

UP6 MANIPULATOR SYSTEM MANUAL

FOR XRC2001 CONTROLLER

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

Part Number: 172089-1CD
Revision: 1

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MANDATORY

- This system manual provides an overview of the UP6 Manipulator system. It gives general information about the system, a description of its major components, and the procedures for installation, system operation, and preventive and repair maintenance. Be sure to read and understand this manual thoroughly before installing and operating the UP6 Manipulator system.
- General items related to safety are listed in Section 2 of the *XRC2001 Controller Manual*. To ensure correct and safe operation, carefully read the *XRC2001 Controller Manual* before reading this manual.



CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure that 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 a 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 UP6 Manipulator system.

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.

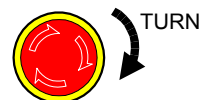
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



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 cabinet of the XRC2001 controller 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 Warning Labels in the *XRC2001 Controller Manual* before operating the UP6 Manipulator system.

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 Programming Pendant, and supply cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
XRC2001 controller	XRC
XRC2001 Programming Pendant	Programming Pendant
XRC2001 Playback Panel	Playback Panel
Cable between the manipulator and the controller	Manipulator cable

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 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, 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.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

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MOTOMAN-UP6 INSTRUCTIONS

YR-UP6-A00

YR-UP6-A01

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-UP6 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 ELECTRIC CORPORATION





MANDATORY

- This instruction manual is intended to explain operating instructions and maintenance procedures primarily for the MOTOMAN-UP6.
- General items related to safety are listed in the Safety Manual Section 1: Safety. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.



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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

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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:

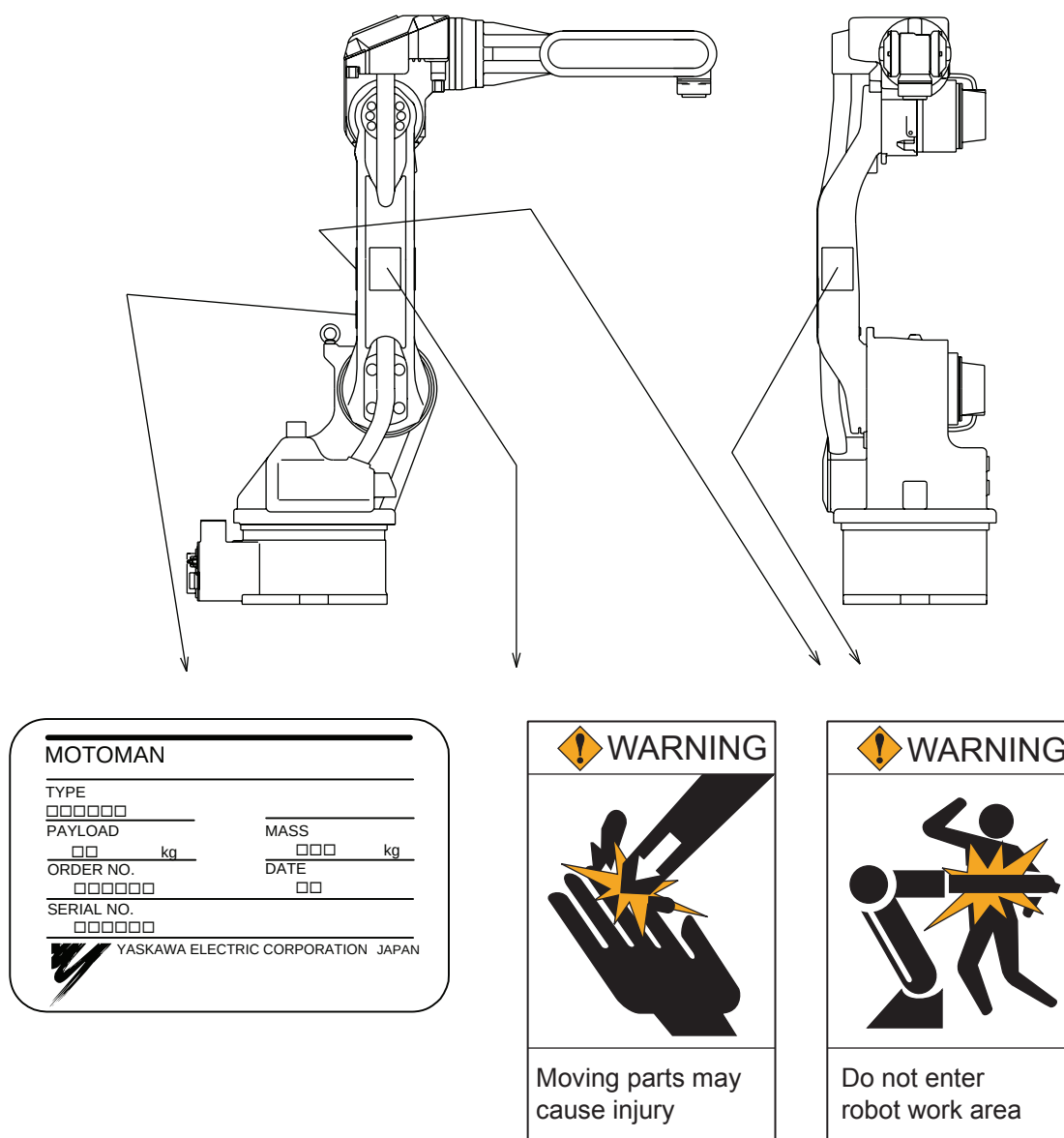
Equipment	Manual Designation
YASNAC XRC Controller	XRC
YASNAC XRC Playback Panel	Playback Panel
YASNAC XRC Programming Pendant	Programming Pendant

AN EXPLANATION OF WARNING LABELS

The following warning labels are attached to the manipulator.

Always follow the warnings on the labels.

Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.



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1 Receiving



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.

1.1 Checking Package Contents

When the package arrives, check the contents for the following standard items (Any additional options ordered should be checked as well.):

- Manipulator
- XRC
- Programming Pendant
- Feeder Cable Between Controller and Manipulator

1.2 Checking the Order Number

Check that the order number of the manipulator corresponds to the XRC. The order number is located on a label as shown below.

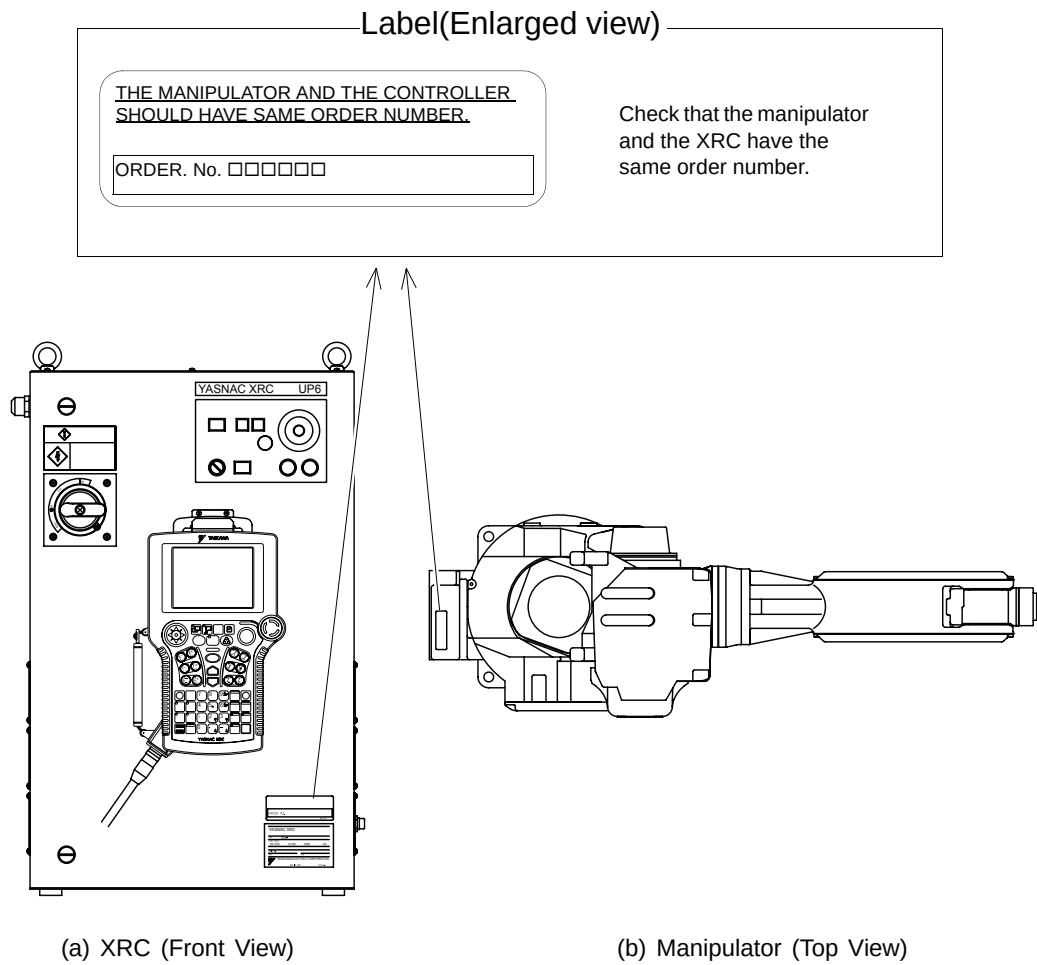


Fig. 1 Location of Order Number Labels

2 Transporting



CAUTION

- Sling applications and crane or forklift operations must be performed by authorized personnel only.

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

- Avoid excessive vibration or shock during transporting.

The system consists of precision components, so failure to observe this caution may adversely affect performance.

2.1 Transporting Method

2.1.1 Using the Crane

As a rule, when removing the manipulator from the package and moving it, a crane should be used. The manipulator should be lifted using wire rope threaded through attached eyebolts. Be sure the manipulator is fixed with jigs before transporting, and lift it in the posture as shown in " Fig. 2 Transporting Position ".

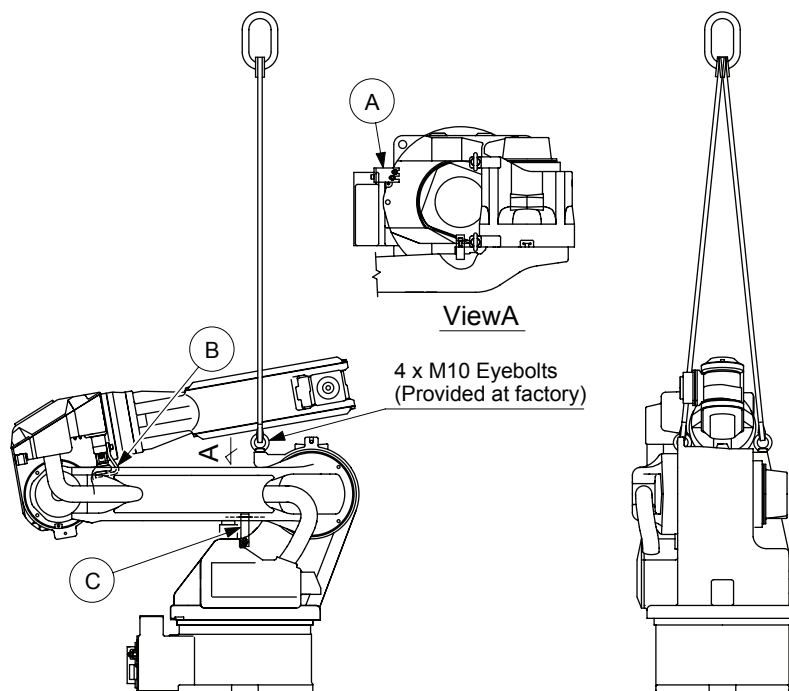


Fig. 2 Transporting Position

2.1.2 Using the Forklift

When using a forklift, the manipulator should be fixed on a pallet with shipping bolts and jigs as shown in " Fig. 3 Using the Forklift ". Insert claws under the pallet and lift it. The pallet must be strong enough to support the manipulator. Transporting of the manipulator must be performed slowly in order to avoid overturning or slippage.

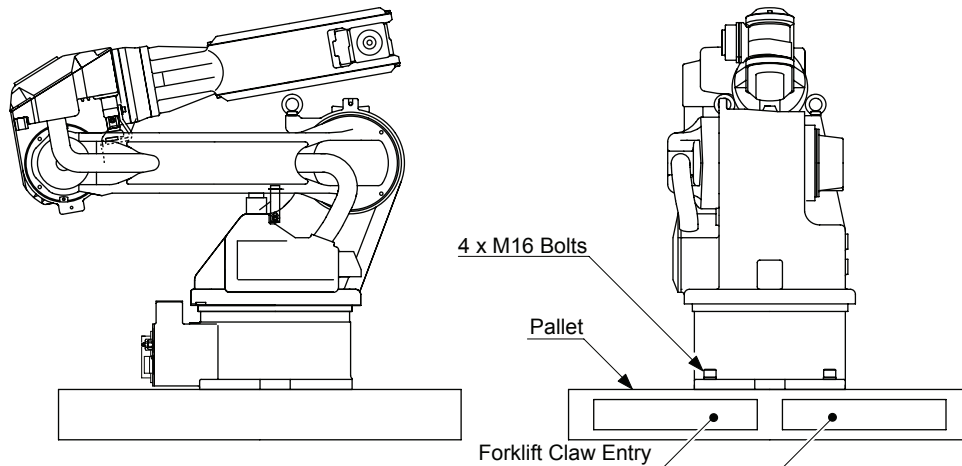


Fig. 3 Using the Forklift

NOTE

- Check that the eyebolts are securely fastened.
- The weight of the manipulator is approximately 150kg including the shipping bolts and jigs. Use a wire rope strong enough to withstand the weight.
- Attached eyebolts are designed to support the manipulator weight. Do not use them for anything other than transporting the manipulator.
- Mount the shipping bolts and jigs for transporting the manipulator.
- Avoid exerting force on the arm or motor unit when transporting, use caution when using transporting equipment other than a crane or forklift, as injury may occur.

2.2 Shipping Bolts and Jigs

The manipulator is provided with shipping bolts and jigs at points A, B, and C (" Fig. 2 Transporting Position ").

- The jigs are painted yellow.
- The number of hexagon socket head cap screws are: A: M6 X 3, B,C: M6 X 1

NOTE

Before turning on the power, check to be sure that the shipping bolts and jigs have been removed. The shipping bolts and jigs then must be stored for future use, in the event that the manipulator must be moved again.

3 Installation



WARNING

- Install the safety guards.

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, safety guards, or controller.

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

- Do not start the manipulator or even turn on the power before it is firmly anchored.

The manipulator may overturn and cause injury or damage.

- When mounting the manipulator on the ceiling or wall, the base section must have sufficient strength and rigidity to support the weight of the manipulator. Also, it is necessary to consider countermeasures to prevent the manipulator from falling.

Failure to observe these warnings may result in injury or damage.



CAUTION

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

Failure to observe this caution may cause injury or damage.

- Before turning on the power, check to be sure that the shipping bolts and jigs have been removed.

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

3.1 Safety Guard Installation

To insure safety, be sure to install safety guards. They prevent unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance. (ISO10218)

Responsibility for Safeguarding

The user of a manipulator or robot system shall ensure that safeguards are provided and used in accordance with Sections 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.

3.2 Mounting Procedures for Manipulator Baseplate

The manipulator should be firmly mounted on a baseplate or foundation strong enough to support the manipulator and withstand repulsion forces during acceleration and deceleration. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the manipulator as shown in Table 1.

During installation, if out of the plane is not right, the manipulator shape may change and its functional ability may be compromised. Out of the plane for installation must be kept at 0.5mm or less. Mount the baseplate in either of the following ways: " 3.2.1 When the Manipulator and Mounting Fixture are Installed on a Common Flat Steel Plate " or " 3.2.2 When the Manipulator is Mounted Directly on the Floor ".

Table. 1 Maximum repulsion forces of the manipulator

Horizontal rotating maximum torque (S-axis moving direction)	2000N • m
Vertical rotating maximum torque (LU-axis moving direction)	3500N • m

3.2.1 When the Manipulator and Mounting Fixture are Installed on a Common Flat Steel Plate

The common base should be rugged and durable to prevent shifting of the manipulator or the mounting fixture. The thickness of the common base is 40mm or more and an M16 size or larger anchor bolt is recommended. Affix the manipulator by fastening the plate with the M16 (mm) anchor bolts. The plate is tapped for M16 (50mm length) bolts. Tighten the bolts and anchor bolts securely so that they will not work loose during operation. See " Fig. 4 Mounting the Manipulator Baseplate " for the method.

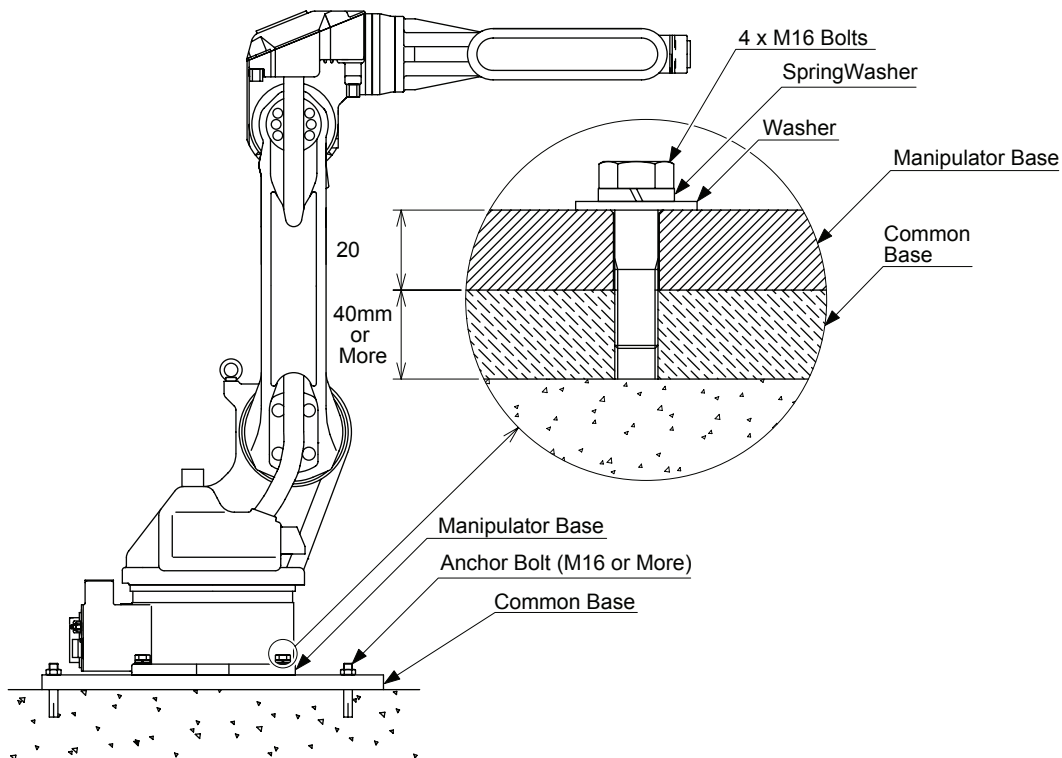


Fig. 4 Mounting the Manipulator Baseplate

3.2.2 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 shown in Table 1. As a rough standard, when there is a concrete thickness (floor) is 150mm or more, the base of the manipulator can be fixed directly to the floor with M16 anchor bolts. Before mounting the manipulator, however, check that the floor is level and that all cracks, etc. are repaired. Any thickness less than 150mm is insufficient for mounting, even if the floor is concrete.

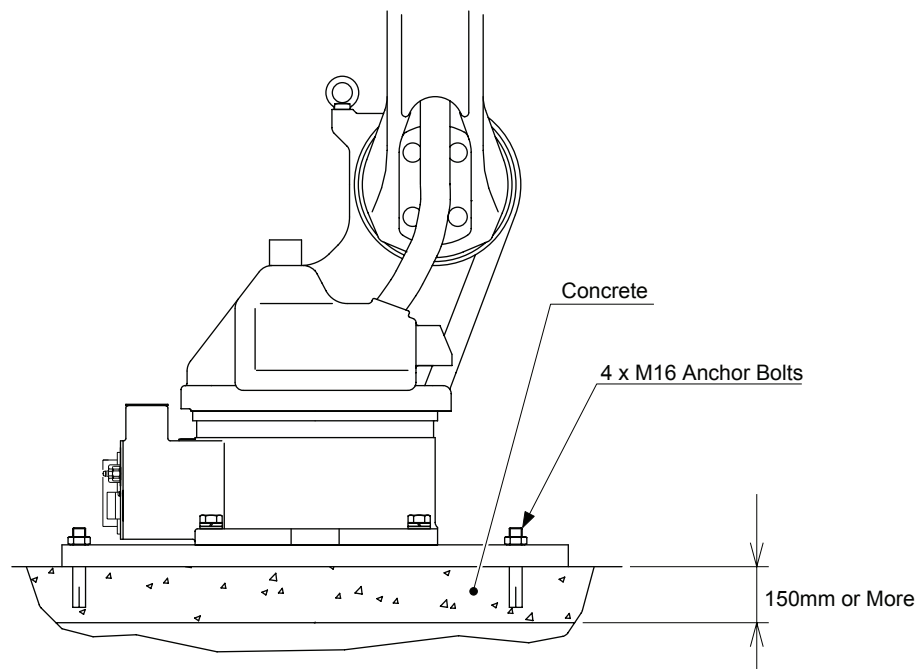


Fig. 5 Direct Mounting on the Floor

3.3 Types of Mounting

The manipulator can be mounted in three different ways: floor-mounted (standard), wall-mounted, and ceiling-mounted types are available. For wall- and ceiling-mounted types, the three points listed below are different from the floor-mounted types.

- S-Axis Working Range
- Affixing the Manipulator Base
- Precautions to Prevent the Manipulator from Falling

3.3.1 S-Axis Working Range

When performing a wall installation, the S-Axis movable range must be $\pm 30^\circ$.

3.3.2 Affixing the Manipulator Base

When performing a wall or ceiling installation, be sure to use four M16 hexagon socket head cap bolts. Use a torque of 206N•m when screwing in the bolts.

3.3.3 Precautions to Prevent the Manipulator from Falling

When performing wall or ceiling installations, for safety purposes, take measures to keep the manipulator from falling. Refer to " Fig. 6 When Using Ceiling and Wall-Mounted Types " for details.

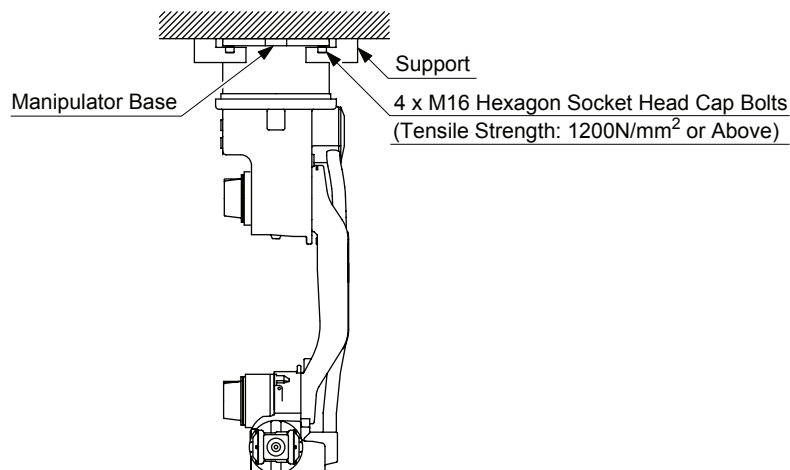


Fig. 6 When Using Ceiling and Wall-Mounted Types



When using wall-mounted or ceiling mounted types, contact your Yaskawa representative.



3.4 Location

When the manipulator is installed, it is necessary to satisfy the undermentioned environmental conditions:

- 0° to +45°C (Ambient temperature)
- 20 to 80%RH (no moisture)
- Free from dust, soot, or water
- Free from corrosive gases or liquid, or explosive gases
- Free from excessive vibration (less than 0.5G)
- Free from large electrical noise (plasma)
- Out of the plane for installation is 0.5mm or less

4 Wiring



WARNING

- Ground resistance must be 100 Ω or less.

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.

4.1 Grounding

Follow local regulations for grounding line size.

NOTE

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

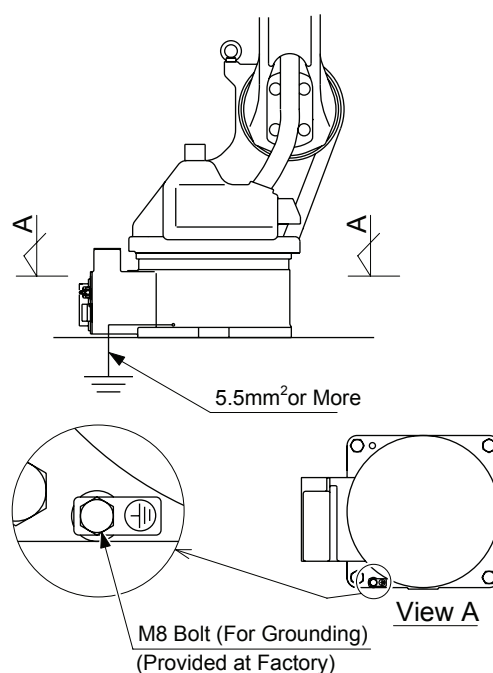


Fig. 7 Grounding Method

4.2 Cable Connection

There are two cables for the power supply; a signal cable for detection (1BC) and a power cable (2BC). Connect these cables to the manipulator base connectors and the XRC. Refer to " Fig. 9 (a) Power Cable Connection to the Manipulator ", " Fig. 9 (b) Power Cable Connection to the XRC ".

4.2.1 Connection to the Manipulator

Before connecting two cables to the manipulator, verify the numbers: 1BC and 2BC on both power supply cables and the manipulator base connectors. When connecting, adjust the cable connector positions to the main key positions of the manipulator, and insert cables in the order of 2BC, 1BC, and then set the lever until hearing a "click".

4.2.2 Connection to the XRC

Remove the two entrance cable covers on the XRC side. Pass the signal cable for detection (1BC) through one entrance, the power cable (2BC) through the other entrance, and then fasten bolts on the entrances.

Connect each cable to the boards. Be sure to verify the numbers on both the cable and board connectors before connecting, and to fasten the bolts on 1BC connectors to prevent cables from loosening.

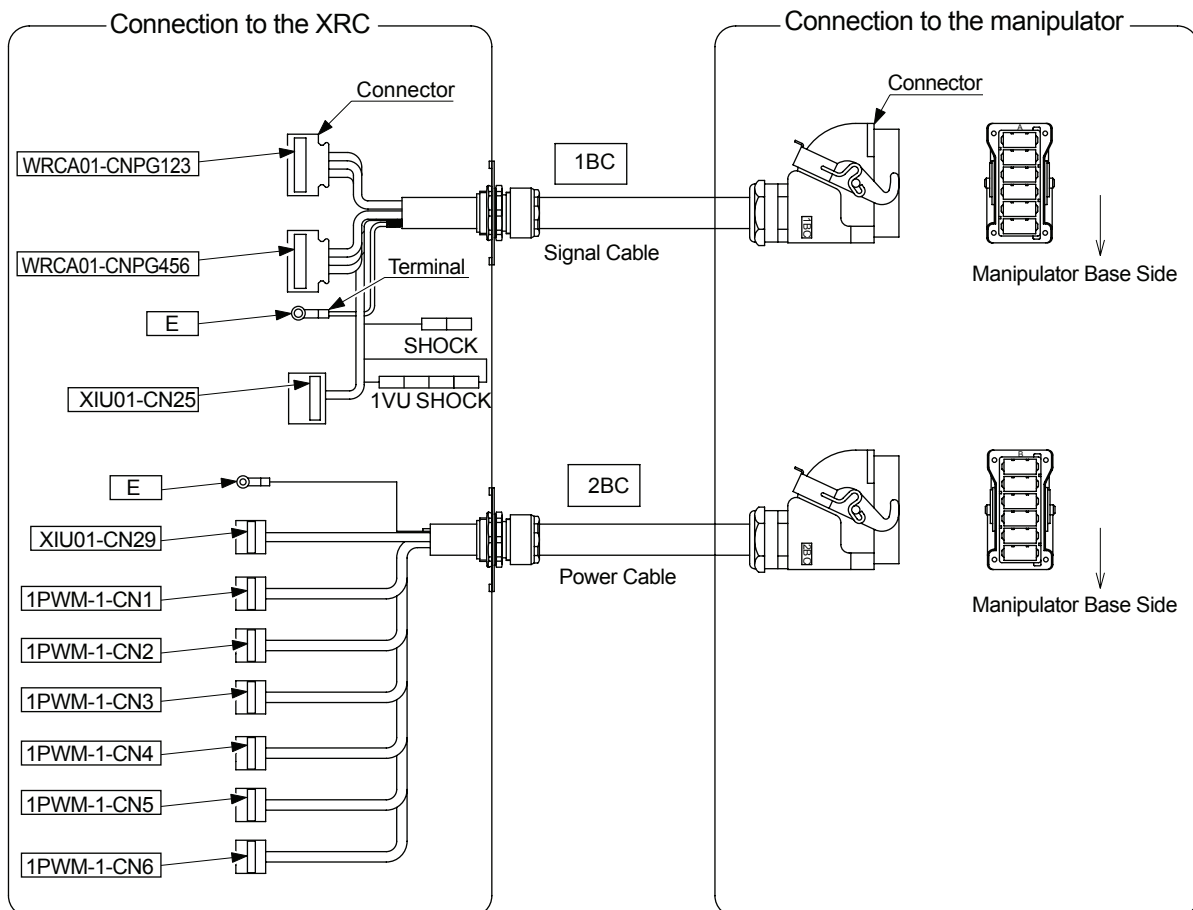


Fig. 8 Power Cables

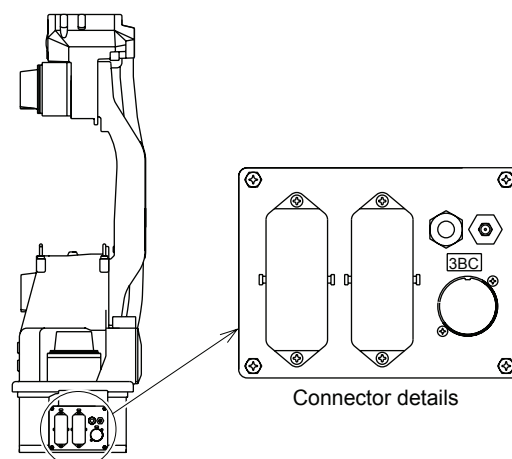


Fig. 9 (a) Power Cable Connection to the Manipulator

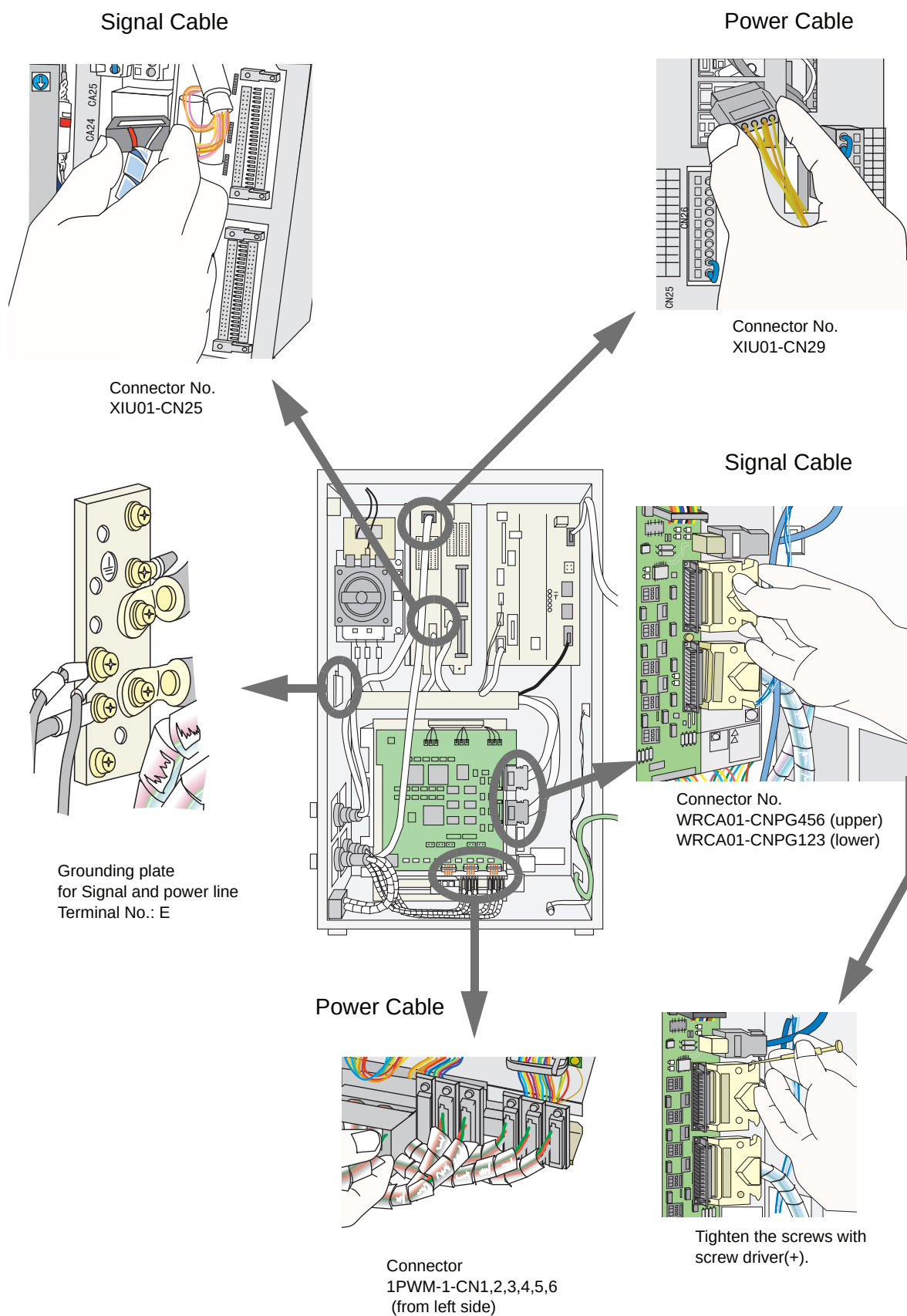


Fig. 9 (b) Power Cable Connection to the XRC

5 Basic Specifications

5.1 Basic Specifications

Table. 2 Basic Specifications*1

Item \ Model		MOTOMAN-UP6 (YR-UP6-A00, -A01)
Operation Mode		Vertically Articulated
Degree of Freedom		6
Payload		6kg
Repetitive Positioning Accuracy*2		±0.08mm
Motion Range	S-Axis (turning)	±170°
	L-Axis (lower arm)	+155°, -90°
	U-Axis (upper arm)	+190°, -170°
	R-Axis (wrist roll)	±180°
	B-Axis (wrist pitch/yaw)	+225°, -45°
	T-Axis (wrist twist)	±360°
Maximum Speed	S-Axis	2.44 rad/s, 140°/s
	L-Axis	2.79 rad/s, 160°/s
	U-Axis	2.97 rad/s, 170°/s
	R-Axis	5.85 rad/s, 335°/s
	B-Axis	5.85 rad/s, 335°/s
	T-Axis	8.73 rad/s, 500°/s
Allowable Moment*3	R-Axis	11.8N•m (1.2kgf•m)
	B-Axis	9.8N•m (1.0kgf•m)
	T-Axis	5.9N•m (0.6kgf•m)
Allowable Inertia (GD ² /4)	R-Axis	0.24kg•m ²
	B-Axis	0.17kg•m ²
	T-Axis	0.06kg•m ²
Mass		130kg
Ambient Conditions	Temperature	0° to 45 °C
	Humidity	20 to 80% RH (non-condensing)
	Vibration	Less than 0.5G
	Others	• Free from corrosive gasses or liquids, or explosive gasses • Clean and dry • Free from excessive electrical noise (plasma)
Power Capacity		1.5kVA

*1 SI units are used in this table. However, gravitational unit is used in ().

