.</p> <p>9:Distance between P point and control point was less than 0 in the wrist weaving</p> <p>Except above: Control error</p>	<ul style="list-style-type: none"> <li>4:Set 0.1 seconds or more in the moving time of weaving file.</li> <li>5:Set 0.1 hertz or more in the frequency of weaving file.</li> <li>6:Set a positive value in the stopping time of weaving file.</li> <li>7:Set 1mm or more in the vertical direction, horizontal direction distance of weaving file.</li> <li>If the error occurs again, contact you YASKAWA representative.</li> </ul>
4449	UNMATCHED POSN VAR DATA TYPE [Bit Pattern]	The data types (pulse, Cartesian) of the stored data and the storage destination are different.	Match the data types (pulse, Cartesian) of the stored data and the storage destination.
4450	FILE NO. ERROR [Decimal Data]	The error occurred during file No. check. Data stands for the alarm factor.	<ul style="list-style-type: none"> <li>Reset the alarm. Select the job and repeat the operation.</li> <li>If the error occurs again, contact you YASKAWA representative.</li> </ul>
4451	UNDEFINED REFERENCE POINT [Bit Pattern]	No reference point was registered or insufficient reference points were registered.	Correctly register reference points.
4452	STACK MORE THAN 8 (JOB CALL) [Decimal Data]	The job call stack overflowed.	Reset the alarm and modify the job to reduce the jobs in the job call stack.
4453	OVER VARIABLE NO. [Bit Pattern]	A variable number was out-of-range.	Modify the job by using the permitted variable number.

## 10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4454	UNDEFINED WELDER CONDITION FILE [Decimal Data]	The welder condition data file was not set.	Set the welder condition data file.
4455	UNDEFINED ARC START COND FILE [Decimal Data]	The arc start condition file was not set.	Set the arc start condition file.
4456	UNDEFINED ARC END COND FILE [Decimal Data]	The arc end condition file was not set.	Set the arc end condition file.
4457	WRONG WELDER SELECTION [Decimal Data]	The arc voltage command units didn't match the welder power supply (individual, unified).	Match the arc voltage command units.
4458	EQUATION EXCEPTION ERROR [Decimal Data]	When executing equation of SET instruction, the item of the equation which couldn't be executed was attempted.	<ul style="list-style-type: none"> <li>• Reset the alarm and repeat the operation.</li> <li>• If the error occurs again, operate the following procedure:               <ol style="list-style-type: none"> <li>① Delete the command that caused the alarm and register again.</li> <li>② Delete the job that caused the alarm and register again.</li> </ol> </li> </ul>
4459	EXCESSIVE INSTRUCTION EQUATION [Decimal Data]	An equation was too long.	Divide up the equation to reduce its length.
4460	ZERO DIVIDED OCCURRENCE [Decimal Data]	A division by zero was attempted.	Set not to divide by zero.
4461	UNDEFINED AUTO WELD RELEASE COND [Decimal Data]	Number of automatic sticking release attempts was set to zero in the arc auxiliary file.	Set the number of automatic sticking release attempts and repeat the operation.
4462	UNDEFINED POSITION FOR ARC RETRY [Decimal Data]	Arc retry was set but no move instruction exists after ARCON.	Set a move instruction after ARCON.
4463	PARITY ERROR	General I/O group parity error.	Stop parity error from occurring.
4464	OVER BCD RANGE	<ul style="list-style-type: none"> <li>• An attempt was made to output a value which exceeded the maximum BCD value limit of 99 (decimal) without parity or 79 (decimal) with parity.</li> <li>• An attempt was made to read data which couldn't be represented as BCD (most-or least-significant 4 bits are 9 or above) to a variable.</li> </ul>	<ul style="list-style-type: none"> <li>• Reset the data in the permitted range.</li> <li>• Check the designated data (BCD/binary and parity check).</li> </ul>
4465	OVER BINARY RANGE (PARITY CHECK)	An attempt was made to output a value exceeding 127(decimal) while the parity check was designated.	<ul style="list-style-type: none"> <li>• Reset the data in the permitted range.</li> <li>• Review the parity check.</li> </ul>

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YASKAWA ELECTRIC CORPORATION

YASKAWA

Specifications are subject to change without notice  
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MANUAL NO. RE-CTO-A203   
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CUSTOMER : \_\_\_\_\_

MACHINE : (PAGE2) \_\_\_\_\_

ELEMENTARY DIAGRAM OF YASNAC XRC (FOR PAINTING)  
ANSI/RIA SPEC  
WITH NON-INTRINSICALLY SAFE PROGRAMMING PENDANT

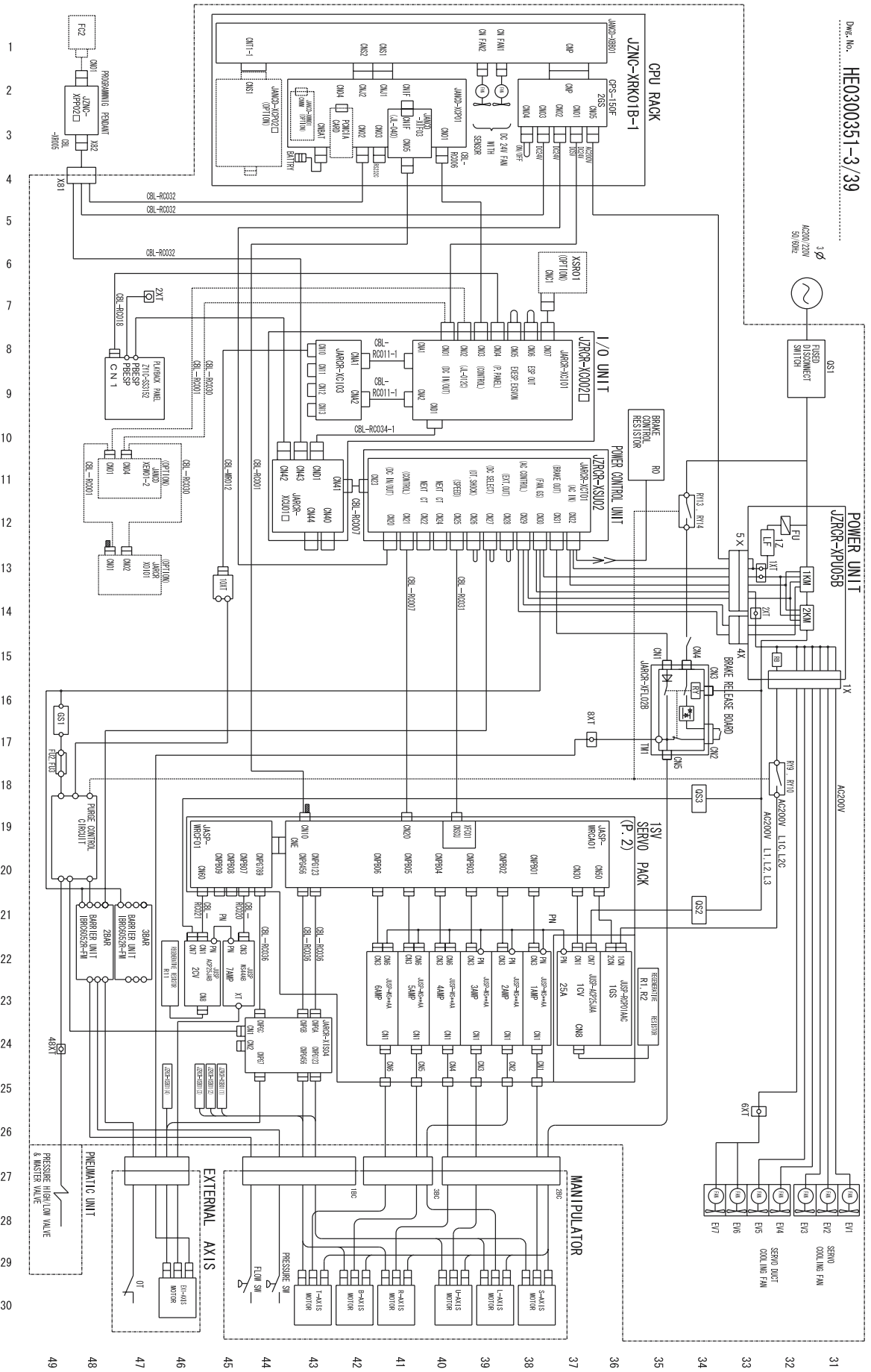
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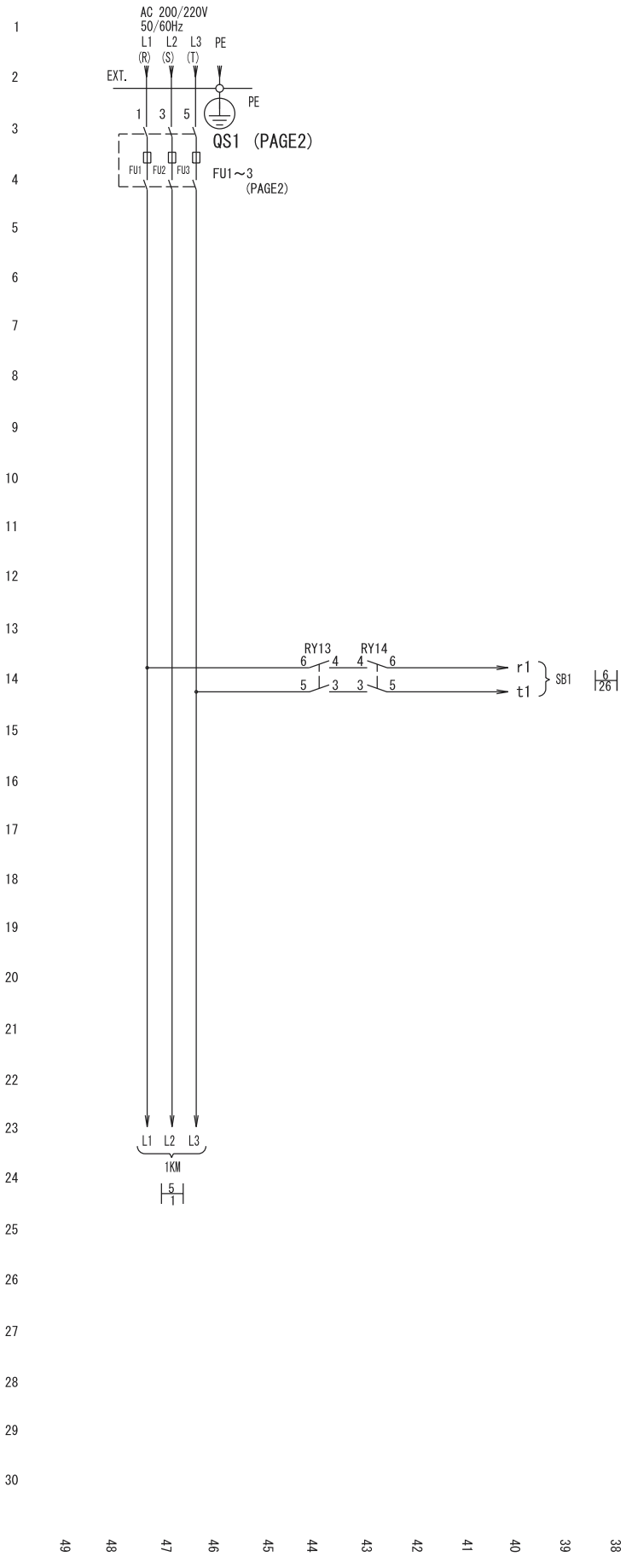
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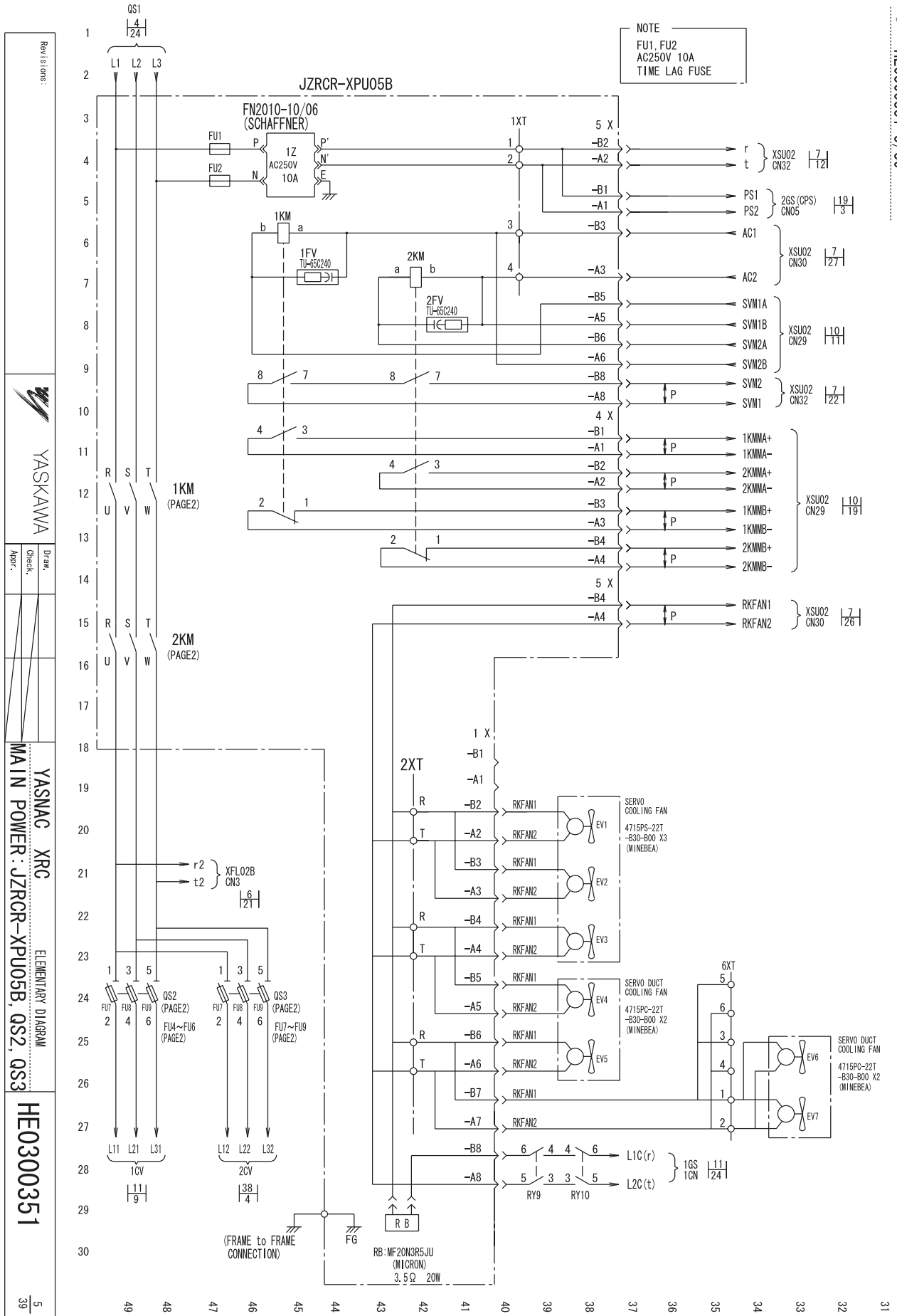
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JARCR-XFL02B