*2 Conformed to ISO9283

*3 Refer to " 6.1 Allowable Wrist Load " for details on the permissible moment of inertia.

5.4 Dimensions and Working Range

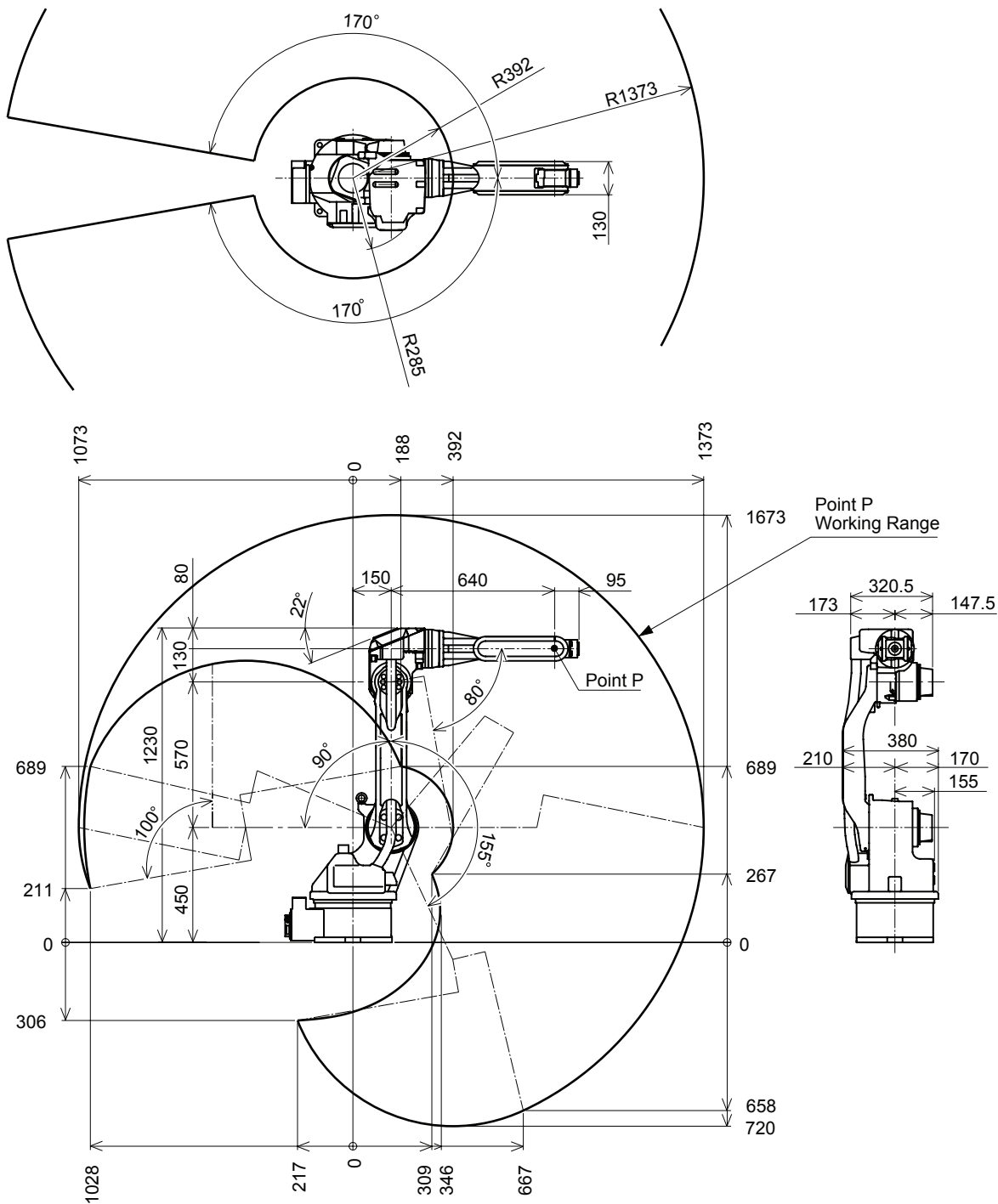


Fig. 12 Dimesions and Working Range

5.5 B-Axis Working Range

The working range of the B-Axis maintaining a constant angle to the center of the U-arm is shown in " Fig. 13 B-Axis Working Range ".

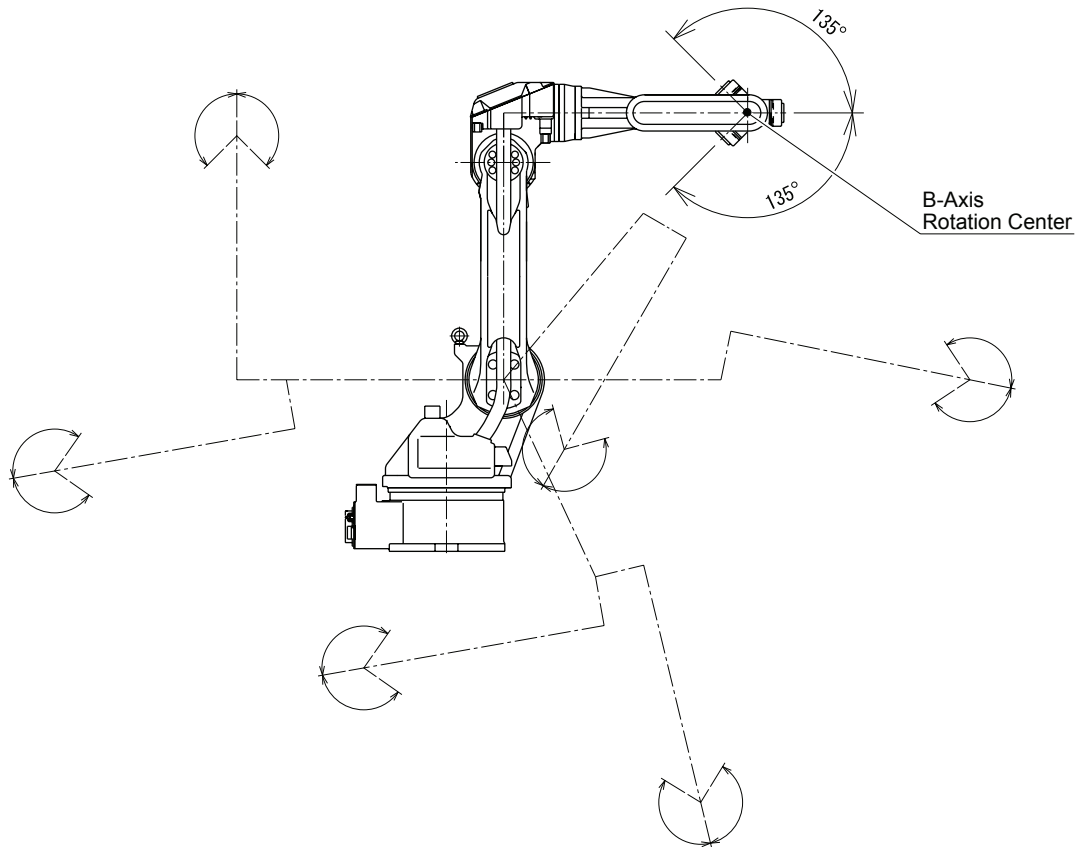


Fig. 13 B-Axis Working Range

5.6 Alterable Working Range

The working range of the S-Axis can be altered according to the operating conditions as shown in " Table. 3 S-Axis Working Range ". If alteration is necessary, contact your Yaskawa representative in advance.

Table. 3 S-Axis Working Range

Item	Specifications
S-Axis Working Range	±170°(standard)
	±150°
	±120°
	±90°
	±60°
	±30°

6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load

The allowable wrist load is 6kg. If force is applied to the wrist instead of the load, force on R-, B-, and T-Axes should be within the value shown in " Table. 4 Moment and Total Inertia ". Contact your Yaskawa representative for further information or assistance.

Table. 4 Moment and Total Inertia

Axis	Moment N•m (kgf•m) ^{*1}	GD ² /4 Total Inertia kg•m ²
R-Axis	11.8 (1.2)	0.24
B-Axis	9.8 (1.0)	0.17
T-Axis	5.9 (0.6)	0.06

***1** (): Gravitational unit

When the volume load is small, refer to the moment arm rating shown in " Fig. 14 Moment Arm Rating ".

The allowable total inertia is calculated when the moment is at the maximum. Contact your Yaskawa representative when only inertia moment, or load moment is small and inertia moment is large. Also, when the load mass is combined with an outside force, contact your Yaskawa representative.

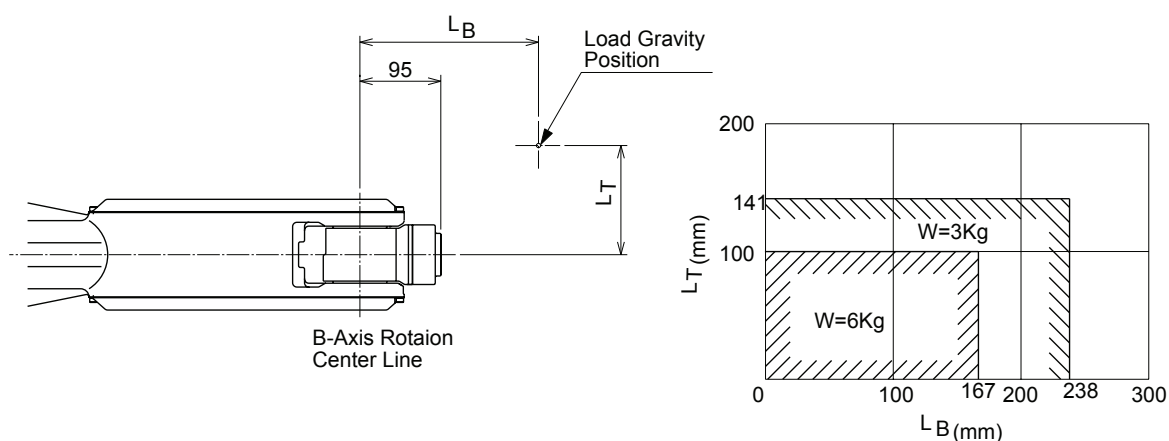


Fig. 14 Moment Arm Rating

6.2 Wrist Flange

The wrist flange dimensions are shown in " Fig. 15 Wrist Flange ". In order to see the tram marks, it is recommended that the attachment be mounted inside the fitting. Fitting depth of inside and outside fittings must be 5mm or less.

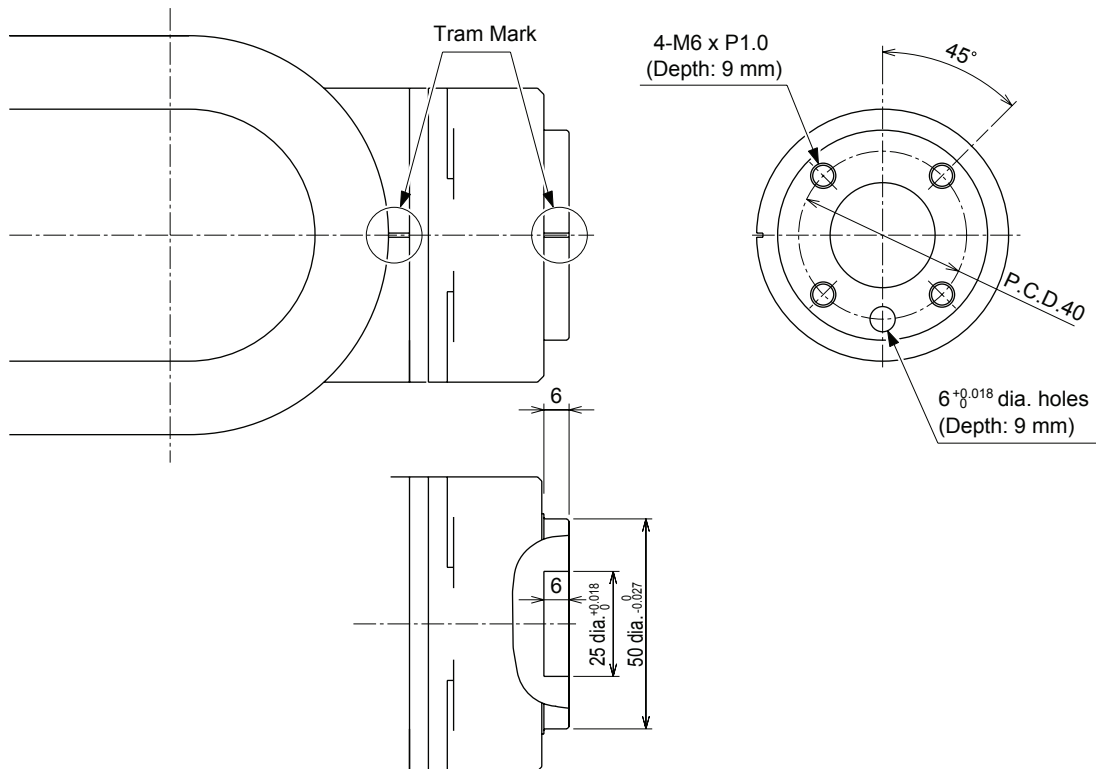


Fig. 15 Wrist Flange



Wash off anti-corrosive paint (solid color) on the wrist flange surface with thinner or light oil before mounting the tools.

7 System Application

7.1 Mounting Equipment

When peripheral equipment is attached to the U-axis, the following conditions should be observed.

7.1.1 Allowable Load

The allowable load on the U-Axis is a maximum of 15kg, including the wrist load. For instance, when the mass installed in the wrist point is 6kg, the mass which can be installed on the upper arm becomes 9kg.

7.1.2 Installation Position

There is a limitation also on the installation position.

" Fig. 17 Allowable Load on U-Axis " shows the distance between the U-Axis rotation center and the load gravity.

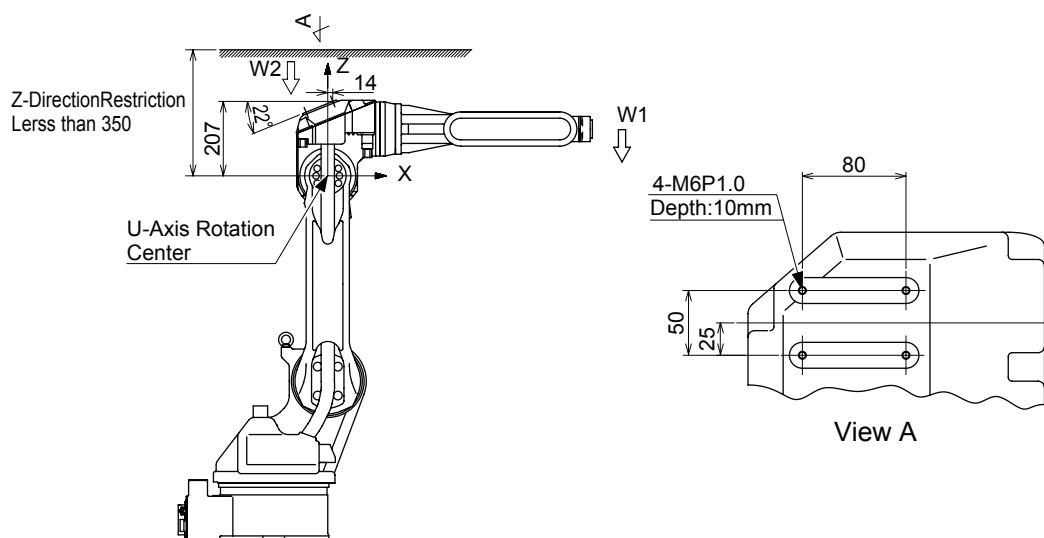


Fig. 16 Installing Peripheral Equipment

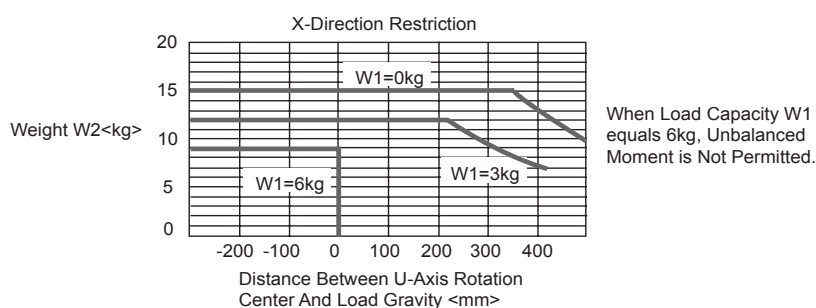


Fig. 17 Allowable Load on U-Axis

7.2 Incorporated Wire and Airduct

Wires and an air line are incorporated into the manipulator for user application. There are 16 wires and an air duct rating. The allowable current for wires must be 3A or below for each wire. (The total current value for pins 1 to 16 must be 40A or below). The maximum pressure for the air duct is 490 kPa (5 kgf/cm²) and its inside diameter is $\phi 6.5$ mm.

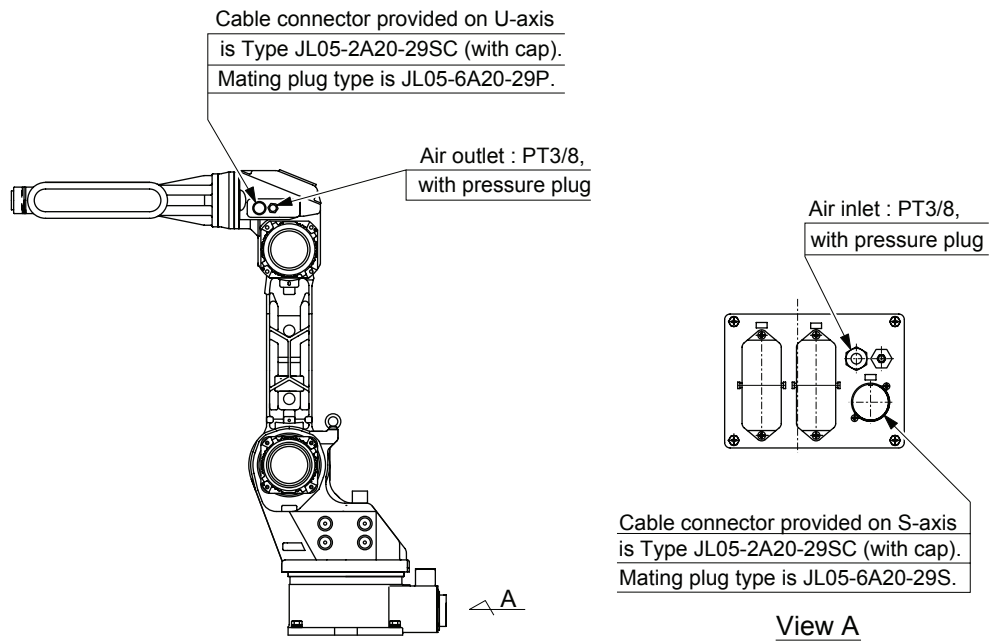


Fig. 18 Incorporated Wire and Airduct

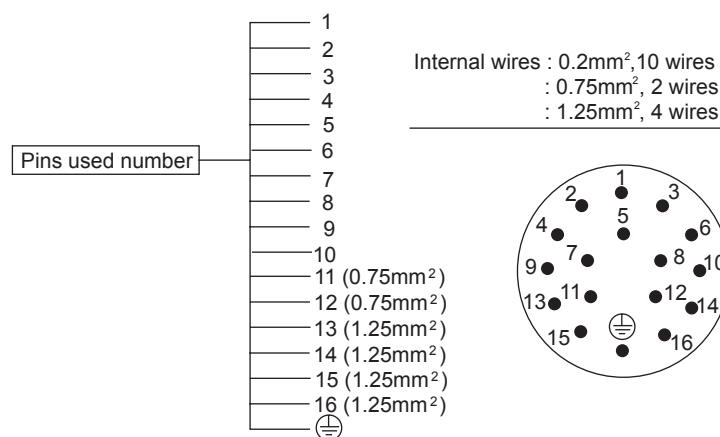


Fig. 19 Detailed Drawing of Connector Pin Numbers

The same pin number (1-16) of two connectors is connected in the lead line of single 0.2mm², 0.75mm², or 1.25mm².

8 Motoman Construction

8.1 Position of S-Axis Limit Switch

The limit switches for the S-, L-, and U-Axes are located as shown in " Fig. 20 Location of Limit Switches ". The limit switch for the S-Axis is standard. The limit switch for the L- and U-Axes are optional (model UP6-A01). The inspection and adjustment of the limit switches should be made after removing the cover.

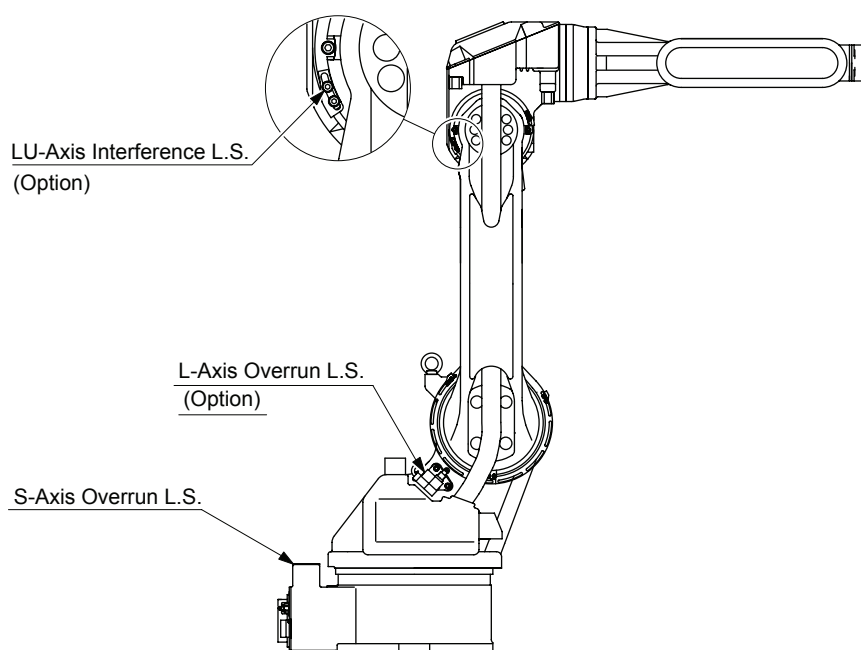


Fig. 20 Location of Limit Switches

8.2 Internal Connections

High reliability connectors which can be easily removed are used with each connector part. For the number and location of connectors, see " Fig. 21 Location and Numbers of Connectors ".

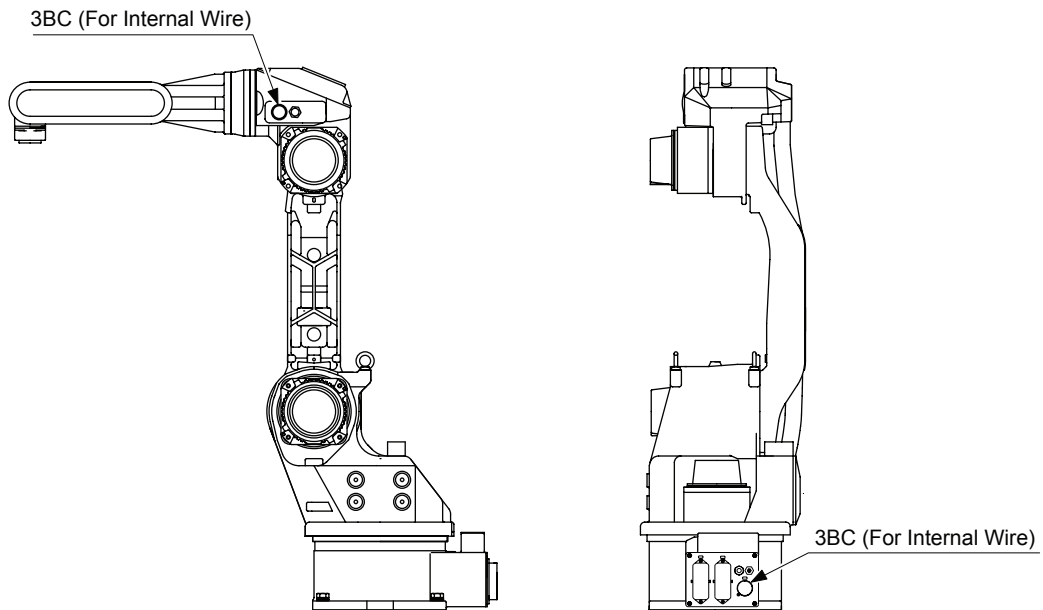


Fig. 21 Location and Numbers of Connectors

Table. 5 List of Connector Types

Name	Type of Connector
Base Connector for Internal Wire	JL05-2A20-29PC (JL05-6A20-29S: Optional)
U-arm Connector for Internal Wire	JL05-2A20-29SC (JL05-6A20-29P: Optional)

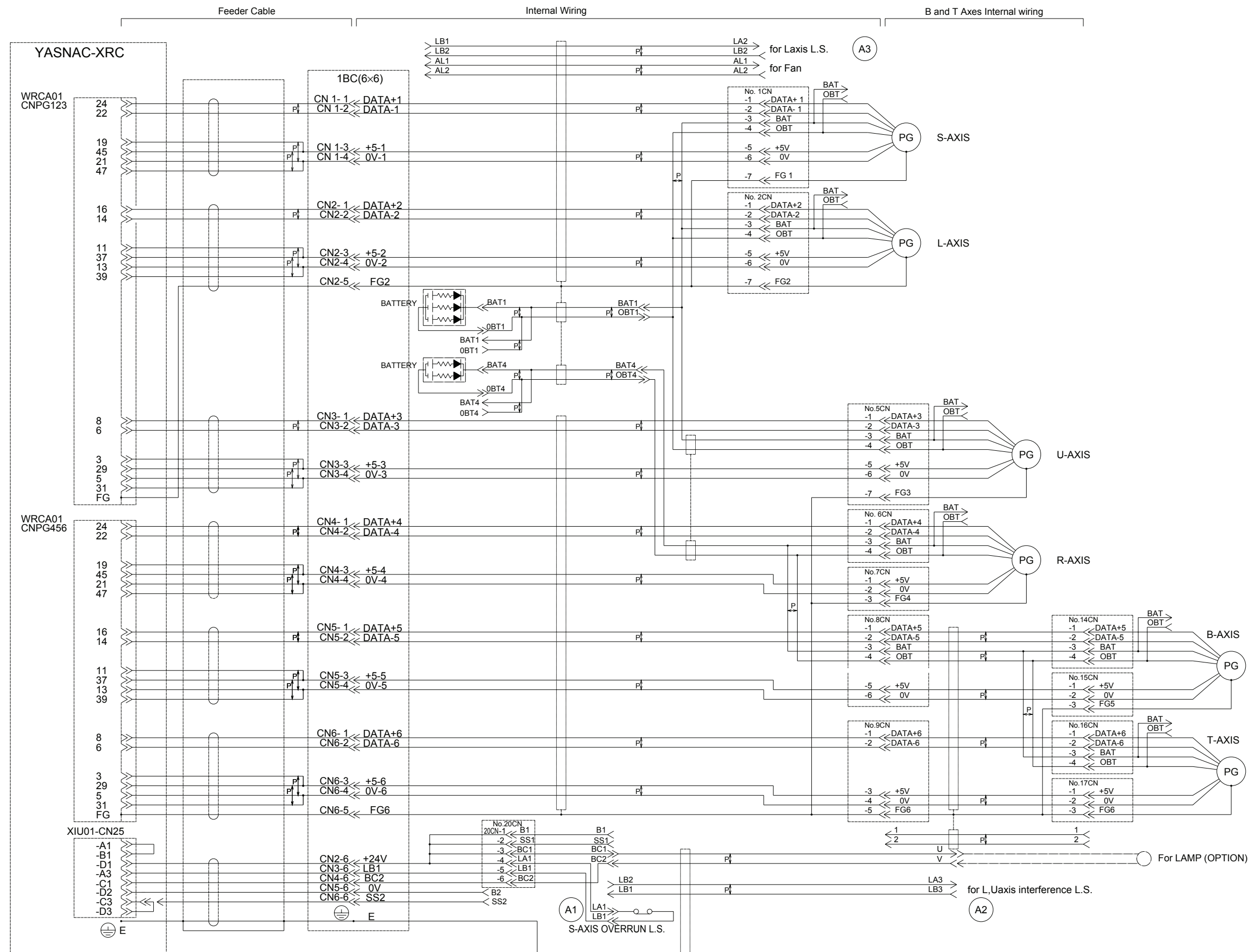


Fig. 22 (a) Internal Connection Diagram

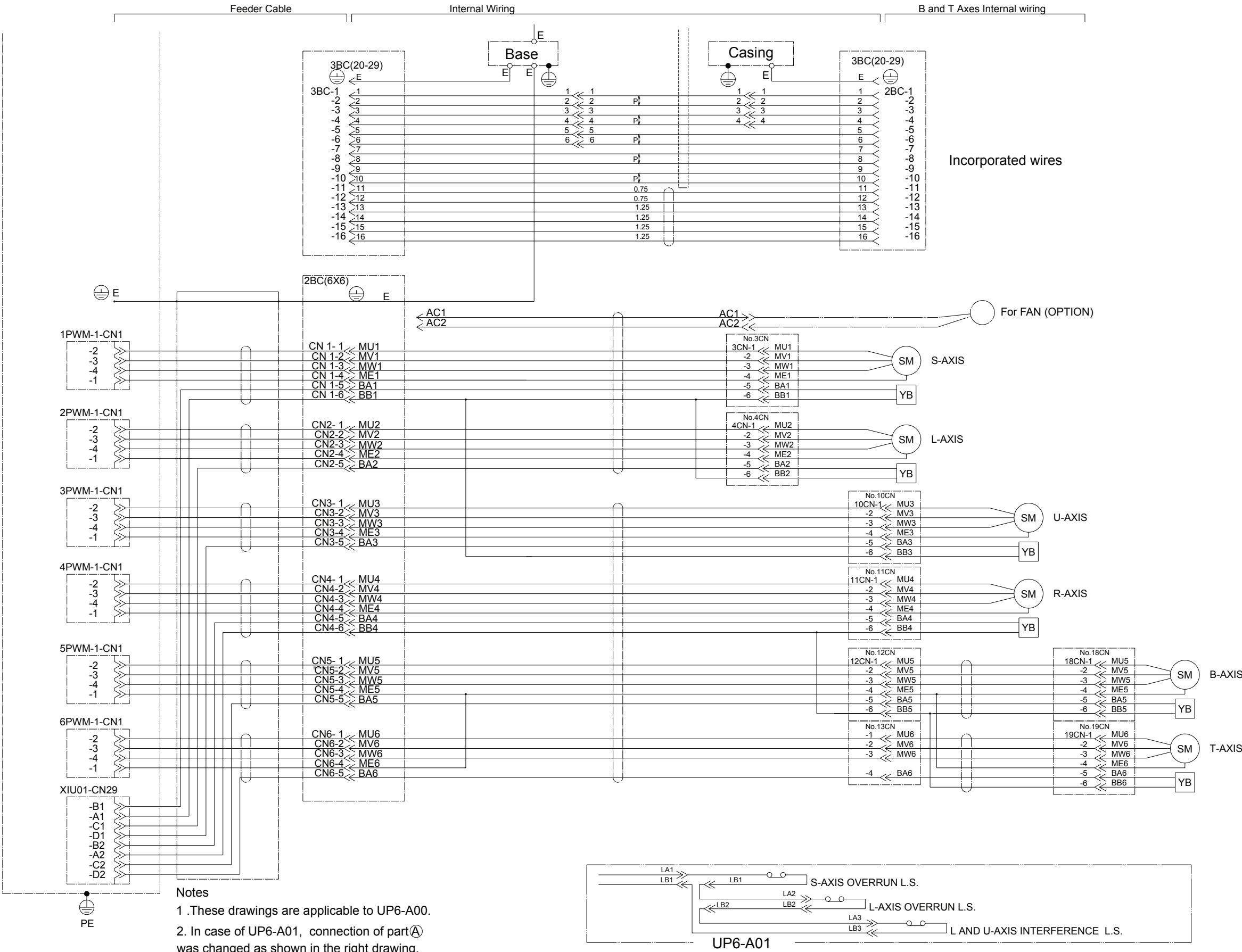


Fig. 22 (b) Internal Connection Diagram

9 Maintenance and Inspection



WARNING

- Before maintenance or inspection, be sure to turn the main power supply off, and put up a warning sign. (ex. 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 specified personnel.