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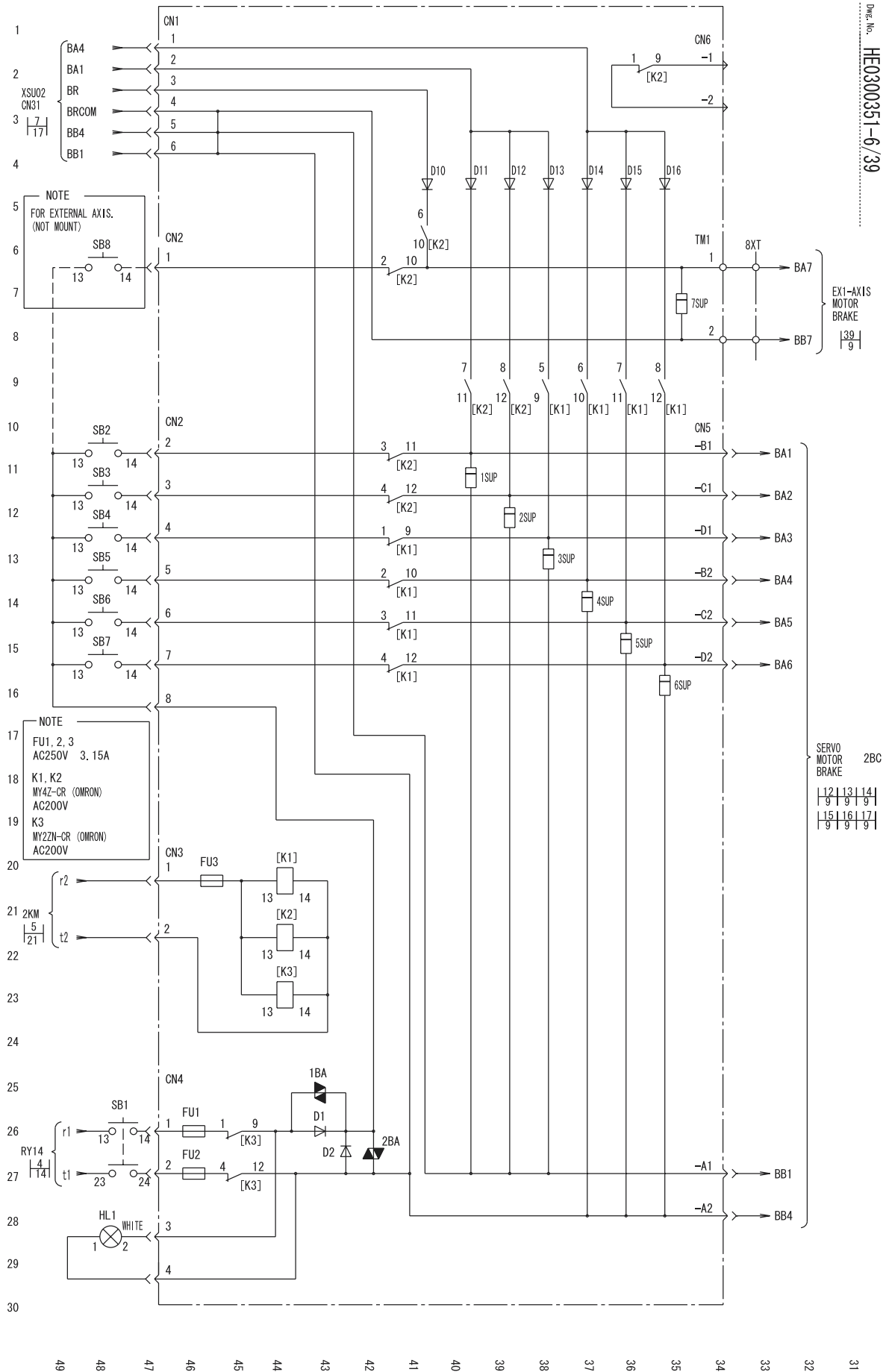
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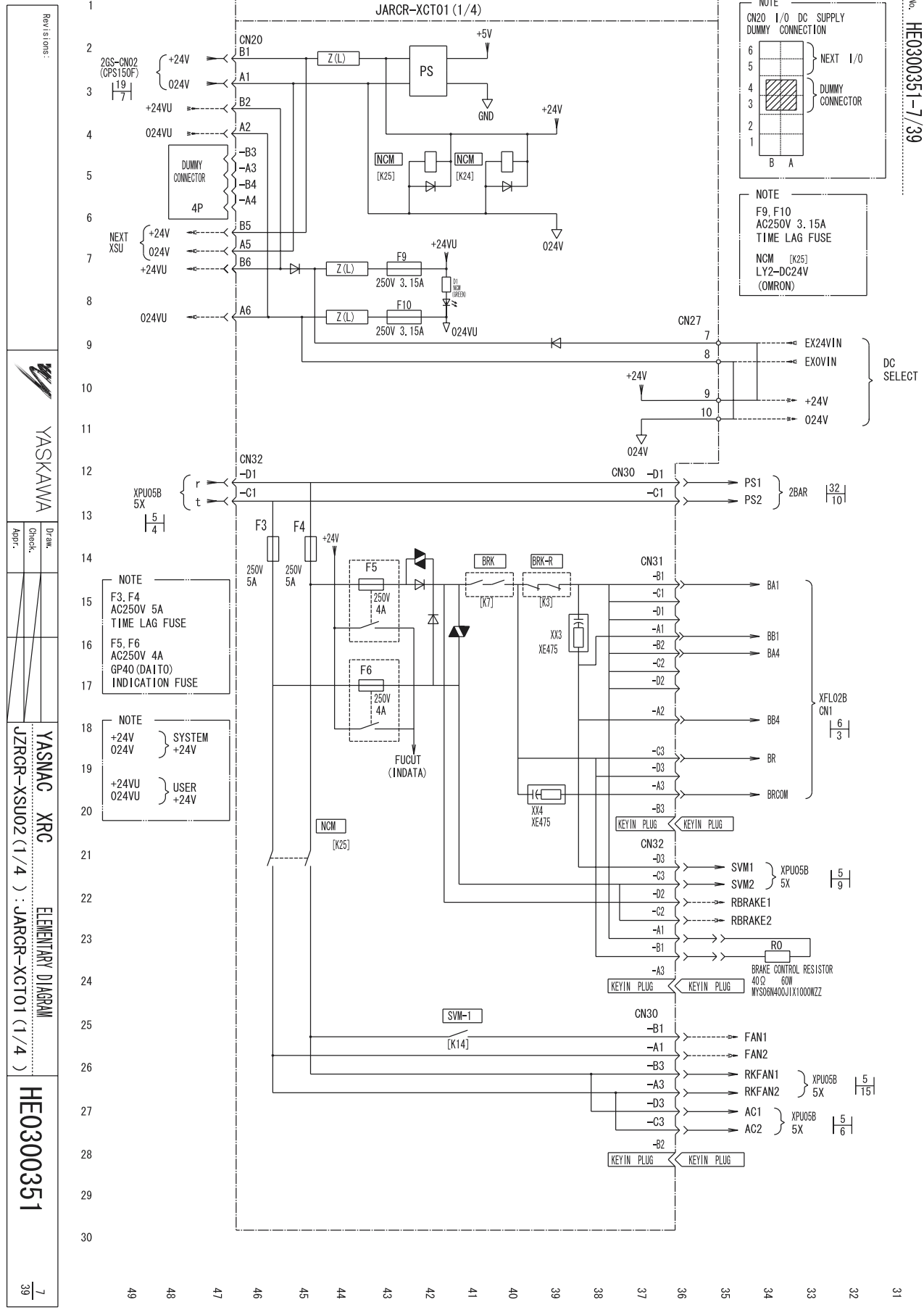
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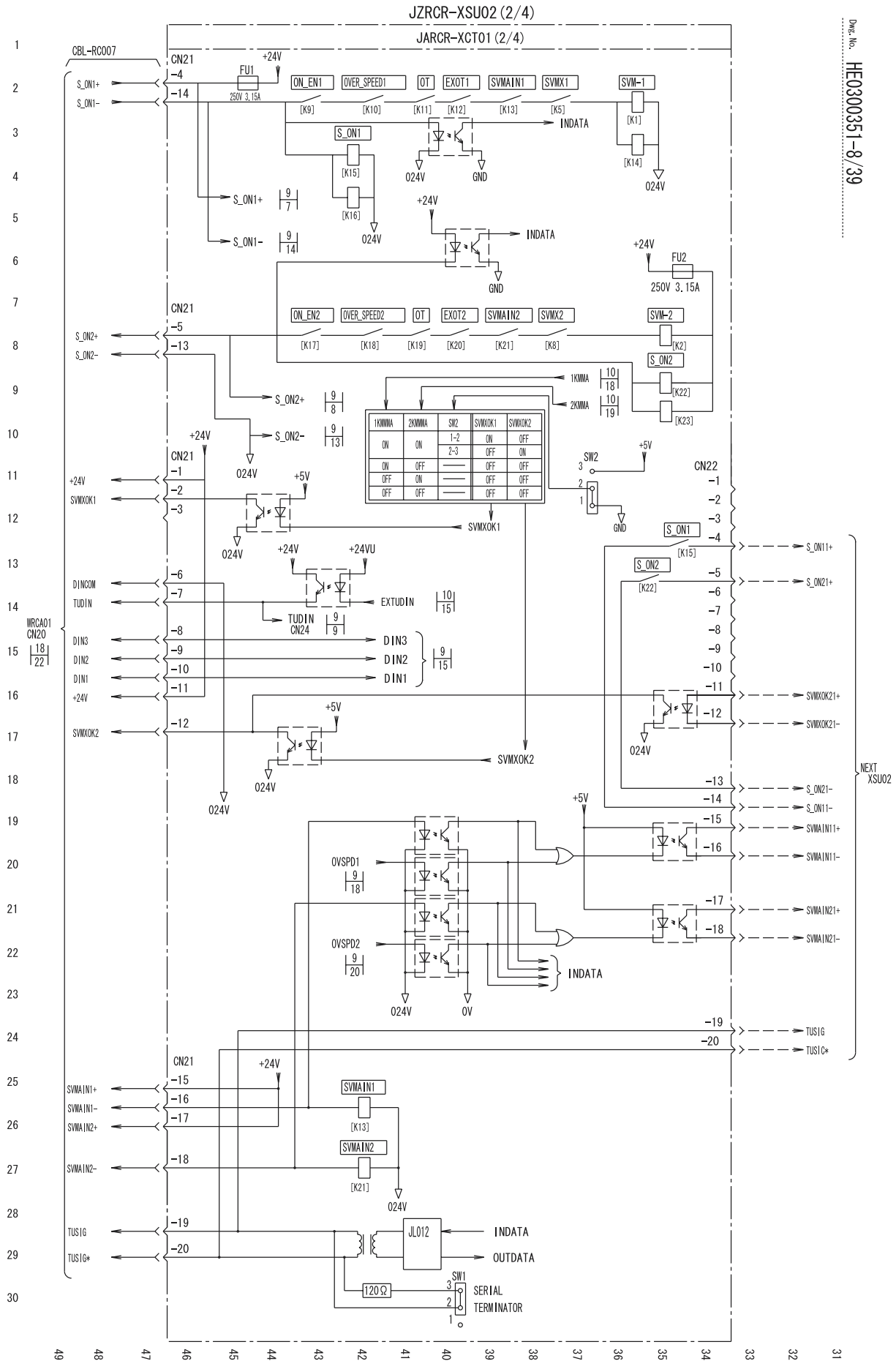
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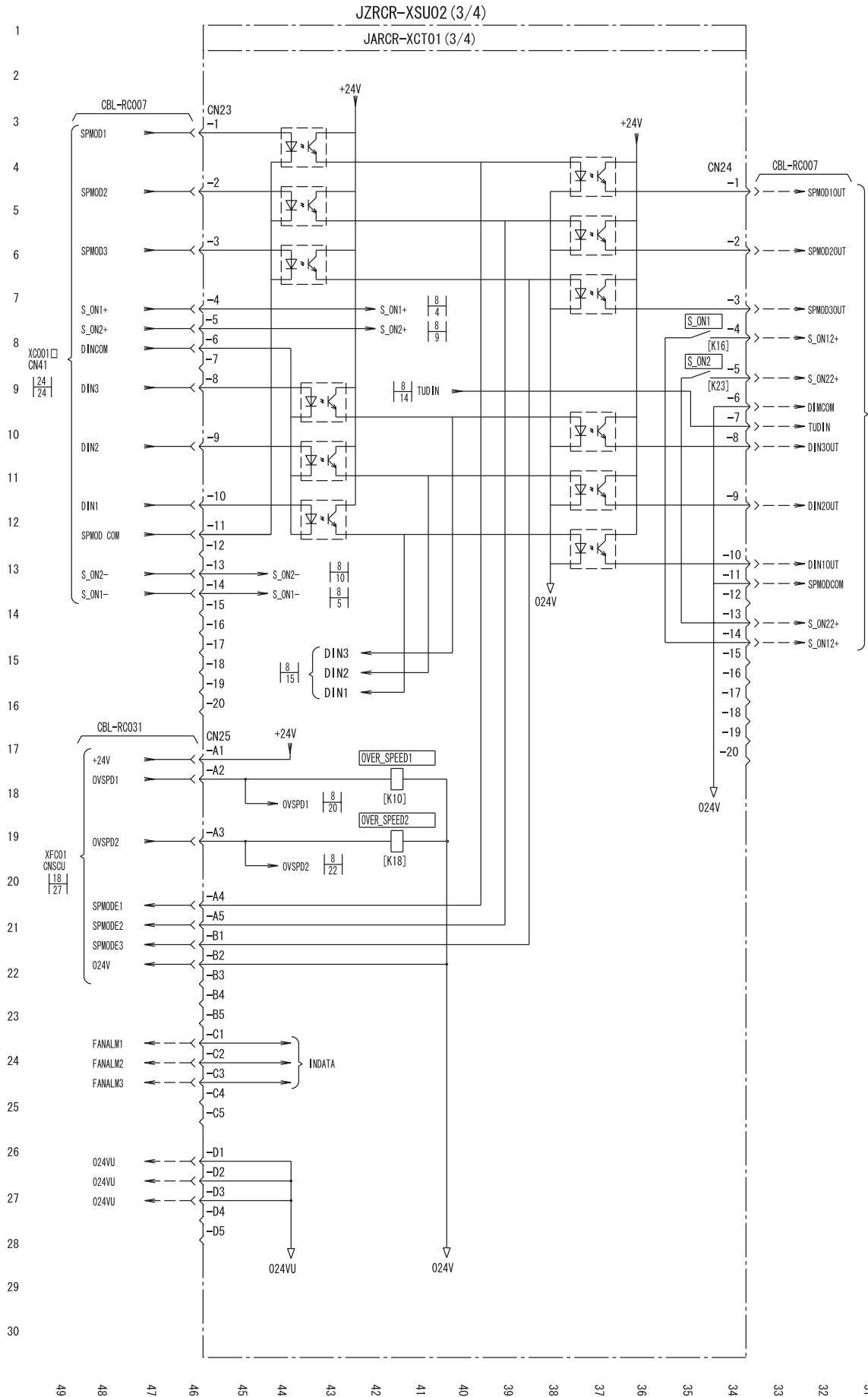
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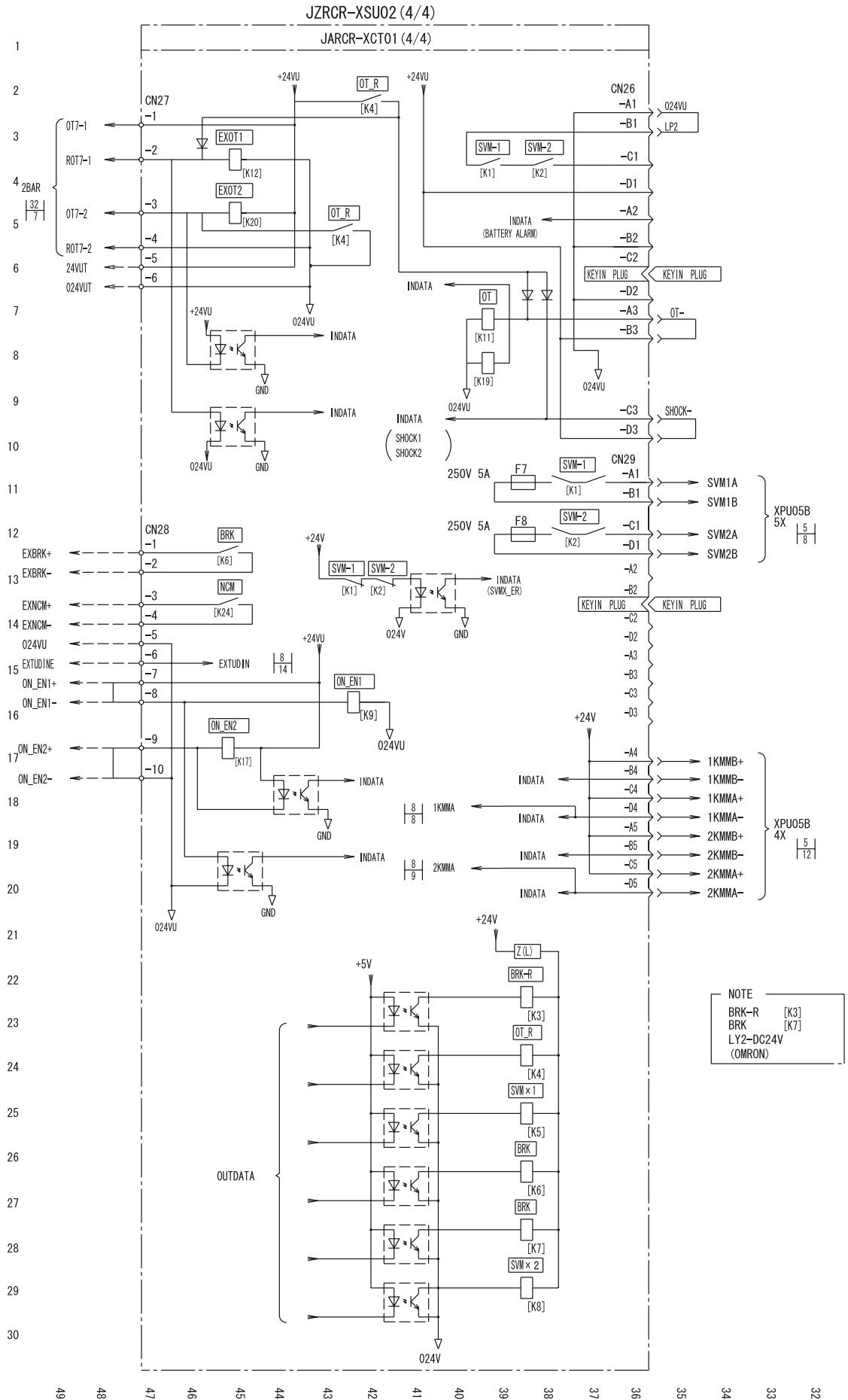
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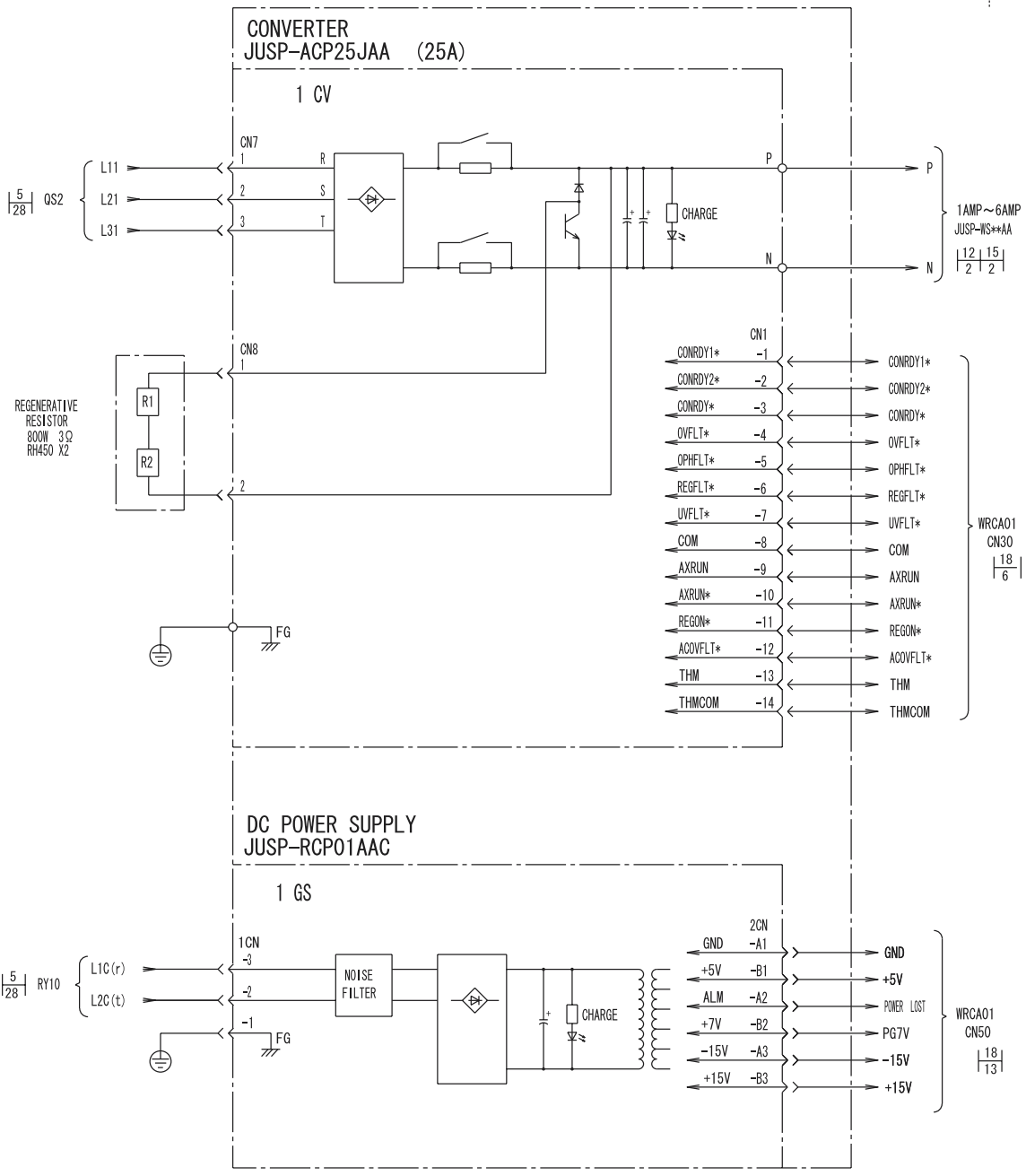
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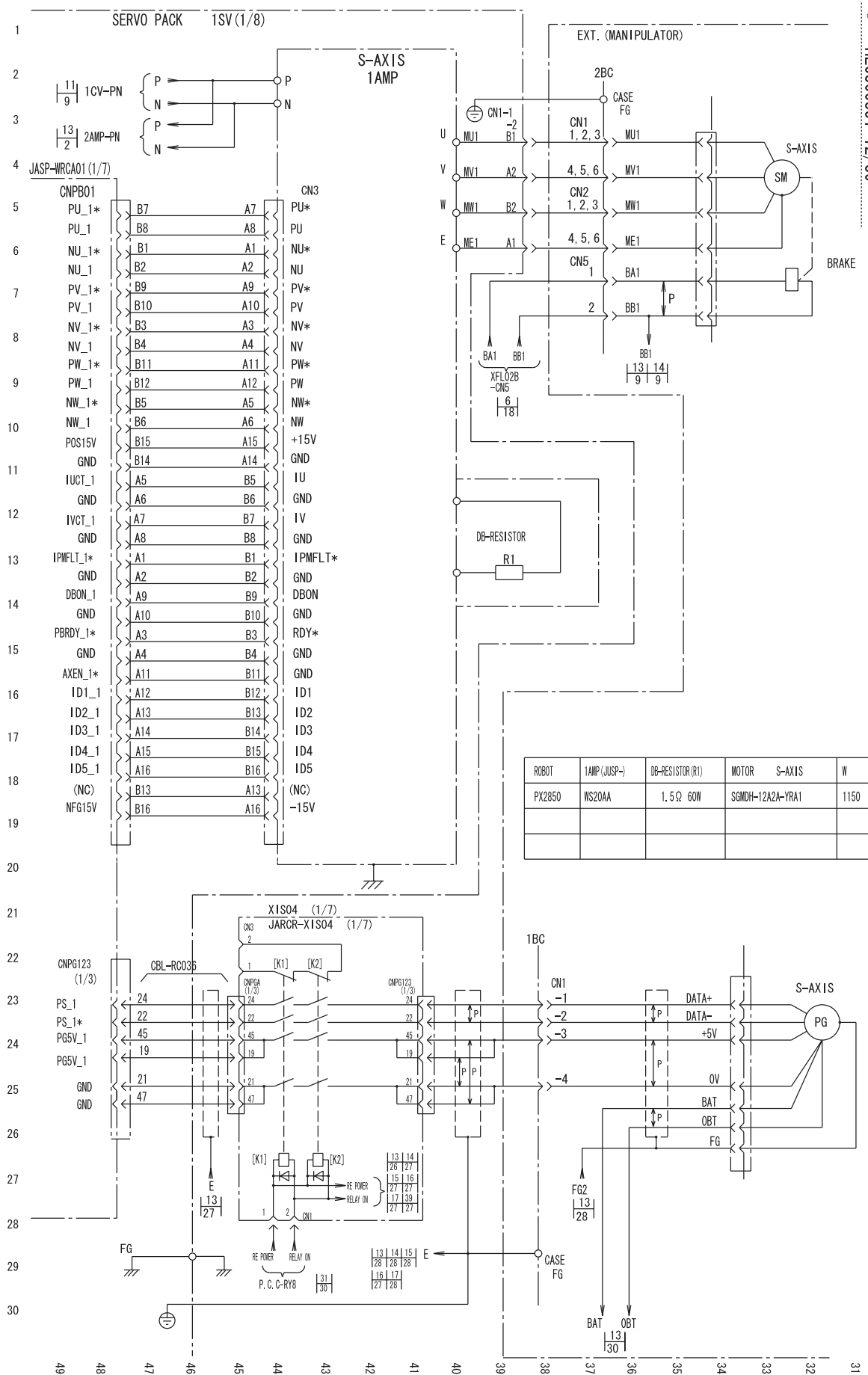
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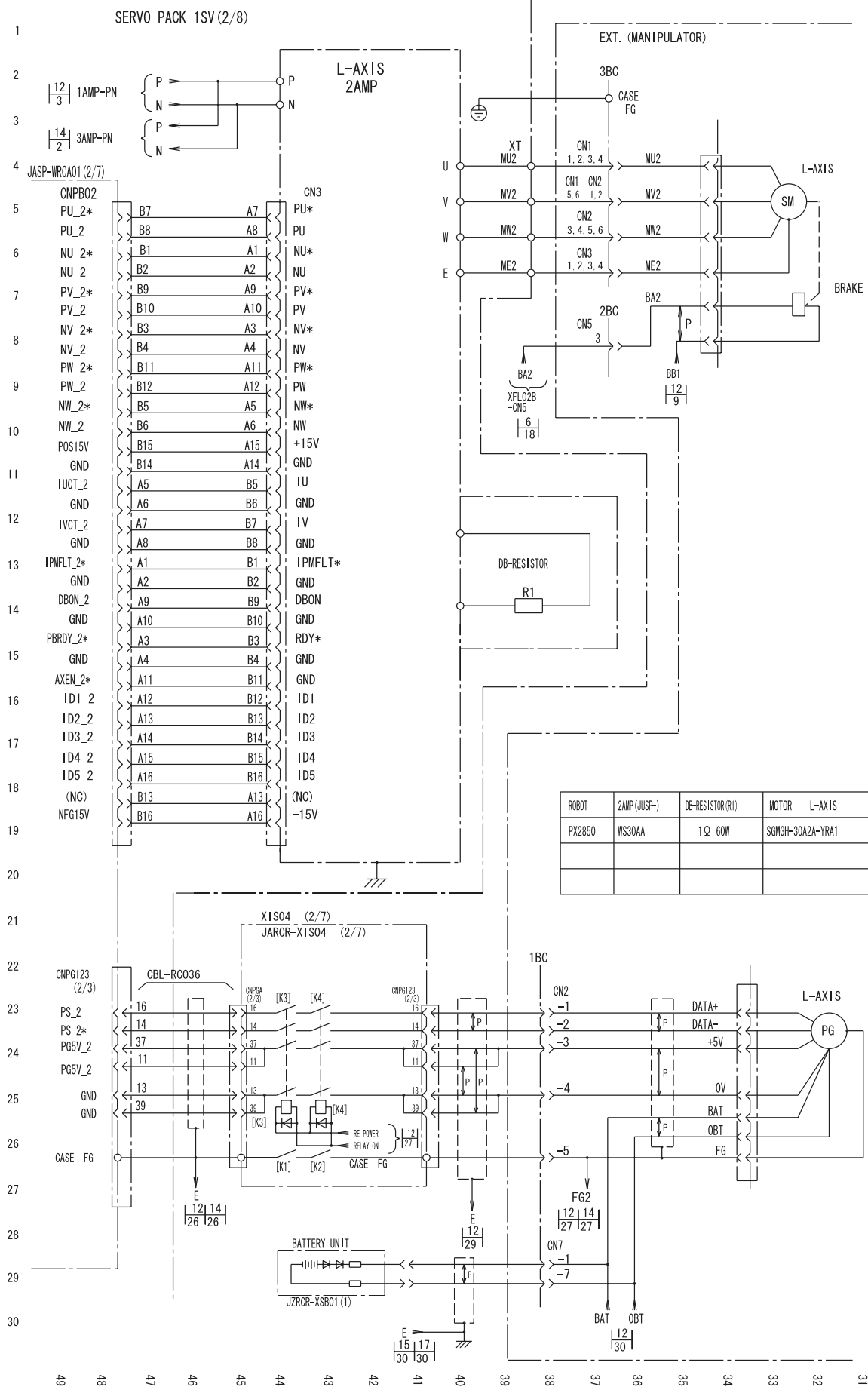
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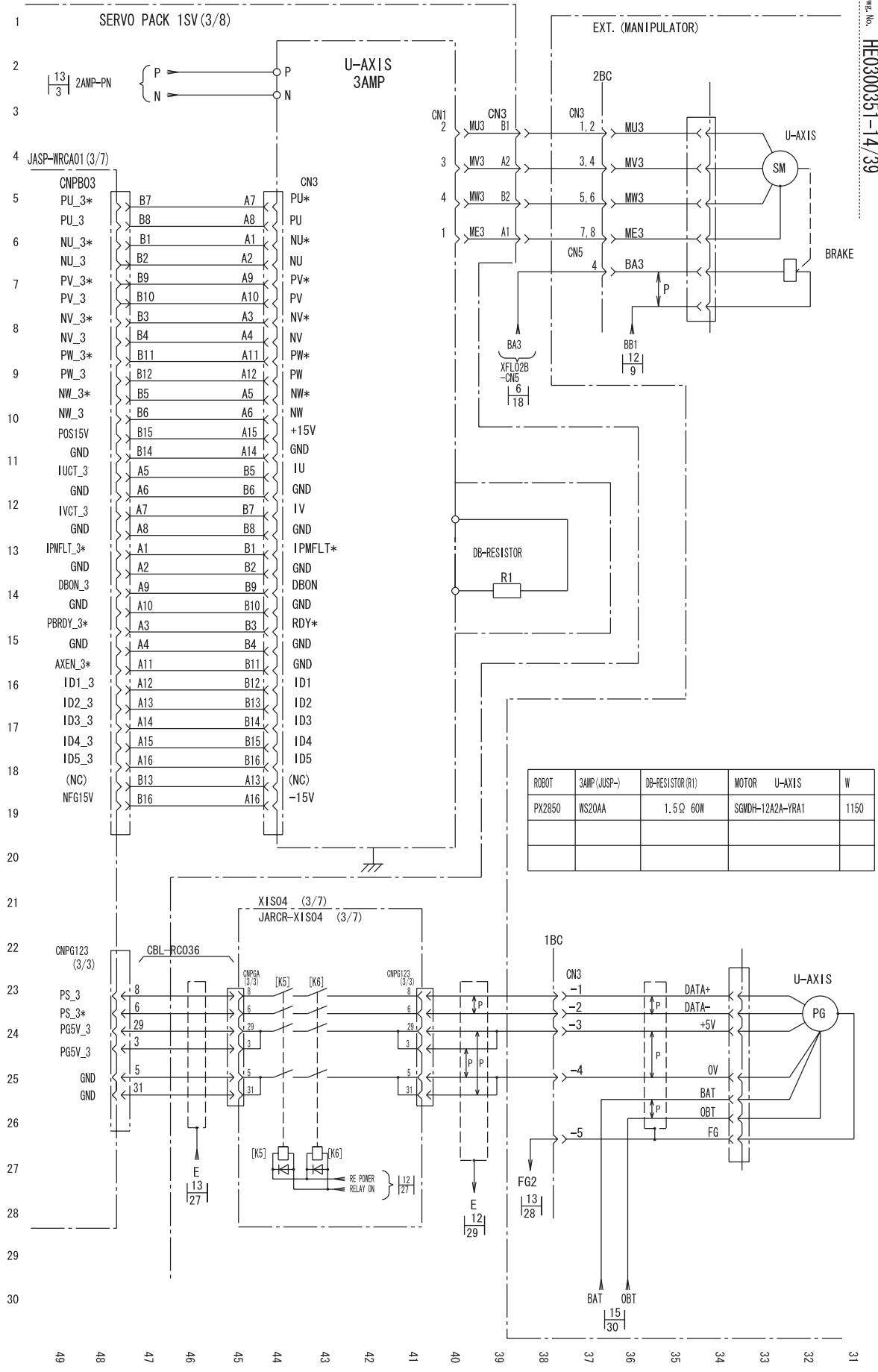
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YASNAC XRC ELEMENTARY DIAGRAM