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

- For disassembly or repair, contact your Yaskawa representative.

- The battery unit must be connected before removing detection connector when maintenance and inspection.

Failure to observe this caution may result in the 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 six levels. Conduct periodical inspections according to the inspection schedule in " Table. 6 Inspection Items ".

In " Table. 6 Inspection Items ", the inspection items are classified into three types of operation: operations which can be performed by personnel authorized by 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.



- The inspection interval must be based on the servo power supply on time.
- These inspections were developed for applications where the manipulator is used for arc welding work. For any different or special applications, the inspection process should be developed on an case-by-case basis.

For axes which are used very frequently (in handling applications, etc.), it is recommended that inspections be conducted at shorter Intervals. Contact your Yaskawa representative.

Table. 6 Inspection Items

Items*4		Schedule						Method	Operation	Inspection Charge		
		Daily	1000 H Cycle	6000 H Cycle	12000 H Cycle	24000 H	36000 H			Specified Person	Licensee	Service Company
①	Tram mark	○						Visual	Check tram mark accordance and damage at the home position.	○	○	○
②	External lead	○						Visual	Check for damage and deterioration of leads.	○	○	○
③	Working area and manipulator	○						Visual	Clean the work area if dust or spatter is present. Check for damage and outside cracks.	○	○	○
④	S,L,U-axes motor	○						Visual	Check for grease leakage.*5	○	○	○
⑤	Baseplate mounting bolts		○					Spanner Wrench	Tighten loose bolts. Replace if necessary.	○	○	○
⑥	Cover mounting screws		○					Screw-driver, Wrench	Tighten loose bolts. Replace if necessary.	○	○	○
⑦	Base connectors		○					Manual	Check for loose connectors.	○	○	○
⑧	RBT-axes timing belt				○			Manual	Check for belt tension and wear.		○	○
⑨	Wire harness in manipulator (SLURBT-axes leads))				○			Visual Multimeter	Check for conduction between the main connector of base and intermediate connector with manually shaking the wire. Check for wear of protective spring.*1		○	○
						○			Replace.*2			○
⑩	Wire harness In manipulator (BT-axes leads)				○			Visual Multimeter	Check for conduction between terminals and wear of protective spring.*1		○	○
						○			Replace.*2			○
⑪	Battery unit in manipulator						○		Replace the battery unit when the battery alarm occurs or the manipulator drove for 36000H.		○	○

Table. 6 Inspection Items

Items*4	Schedule						Method	Operation	Inspection Charge		
	Daily	1000 H Cycle	6000 H Cycle	12000 H Cycle	24000 H	36000 H			Specified Person	Licensee	Service Company
⑫ S-axis speed reducer			○	○			Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease*3 (6000H cycle). See Par. " 9.2.2 Grease Replenishment/ Replacement for S-Axis Speed Reducer " Replace grease*3. (12000H cycle) See Par. " 9.2.2 Grease Replenishment/Replacement for S-Axis Speed Reducer "		○	○
⑬ LU-axes speed reducers			○	○			Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease*3 (6000H cycle). See Par. " 9.2.3 Grease Replenishment/ Replacement for L-Axis Speed Reducer " Replace grease*3 (12000H cycle). See Par. " 9.2.3 Grease Replenishment/ Replacement for L-Axis Speed Reducer "		○	○
⑭ RBT-axes speed reducers			○				Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease*3 (6000H cycle). See Par. " 9.2.4 Grease Replenishment/Replacement for U-Axis Speed Reducer ", " 9.2.5 Grease Replenishment for R-Axis Speed Reducer "		○	○
⑮ T-axis gear			○				Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease*3 (6000H cycle). See Par. " 9.2.6 Grease Replenishment for B- and T-Axis Speed Reducers "		○	○

Table. 6 Inspection Items

Items ^{*4}	Schedule						Method	Operation	Inspection Charge		
	Daily	1000 H Cycle	6000 H Cycle	12000 H Cycle	24000 H	36000 H			Specified Person	Licensee	Service Company
①⑥ R-axis cross roller bearing			○				Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease ^{*3} (6000H cycle). See Par. " 9.2.7 Grease Replenishment for T-Axis Gear ", " 9.2.8 Grease Replenishment for R-Axis Cross Roller Bearing "		○	○
①⑦ Overhaul						○					○

***1** When checking for conduction with multimeter, connect the battery to "BAT" and "OBT" 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 may be lost. (Refer to " 9.2.9 Notes for Maintenance ")

***2** Wire harness in manipulator to be replaced at 24000H inspection.

***3** For the grease, refer to " Table. 7 Inspection Parts and Grease Used ".

***4** Inspection No. correspond to the numbers in " Fig. 23 Inspection Parts and Inspection Numbers ".

***5** The occurrence of a grease leakage indicates the possibility that grease has seeped into the motor. This can cause a motor breakdown. Contact your Yaskawa representative.

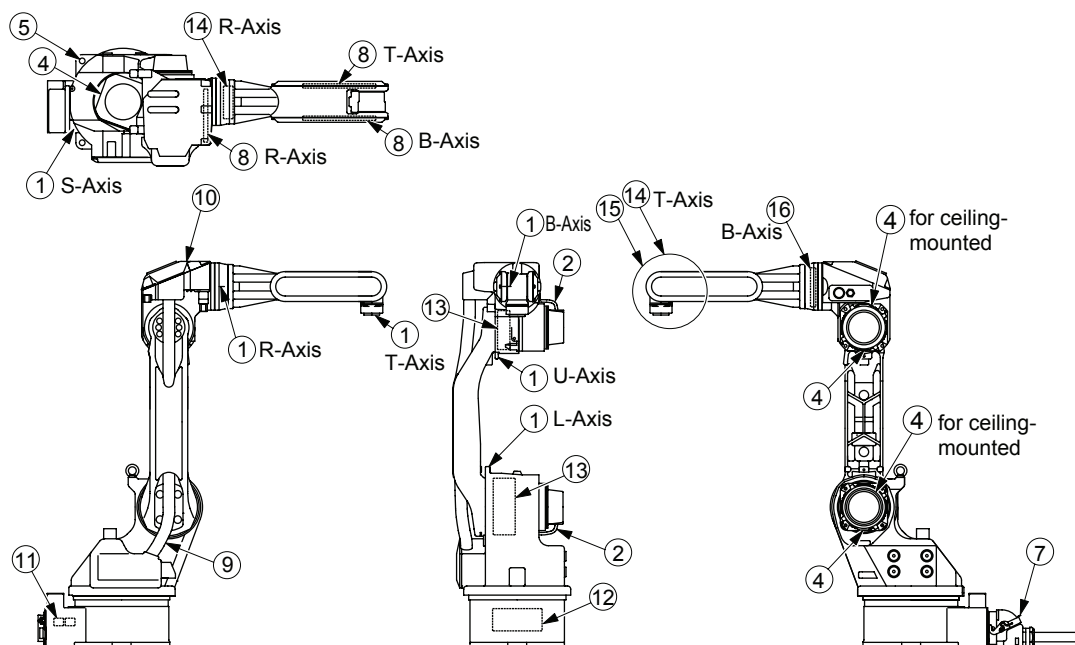


Fig. 23 Inspection Parts and Inspection Numbers

Table. 7 Inspection Parts and Grease Used

No.	Grease Used	Inspected Parts
12, 13	Molywhite RE No. 00	S-, L-, and U-axis speed reducers
14, 15	Harmonic Grease SK-1A	R-, B-, and T-axis speed reducers, T-axis gear
16	Alvania EP Grease 2	R-axis cross roller bearings

The numbers in the above table correspond to the numbers in " Table. 6 Inspection Items ".

9.2 Notes on Maintenance Procedures

9.2.1 Battery Unit Replacement

If the battery alarm occurs in the XRC, replace the battery according to the following procedure:

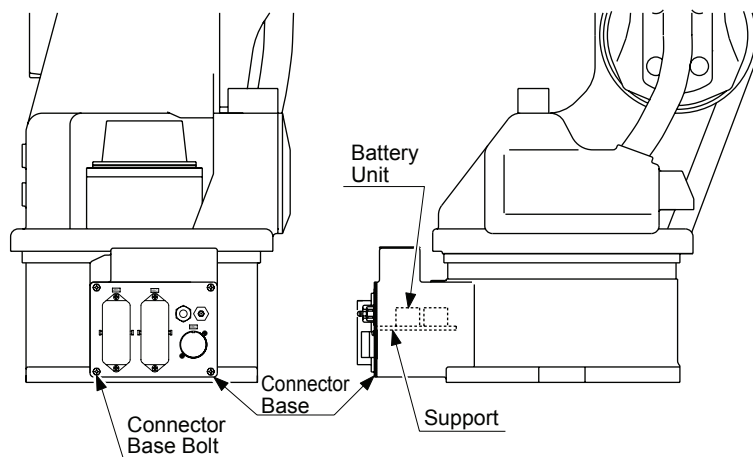


Fig. 24 Battery Location

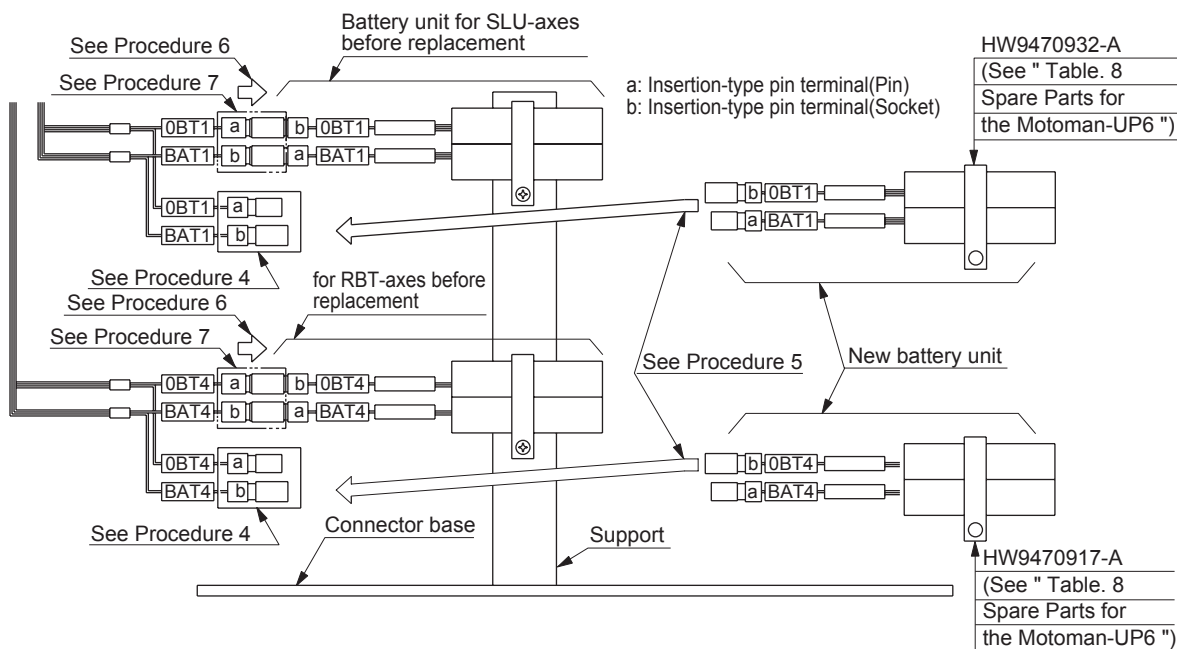


Fig. 25 Battery Connection

1. Turn the XRC main power supply off.
2. Remove the connector base, and grease tube from the union.
3. Remove the battery unit mounting screw on the support.
4. Remove the plastic tape (insulation tape) protecting the connection part of the battery unit in the manipulator.

5. Connect the new battery.
6. Remove the old battery.

NOTE Remove the old battery unit after connecting the new one so that the encoder absolute data does not disappear.

7. Protect the connection part of the battery unit in the manipulator with plastic tape (insulation tape).
8. Mount the battery unit with the screws, connect the grease tube to the union, and then mount the connector base.

9.2.2 Grease Replenishment/Replacement for S-Axis Speed Reducer

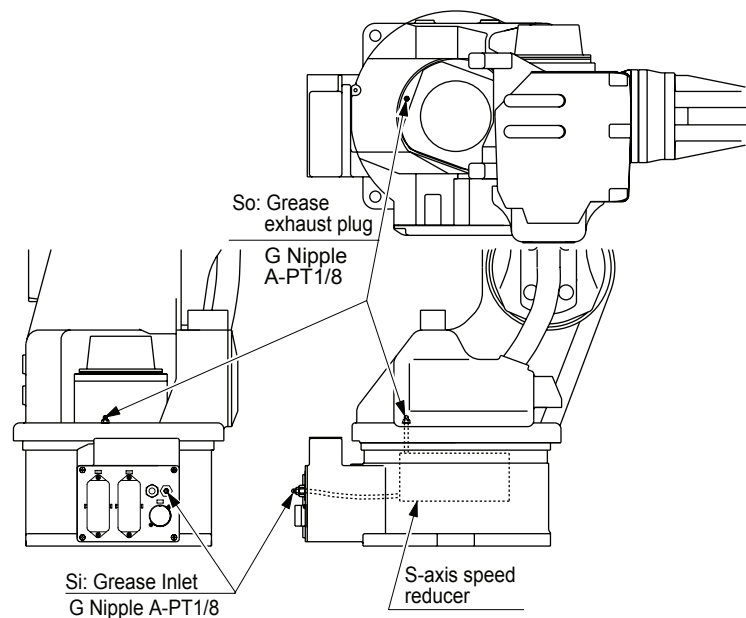


Fig. 26 S-Axis Speed Reducer Diagram

NOTE For ceiling mounted manipulators, the exhaust port and the grease inlet are inverted.

■ Grease Replenishment (Refer to " Fig. 26 S-Axis Speed Reducer Diagram ".)

Replenish the grease according to the following procedure:

1. Remove the So exhaust plug.



If grease is added without removing the exhaust plug, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plug.

2. Inject the grease into the Si grease inlet using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: 30cc
(60cc for 1st supply)

3. Move the S-axis for for a few minutes to discharge the excess grease.
4. Reinstall the So exhaust plug.

■ Grease Replacement (Refer to " Fig. 26 S-Axis Speed Reducer Diagram ".)

1. Remove the So exhaust plug.



If grease is added without removing the exhaust plug, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plug.

2. Inject the grease into the Si grease inlet using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: 200cc

3. The grease replacement is complete when new grease appears in the So exhaust port. The new grease can be distinguished from the old grease by color.
4. Move the S-axis for for a few minutes to discharge the excess grease.
5. Wipe the So exhaust port with a cloth and reinstall the plug.

9.2.3 Grease Replenishment/Replacement for L-Axis Speed Reducer

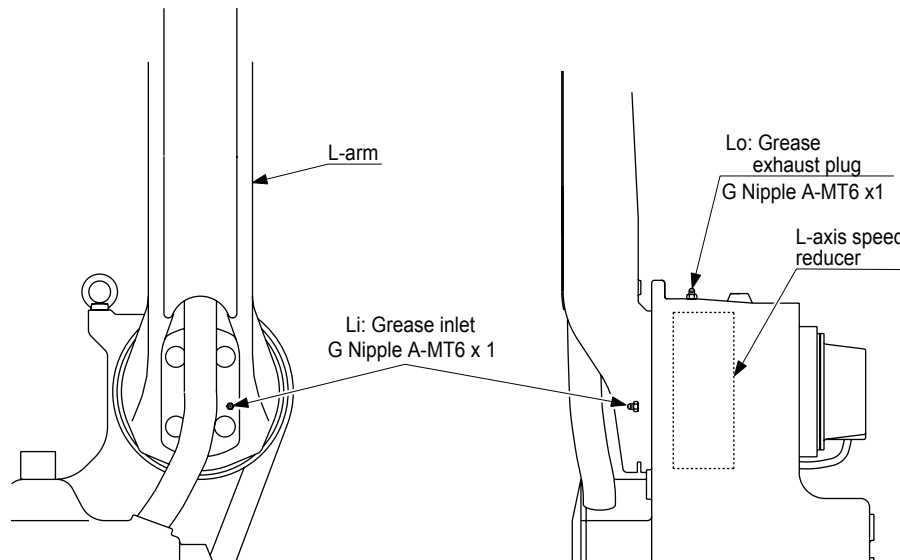


Fig. 27 L-Axis Speed Reducer Diagram



For ceiling mounted manipulators, the exhaust port and the grease inlet are inverted.

■ Grease Replenishment (Refer to " Fig. 27 L-Axis Speed Reducer Diagram ".)

1. Make the L-arm vertical for ground.
2. Remove the Lo exhaust plugs.



If grease is added without removing the exhaust plugs, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plugs.

3. Inject grease into the Li grease inlet using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: 30cc
(60cc for 1st supply)

4. Move the L-Axis for for a few minutes to discharge the excess grease.
5. Wipe the Lo exhaust plugs with a cloth and reinstall the plugs.

■ Grease Replacement (Refer to " Fig. 27 L-Axis Speed Reducer Diagram ".)

1. Make the L-arm vertical for ground.
2. Remove the Lo exhaust plugs.



If grease is added without removing the exhaust plugs, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plugs.

3. Inject grease into the Li grease inlets using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: approx. 200cc

4. The grease replacement is complete when new grease appears in the Lo exhaust ports. The new grease can be distinguished from the old grease by color.
5. Move the L-Axis for a few minutes to discharge the excess grease.
6. Wipe the Lo exhaust plugs with a cloth and reinstall the plugs.

9.2.4 Grease Replenishment/Replacement for U-Axis Speed Reducer

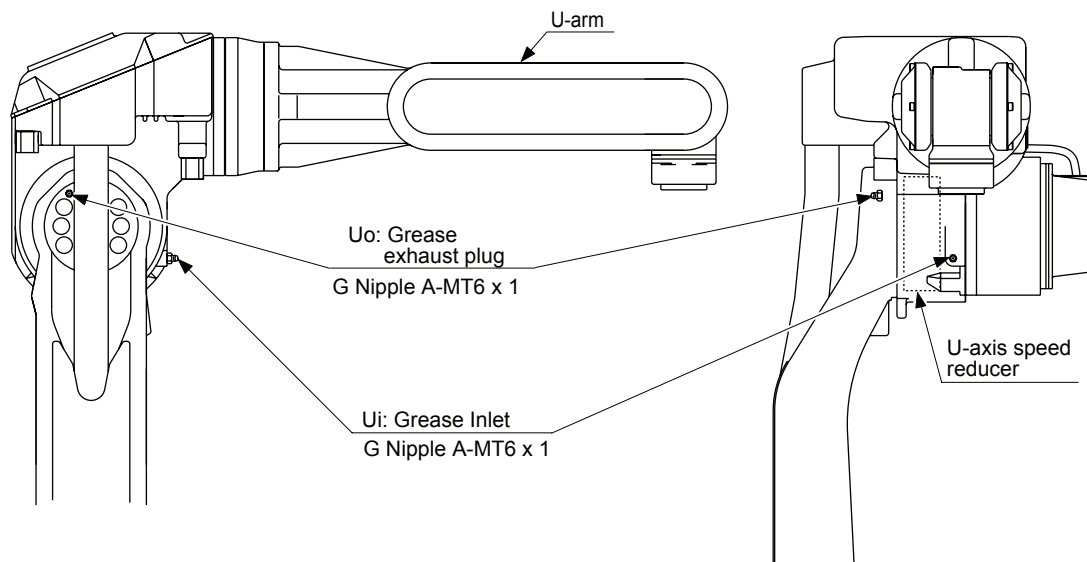


Fig. 28 U-Axis Speed Reducer Diagram



For ceiling mounted manipulators, the exhaust port and the grease inlet are inverted.

■ Grease Replenishment (Refer to " Fig. 28 U-Axis Speed Reducer Diagram ".)

1. Make the U-arm horizontal for ground.
2. Remove the Uo exhaust plugs.



If grease is added without removing the exhaust plugs, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plugs.

3. Inject grease into the Ui grease inlet using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: 30cc
(60cc for 1st supply)

4. Move the U-Axes for a few minutes to discharge the excess grease.
5. Wipe the Uo exhaust plugs with a cloth and reinstall the plugs.

■ Grease Replacement (Refer to " Fig. 28 U-Axis Speed Reducer Diagram ".)

1. Make the U-arm horizontal for ground.
2. Remove the Uo exhaust plugs.



If grease is added without removing the exhaust plugs, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plugs.

3. Inject grease into the Ui grease inlets using a grease gun.

Grease type: Molywhite RE No. 00
Amount of grease: approx. 200cc

4. The grease replacement is complete when new grease appears in the Uo exhaust ports. The new grease can be distinguished from the old grease by color.
5. Move the U-Axes for a few minutes to discharge the excess grease.
6. Wipe the Uo exhaust plugs with a cloth and reinstall the plugs.

9.2.5 Grease Replenishment for R-Axis Speed Reducer

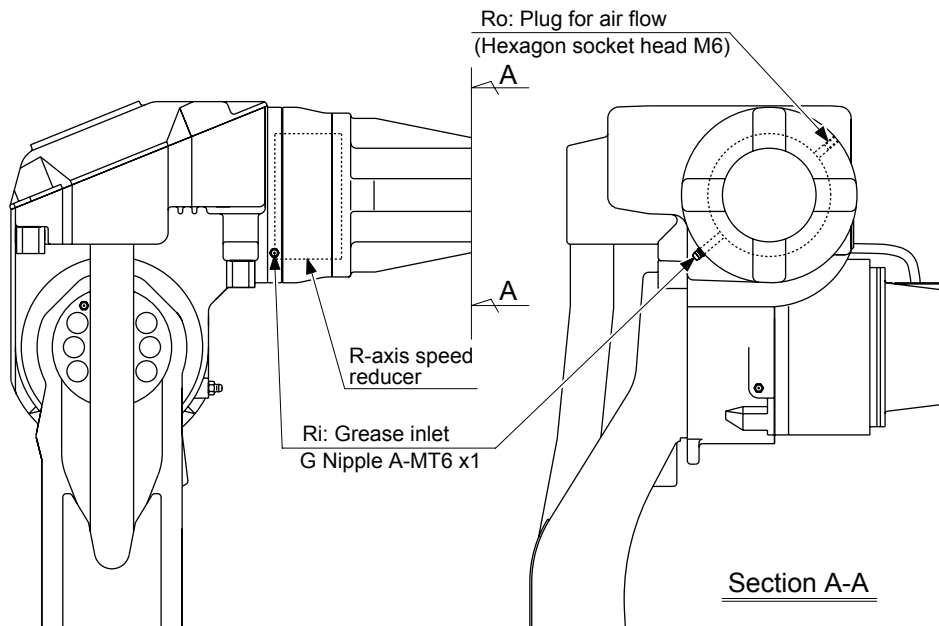


Fig. 29 R-Axis Speed Reducer Diagram

1. Remove the Ro plug for air flow.
2. Inject grease into the Ri grease inlet using a grease gun. (Refer to " Fig. 29 R-Axis Speed Reducer Diagram ".)

Grease type: Harmonic grease SK-1A
Amount of grease: 8cc
(16cc for first supply)



The Ro exhaust port is used for air flow. Do not inject excessive grease into the Ri grease inlet.

3. Reinstall the Ro plug.

9.2.6 Grease Replenishment for B- and T-Axis Speed Reducers

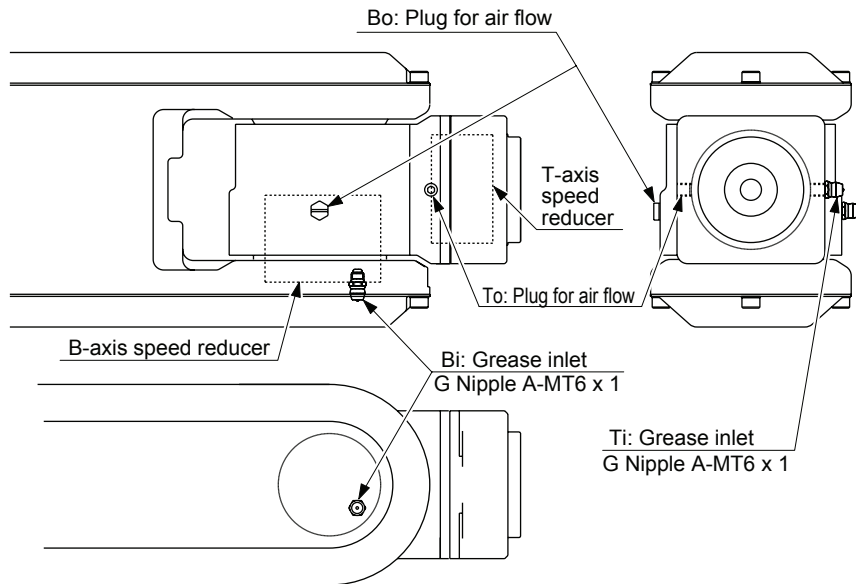


Fig. 30 B- and T-Axis Speed Reducers Diagram

1. Remove the Bo and To plugs for air flow.



Remove the U-arm cover side of the B-axis speed reducer.

2. Inject grease into the Bi and Ti grease inlets using a grease gun. (Refer to " Fig. 30 B- and T-Axis Speed Reducers Diagram ".)

Grease type: Harmonic grease SK-1A
 Amount of grease:
 For B-axis (Bi): 10cc (20cc for 1st supply)
 For T-axis (Ti): 5cc (10cc for 1st supply)



The Bo and To exhaust ports are used for air flow. Do not inject excessive grease into the Bi and Ti grease inlets.

3. Reinstall the Bo and To plugs.



Mount the U-arm cover side of the B-axis speed reducer. (Refer to " 9.2.9 Notes for Maintenance ")

9.2.7 Grease Replenishment for T-Axis Gear

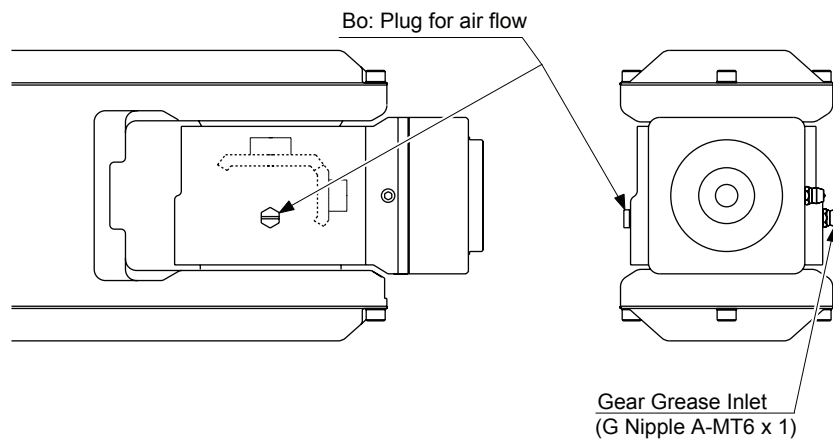


Fig. 31 T-Axis Gear Diagram

1. Remove the Bo plug for air flow.
2. Inject grease into the gear grease inlet using a grease gun. (Refer to " Fig. 31 T-Axis Gear Diagram ".)

Grease type: Harmonic grease SK-1A
Amount of grease: 5cc
(10cc for 1st supply)



The Bo exhaust port is used for air flow. Do not inject excessive grease into the gear grease inlet.

3. Reinstall the Bo plug.

9.2.8 Grease Replenishment for R-Axis Cross Roller Bearing

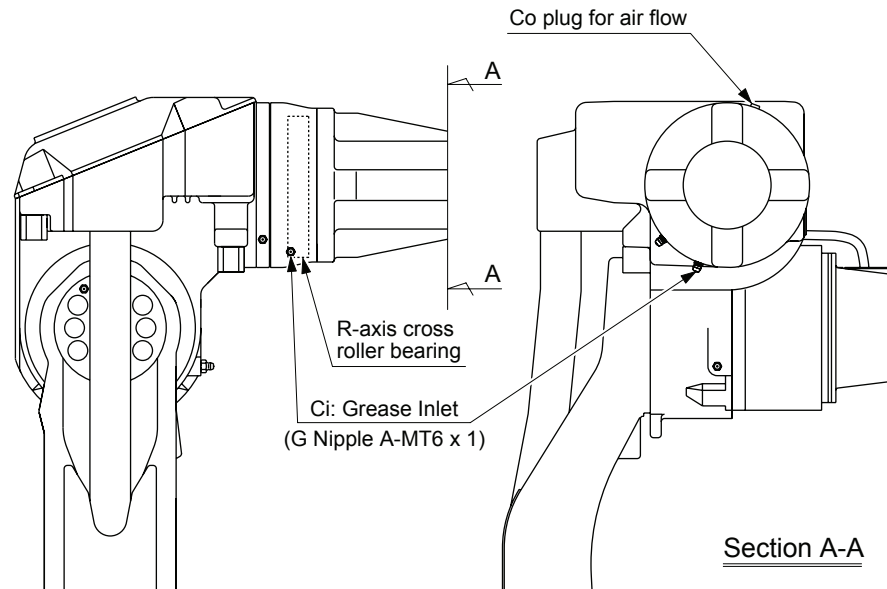


Fig. 32 R-Axis Cross Roller Bearing Diagram

1. Remove the Co plug for air flow.
2. Inject grease into the Ci grease inlet using a grease gun. (Refer to " Fig. 32 R-Axis Cross Roller Bearing Diagram ").

Grease type: Alvania EP grease 2
Amount of grease: 3cc
(6cc for 1st supply)

NOTE The Co exhaust port is used for air flow. Do not inject excessive grease into the gear grease inlet.

3. Reinstall the Co plug.

9.2.9 Notes for Maintenance

■ Wrist Axes

The motor and encoder units are provided with the wrist unit. To prevent fumes from penetrating into the wrist unit, the matched parts are sealed with silicon sealant. Therefore, if the wrist cover is disassembled, reseal with silicon sealant (modifier silicon caulk, refer to " Table. 8 Spare Parts for the Motoman-UP6 ").

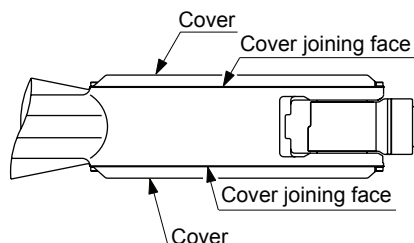


Fig. 33 Sealing Part of Wrist Unit

■ Encoder Connector (with CAUTION label)

Connect the battery unit with reference to the following figure before removing the encoder connector (with CAUTION label).

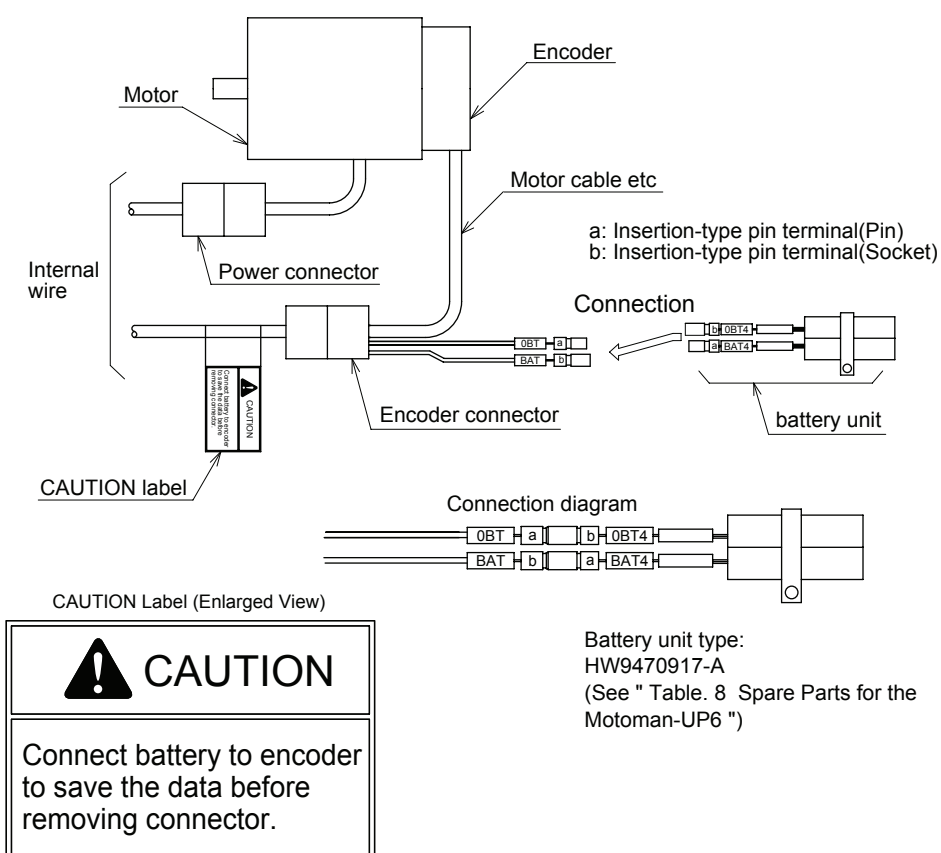


Fig. 34 Encoder Connector Diagram

10 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the Motoman-UP6. The spare parts list for the Motoman-UP6 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 unit



For replacing parts in Rank B or Rank C, contact your Yaskawa representative.