1SV(3/8) : U-AXIS 3AMP, JASP-WRCAO1(3/7), XISO4(3/7)

HE0300351

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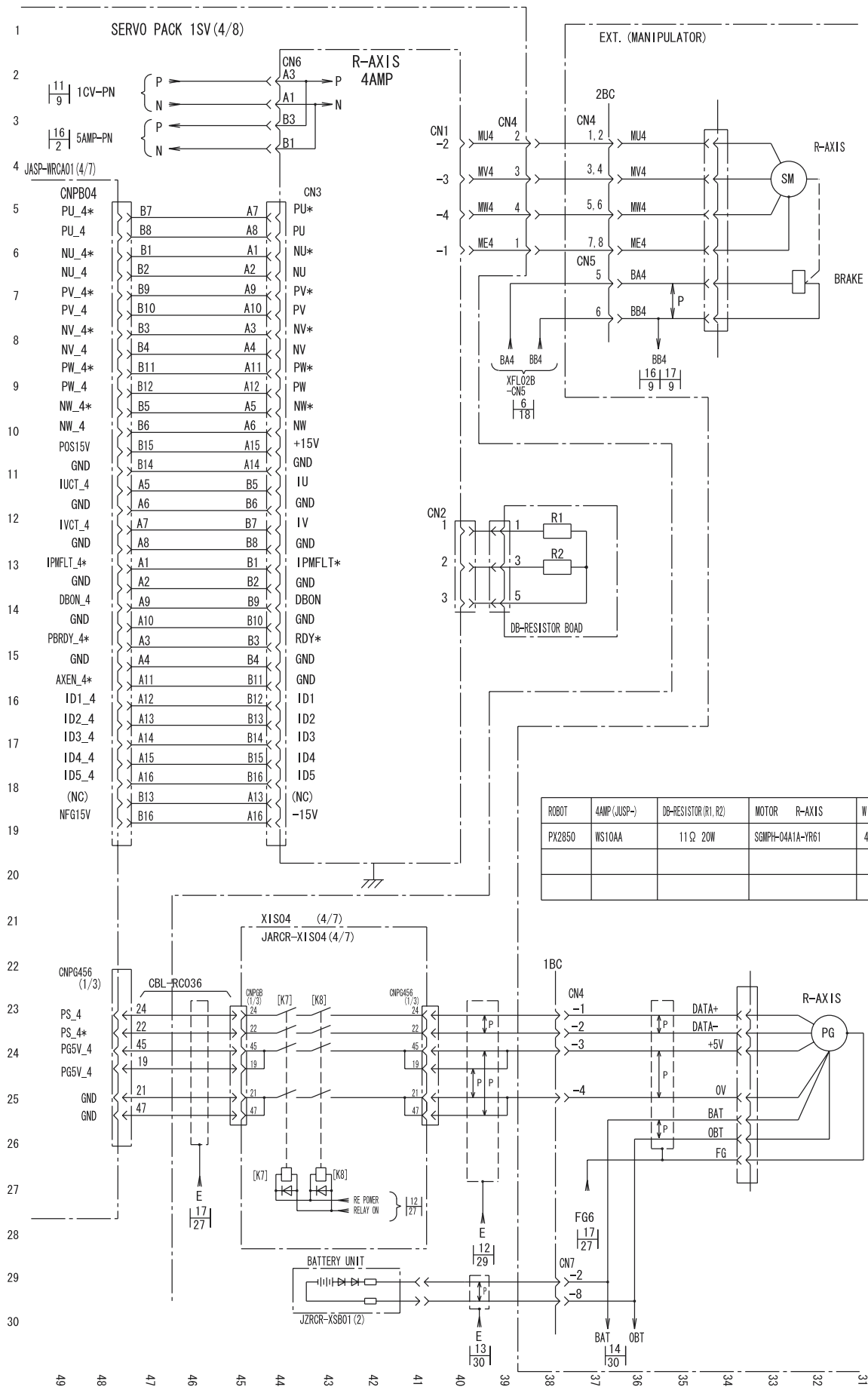


Revisions:

Dr. am.	YASKAWA
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YASNAC XRC ELEMENTARY DIAGRAM

15/39



ROBOT	4AMP (JUSP-)	DB-RESISTOR (R1, R2)	MOTOR	R-AXIS	W
PX2850	WS10AA	11Ω 20W	SGMPH-04A1A-YR61		400

Revisions:

Dr. am.	Check.	Appr.

**YASKAWA**

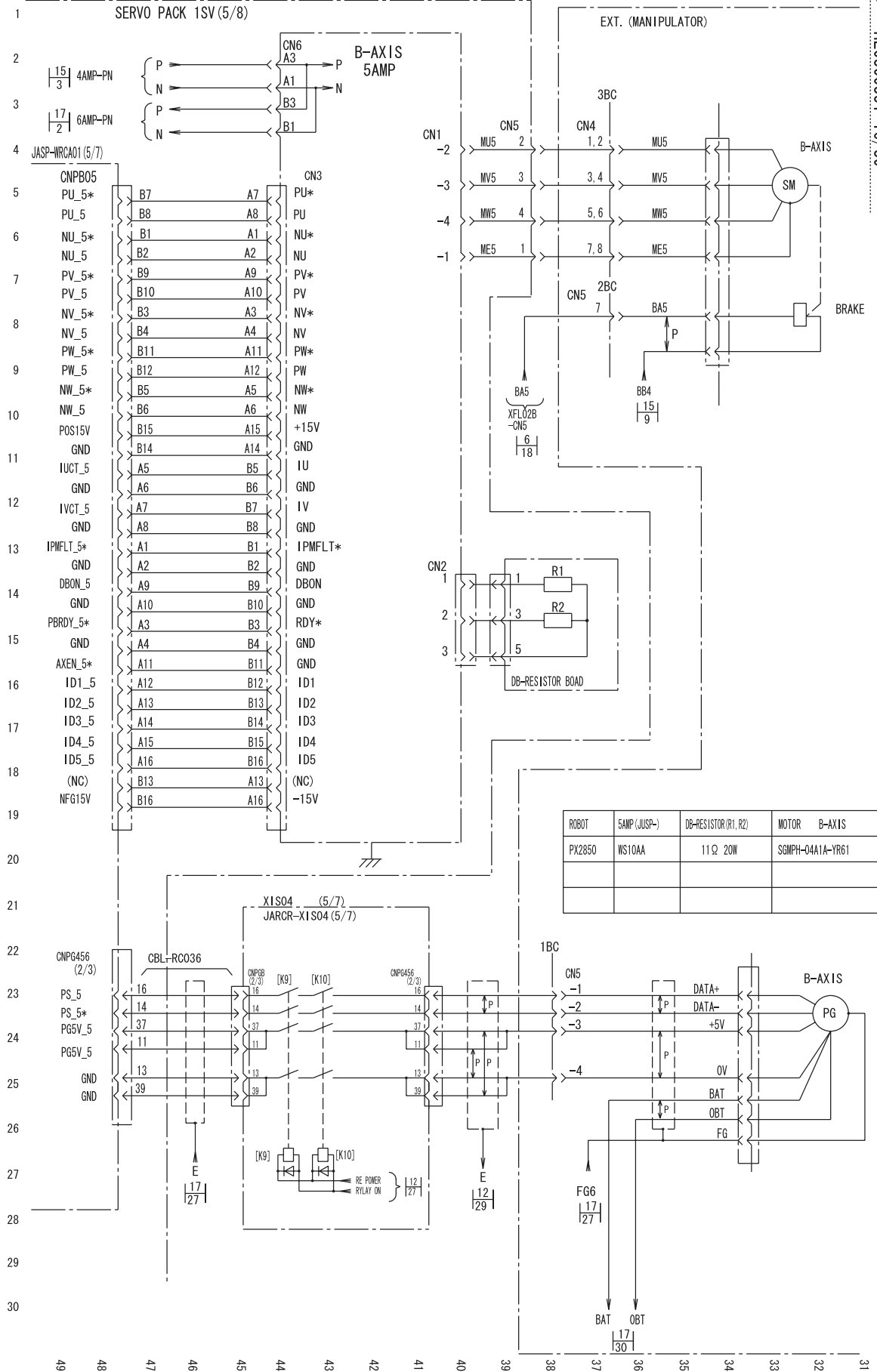
**YASNAC XRC**

**ELEMENTARY DIAGRAM**

ISV(5/8), B-AXIS 5AMP, JASP-WRCA01(5/7), X1S04(5/7)

**HE0300351**

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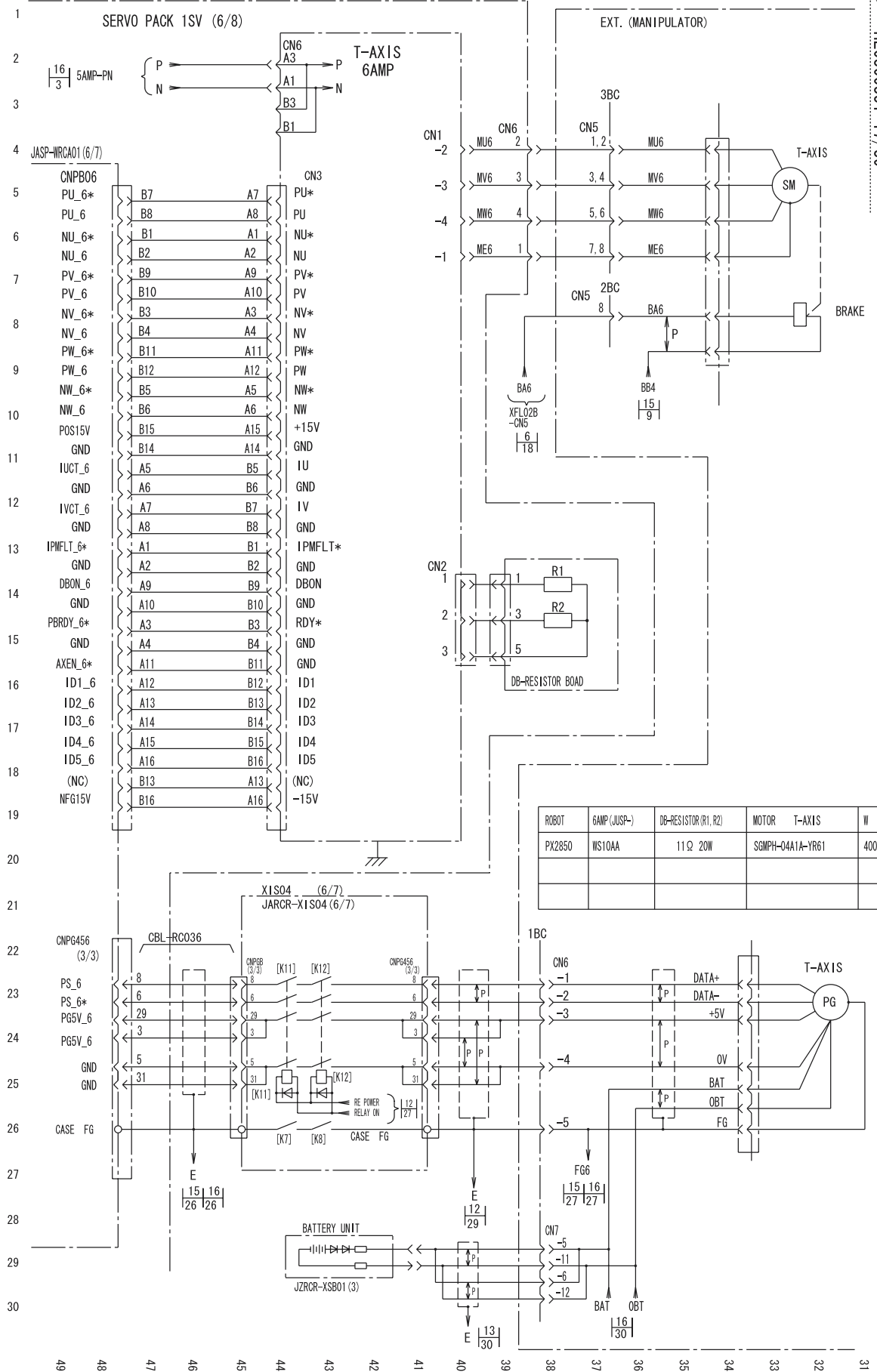
Revisions:

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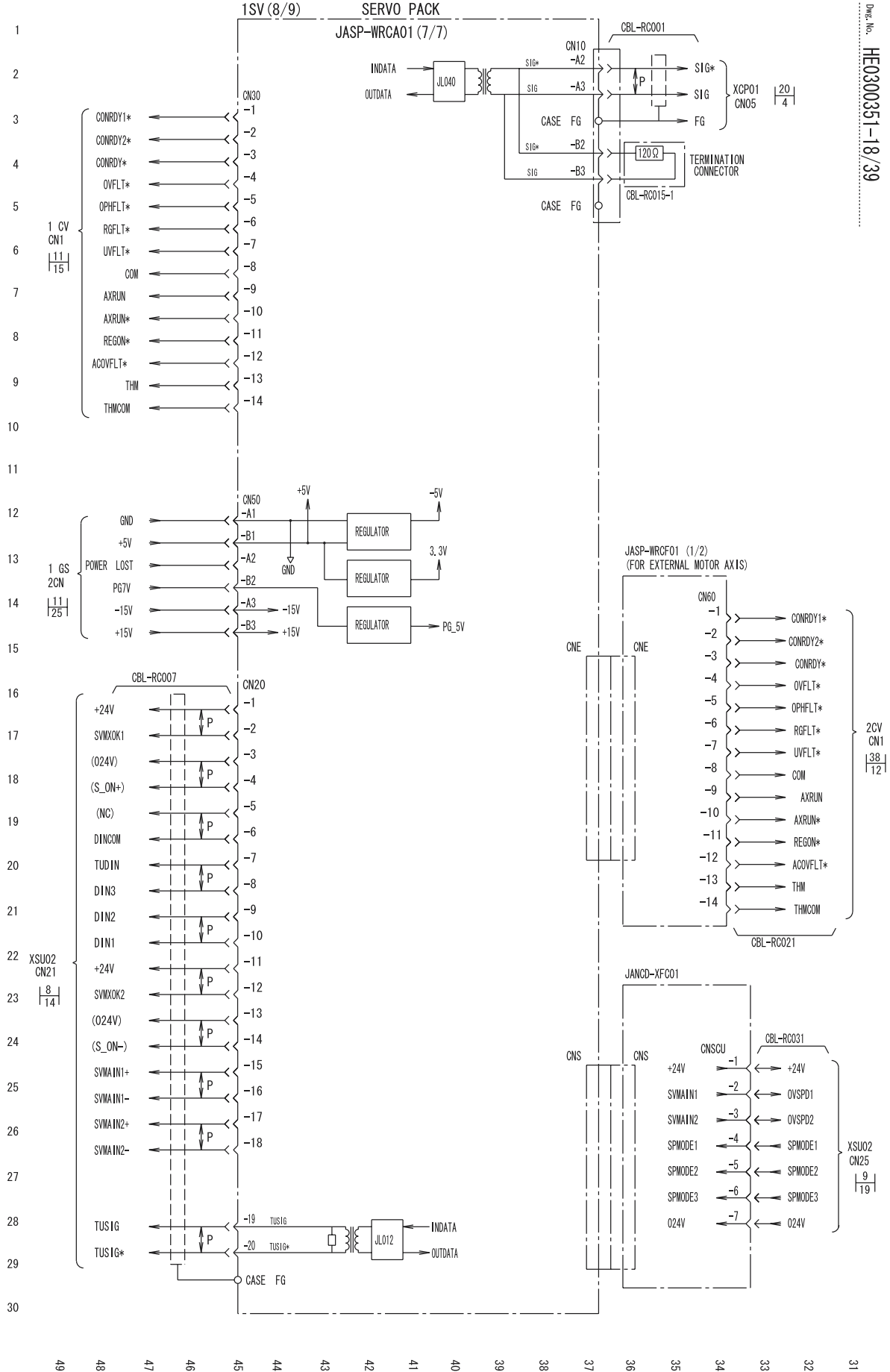
YASKAWA

YASNAC XRC ELEMENTARY DIAGRAM

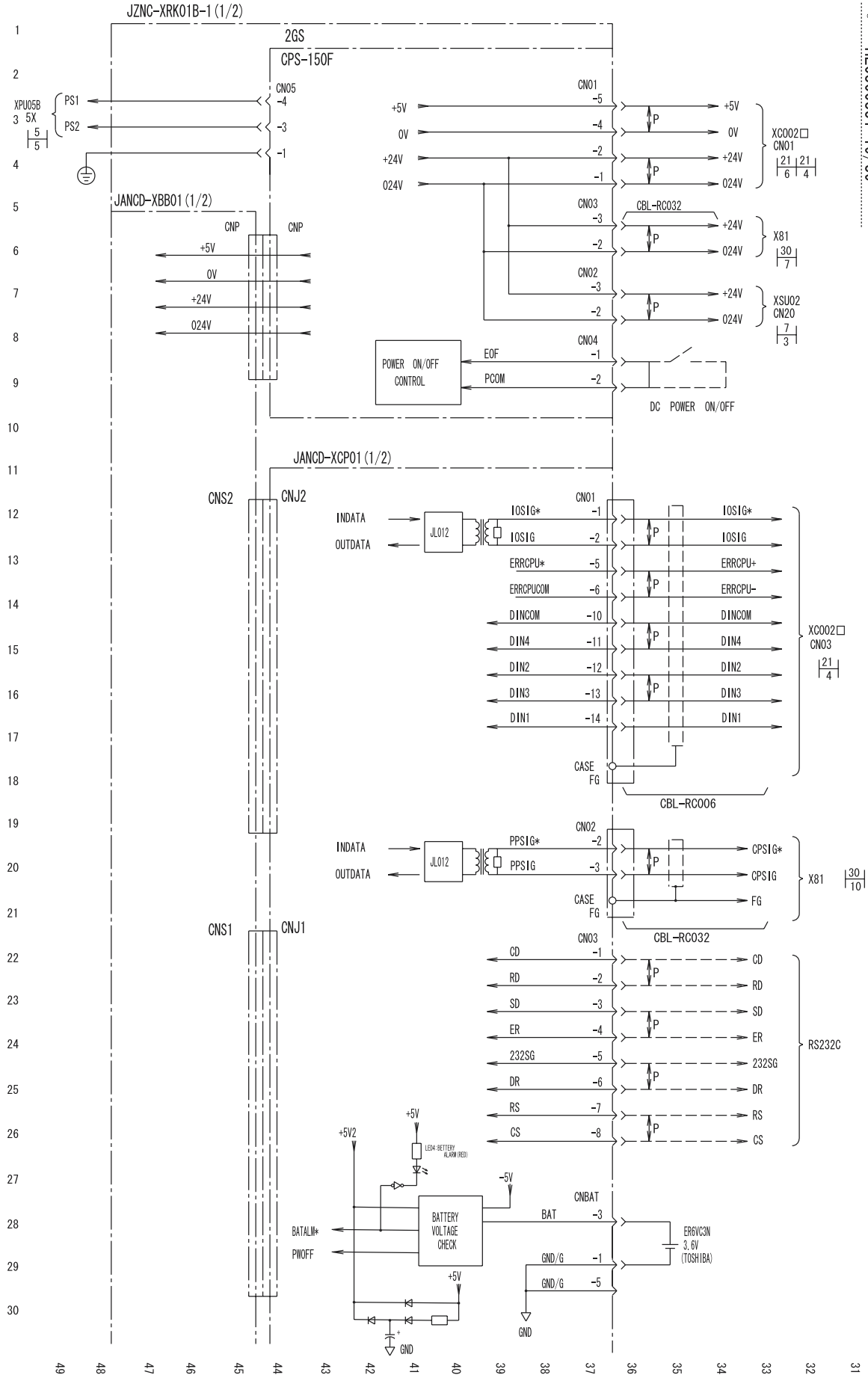
HE0300351

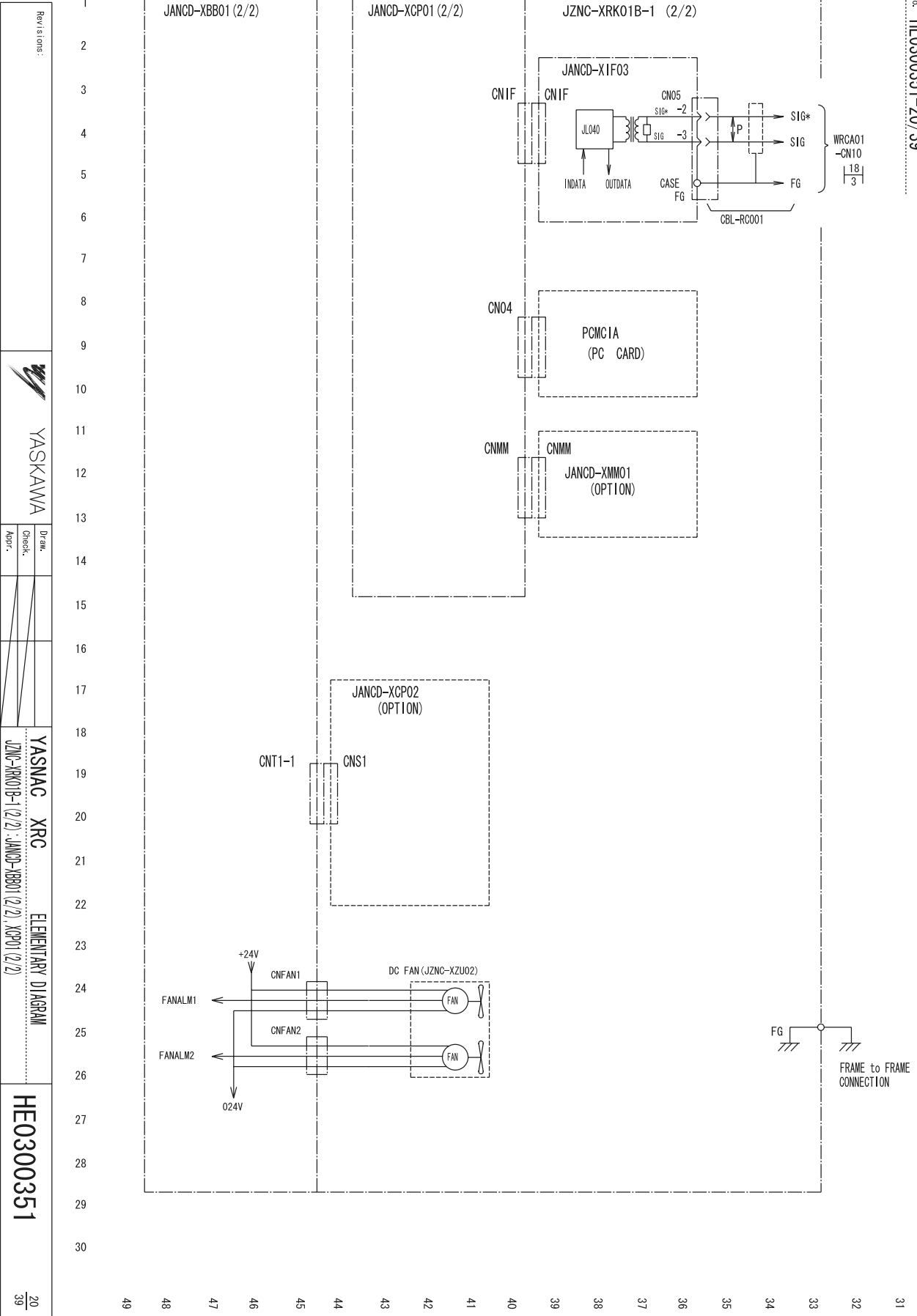


Revisions:	
YASKAWA	
Dr.am.	Check.
Appr.	
YASNAC XRC ELEMENTARY DIAGRAM	
1SV (7/8) : JASP-WRCA01 (7/7) , JASP-WRCF01 (1/2)	
HE0300351	
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Revisions:	
19	39
<b>YASKAWA</b>	
Dr. am.	Check.
Appr.	
<b>YASNAC XRC</b>	
ELEMENTARY DIAGRAM	
<b>HE0300351</b>	





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Revisions:



Draw. Check. Apr. 20

YASNAG XRC ELEMENTARY DIAGRAM

HE0300351

Revisions:

Drawn	YASUNAC XRC
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Apr.	