Table. 8 Spare Parts for the Motoman-UP6

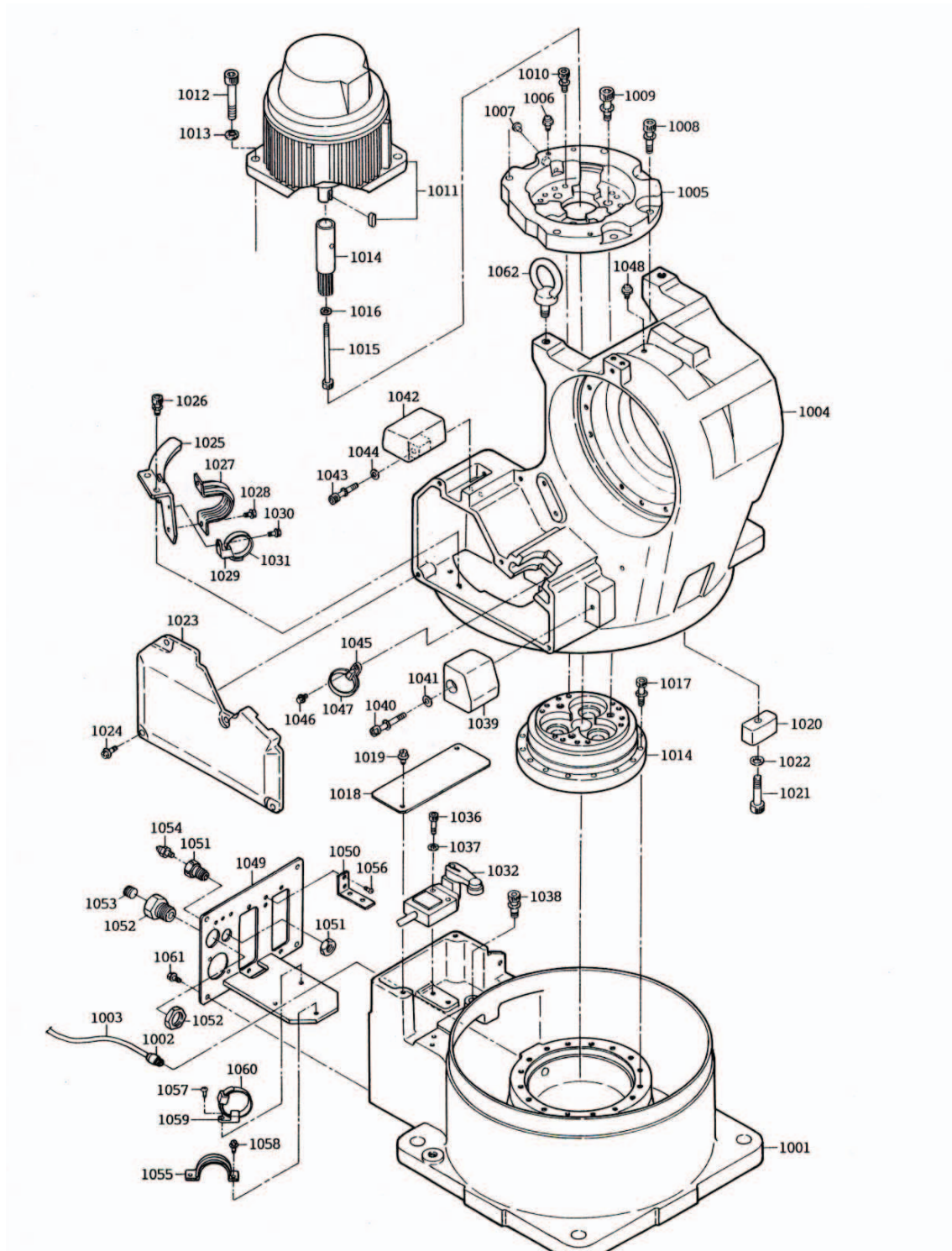
Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	Molywhite RE No. 00	Yaskawa Electric Corporation	16kg	-	
A	2	Grease	Harmonic Grease SK-1A	Harmonic Drive System Co., Ltd.	2.5kg	-	
A	3	Grease	Alvania EP Grease 2	Showa Oil Co., Ltd.	16kg	-	
A	4	Silicon Rubber Compound Tube	Modifier Silicon Caulk	Konishi Co., Ltd.			
A	5	Battery Unit	HW9470932-A	Yaskawa Electric Corporation	1	1	for SLU-axes
A	6	Battery Unit	HW9470917-A	Yaskawa Electric Corporation	1	1	for RBT-axes
B	7	R-Axis Timing Belt	60S4.5M338	Mitsuboshi Belting Limited	1	1	
B	8	B-Axis Timing Belt	60S4.5M518	Mitsuboshi Belting Limited	1	1	
B	9	T-Axis Timing Belt	60S4.5M387	Mitsuboshi Belting Limited	1	1	
B	10	S-Axis Speed Reducer	HW9280729-A	Yaskawa Electric Corporation	1	1	
B	11	L-Axis Speed Reducer	HW9280732-A	Yaskawa Electric Corporation	1	1	
B	12	U-Axis Speed Reducer	HW9280738-A	Yaskawa Electric Corporation	1	1	

Table. 8 Spare Parts for the Motoman-UP6

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
B	13	R-Axis Speed Reducer	HW9381377-A	Yaskawa Electric Corporation	1	1	
B	14	B-Axis Speed Reducer	HW9381454-A	Yaskawa Electric Corporation	1	1	
B	15	T-Axis Speed Reducer	HW9381379-A	Yaskawa Electric Corporation	1	1	
B	16	Internal Wiring	HW9171470-A	Yaskawa Electric Corporation	1	1	
B	17	B- and T-Axes Internal Wiring	HW9371034-A	Yaskawa Electric Corporation	1	1	in U-arm
C	18	S-and U-Axes AC Servomotor	HW9381362-A	Yaskawa Electric Corporation	1	2	With brake, with key, lead terminal treatment completion
C	19	L-Axis AC Servomotor	HW9381363-A	Yaskawa Electric Corporation	1	1	With brake, with key, lead terminal treatment completion
C	20	R-, B- and T-Axes AC Servomotor	HW9381370-A	Yaskawa Electric Corporation	1	3	With brake, no key, lead terminal treatment completion
C	21	Limit Switch Set	HW9371069-A	Yaskawa Electric Corporation	1	1	Lead terminal treatment completion
C	22	Wrist Unit	HW9170593-A	Yaskawa Electric Corporation	1	1	
C	23	R-axis Driving Unit	HW9370934-A	Yaskawa Electric Corporation	1	1	

11 Parts List

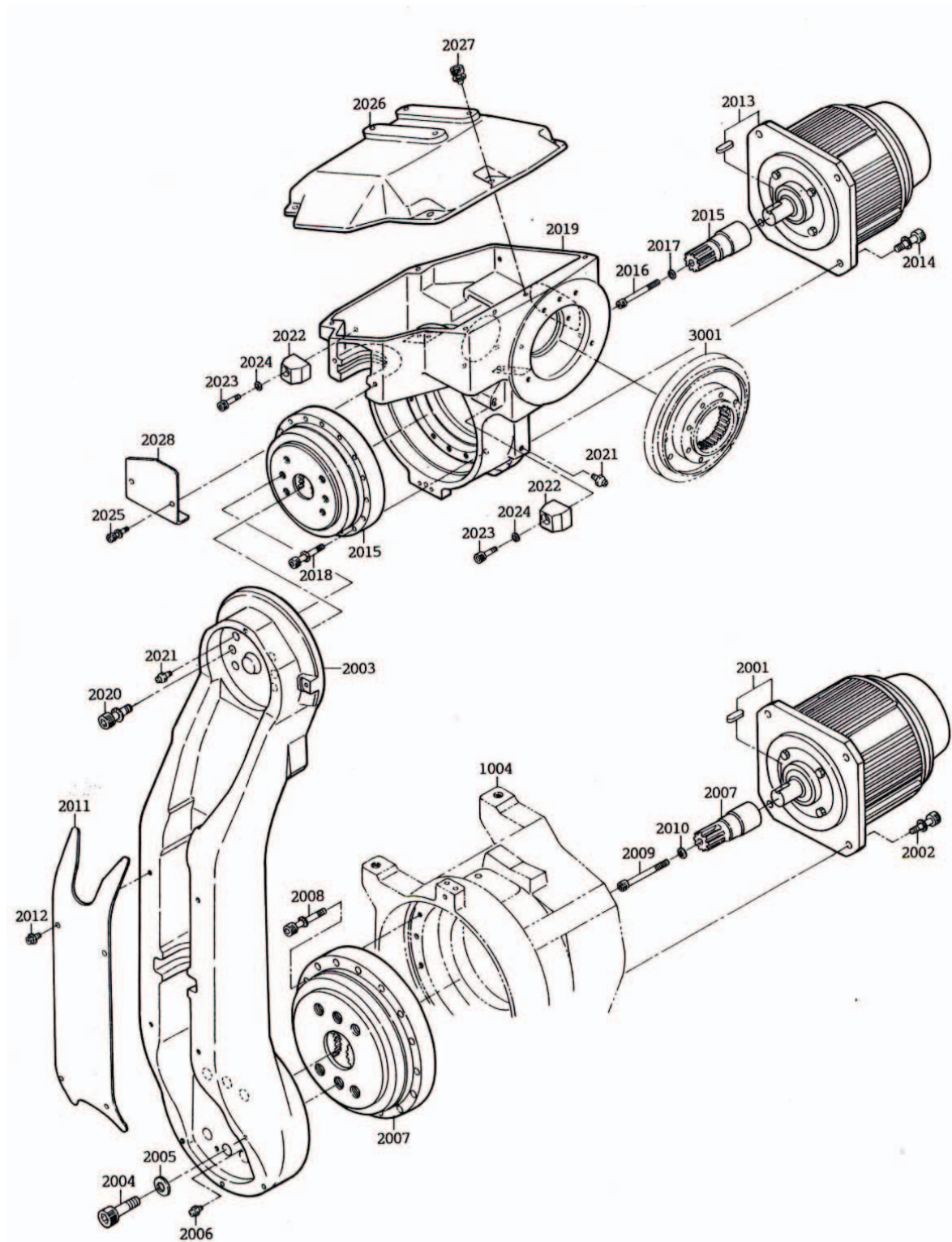
11.1 S-Axis Parts List



11.1 S-Axis Parts List

No.	DWG No.	Name	Pcs.	No.	DWG No.	Name	Pcs.
1001	HW9100881-1	Base	1	1057	M5 × 6	Round head screw	1
1002	POC6-01M	Union	1	1058	M6 × 8	APS bolt	1
1003	NB-0640-0.25	Tube	1	1059	TA1-S10	Clamp	1
1004	HW9100941-1	S head	1	1060	T50R	Insulock' tie	1
1005	HW9302222-1	M base	1	1061	M5 × 10	APS bolt	4
1006	A-MT6 × 1	G nipple	1	1062	M10	I bolt	2
1007	M5 × 5	H set screw	1				
1008	GT-SA M8 × 30	Socket screw	4				
1009	GT-SA M10 × 25	Socket screw	3				
1010	GT-SA M6 × 20	Socket screw	12				
1011	SDMDH-06A2A-YR24	Motor	1				
1012	M8 × 50	Socket screw	3				
1013	2H-8	Spring washer	3				
1014	HW9230729-A	Reduction gear	1				
1015	M4 × 80	Socket screw	1				
1016	2H-4	Spring washer	1				
1017	GT-SA M6 × 30	Socket screw	16				
1018	HW9405026-1	Cover	1				
1019	M5 × 10	APS bolt	2				
1020	HW9405273-1	Dog	1				
1021	M10 × 35	Socket screw	1				
1022	2H-10	Spring washer	1				
1023	HW9302303-1	Cover	1				
1024	M5 × 16	APS bolt	4				
1025	HW9302270-1	Support	1				
1026	GT-SA M6 × 15	Socket screw	2				
1027	CD-31	Saddle	1				
1028	M6 × 8	APS bolt	2				
1029	TA1-S10	Clamp	1				
1030	M5 × 10	APS bolt	1				
1031	T50R	Insulok' tie	1				
1032	HW9371069-A	LS ASSY	1				
1036	M5 × 20	Socket screw	2				
1037	2H-5	Spring washer	2				
1038	GT-SA M10 × 20	Socket screw	1				
1039	HW9405238-A	Stopper	1				
1040	GT-SA M6 × 45	Socket screw	1				
1041	M6	Washer	1				
1042	HW9405284-A	Stopper	1				
1043	GT-SA M6 × 30	Socket screw	1				
1044	M6	Washer	1				
1045	TA1-S10	Clamp	1				
1046	M5 × 10	APS bolt	1				
1047	T50R	Insulock' tie	1				
1050	HW9405420-1	Support	1				
1051	PMF6-01	Union	1				
1052	KQE10-03	Union	1				
1053	3/8-19	Plug	1				
1054	A-PT1/8	G nipple	1				
1055	CD-31	Saddle	1				
1056	M5 × 10	Round head screw	2				

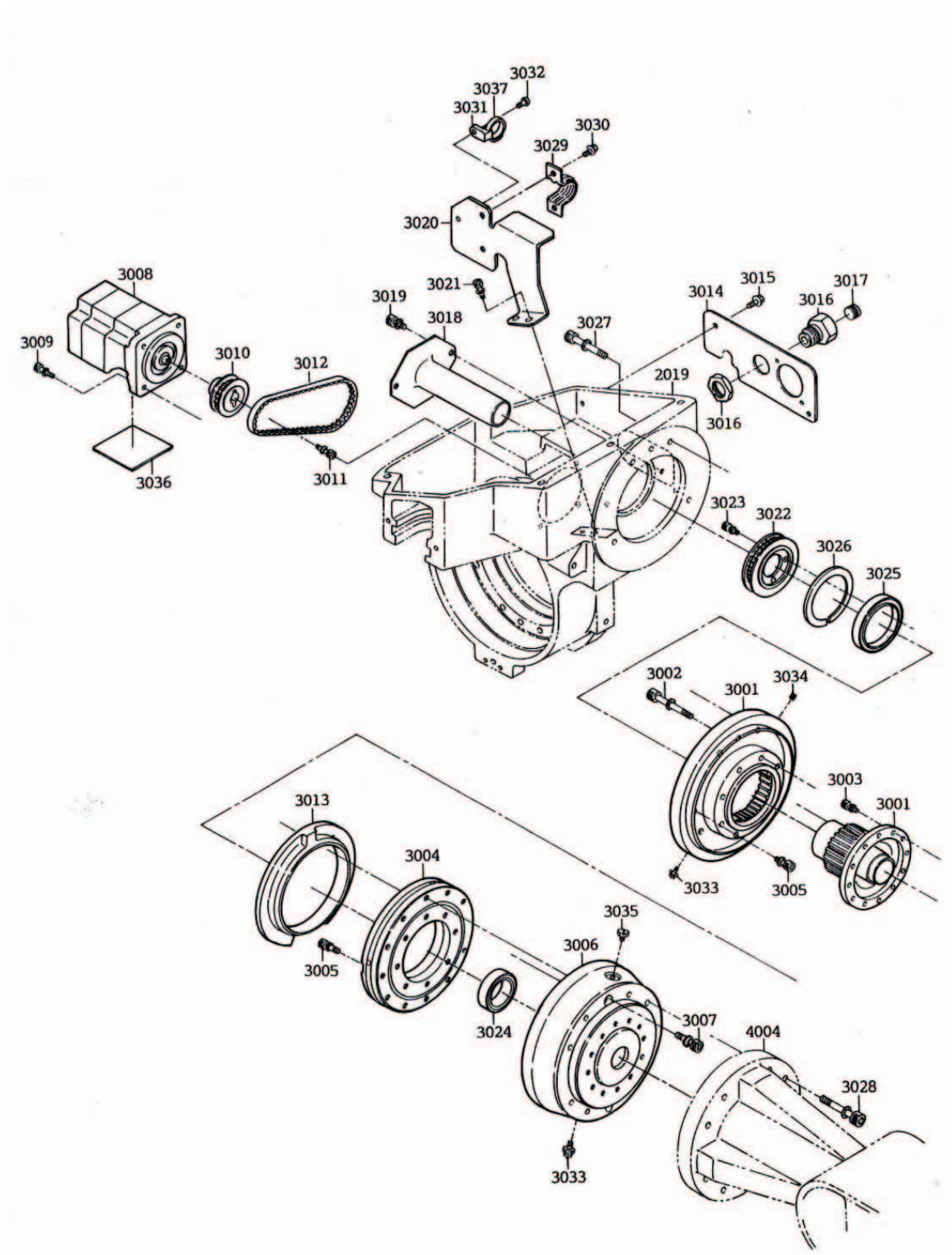
11.2 L.U-Axis Driving Unit



11.2 L.U-Axis Driving Unit

No.	DWG No.	Name	Pcs.
1004	HW9100941-1	S head	1
2001	SGMDH-12A2A-YR12	Motor	1
2002	GT-SA M8 × 30	Socket screw	4
2003	HW9100942-1	L arm	1
2004	M14 × 35	Socket screw	6
2005	GT-SH M14	Washer	6
2006	A-MT6 × 1	G nipple	1
2007	HW9280732-A	Reduction gear	1
2008	GT-SA M8 × 45	Socket screw	12
2009	M6 × 60	Socket screw	1
2010	2H-6	Spring washer	1
2011	HW9302190-1	Cover	1
2012	M6 × 8	APS bolt	4
2013	SGMDH-06A2A-YR-24	Motor	1
2014	GT-SA M8 × 30	Socket screw	4
2015	HW9280738-A	Reduction Gear	1
2016	M4 × 50	Socket screw	1
2017	2H-4	Spring washer	1
2018	GT-SA M6 × 40	Socket screw	12
2019	HW9100943-1	Casing	1
2020	GT-SA M10 × 30	Socket screw	6
2021	A-MT6 × 1	G nipple	2
2022	HW9405283-A	Stopper	2
2023	M5 × 20	Socket screw	2
2024	2H-5	Spring washer	2
2025	GT-SA M5 × 12	Socket screw	2
2026	HW9200893-1	Cover	1
2027	GT-SA M5 × 12	Socket screw	5
2028	HW9405357-1	Cover	1

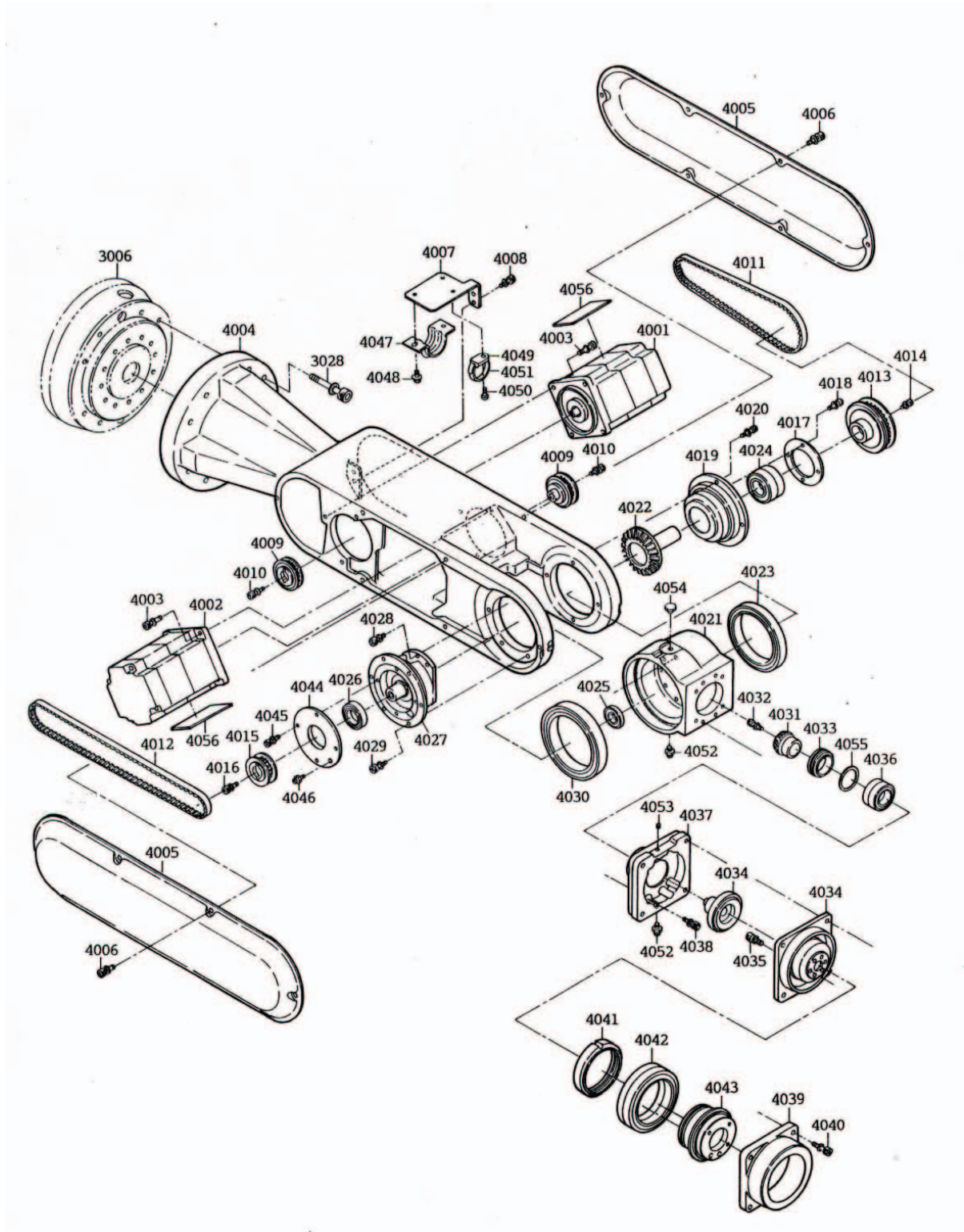
11.3 R-Axis Driving Unit



11.3 R-Axis Driving Unit

No.	DWG No.	Name	Pcs.
2019	HW9100943-1	Casing	1
3001	HW9381377-A	Reduction gear	1
3002	GT-SA M6 × 40	Socket screw	8
3003	GT-SA M4 × 12	Socket screw	12
3004	HW9381397-A	Cross rollar bearing	1
3005	GT-SA M5 × 12	Socket screw	2
3006	HW9301499-1	Housing	1
3007	GT-SA M6 × 20	Socket screw	2
3008	SGMPH-01A1A-YR21	Motor	1
3009	GT-SA M4 × 16	Socket screw	4
3010	HW9482235-A	Pulley	1
3011	GT-SA M4 × 12	Socket screw	1
3012	60S4.5M338	Timing belt	3
3013	HW9301500-1	Stopper	1
3014	HW9405356-1	Plate	1
3015	M5 × 10	APS bolt	2
3016	HQE10-03	Union	1
3017	PT3/8	Plug	1
3018	HW9301976-1	Support	1
3019	GT-SA M5 × 12	Socket screw	2
3020	HW9302409-1	Support	1
3021	GT-SA M5 × 12	Socket screw	2
3022	HW9482236-A	Pulley	1
3023	GT-SA M4 × 12	Socket screw	4
3024	6806ZZ	Bearing	1
3025	6809ZZ	Bearing	1
3026	IRTW-58	Retaining ring	1
3027	GT-SA M6 × 40	Socket screw	5
3028	GT-SA M6 × 40	Socket screw	8
3029	CD-12	Saddle	1
3030	M5 × 10	APS bolt	2
3031	TAI-S8	Clamp	1
3032	M4 × 8	Round head screw	1
3033	A-MT6 × 1	G nipple	2
3034	M6 × 8	H set screw	1
3035	LP-M5	Plug	1
3036	HW9482408-A	Seat	1
3037	T50R	Insulok' tie	1
4004	HW9100796-1	U arm	1

11.4 Wrist Unit



11.4 Wrist Unit

No.	DWG No.	Name	Pcs.	No.	DWG No.	Name	Pcs.
3006	HW9301499-1	Housing	1	4050	M4 × 8	Round head screw	1
3028	GT-SA M6 × 40	Socket screw	8	4051	T50R	Insulok' tie	1
4001	SGMPH-01A1A-YR21	Motor	1	4052	A-MT6 × 1	G nipple	2
4002	SGMPH-01A1A-YR21	Motor	1	4053	M6 × 6	H set screw	1
4003	GT-SA M4 × 16	Socket screw	6	4054	LP-M5	Plug	1
4004	HW9100796-1	U arm	1	4055	SP-0120**	shim	1
4005	HW9200780-1	Cover	2	4056	HW9482404-A	Seat	1
4006	GT-SA M5 × 12	Socket screw	12				
4007	HW9405025-1	Support	1				
4008	GT-SA M4 × 12	Socket screw	2				
4009	HW9482352-A	Pulley	2				
4010	GT-SA M4 × 12	Socket screw	2				
4011	60S4.5M387	Timing belt	1				
4012	60S4.5M518	Timing belt	1				
4013	HW9482220-A	Pulley	1				
4014	GT-SA M4 × 12	Socket screw	1				
4015	HW9482219-A	Pulley	1				
4016	GT-SA M4 × 12	Socket screw	1				
4017	HW9404986-1	B cover	1				
4018	GT-SA M4 × 12	Socket screw	4				
4019	HW9404529-1	Housing	1				
4020	GT-SA M14 × 12	Socket screw	4				
4021	HW9200713-1	Wrist base	1				
4022	HW9381452-A	Gear	1				
4023	6811LLU	Bearing	1				
4024	HW9482218-A	Bearing	1				
4025	6900ZZ*NS7*	Bearing	1				
4026	6902ZZ*NS7*	Bearing	1				
4027	HW9381454-A	Reduction gear	1				
4028	GT-SA M4 × 12	Socket screw	7				
4029	GT-SA M4 × 12	Socket screw	6				
4030	6812LLU	Bearing	1				
4031	HW9381384-A	Gear	1				
4032	GT-SA M4 × 12	Socket screw	1				
4033	HW9405199-1	B nut	1				
4034	HW9381379-A	Reduction gear	1				
4035	GT-SA M5 × 12	Socket screw	6				
4036	HW9481180-A	Bearing	1				
4037	HW9302037-1	Housing	1				
4038	GT-SA M4 × 12	Socket screw	8				
4039	HW9403430-1	Housing	1				
4040	GT-SA M4 × 16	Socket screw	4				
4041	HW9405200-1	B nut	1				
4042	HW9481024-A	Bearing	1				
4043	HW9302220-1	Flange	1				
4044	HW9404530-1	Housing	1				
4045	GT-SA M4 × 12	Socket screw	4				
4046	A-MT6 × 1	G nipple	1				
4047	CD-12	Saddle	1				
4048	M5 × 10	APS bolt	2				
4049	TA1-S8	Clamp	1				

MOTOMAN-UP6

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

YASKAWA ELECTRIC CORPORATION



MANUAL NO. RE-MTO-A211 
© Printed in Japan December 2010 98-12

MOTOMAN SETUP MANUAL

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-□□□ 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.**

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.

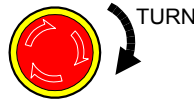
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



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 []. 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 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, 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.

Explanation of warning labels

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

**WARNING**

- **The label described below is attached to the manipulator.**

Observe the precautions on the warning labels.
Failure to observe this caution may result in injury or damage to equipment.

**WARNING**



Do not enter
robot work area

**WARNING**



Moving parts may
cause injury

Refer to the manipulator manual for the warning label location.

- **The following warning labels are attached to XRC.**

Fully comply with the precautions on the warning labels.
Failure to observe this warning may result in injury or damage to equipment.

**WARNING**



High Voltage
Do not open the door
with power ON.

**WARNING**



High Voltage
Do not open the cover.

**WARNING**



May cause
electric shock.
Ground the earth
terminal based on
local and national
electrical code.

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1 Safety

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8 Final Notes

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:

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

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

Chapter 3 explains XRC installation, location, and setup.

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

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

Chapter 6 explains the check operation and manipulator handling.

Chapter 7 explains home position registration and confirmation.

Chapter 8 lists all the manuals and their relevant uses.

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.

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.

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-□□□ 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", "Waiting", 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.**

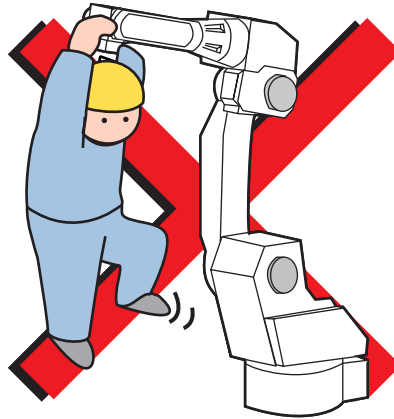
Failure to observe this caution may result in injury due to contact with XRC, playback panel, the workpiece, the positioner, etc.



CAUTION

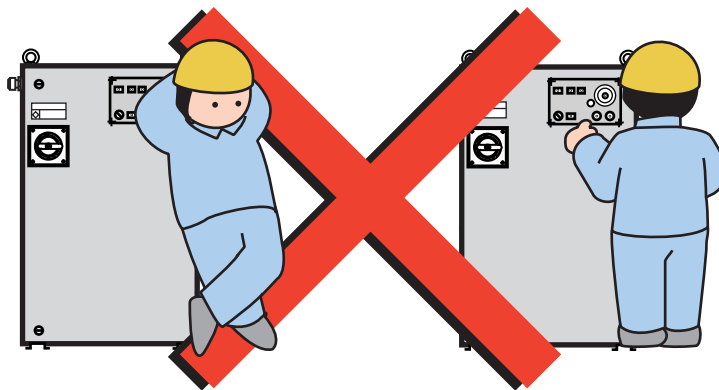
- **Never forcibly move the manipulator axes.**

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.

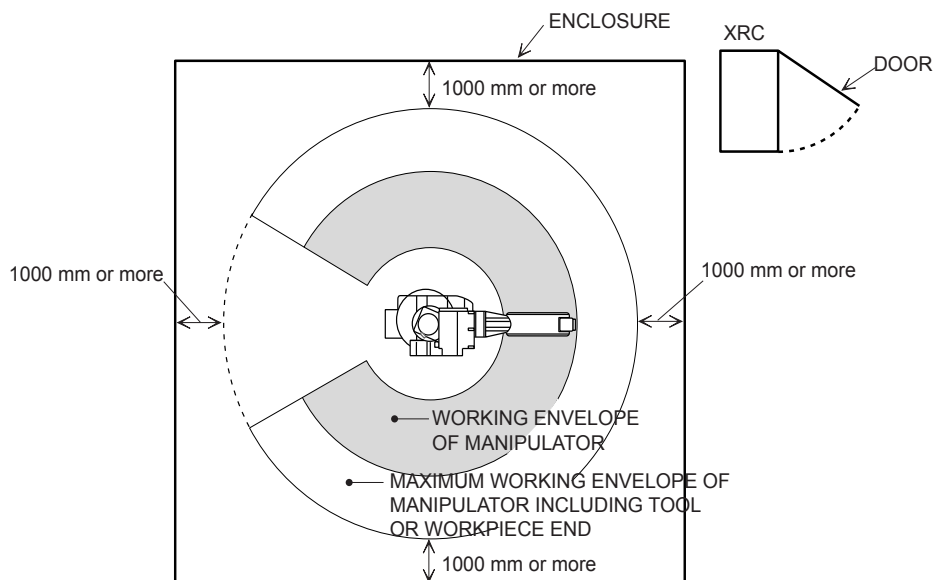
In planning installation, adapt an easy to observe arrangement to ensure safety. Take safety into consideration when planning the installation. Observe the following when installing the manipulator:



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.**

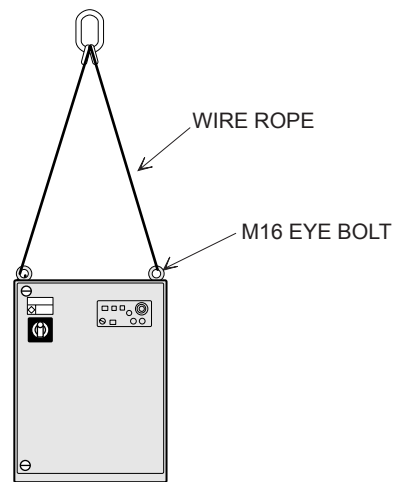
Failure to observe this precaution may result in injury or equipment damage.

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.**

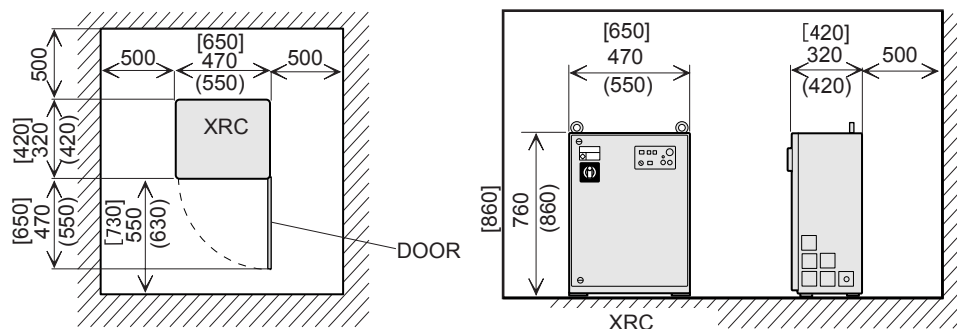
Failure to observe this precaution may result in injury or damage to equipment.



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.**

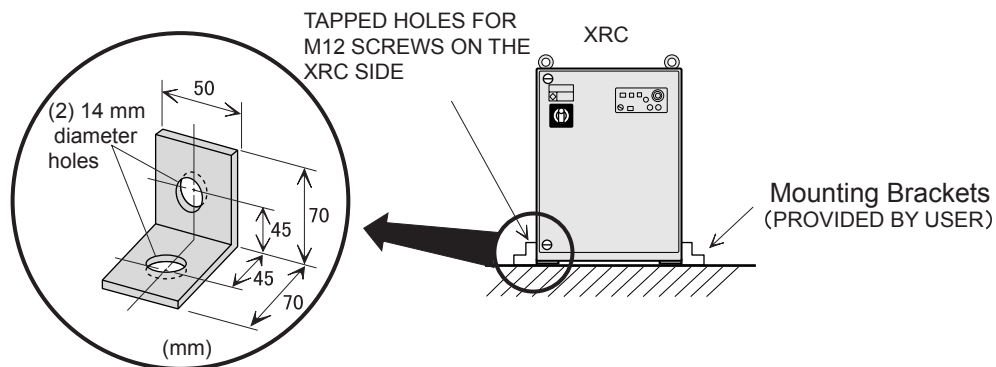
Failure to observe this caution may result in injury or damage to equipment.



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.



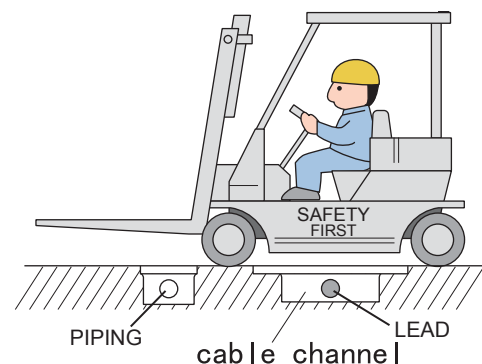
Failure to observe this caution could lead to injury or equipment damage if the XRC should shift or fall.

- **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.**

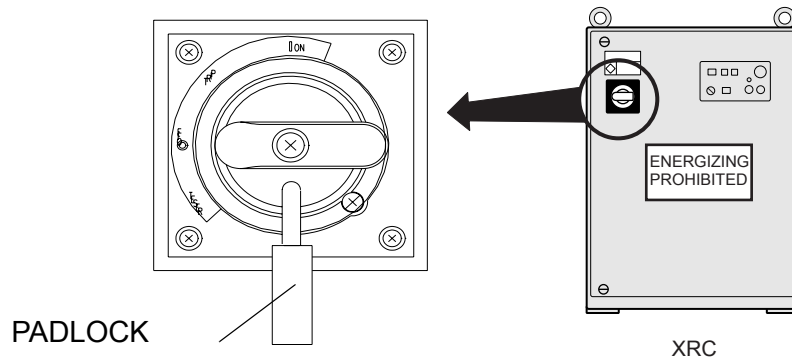
Tools and loose equipment should not be left on the floor around the manipulator, XRC, or welding fixture, etc., as injury or damage to equipment can occur if the manipulator comes in contact with objects or equipment left in the work area.

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.**

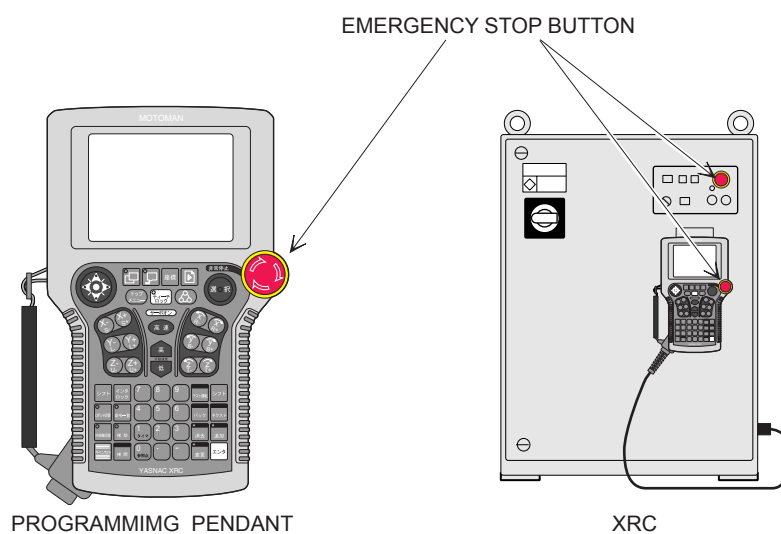
Failure to observe this precaution may result in injury due to unauthorized personnel operating the manipulator from the playback panel.

- **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.

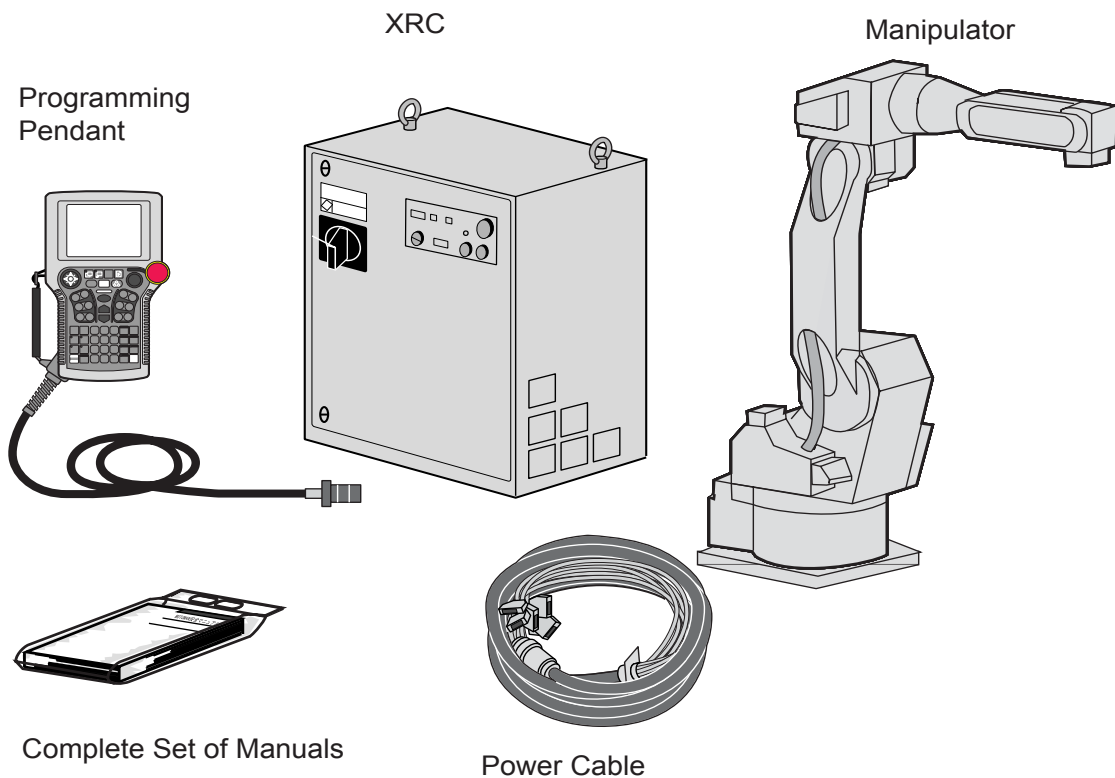
2 Product Confirmation

2.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

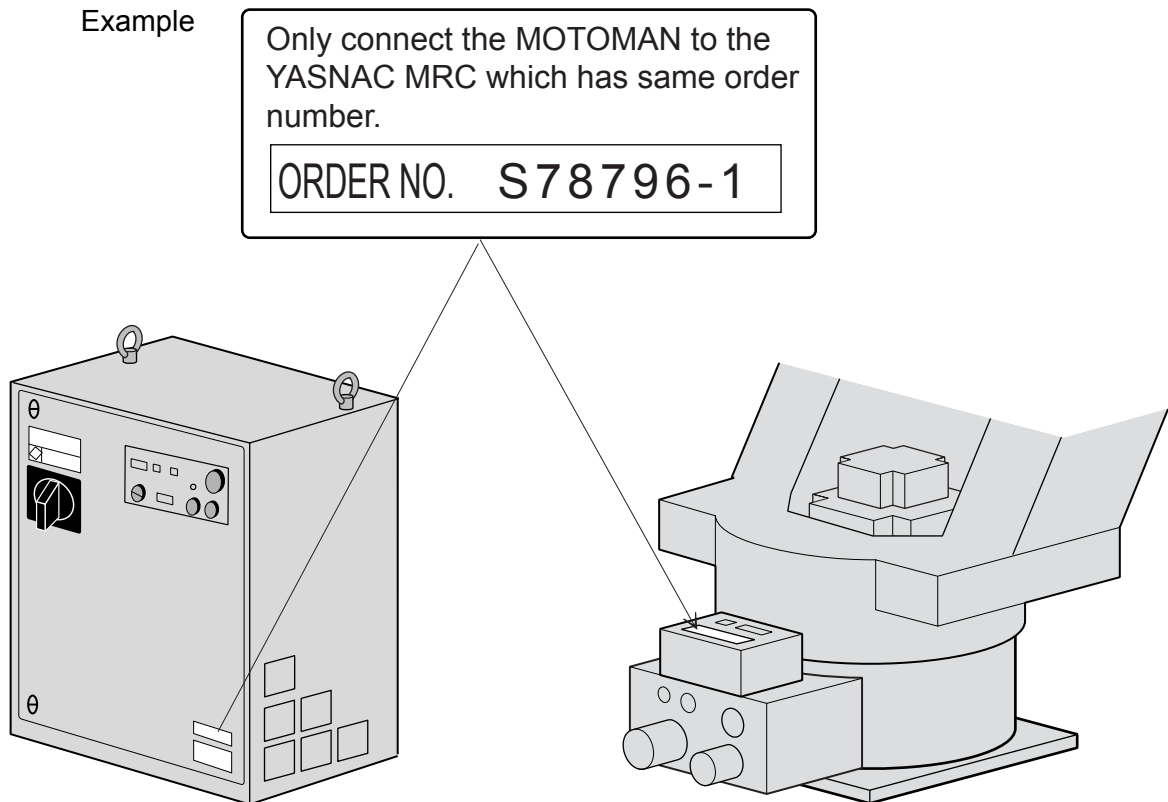
Standard delivery includes the following five items (Information for the content of optional goods is given separately):

- 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.



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.

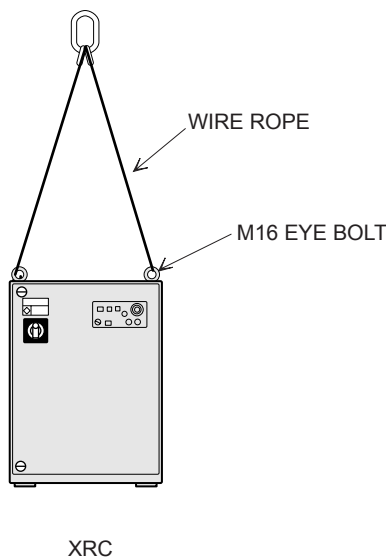
- **Avoid jarring, dropping, or hitting the controller during handling.**

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.



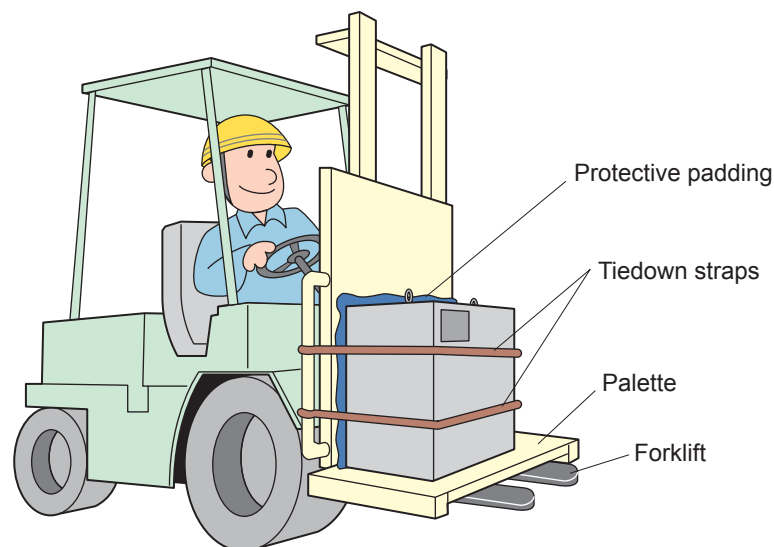
THE WEIGHT OF YASNAC XRC (approx)

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.



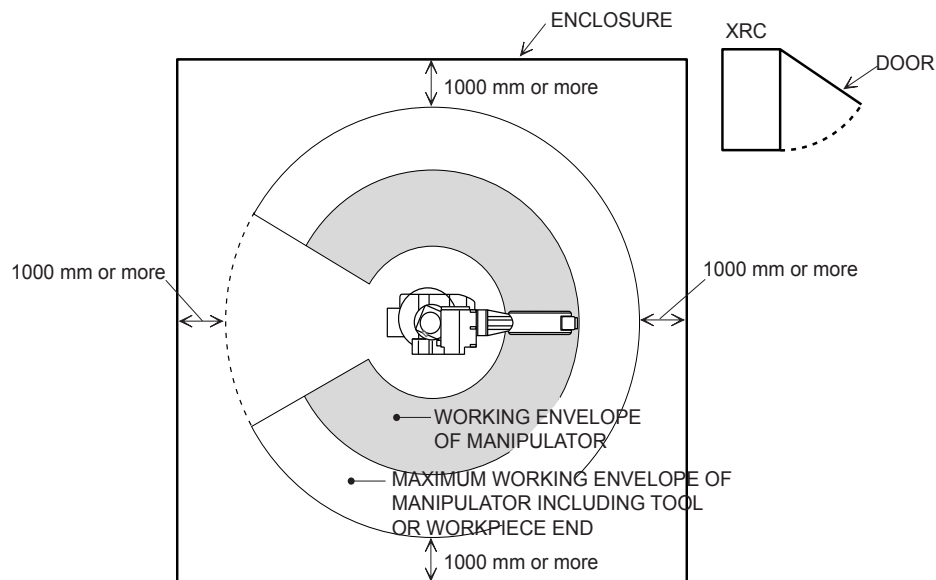
3.2 Place of Installation

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

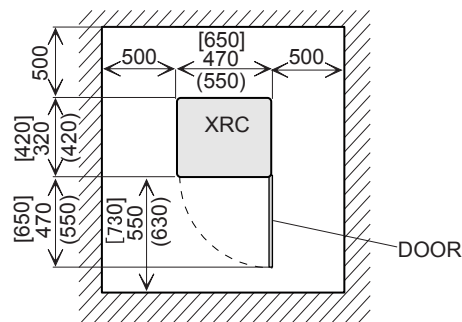
- Ambient temperature must be 0 to 45° C (32 to 113°F) during operation and -10 to 60°C (14 to 140°F) during transportation and maintenance.
- Humidity must be low with no condensation (under 20%RH).
- It must be a place with little dirt, dust, or water.
- No flammable or corrosive liquids or gases, 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

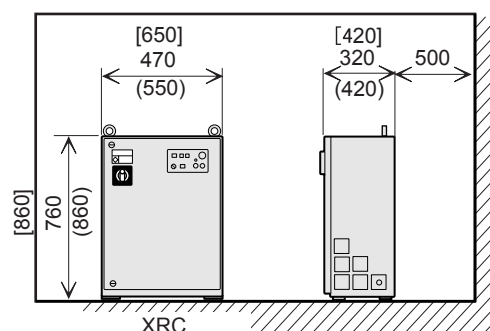
- Install the XRC outside of the working envelope of the manipulator (outside of the enclosure)



- 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.

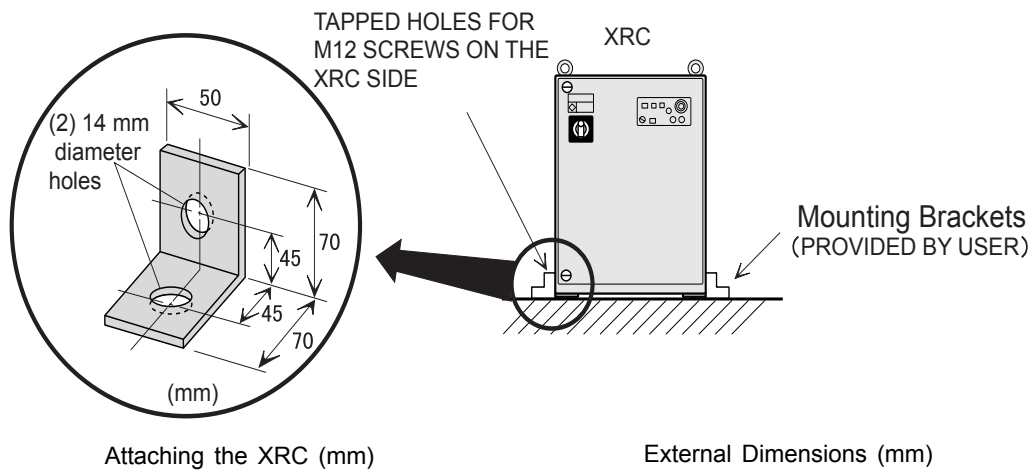


- Install the controller at least 500mm from the nearest wall to allow maintenance access. Shows the external dimensions.



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.**

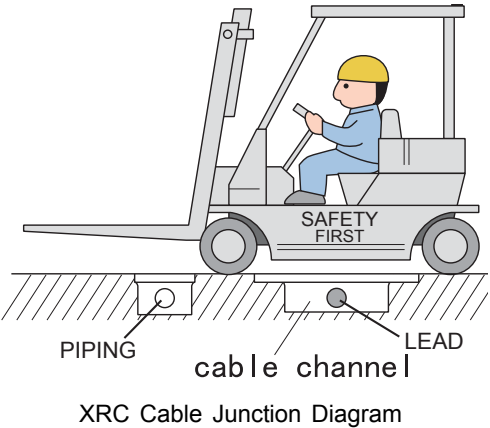
Loose power circuit wires can cause fire and electric shock.

- **Do not handle the circuit board directly by hand.**

The IC board may malfunction due to static electricity.

4.1 Notes on Cable Junctions

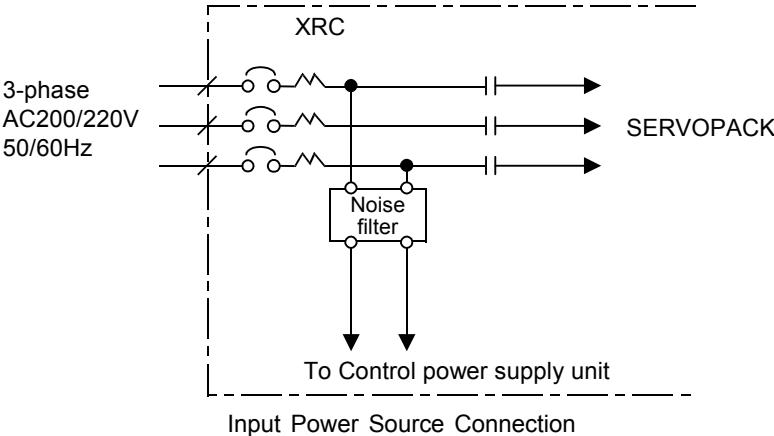
- The cables that connect the controller to peripheral equipment are low voltage circuits. Keep controller signal cables away from the primary power circuit. High voltage power lines should not be run in parallel to controller signal cables. If running parallel cables is unavoidable, use metal ducts 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.



4.2 Power Supply

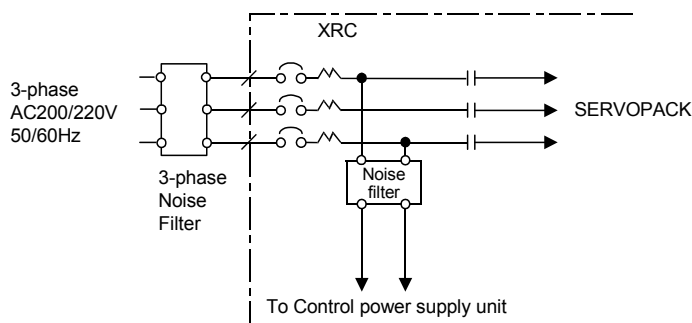
4.2.1 Three-Phase Power Supply

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.



Connection of Three-Phase Noise Filter

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)

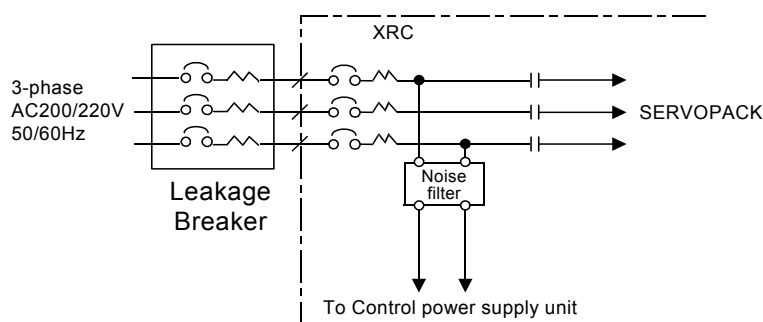
Recommended breaker (sensibility): 100 mA



CAUTION

- **If the XRC with European spec. is installed in Japan, the breaker of which sensibility is 200 mA or 500 mA should be used.**

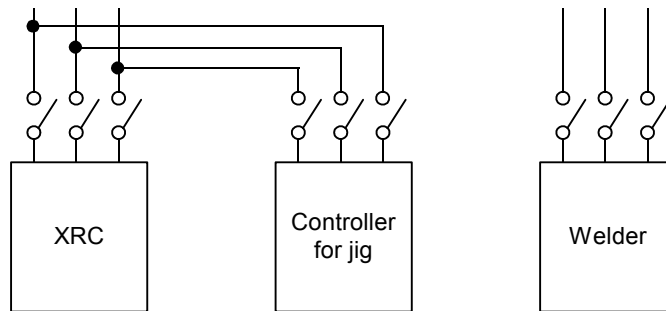
If the primary power of delta connection (Japanese standard), instead of star connection (EU standard), is applied to the XRC, the leakage becomes approximately twice, which may activate the breaker occasionally.



Connection of the Leakage Breaker

4.2.4 Primary Power Supply Switch Installation

Install the primary power supply switch as shown.



Installation of the Primary Power Supply Switch

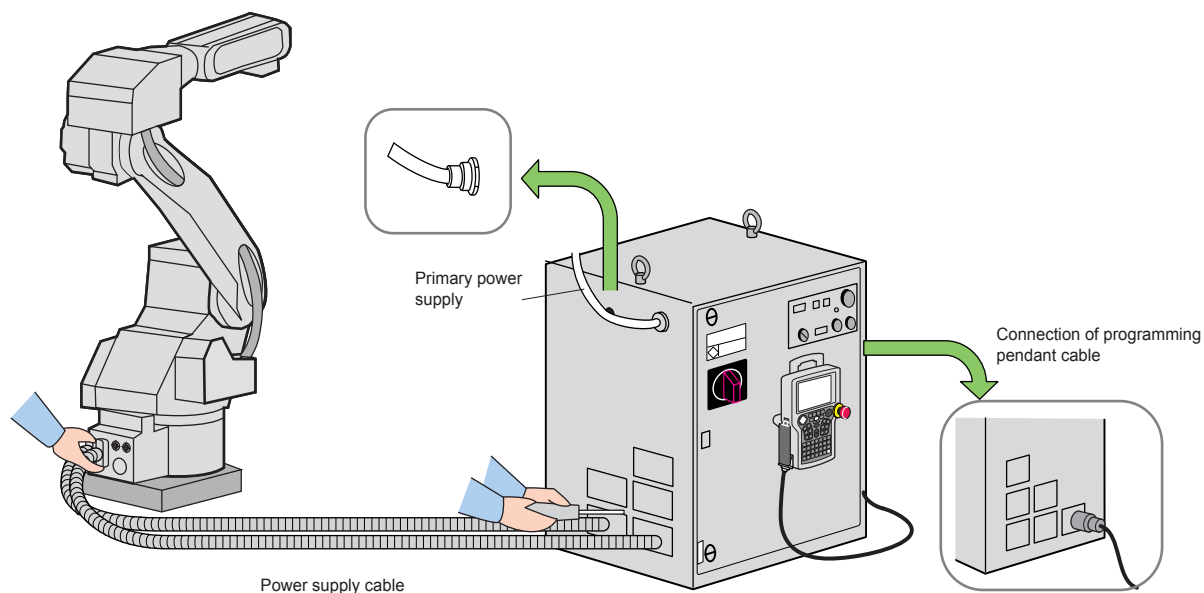
Cable Sizes and Switch Capacities

Manipulator	Voltage source capacity (kVA)	Cable size (size of terminal) (In case of Cabtyre cable (four wicks))mm ²	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.

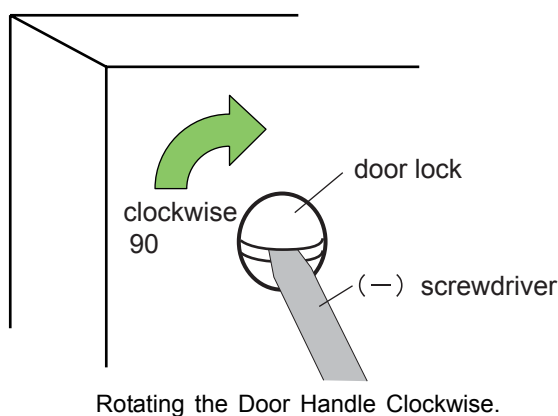
4.3 Connection Methods

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

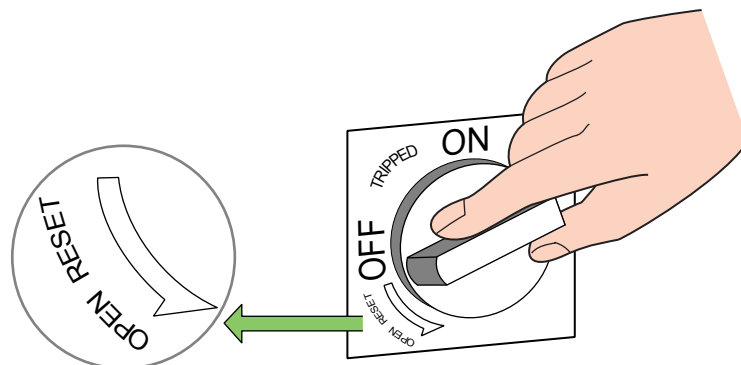


4.3.1 Connecting the Primary Power Supply

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.



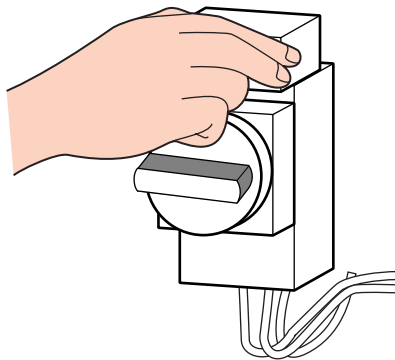
- (2) Rotate the main switch to the "OPEN RESET" position and open the door gently.



Rotating the main switch to the OPEN RESET position.

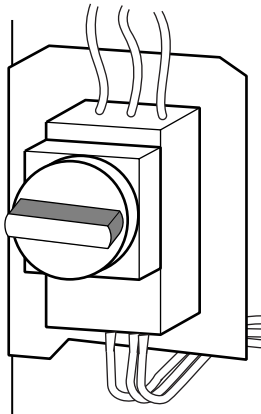
2. Confirm that the main power supply is OFF.
3. Make a hole in the plate and run the primary power supply cable through it. It is located on the top or on the left side of the XRC.
Attach the plate and cable firmly so that it won't shift or slide out of place.

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



Pulling Off the Cover

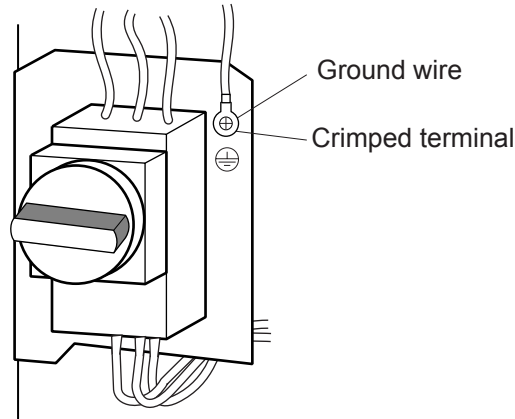
(2) Connect the primary power supply cable.



Connection to the Terminal

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

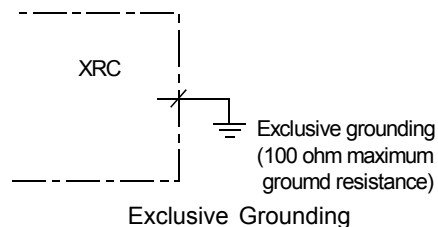
- 1) Connect the ground wire to the ground terminal (screw) of the switch which is on the upper left side of XRC.



Connection of the Ground Wire

- 2) Perform grounding in accordance with all relevant local and national electrical codes. Grounding wire must be 8.0 mm² or larger.

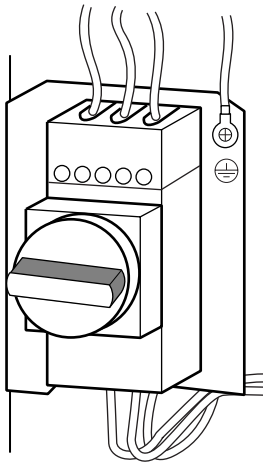
NOTE The customer must prepare the ground wire.



NOTE

- 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.

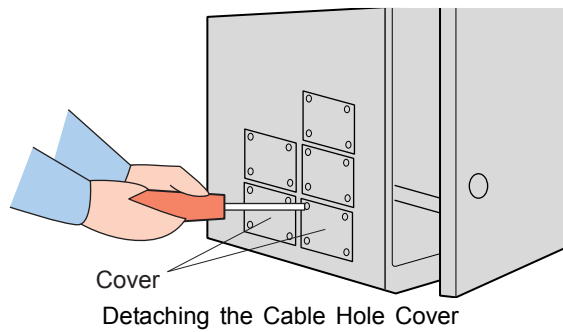
- (4) Install the cover.



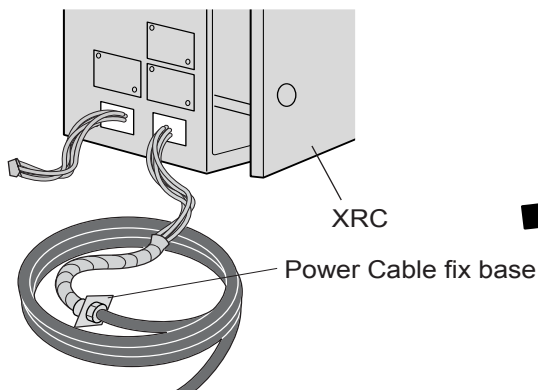
Install the Switch Cover

4.3.2 Connecting the Power Supply

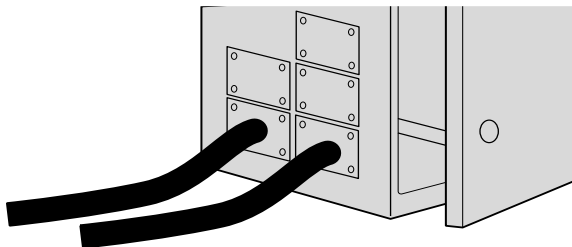
1. Remove the cover from the left side of the controller cabinet.



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

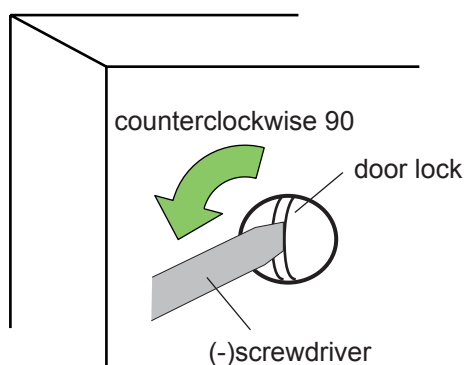


Tightening the Screws for the Cable



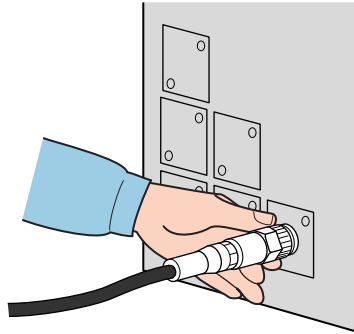
For more information on connecting the power cables, please refer to the Instruction Manual which corresponds to the particular XRC model.