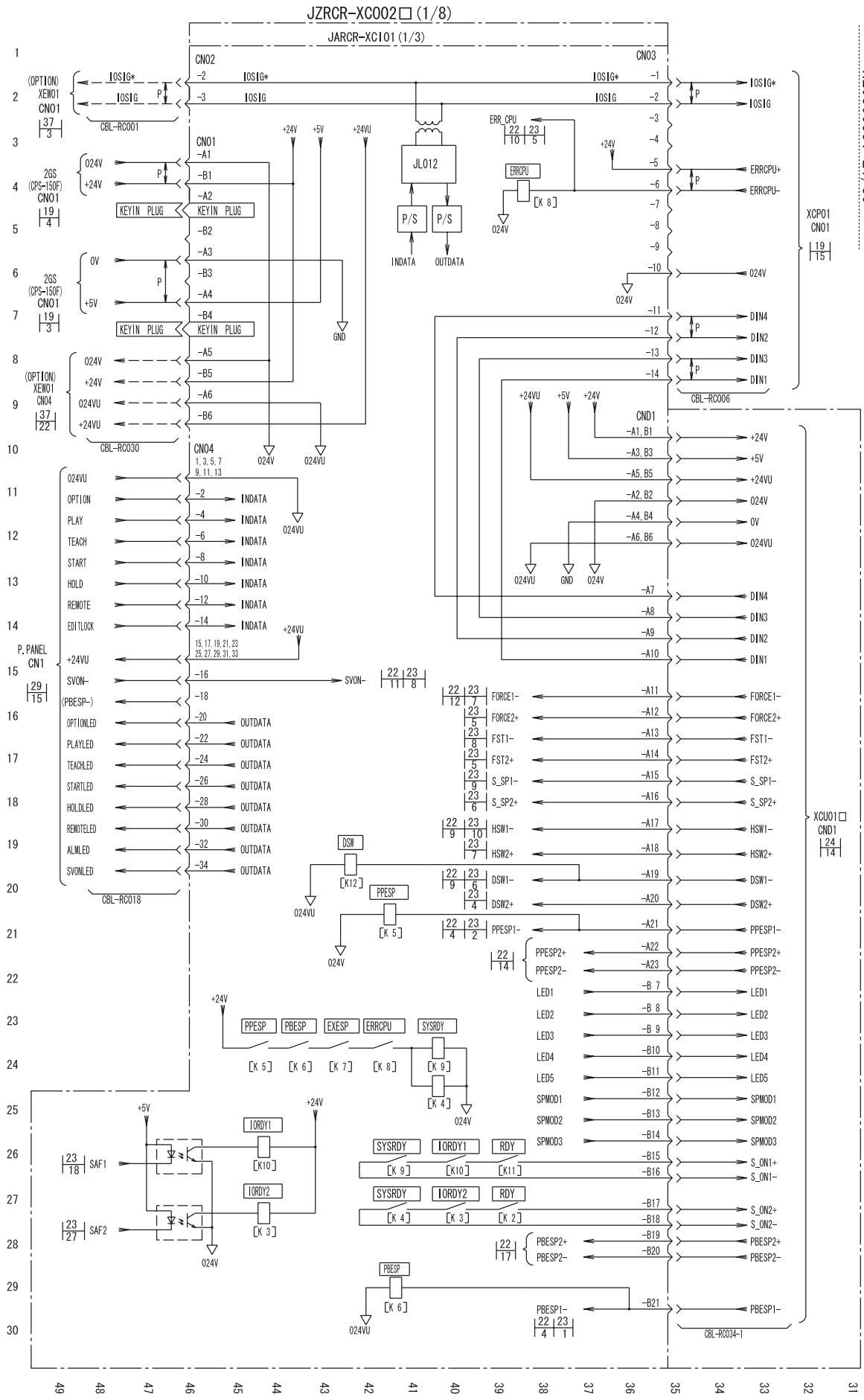
YASKAWA

Elementary Diagram

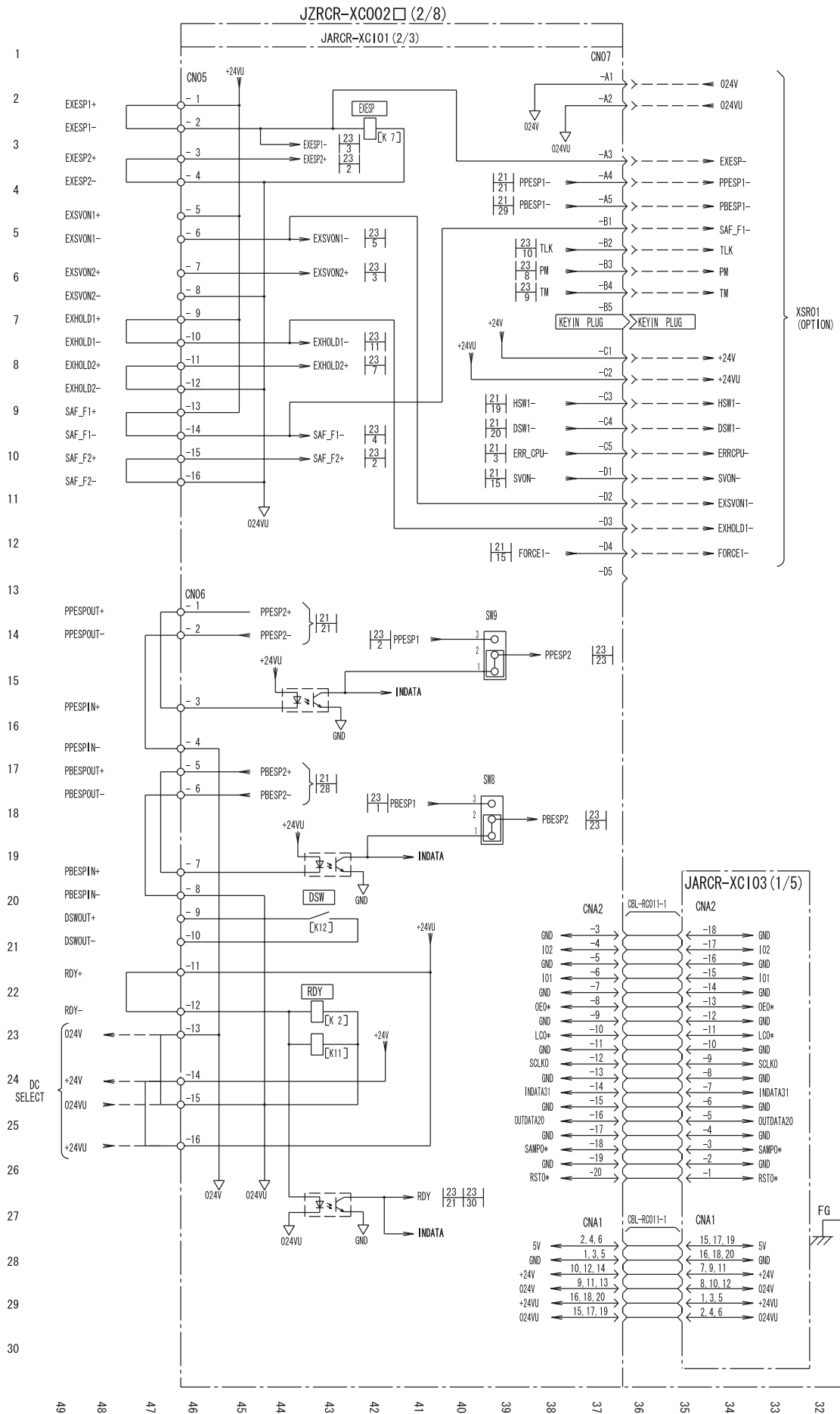
JZRGR-XC002 (1/8) : JARCR-XC101 (1/3)

HE0300351

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 YASKAWA  
 YASNAC XRC  
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XSR01 (OPTION)

FG  
 FRAME to FRAME CONNECTION

Dr. am.	Check.	Appr.

YASNAC XRC  
 JZRGR-XC002 (2/8) · JARCR-XC101 (2/3) · XC103 (1/5)

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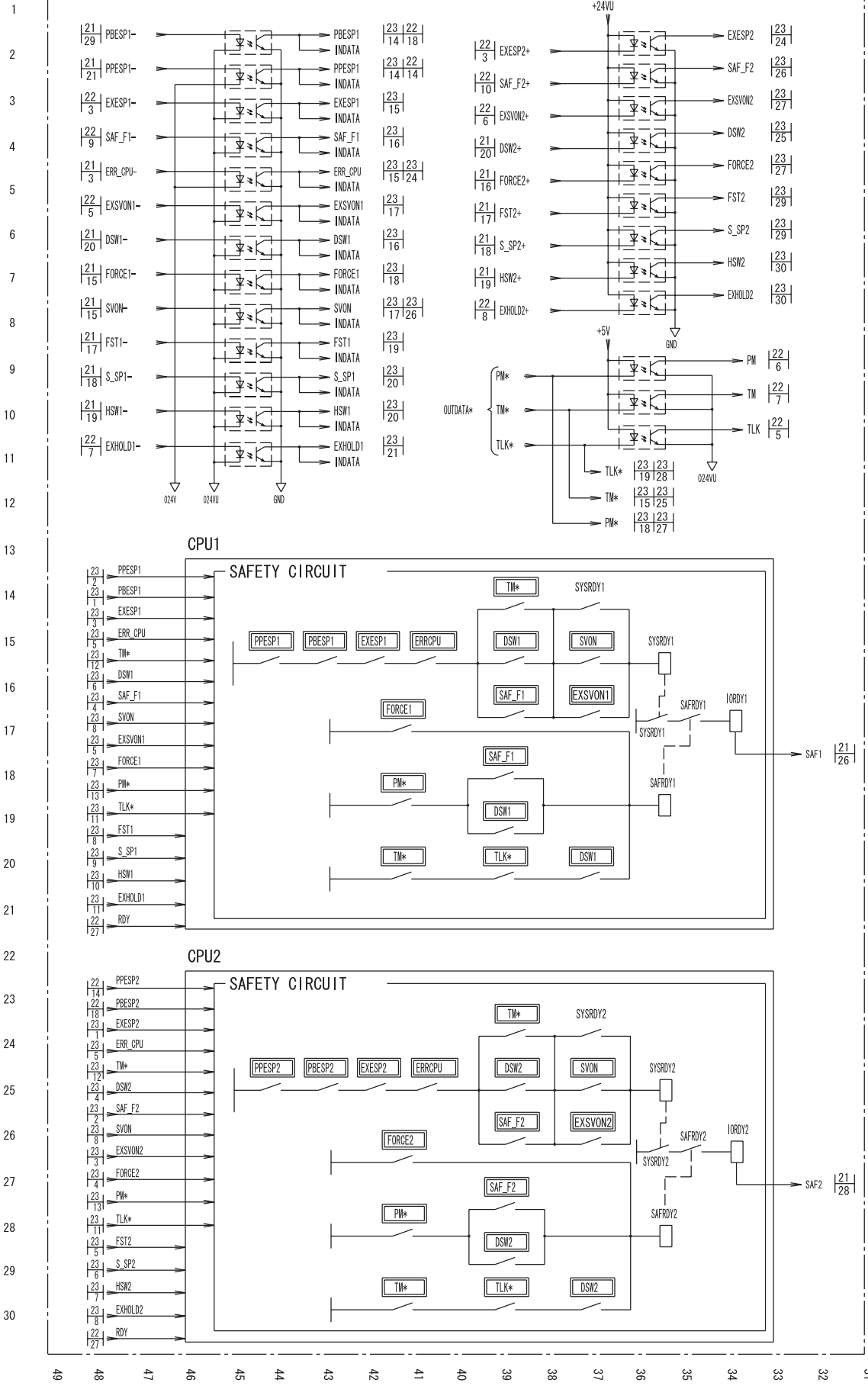
Revisions:

Dr.am.	YASNAC	XRC	ELEMENTARY DIAGRAM
Check.	JZRCR-XC002 (3/8)	JARCRC-XC101 (3/3)	SAFETY CIRCUIT: CPU1, CPU2
Appr.			

YASKAWA

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JZRCR-XC002 (4/8)

JARCR-XCU01

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Rev's items:

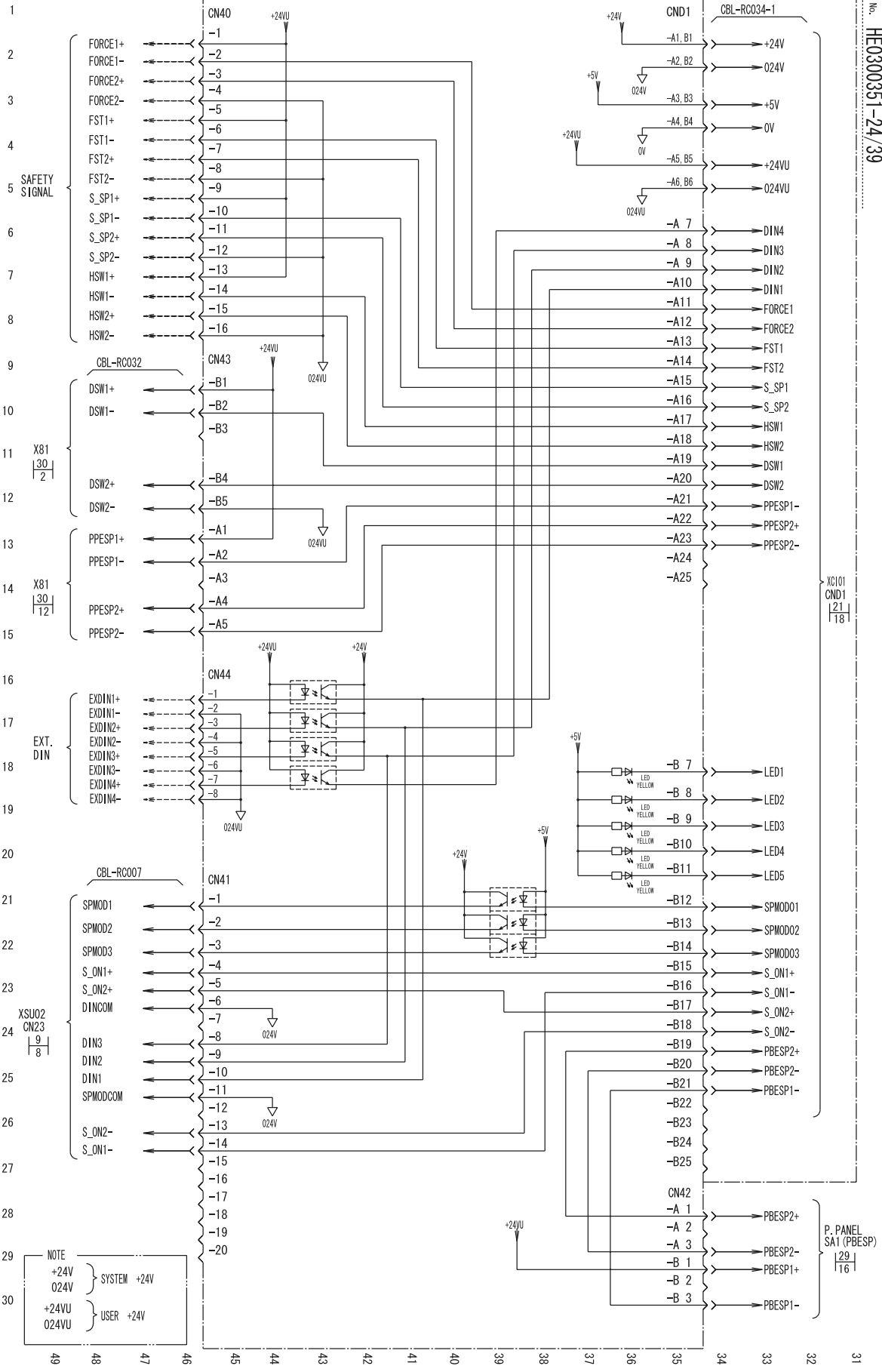
**YASKAWA**

YASNAC XRC ELEMENTARY DIAGRAM

JZRCR-XC002 (4/8) : JARCR-XCU01

HE0300351

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NOTE

+24V SYSTEM +24V

024V

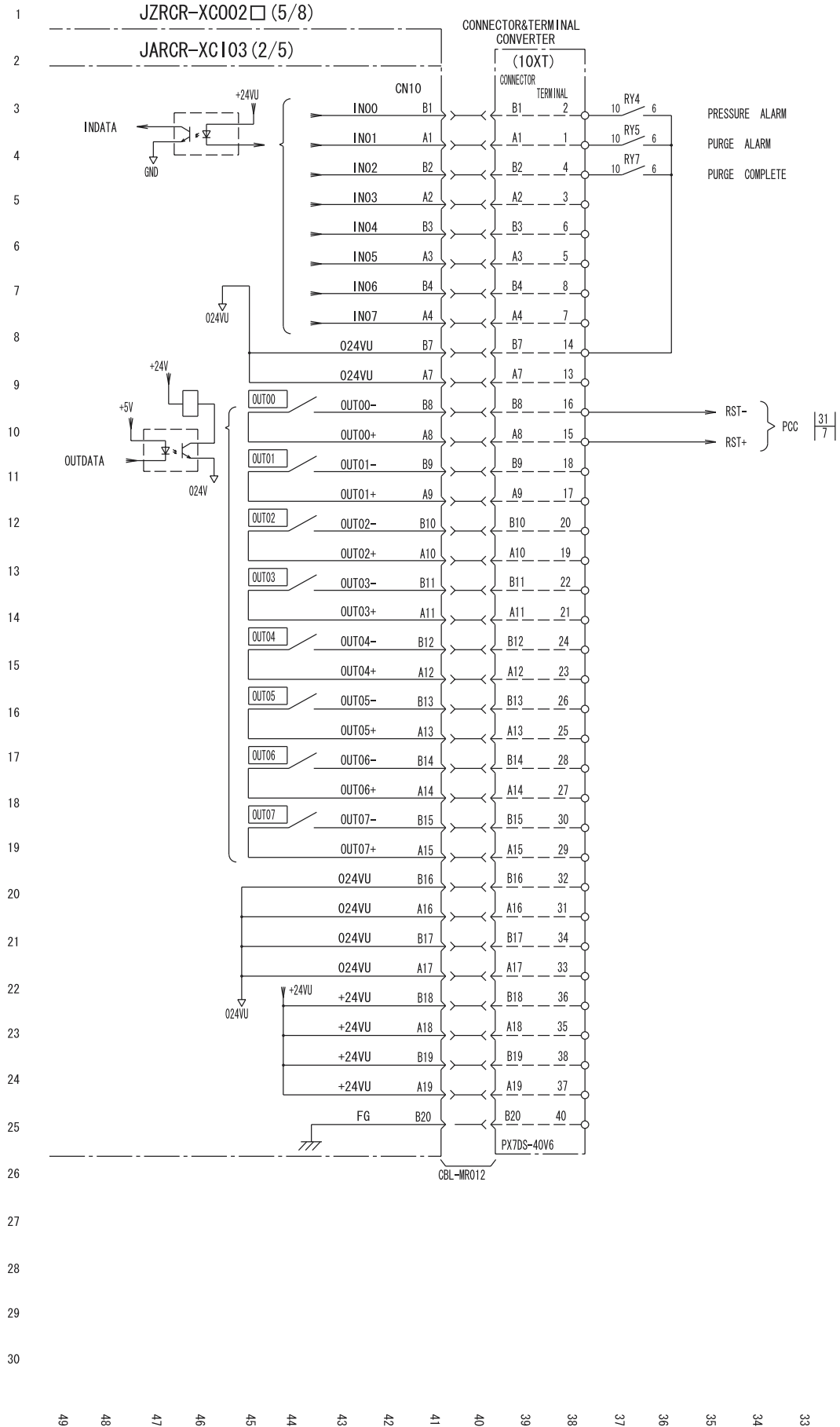
+24VU USER +24V

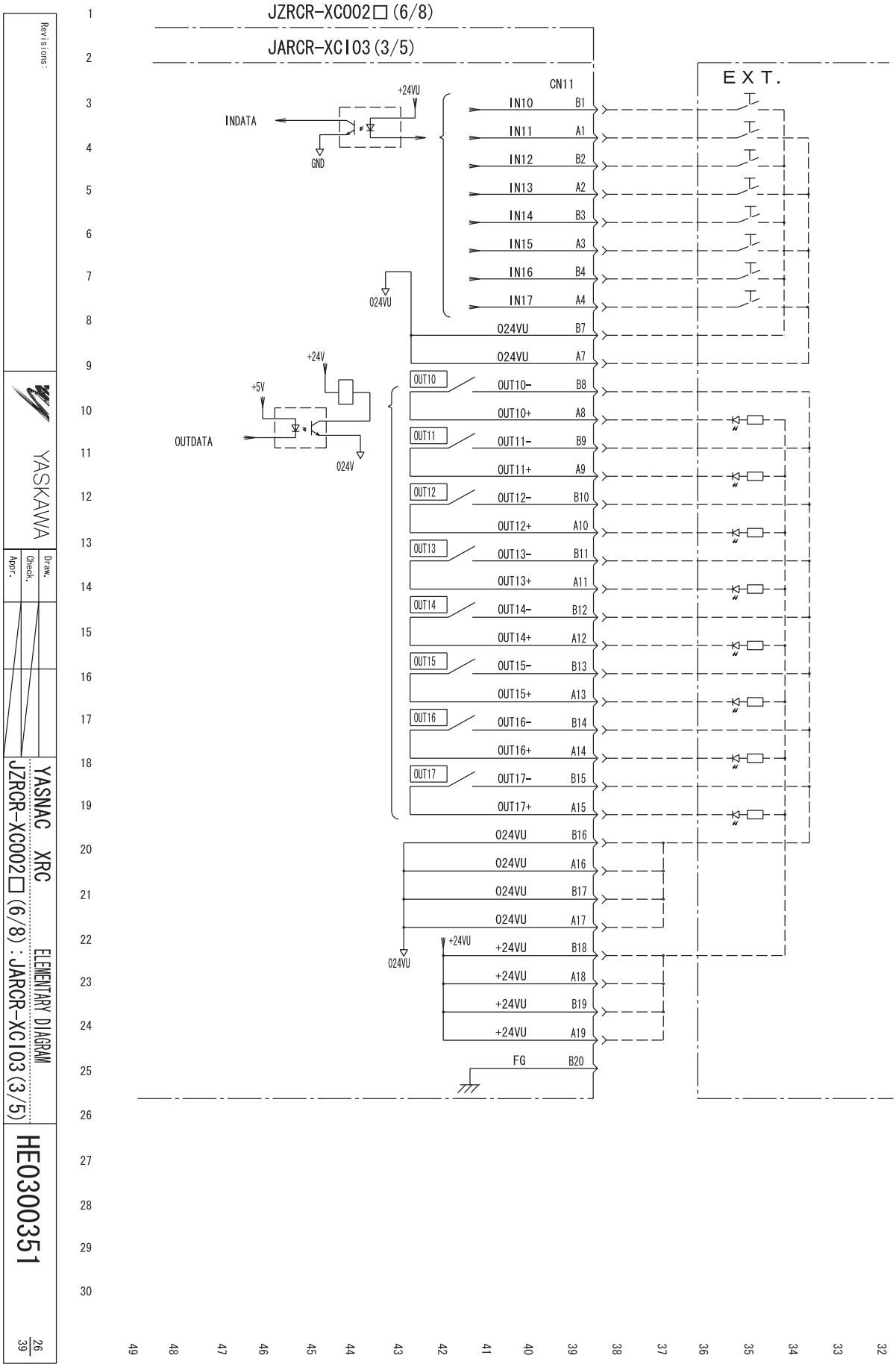
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Dr. am.	
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JZRCR-XC002□ (5/8) : JARCR-XC103 (2/5)	
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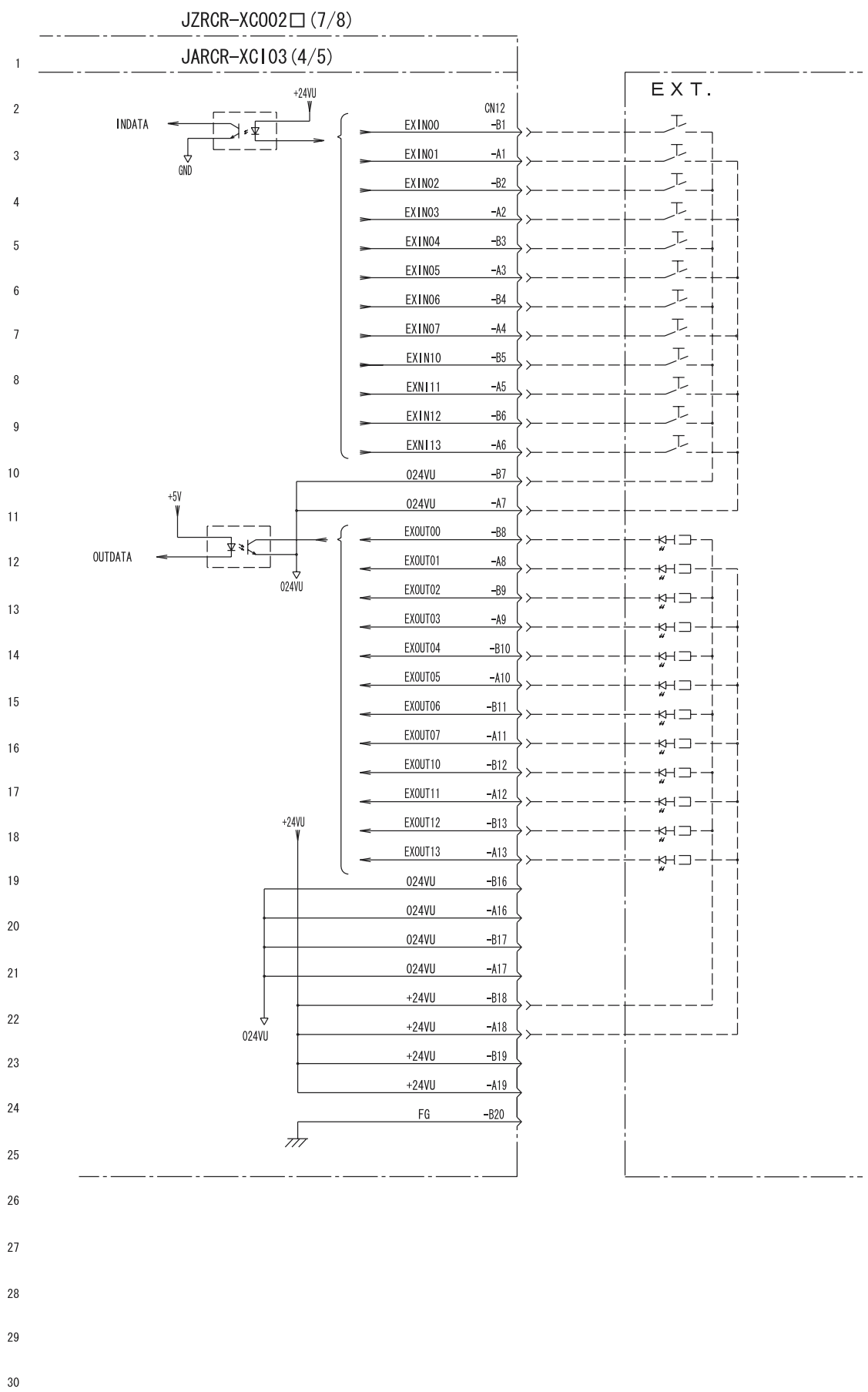


Revisions:	
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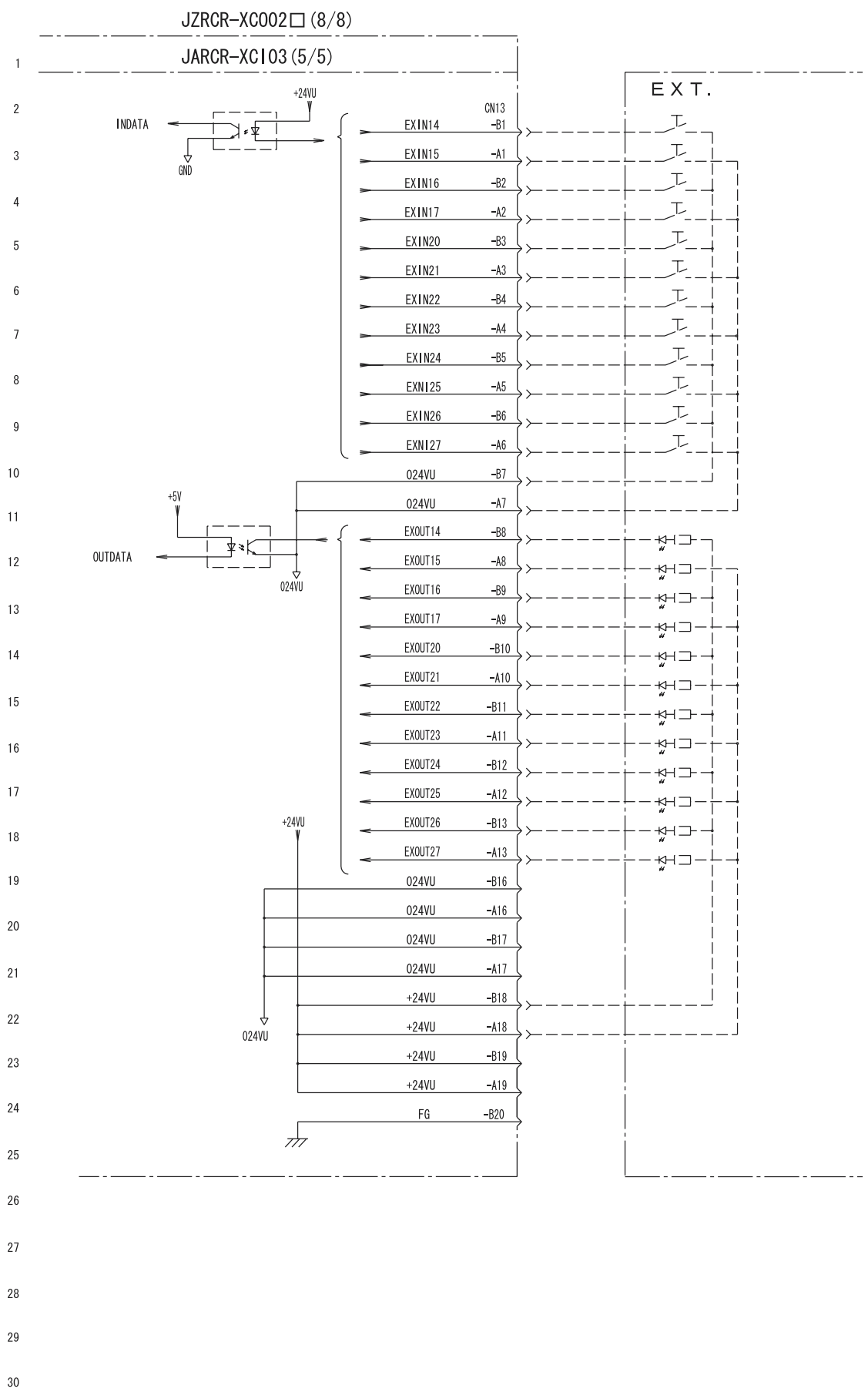
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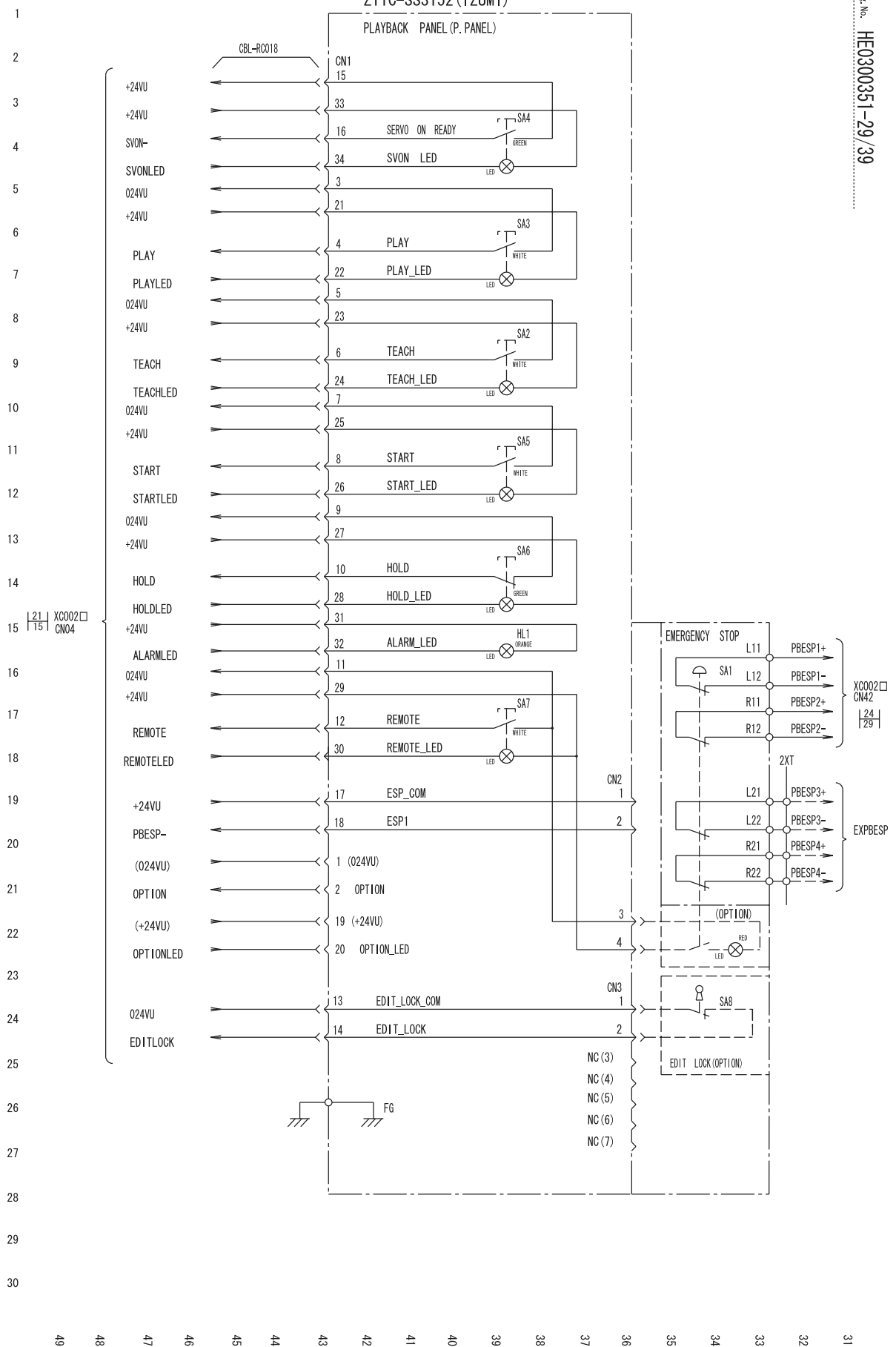
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JZRCR-XC002□ (7/8) : JARCR-XC103 (4/5)	
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Revisions:		 <b>YASKAWA</b>	Dr. am. Check. Appr.
YASNAC XRC JZRRCR-XC002□ (8/8) : JARCR-XC103 (5/5)			
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Revisions:	
YASKAWA	
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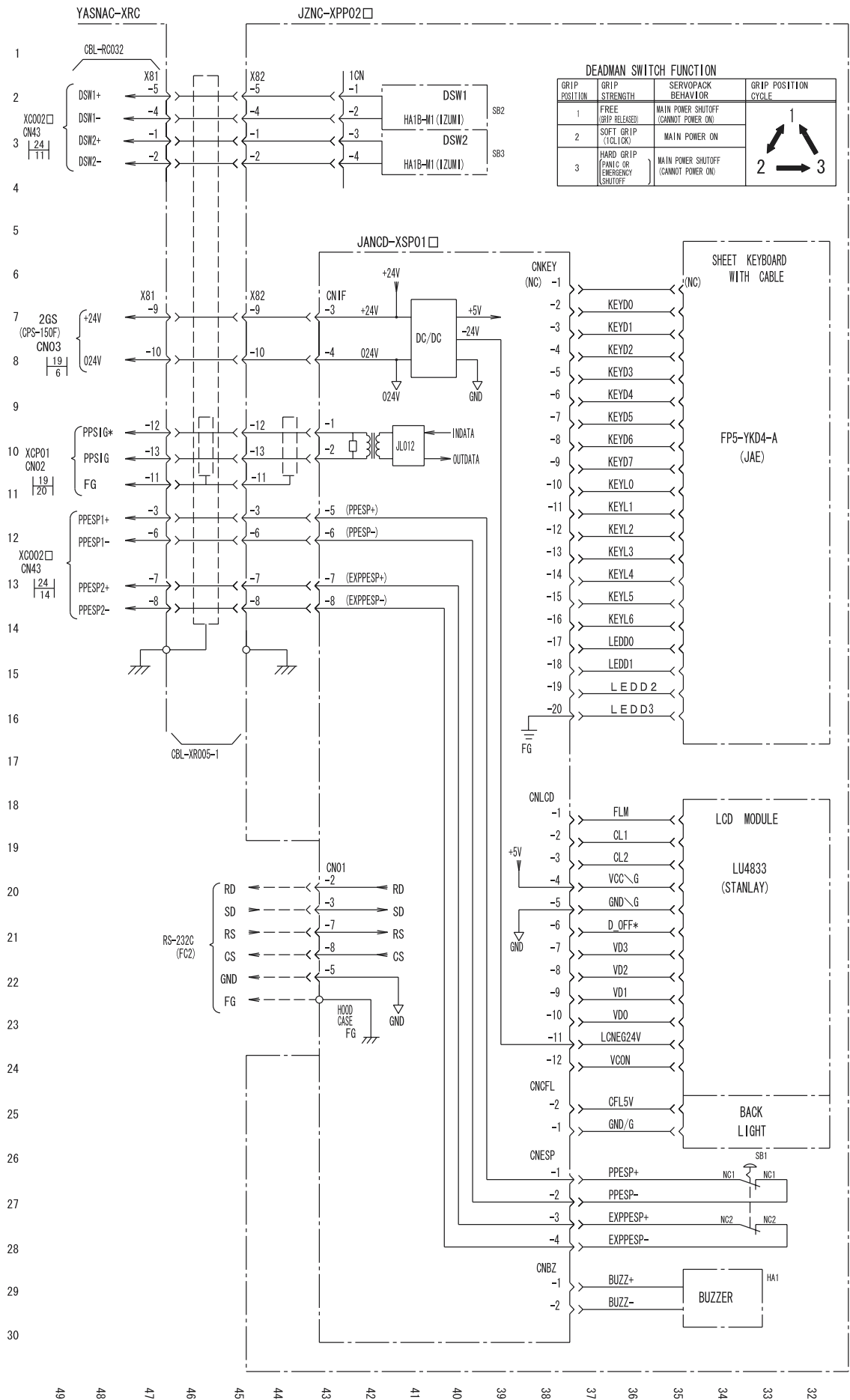
Revisions:

Dr. am.	YASKAWA
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Appr.	

YASNAC XRC ELEMENTARY DIAGRAM  
PROGRAMMING PENDANT : JZNC-XPP02

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Revisions:

**YASKAWA**

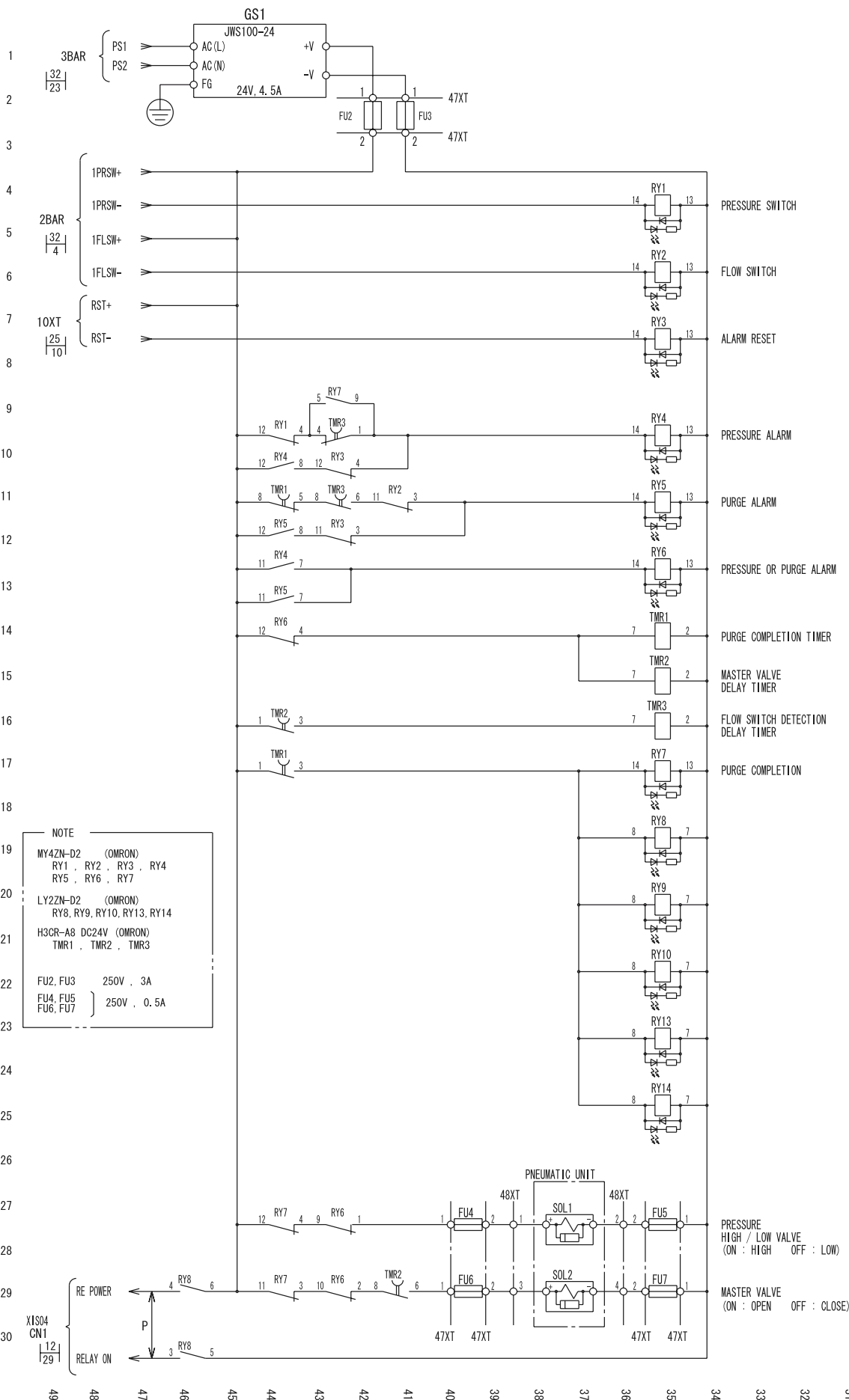
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**YASNAC XRC**

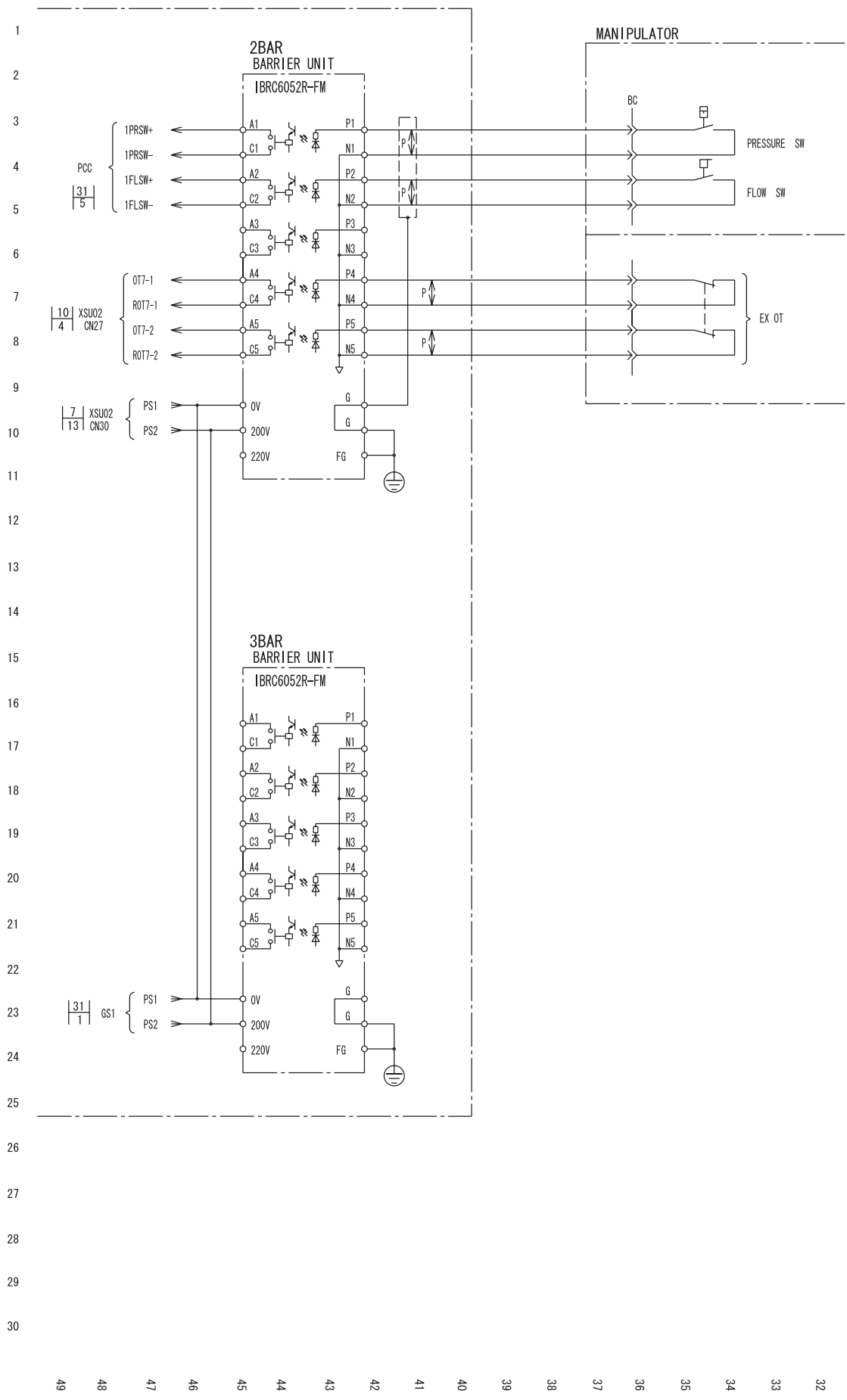
ELEMENTARY DIAGRAM

**HE0300351**

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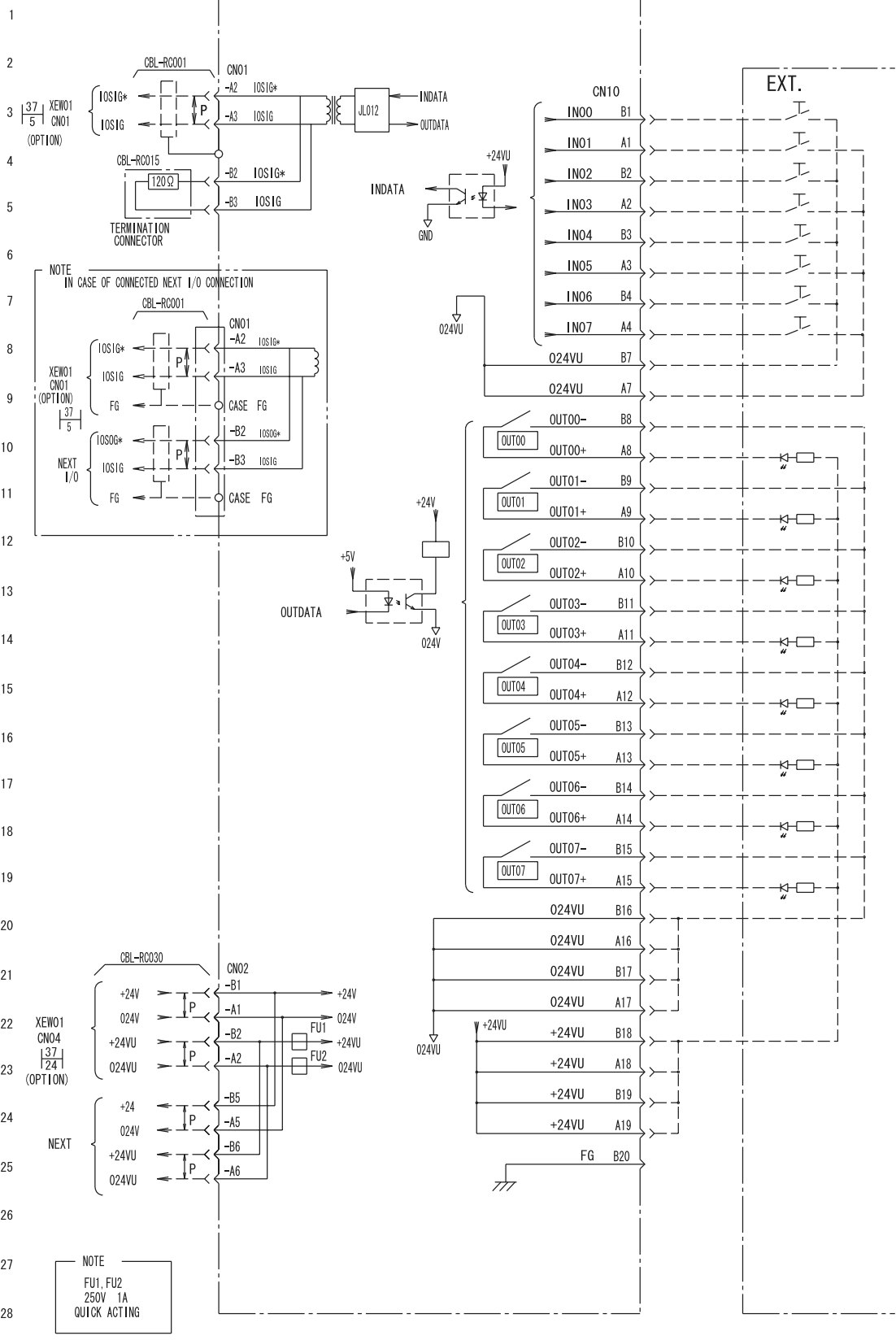


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YASNAC XRC		ELEMENTARY DIAGRAM	
2BAR, 3BAR: IBRC6052R-FM			
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JARCR-X0101 (1/4) (OPTION)



Revisions:

37	XEW01	CNO1	(OPTION)
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Dr. am.	Check.	Appr.

**YASNAC XRC**

**JARCR-X0101 (1/4) (OPTION)**

**ELEMENTARY DIAGRAM**

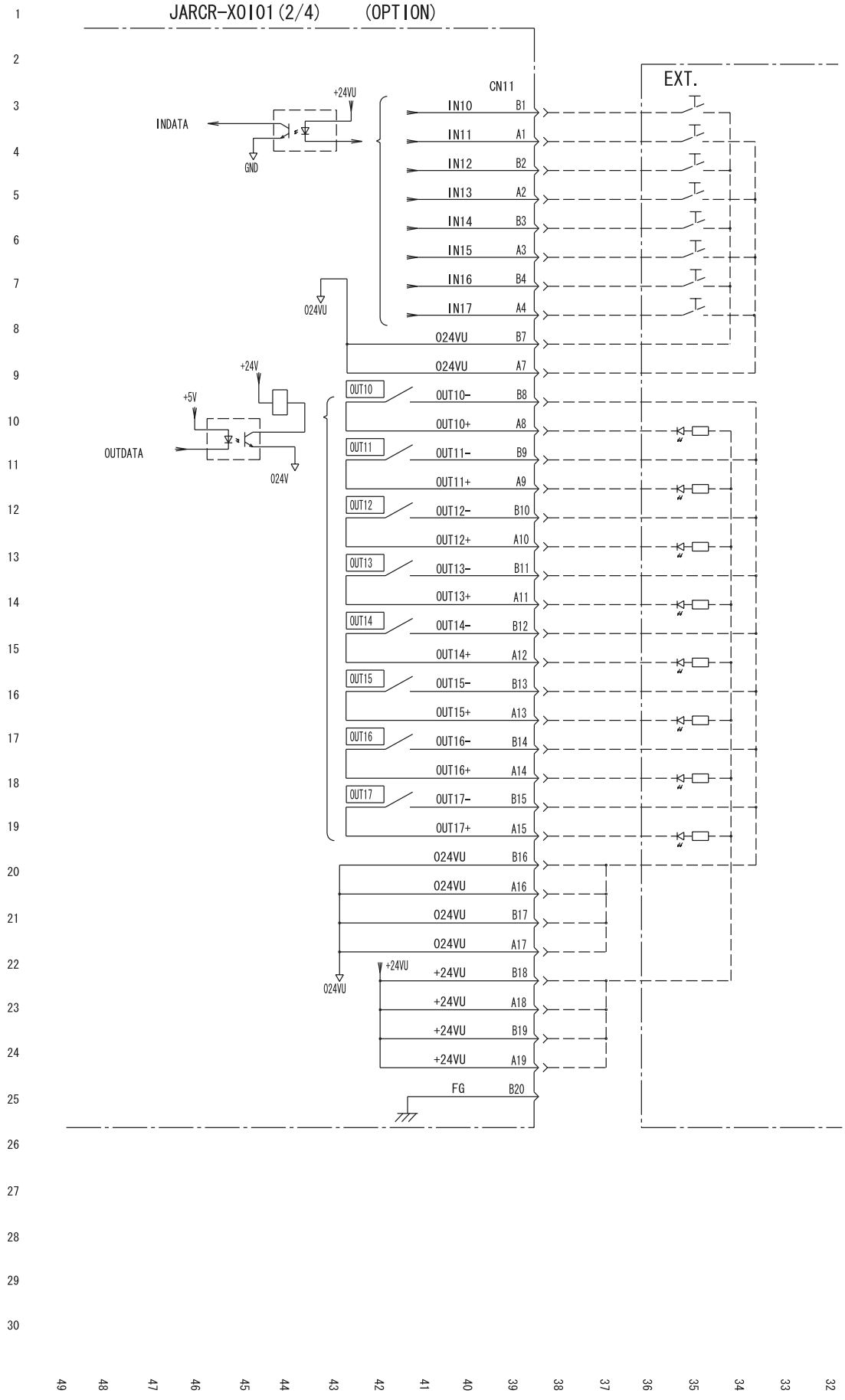
**HE0300351**

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JARCR-X0101 (2/4) (OPTION)

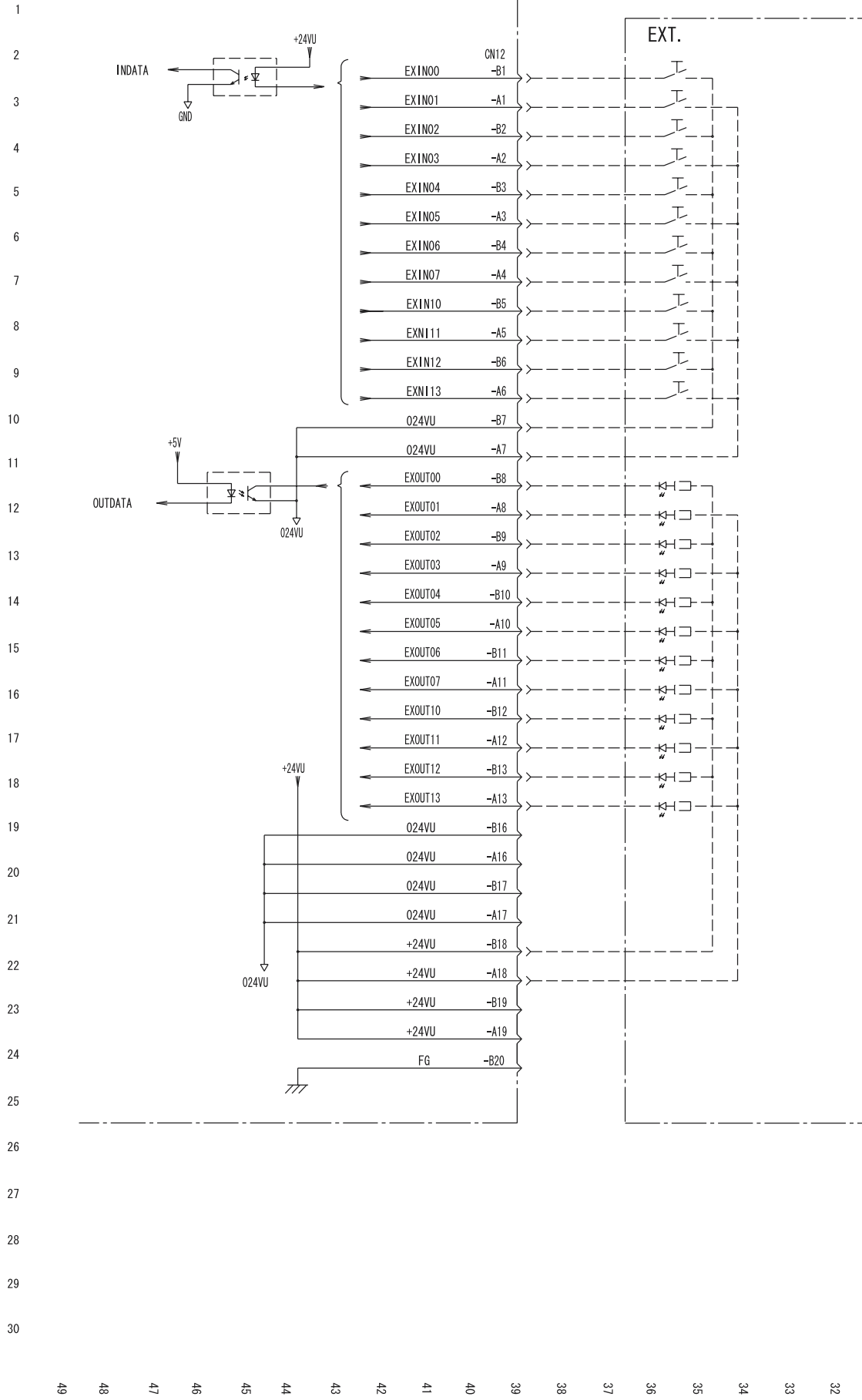
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Dr. am.	YASNAG XRC
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Appr.	JARCR-X0101 (2/4) (OPTION)
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JARCR-X0101 (3/4) (OPTION)

Doc. No. HE0300351-35/39

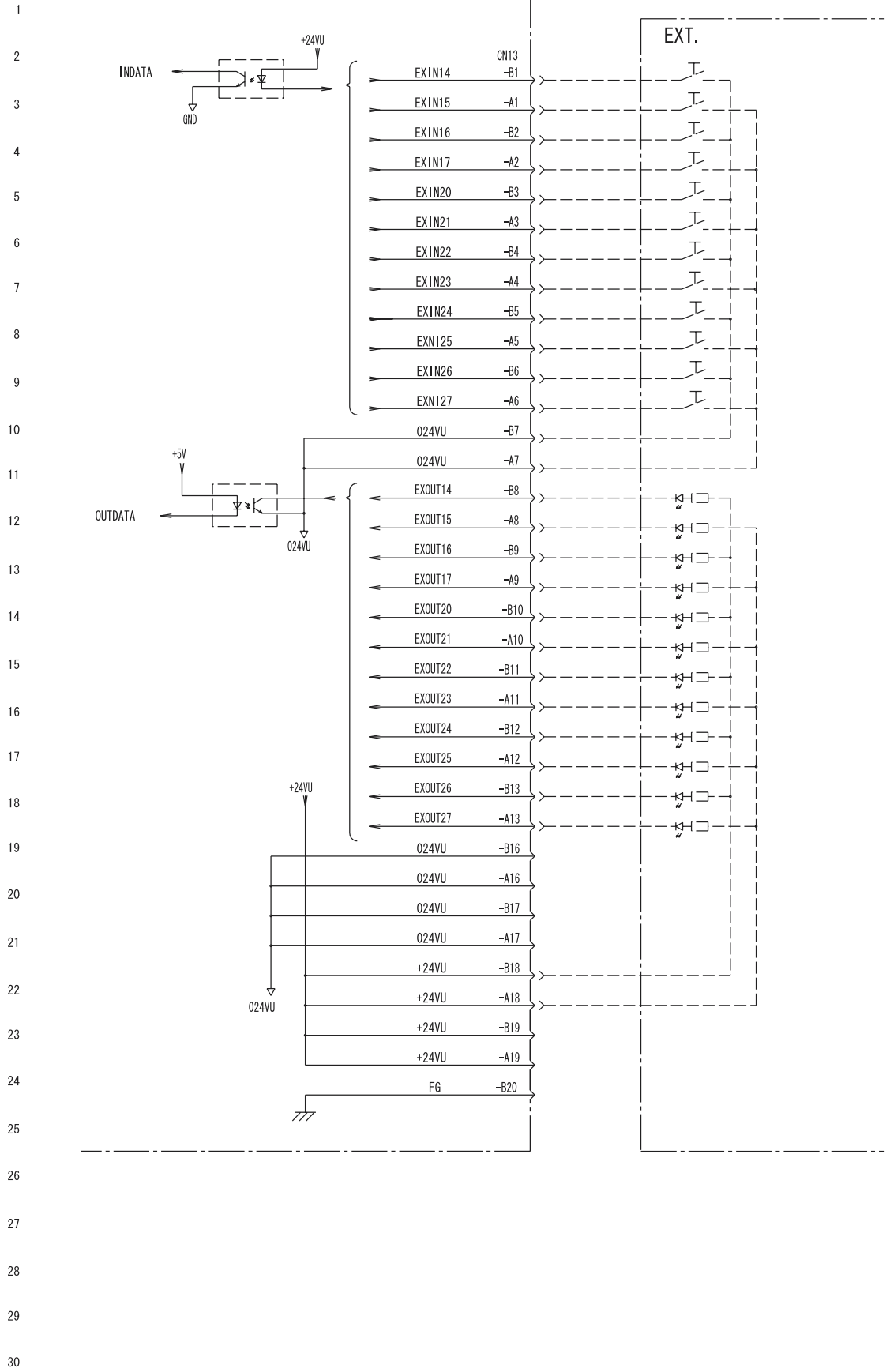
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Appr.	JARCR-X0101 (3/4) (OPTION)
	ELEMENTARY DIAGRAM
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JARCR-X0101 (4/4) (OPTION)

Doc. No. HE0300351-36/39

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Dr. am.	
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YASNAG XRC	ELEMENTARY DIAGRAM
JARCR-X0101 (4/4) (OPTION)	
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YASKAWA

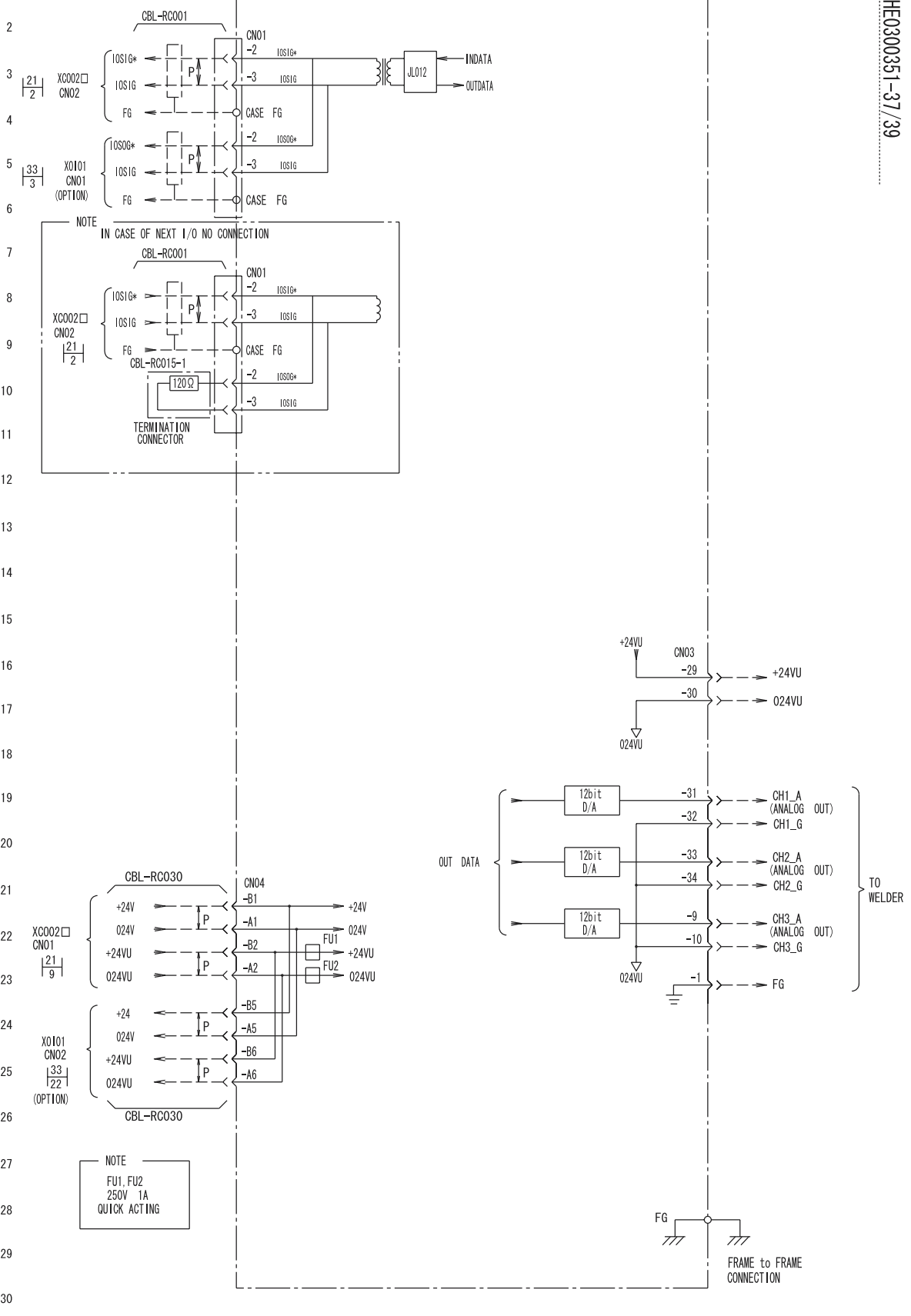
Dr. am. Check. Appr.

YASNAC XRC ELEMENTARY DIAGRAM

ANALOG I/F BOARD: JANCD-XEW01-2 (OPTION)

HE0300351

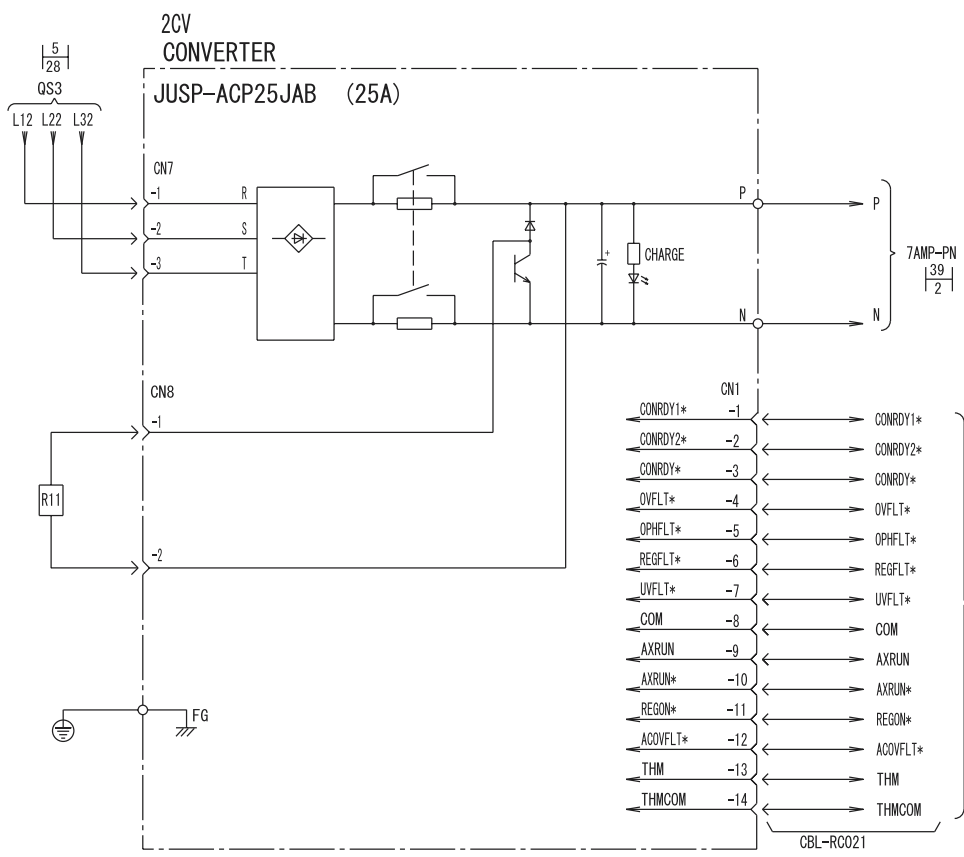
JANCD-XEW01-2 (OPTION)



NOTE  
FU1, FU2  
250V 1A  
QUICK ACTING

Revisions:	
YASKAWA	Dr. am. / Check. / Appr.
YASNAC XRC	
2CV (CONVERTER)	
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Revisions:

Dr. am.	Check.	Appr.

**YASKAWA**

**YASNAC XRC**

ELMENTARY DIAGRAM

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