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.**

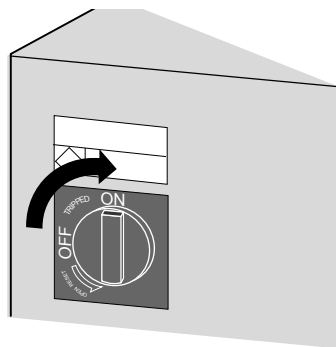
Failure to observe this caution could result in injury caused by accidental contact with the manipulator.

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.

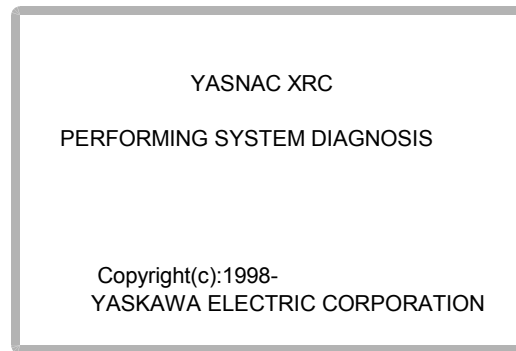
5.1 Turning on the Main Power Supply

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:

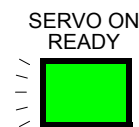
- Mode of operation
- Cycle
- Called job (active job if the XRC is in the play mode; edit job if the XRC is in the teach mode) and the cursor position in the job.

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.

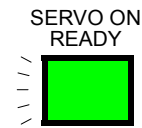
1. When the safety guard is closed, press [SERVO ON READY] on the playback panel to turn on the servo power supply. This button lights.



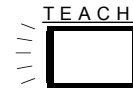
When the safety guard is open, the servo power supply cannot be turned on.

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.

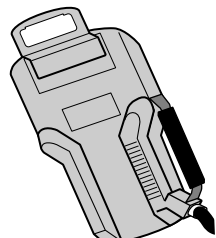


3. The servo power is turned on and [SERVO ON READY] on the playback panel lights when the operator grips the deadman switch.



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



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

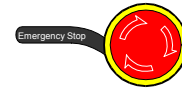
5.3 Turning the Power Off

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

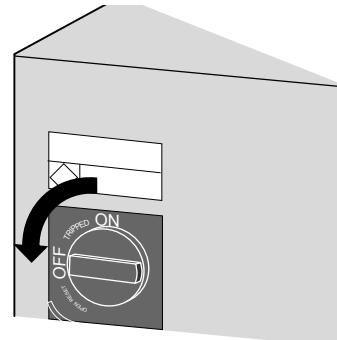


Playback Panel

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

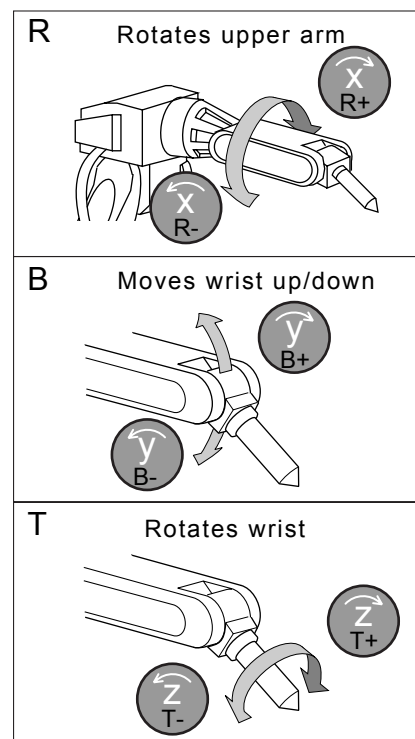
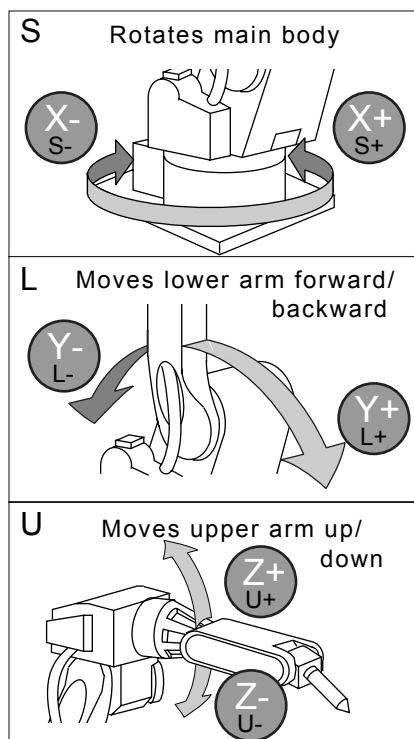
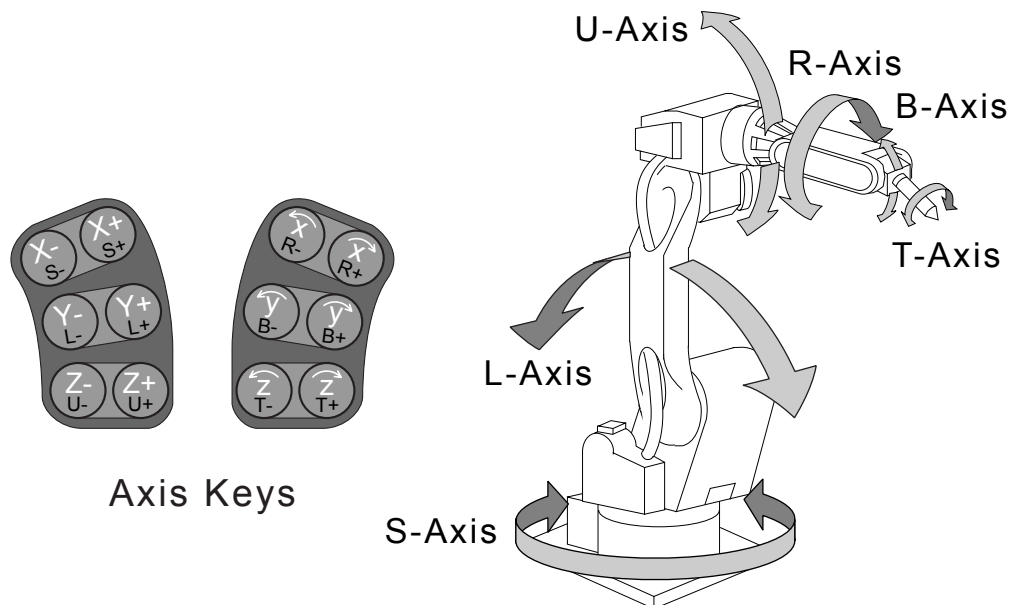
- **Always return the programming pendant to its specified position after use.**

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}*1

Explanation

*1 The position display is shown.

DATA	EDIT	DISPLAY	UTILITY
CUR POS		R1 2	TOOL:00
COORDINATE:	PULSE		
R1:S	-18402		
L	45714		
U	-28450		
R	-287		
B	8090		
T	-461		
!			

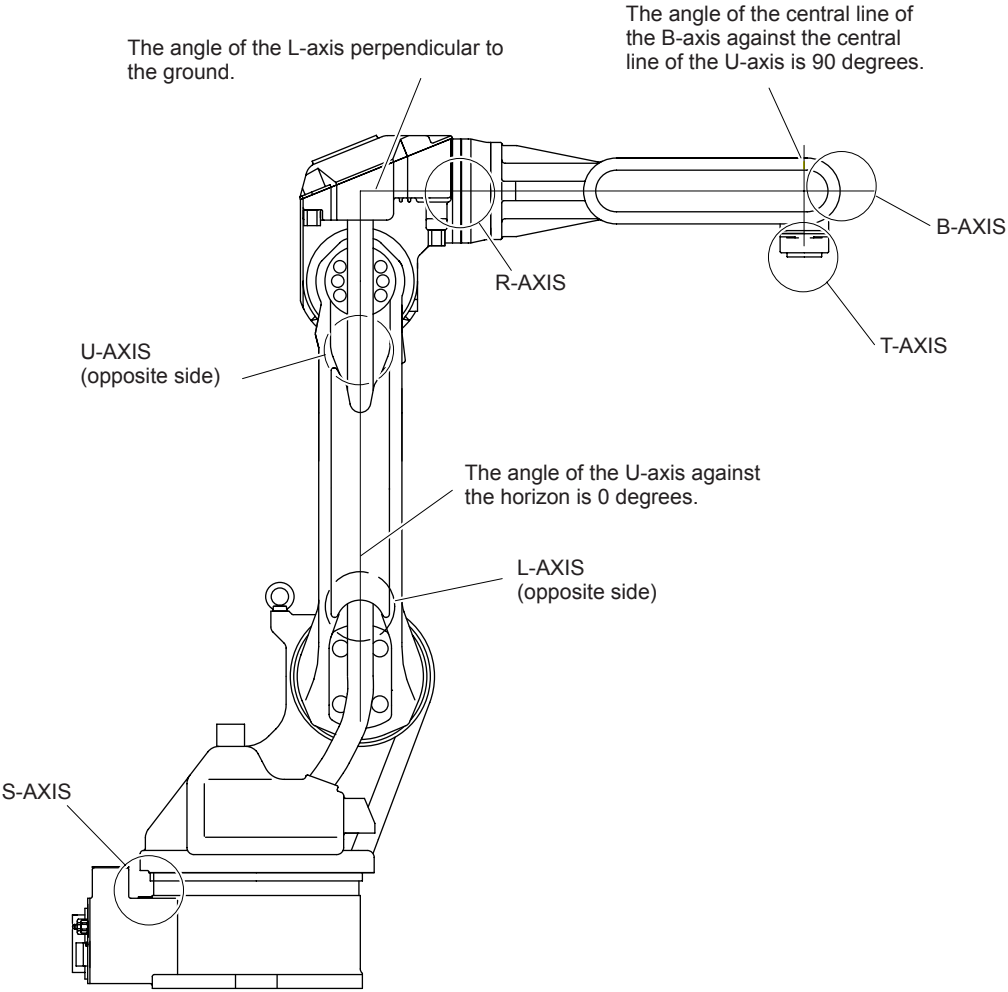
Operation

Press the AXIS KEY ➡ Press {E. STOP}*2

Explanation

*1 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.

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

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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YASNAC XRC INSTRUCTIONS

SUPPLEMENTARY FOR NORTH AMERICAN (ANSI/RIA) STANDARD

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 ELECTRIC CORPORATION





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.

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 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, 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.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

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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 %) (Built-in transformer tap switchable) Built-in transformer 240 V - 480 V - 575 V/208 V (Δ - Δ) 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% ~ -15%) at 50/60Hz(±2 %)
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

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-232C × 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

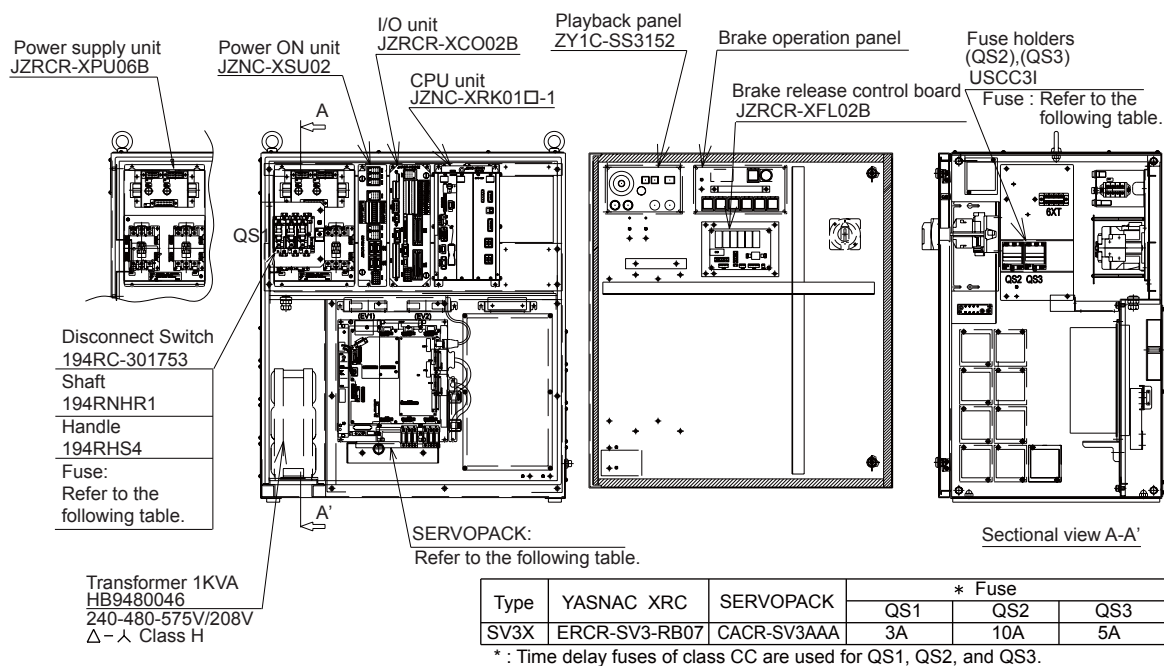
1.4 Equipment Configuration

1.4 Equipment Configuration

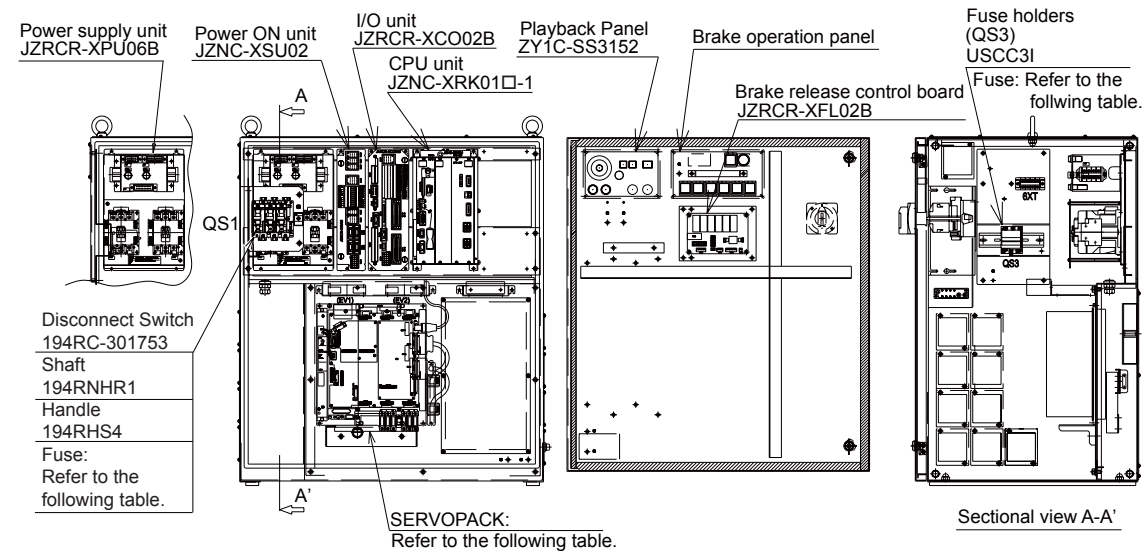
The XRC is comprised of individual units and modules (circuit boards). Malfunctioning components can generally be easily repaired after a failure by replacing a unit or a module. This section outlines the XRC equipment configuration.

1.4.1 Arrangement of Units and Circuit Boards

■ Configuration



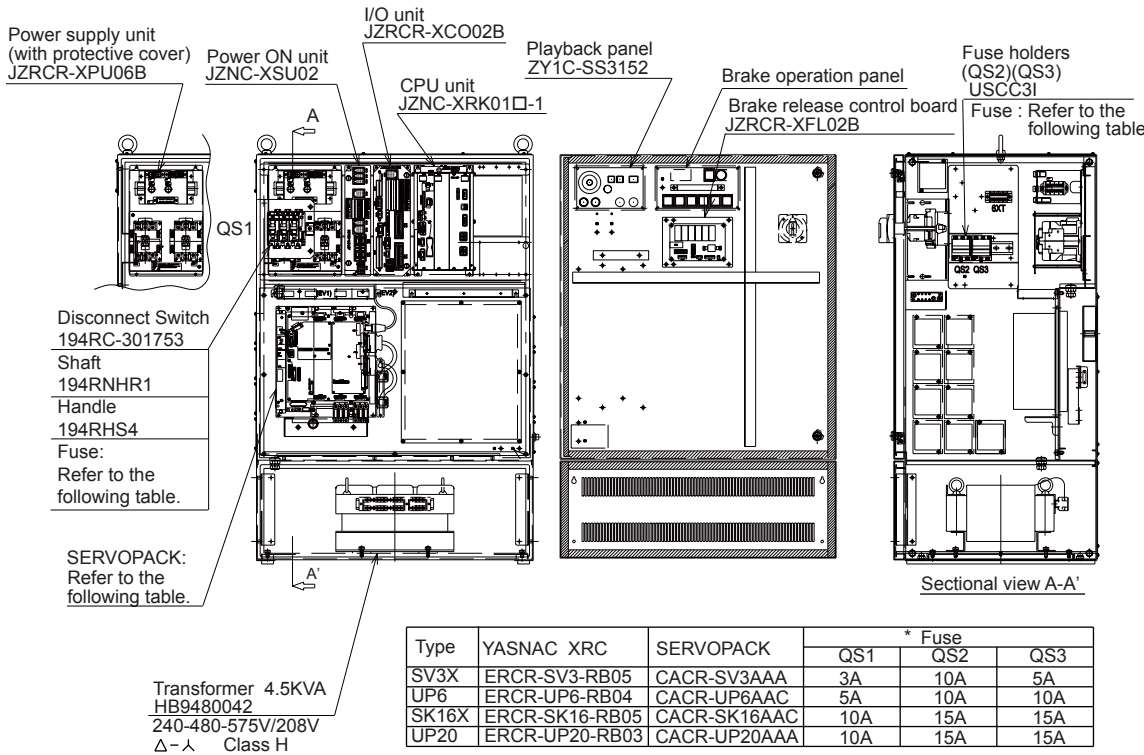
SV3X Configuration (With transformer built-in)



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)

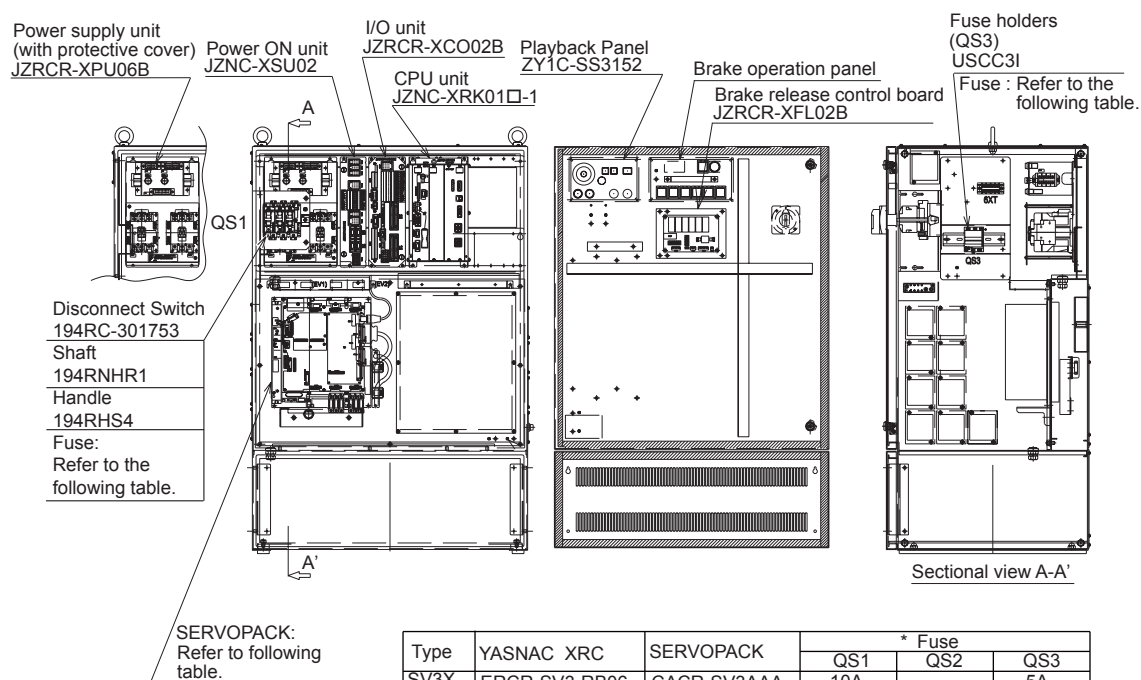


Type	YASNAC XRC	SERVOPACK	* Fuse		
			QS1	QS2	QS3
SV3X	ERCR-SV3-RB05	CACR-SV3AAA	3A	10A	5A
UP6	ERCR-UP6-RB04	CACR-UP6AAC	5A	10A	10A
SK16X	ERCR-SK16-RB05	CACR-SK16AAC	10A	15A	15A
UP20	ERCR-UP20-RB03	CACR-UP20AAA	10A	15A	15A

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

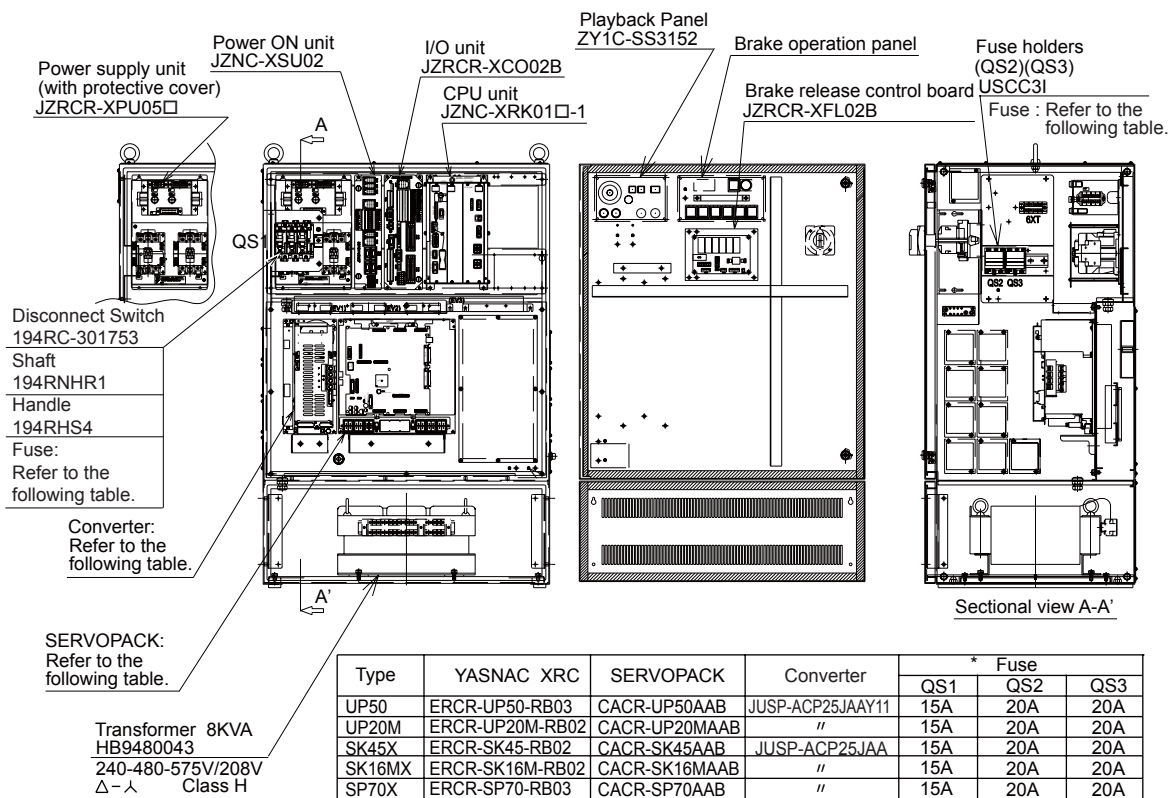
SV3X, UP6, SK16X, UP20 Configuration (With transformer built-in)

1.4 Equipment Configuration



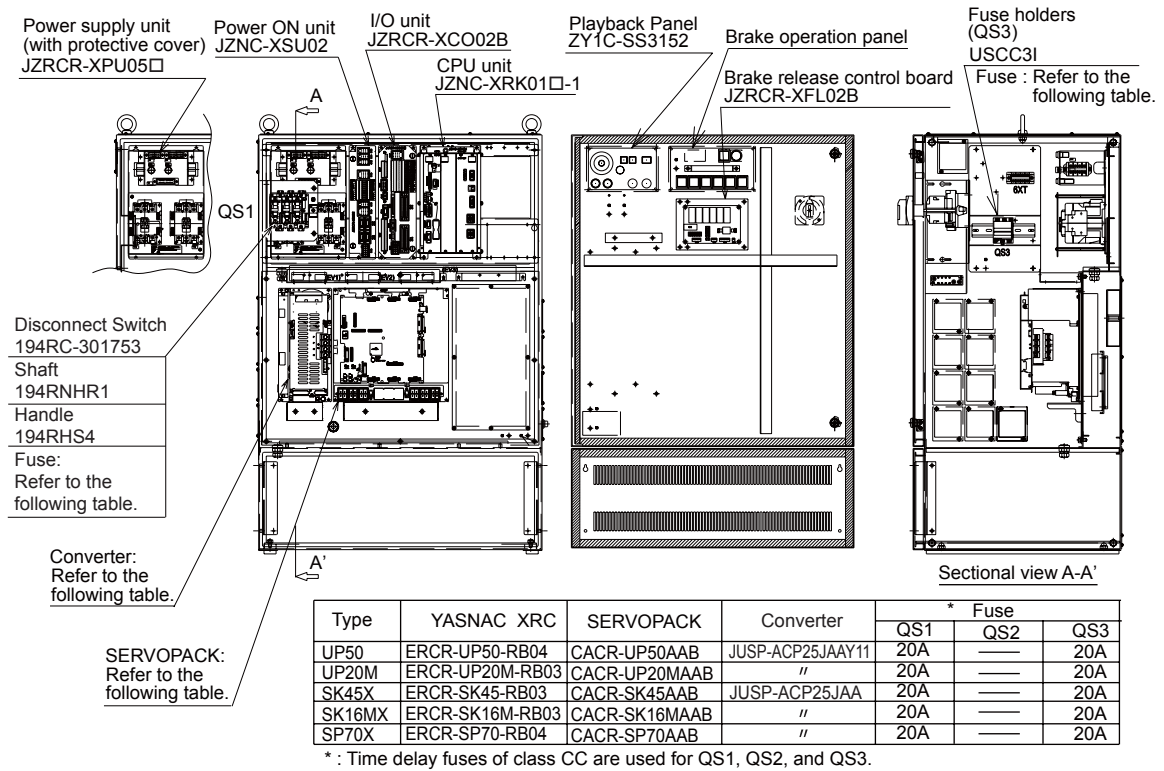
* : Time delay fuses of class CC are used for QS1, and QS3.

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

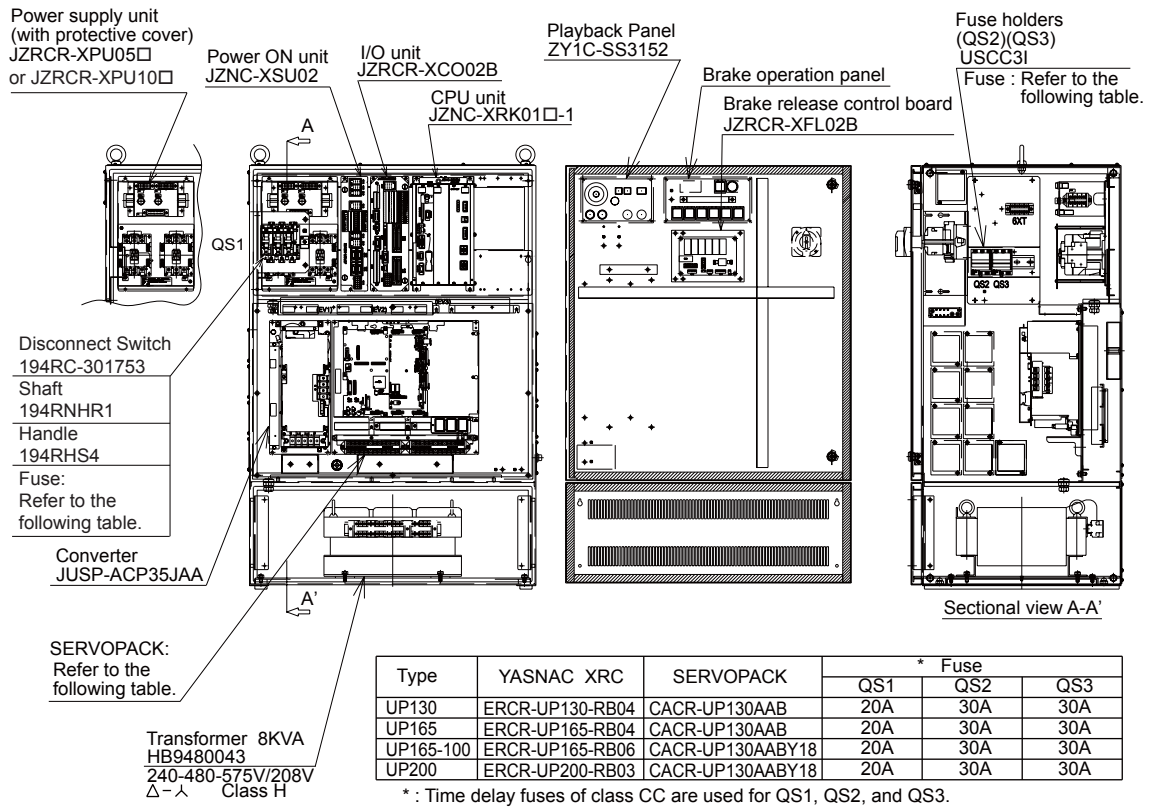


* : Time delay fuses of class CC are used for QS1, QS2, and QS3.

SK45X, SK16MX, UP50, UP20M, SP70 Configuration (With transformer built-in)

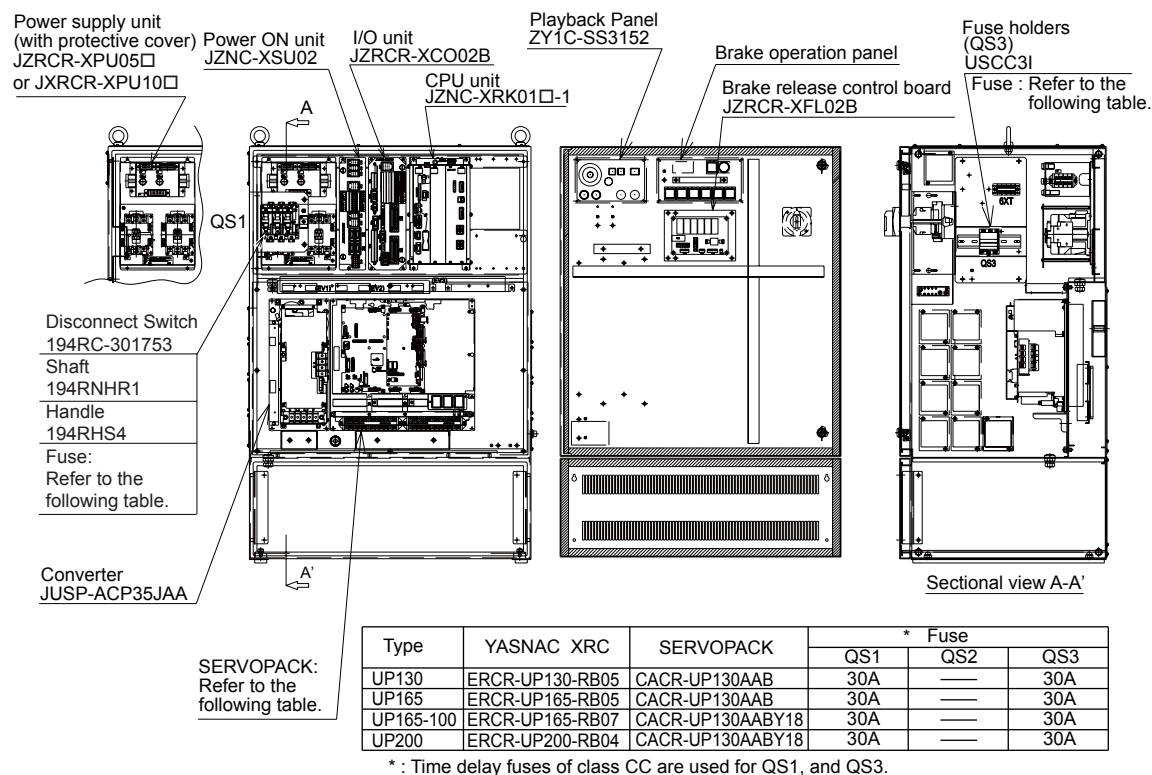


SK45X, SK16MX, UP50, UP20M, SP70 Configuration (Without transformer)

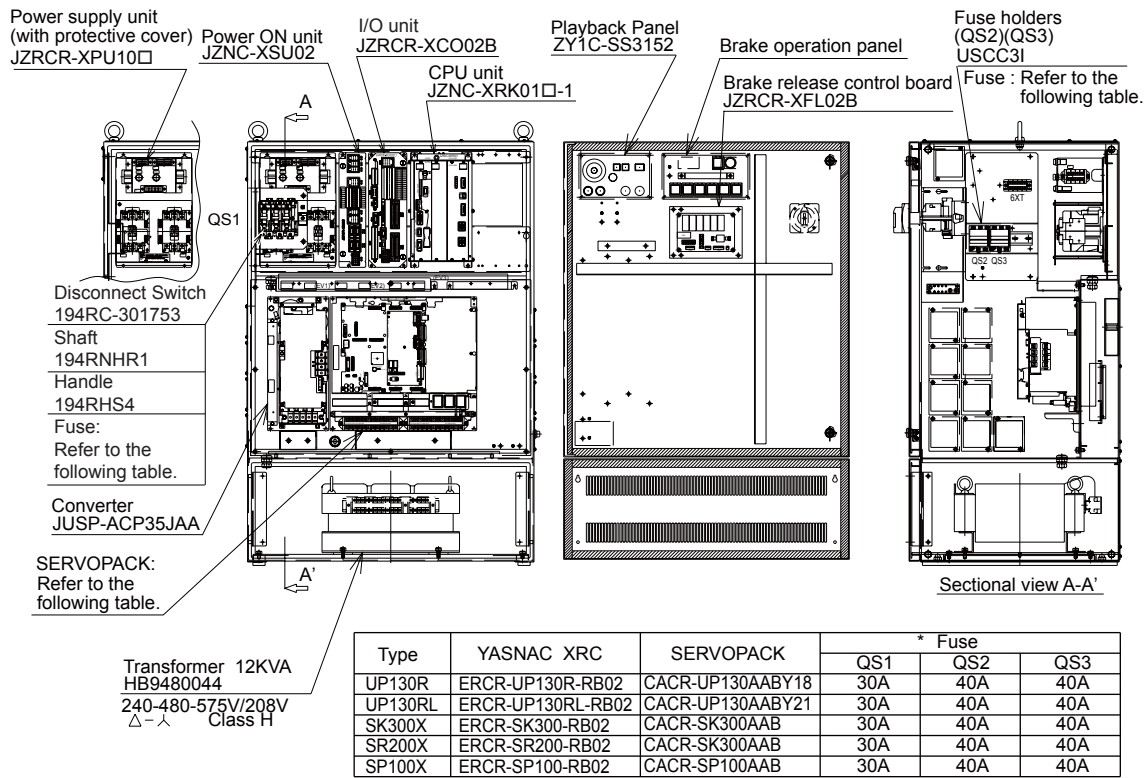


UP130, UP165, UP165-100, UP200 Configuration (With transformer built-in)

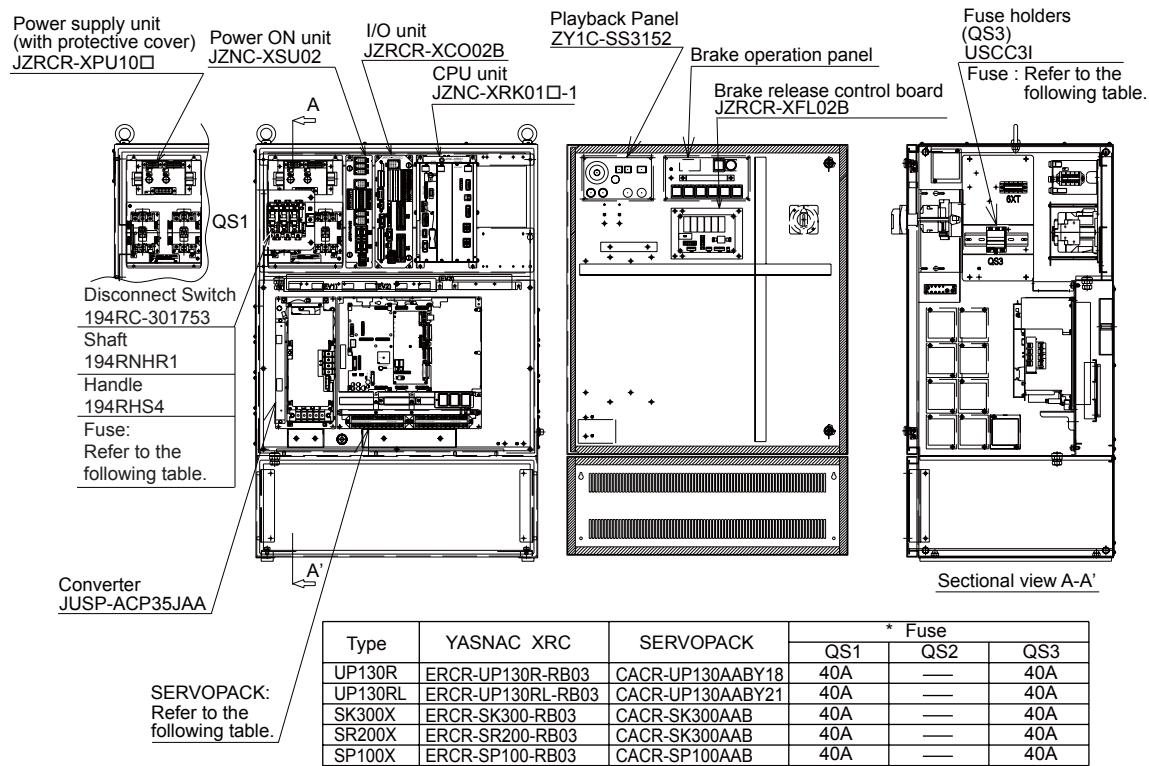
1.4 Equipment Configuration



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



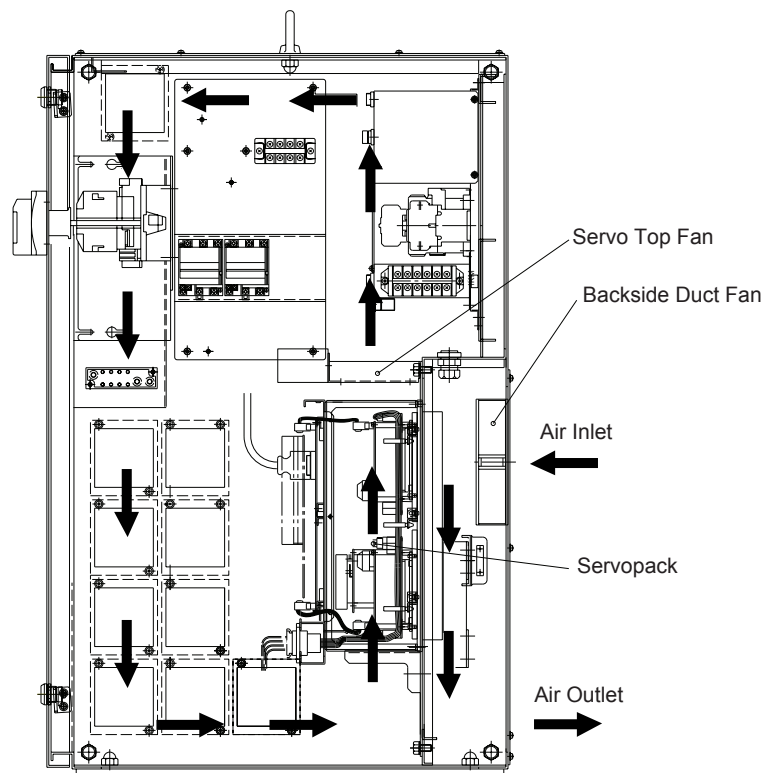
UP130R, UP130RL, SK300X, SR200X, SP100X Configuration (With transformer built-in)



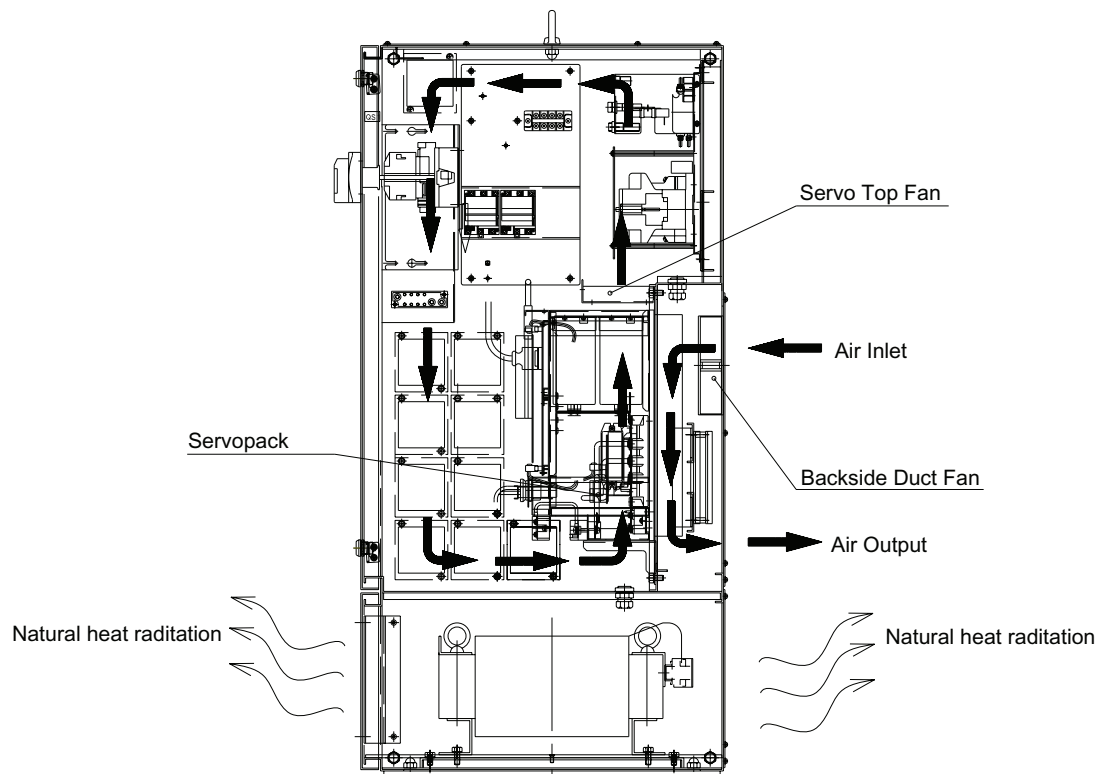
UP130R, UP130RL, SK300X, SR200X, SP100X Configuration (Without transformer)

1.4 Equipment Configuration

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.

2.1 Power Supply Unit



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.

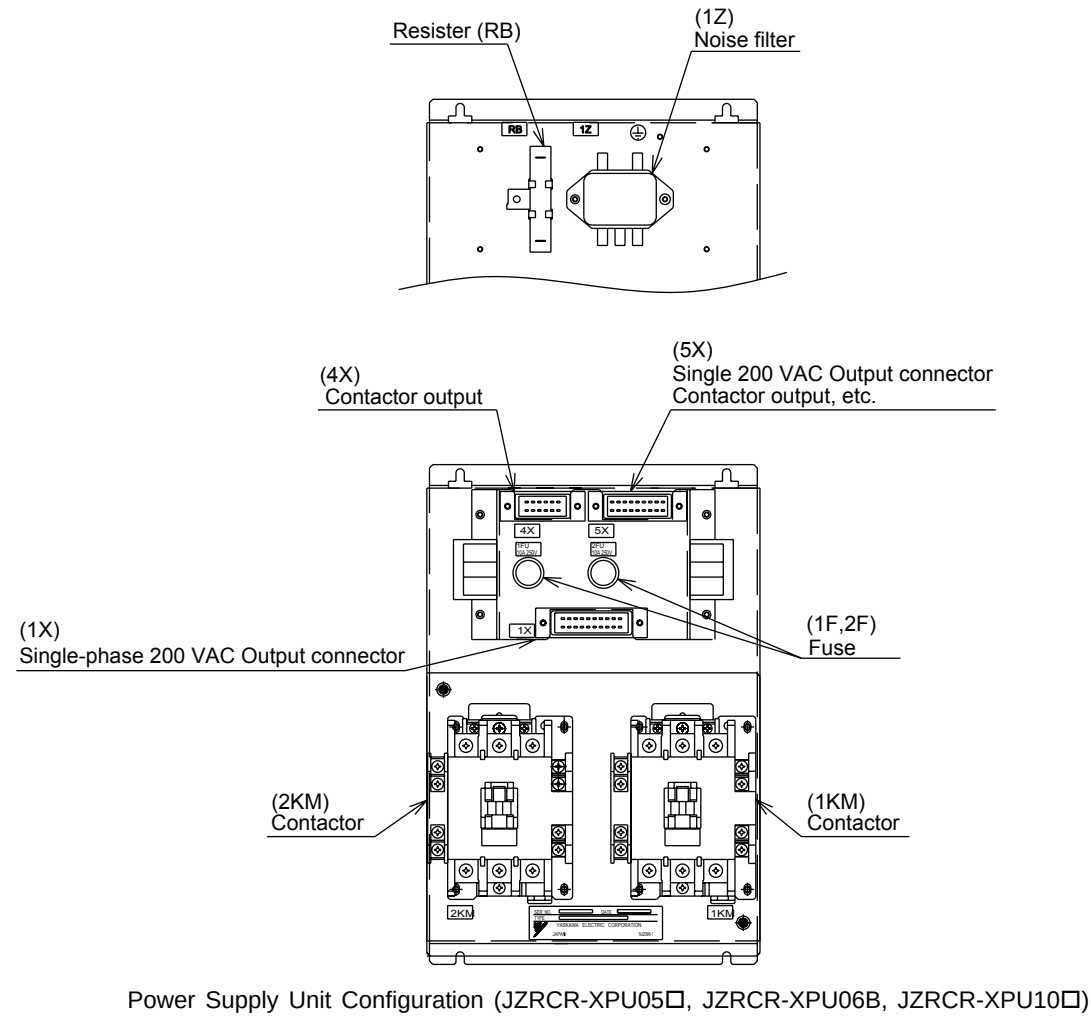
2.1 Power Supply Unit

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.

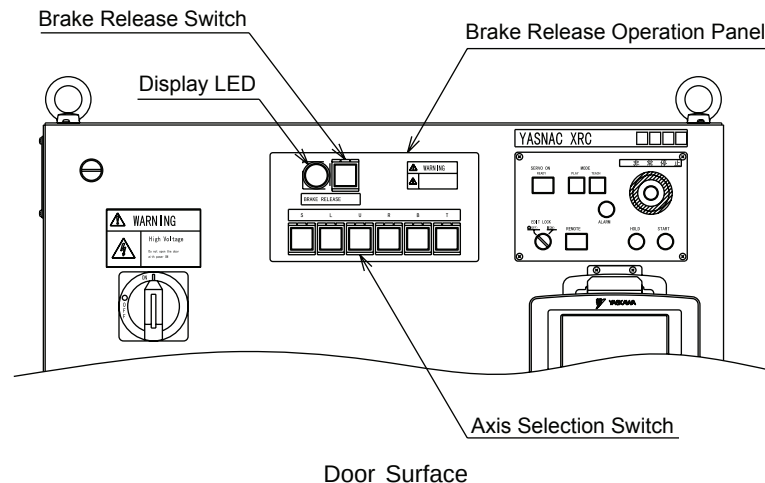
Power Supply Unit Models

Model	Robot Type
JZRCR-XPU06B	SV3X, UP6, SK16X, UP20
JZRCR-XPU05□	UP50, UP20M, SK45X, SK16MX, SP70X
JZRCR-XPU05□ or JZRCR-XPU10□	UP130, UP165, UP165-100, UP200
JZRCR-XPU10□	UP130R, UP130RL, SK300X, SR200X, SP100X



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.

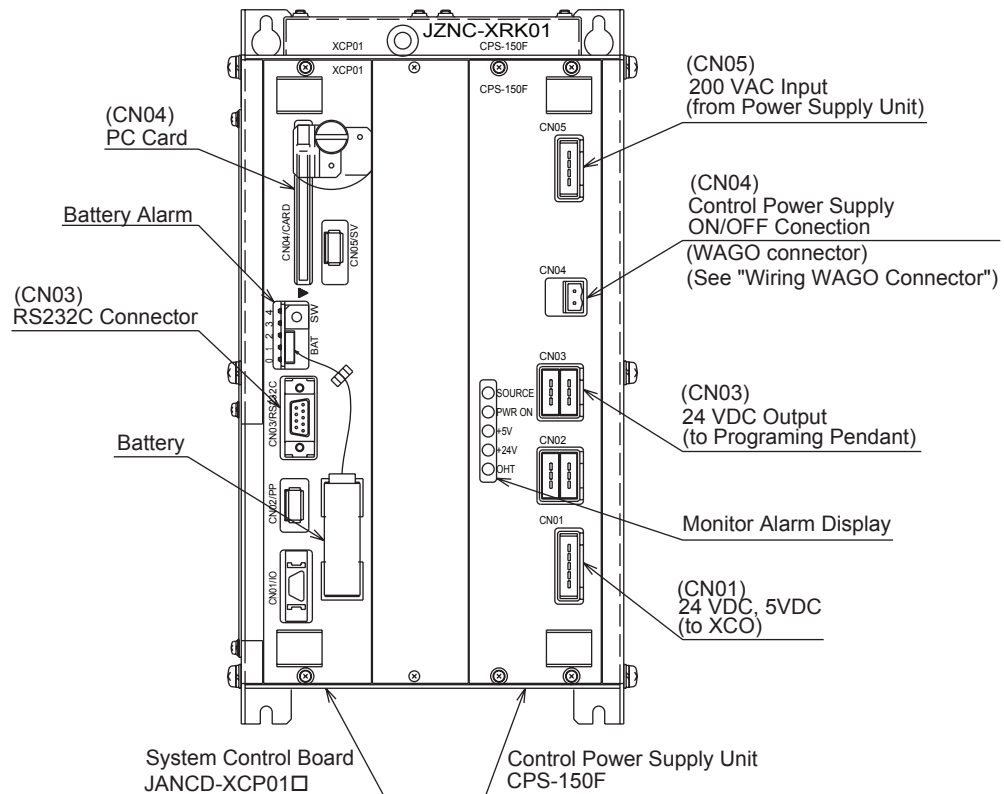
- Release the axis brake one by one.

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-XRK01□-□)

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 or JANCD-XIF04). 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.

2.3 CPU Rack

■ 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	DISPLAY	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		

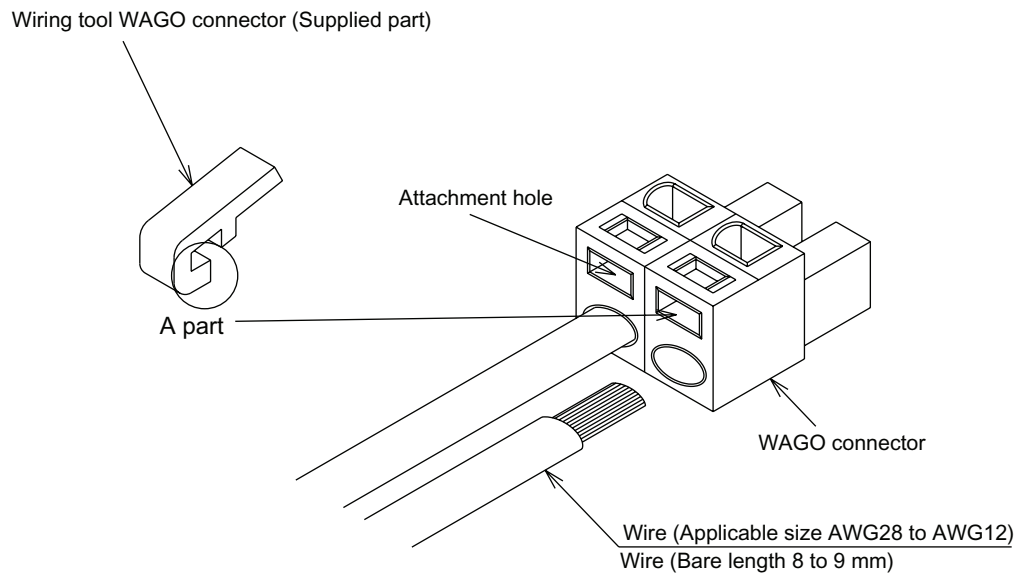
Items	Specifications
Control Power ON/OFF	To turn on the XRC controller power, turn the main switch to the ON position then turning on the control power supply. If the controller is not located at the workplace, the control power supply can be turned ON and OFF by input from external device. It is operated by the external switch connected with CN 04 of control power supply unit as shown in the following figures. (CN04 is shortaged when shipment) Control Power Supply Unit (CPS-150F) CN4:231-102/026-000 (WAGO) *1 Connection to Control Power Supply Unit GO “Wiring WAGO Connector” for wiring of CN04 connector.

■ Wiring WAGO Connector

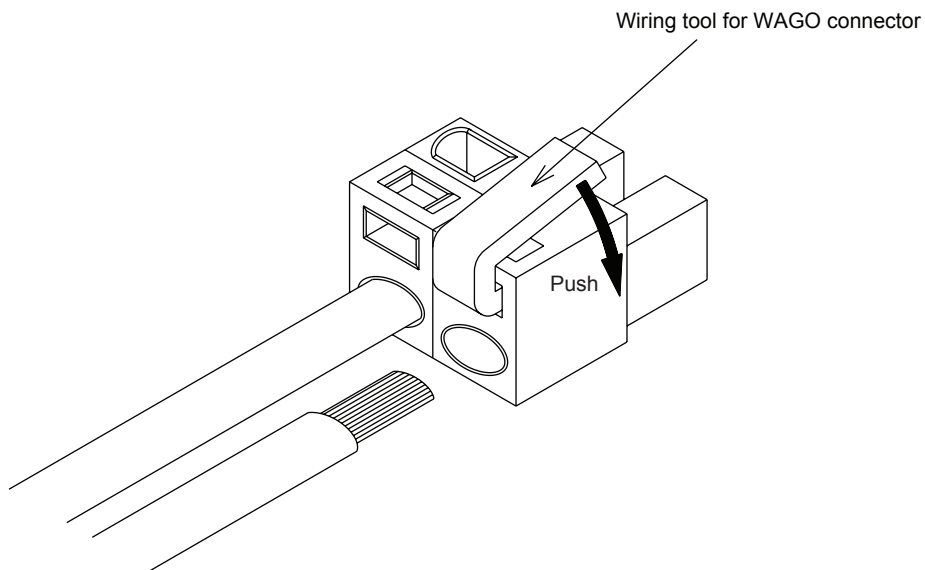
CN04 on the control power supply unit (CPS-150F) is equipped with a connector produced by WAGO. The “wiring tool for WAGO connector” is necessary to wire with WAGO connector. Two wiring tools are provided with the XRC as supplied parts. The wiring procedure is described as follows:

2.3 CPU Rack

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.

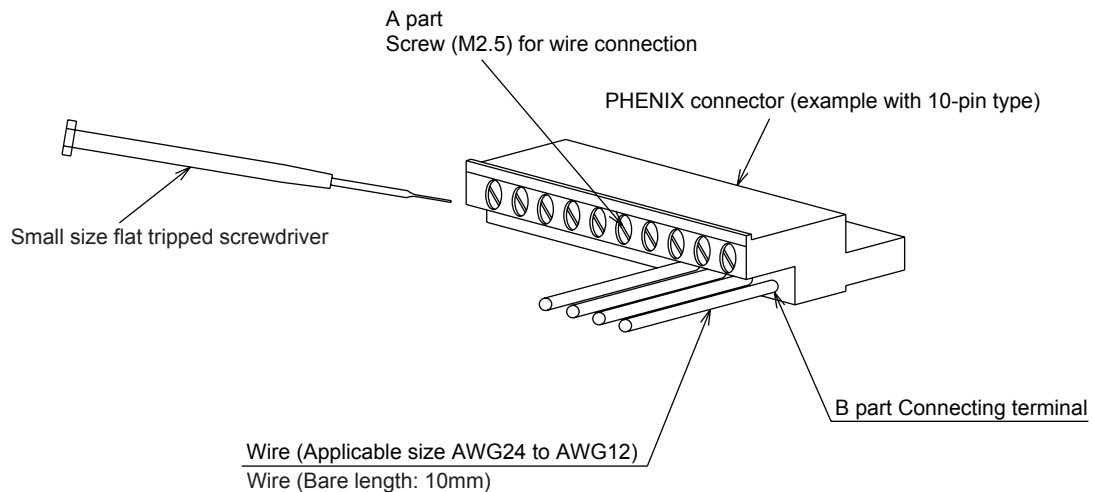
■ Wiring PHOENIX Connector

CN05, 06, 40 and 44 on the I/O unit (JZRCR-XCO02B) and CN27 and 28 of the power ON unit (JZRCR-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)



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

2.4 I/O Unit (JZRCR-XCO02B)

2.4 I/O Unit (JZRCR-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).

(CN05)

External Emergency Stop
External Servo ON, External Hold
Safeguard

Specific Output Connector (PHENIX connector)
(Refer to "Wiring PHENIX Connector".)

(CN06)

For fetch of emergency stop direct output
For fetch of deadman signal
Power Supply ON/OFF

Specific Output Connector (PHENIX connector)
(Refer to "Wiring PHENIX Connector".)

(CN44)

Direct IN (PHENIX connector)
(Refer to "Wiring PHENIX Connector".)

(CN43)

Deadman Switch and Input Connector
for Emergency Stop from programming pendant

(CN42)

Input Connector for Emergency Stop
from the playback panel

(CN41)

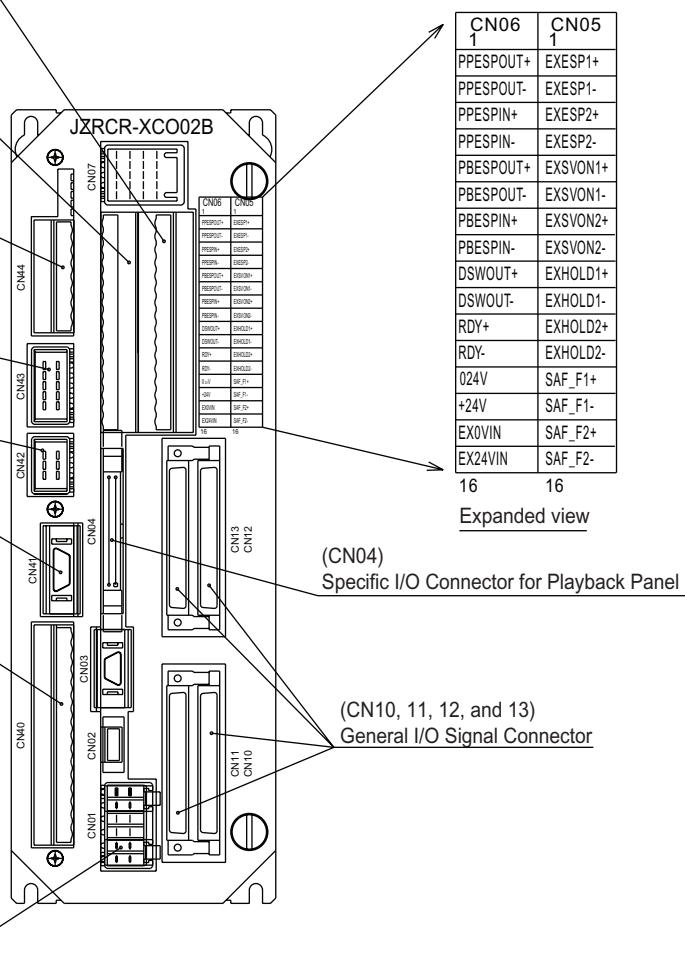
For connection to Power ON unit

(CN40)

Forced Reset, Full-speed Set,
Switch to Safe Speed, Hanger Switch
(PHENIX connector)
(Refer to "Wiring PHENIX connector".)

(CN01)

Power Supply Input



I/O Unit Configuration (JZRCR-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.

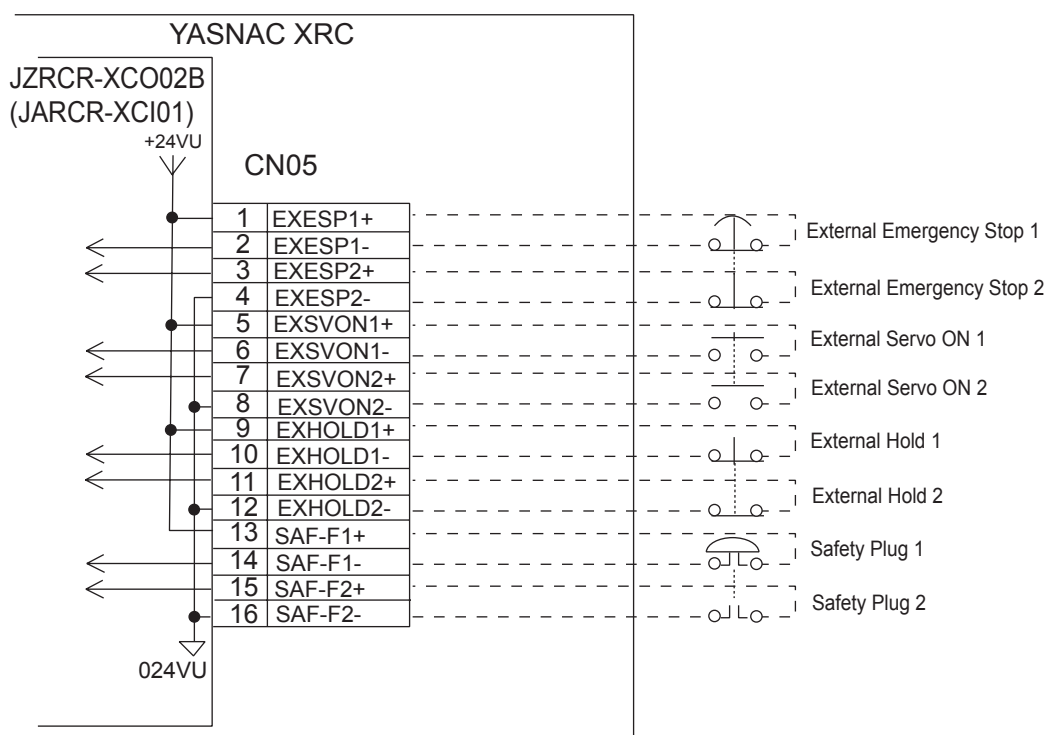
- Safety circuit control (depulexing + cross-diagnosis) function
- Specific I/O for playback panel (IN / OUT = 8 points / 8 points)
- Direct input (3 points)
- Deadman Switch Control Circuit



CAUTION

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

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

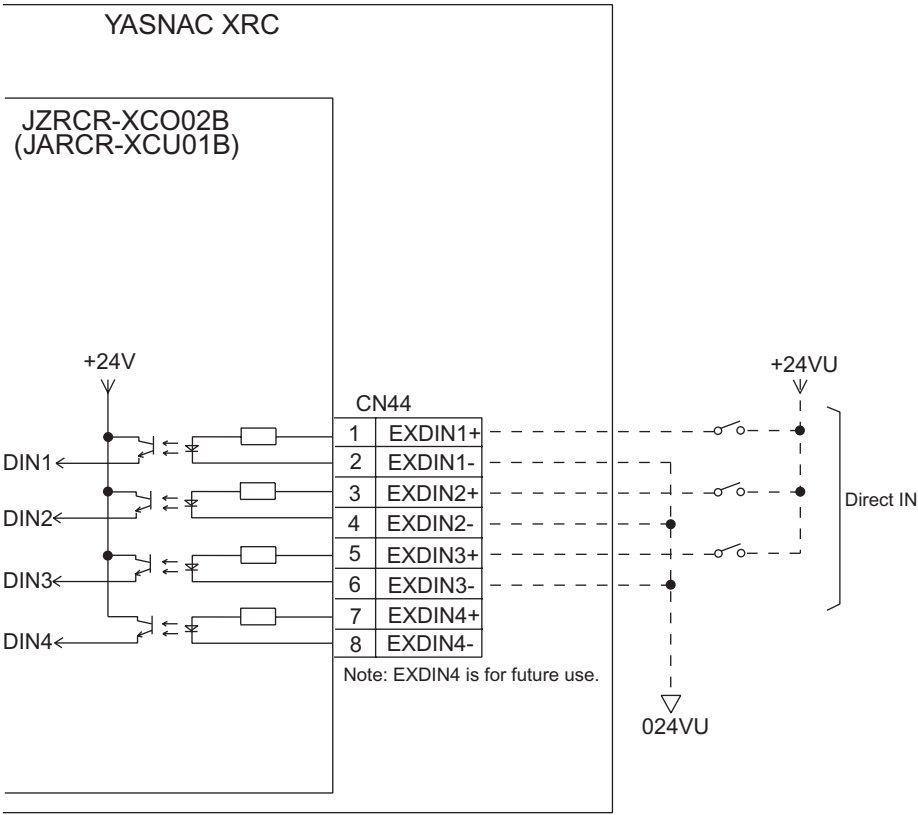


JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

2.4 I/O Unit (JZRCCR-XCO02B)

■ Direct IN

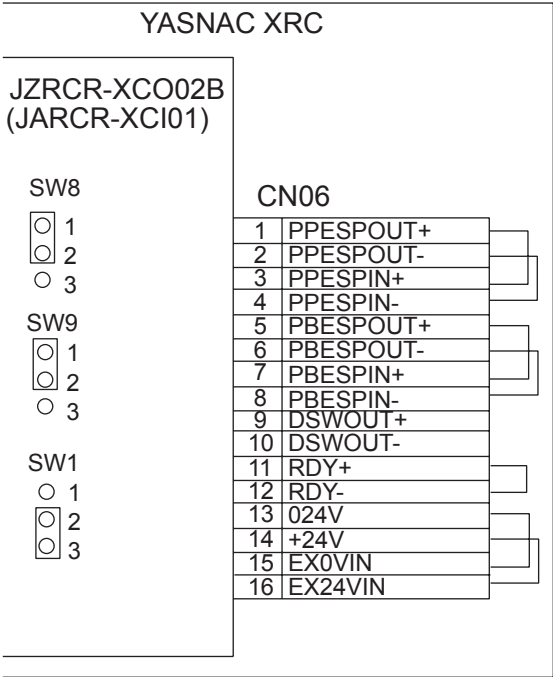
The signals can be directly and externally connected.



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

■ Connected Jumper Leads Before Shipment

CN06 of the I/O unit (JZRCCR-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 (JARCCR-XCI01) are set across 2 and 3 of SW 1, 1 and 2 of SW8 , and 1 and 2 of SW9.

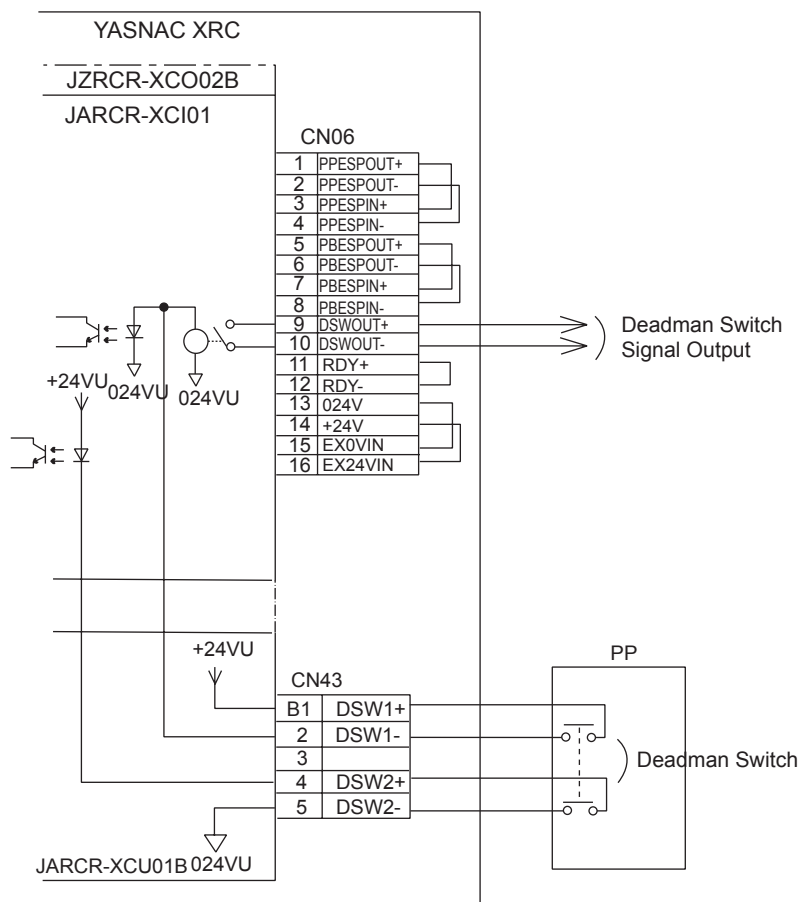


JZRCCR-XCO02B Specific I/O Circuit Board Allocation and Connection Diagram

2.4 I/O Unit (JZRRCR-XCO02B)

■ Deadman Switch Signal Output

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

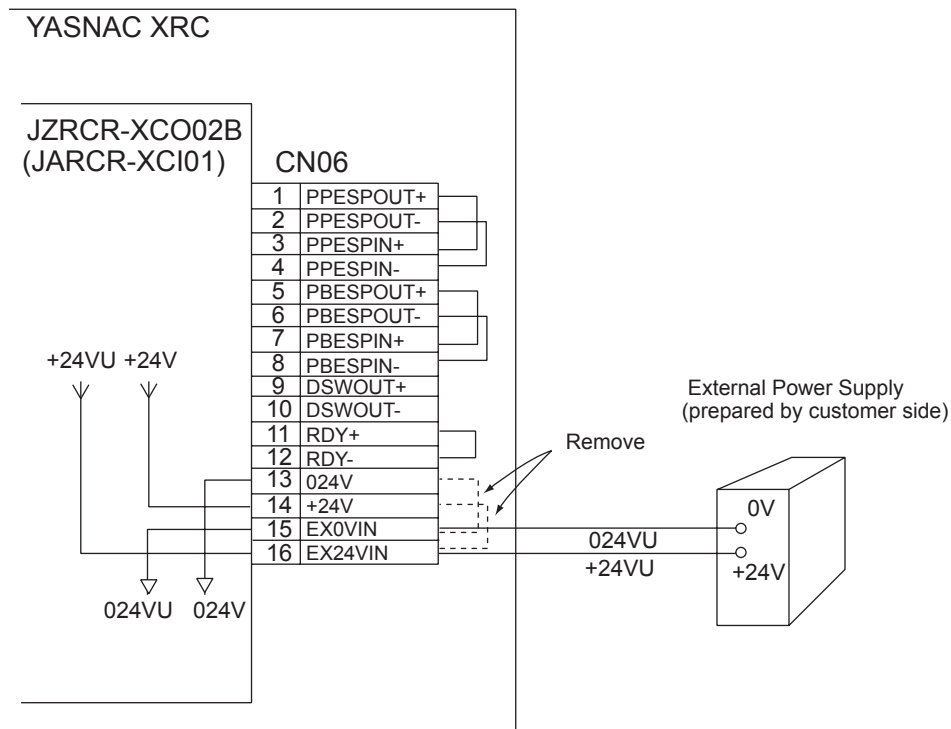


JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

■ 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 (JZRCCR-XCO02B).
2. Connect CN06-16 and -15 of the I/O unit (JZRCCR-XCO02B) to +24 V and 0V of the external power supply respectively.

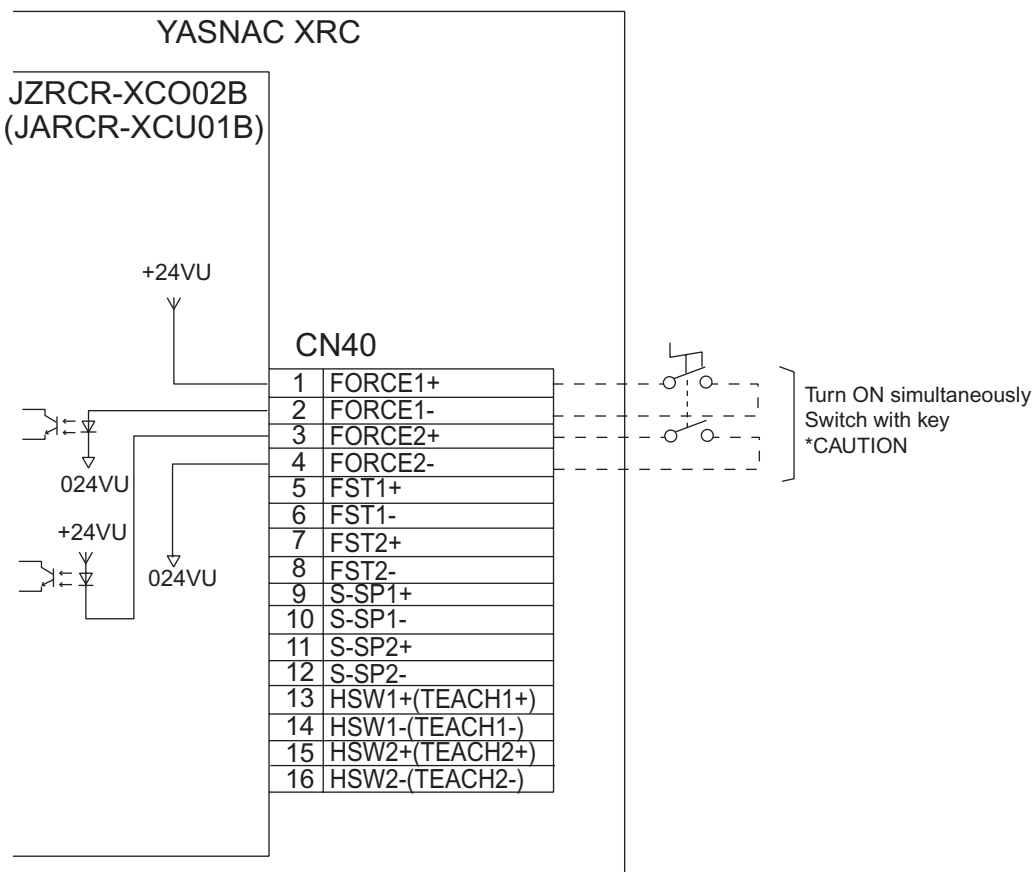


JZRCCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

2.4 I/O Unit (JZRRCR-XCO02B)

■ 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.



JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram



CAUTION

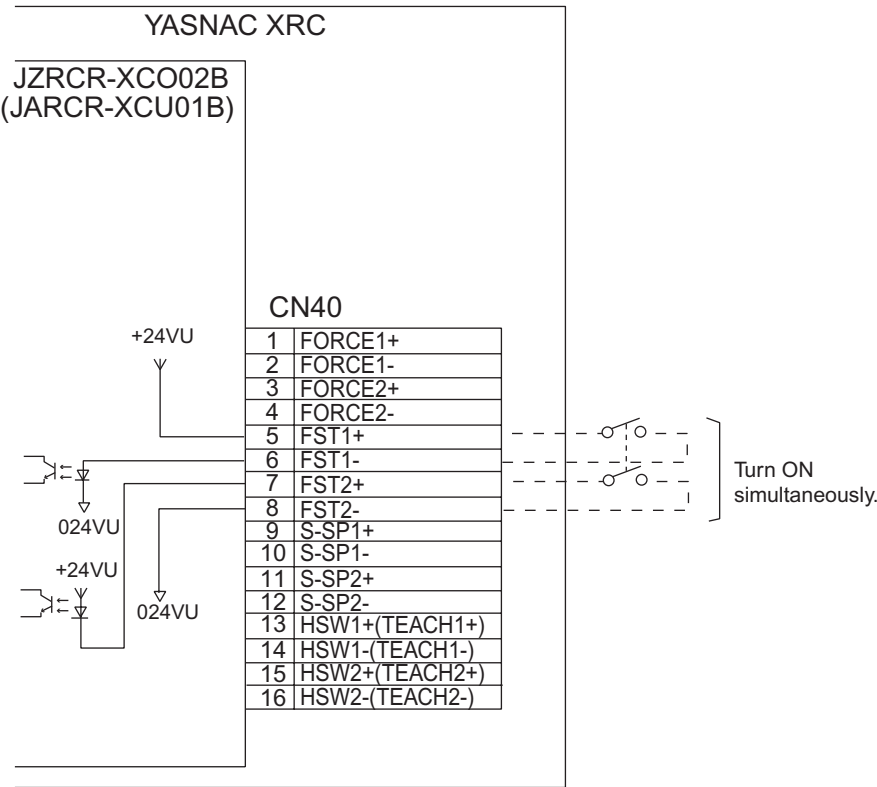
Do not use the "FORCE" (Forced release) input.

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.



JZRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

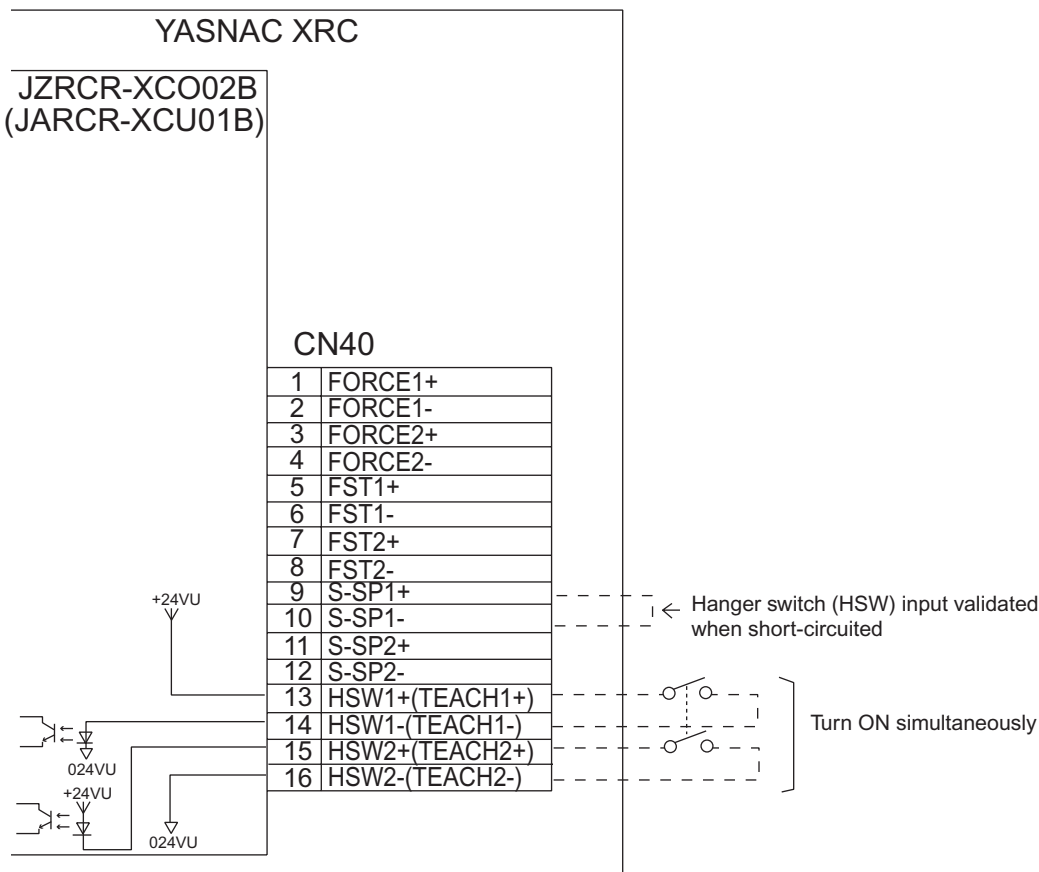
2.4 I/O Unit (JZRRCR-XCO02B)

■ 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.

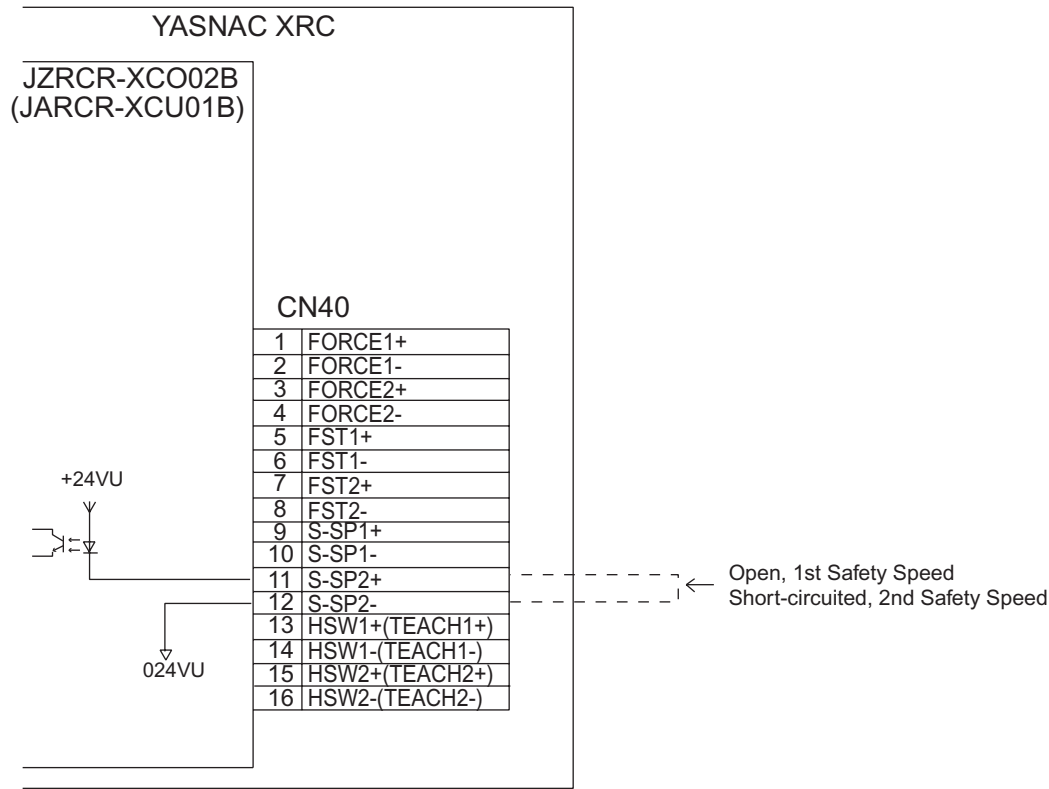


JZRRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

■ 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.



JZRCR-XCO02B Specific Input Circuit Board Allocation and Connection Diagram

2.4 I/O Unit (JZRRCR-XCO02B)

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 safe-guard 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.	

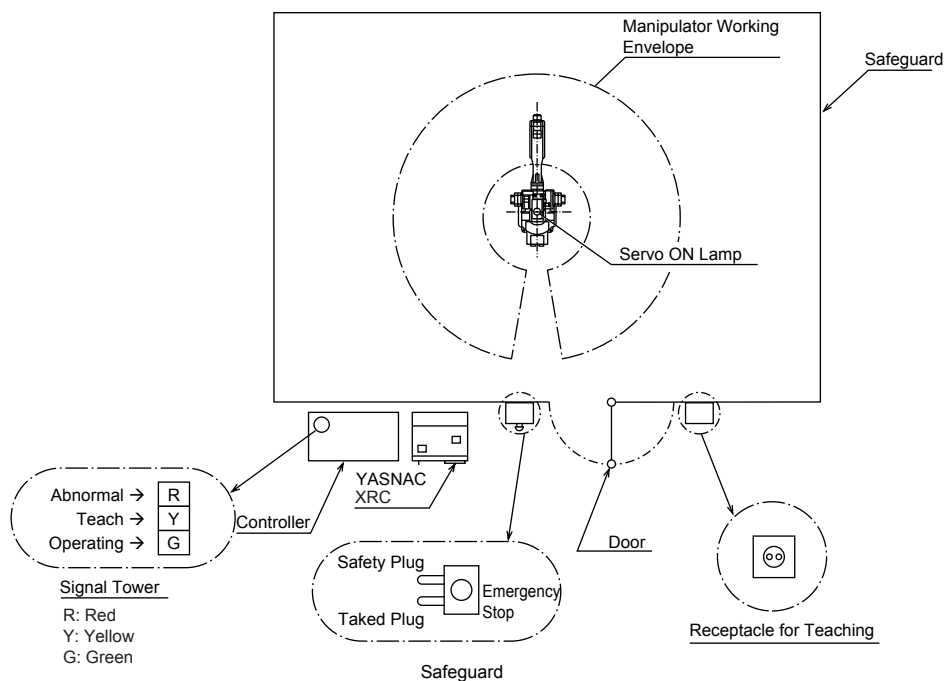
Specific Input List (XCO02B)

Terminal	Input Name / Function	Factory Setting
DIN4	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 Whe 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		

2.4 I/O Unit (JZRCCR-XCO02B)

■ 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).

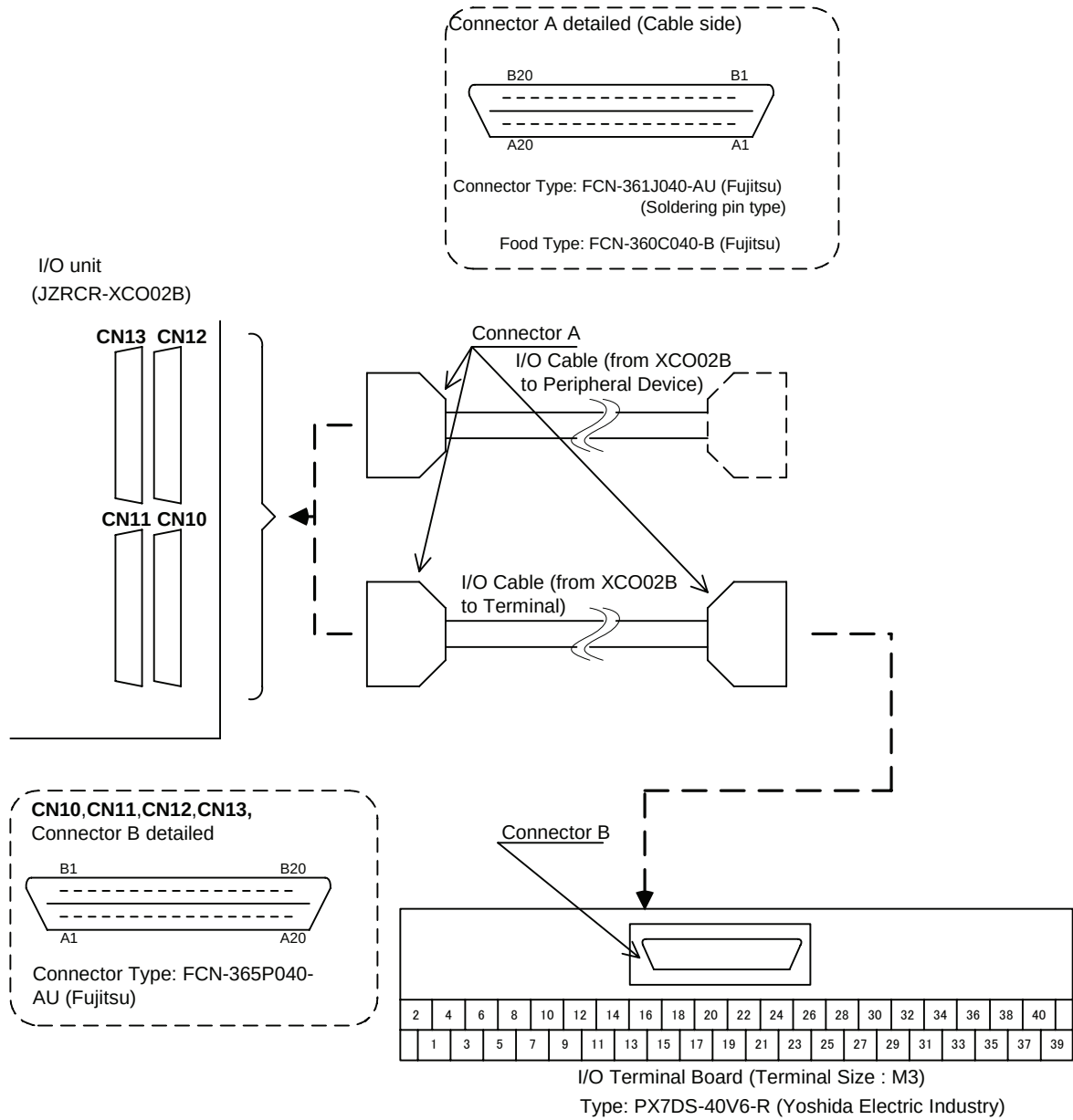
I/O can be separated as specific I/O and general I/O allocated software as follows:

- 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)

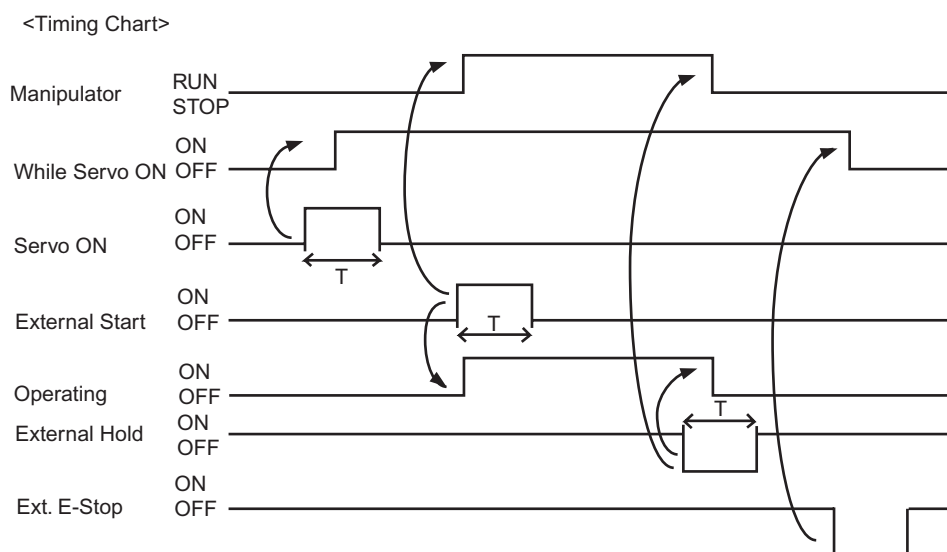


2.4 I/O Unit (JZRCR-XCO02B)

■ Specific I/O Signal Related to Start and Stop

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

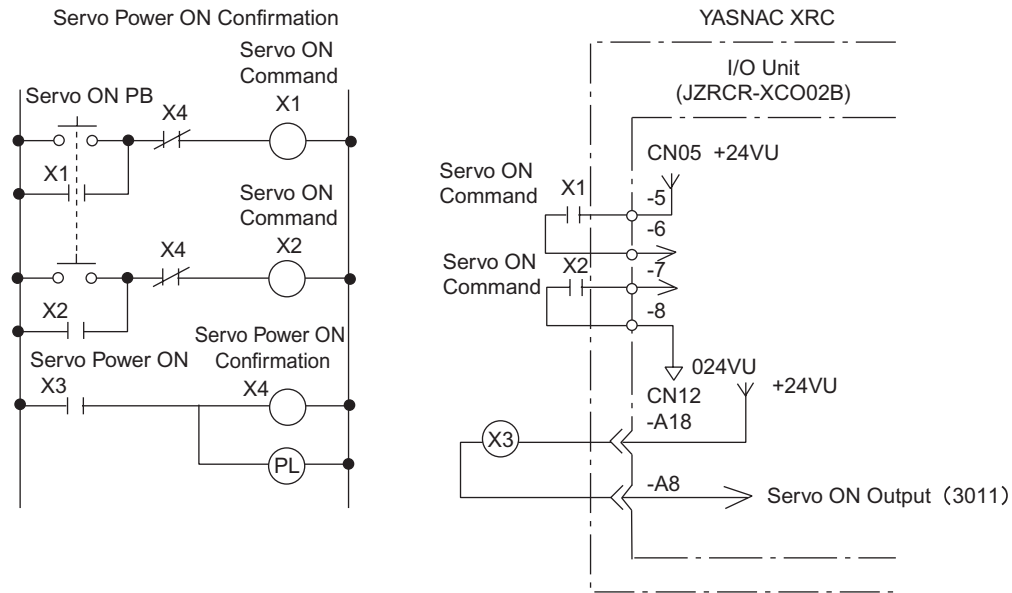
- Servo On (depending on application:JARCR-XCI03)
- External Servo On (common to all application:JARCR-XCI01)
- External Start (depending on application:JARCR-XCI03)
- Operating (depending on application:JARCR-XCI03)
- External Hold (common to all application:JARCR-XCI01)
- External Emergency Stop (common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



Note: Set T=100msec or more

Example of Servo ON Sequence Circuit from External Device

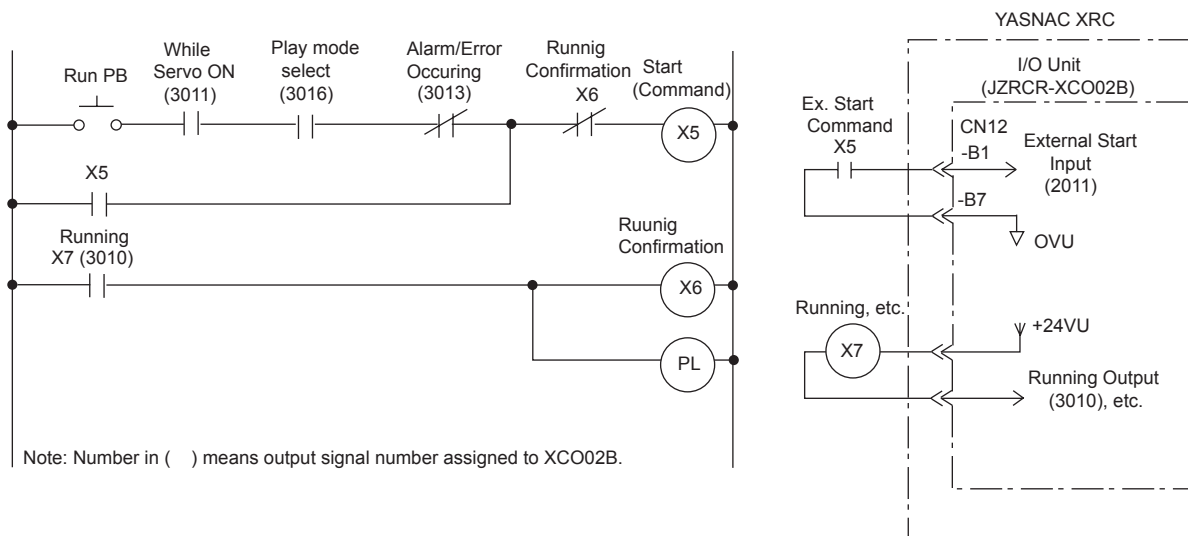
Only the rising edge of the servo ON signal is valid. This signal turns ON the manipulator servo power supply. The set and reset timings are shown in the following.



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.

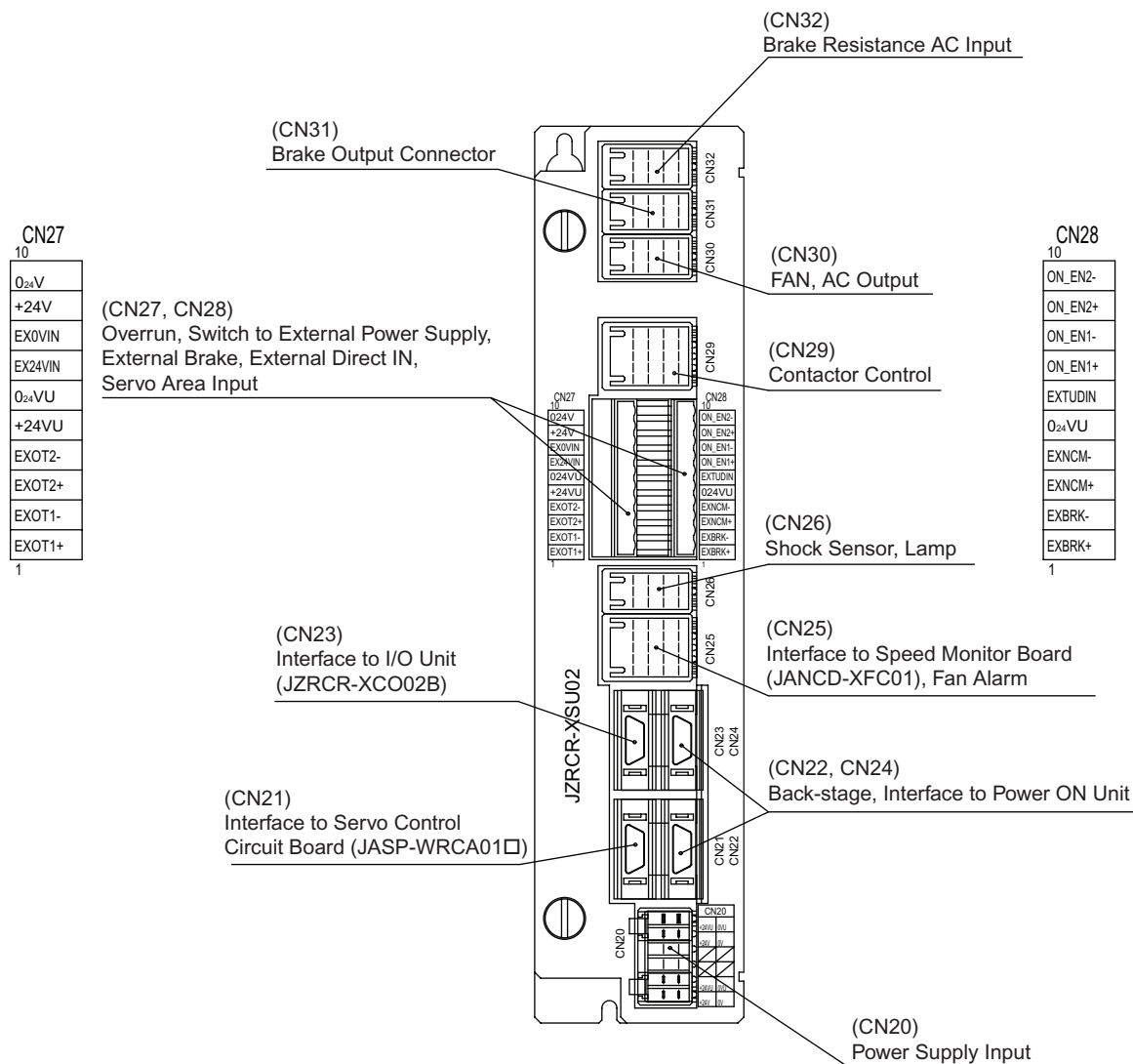


Note: Number in () means output signal number assigned to XCO02B.

2.5 Power ON Unit (JZRCR-XSU02)

2.5 Power ON Unit (JZRCR-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 (JZRCR-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:

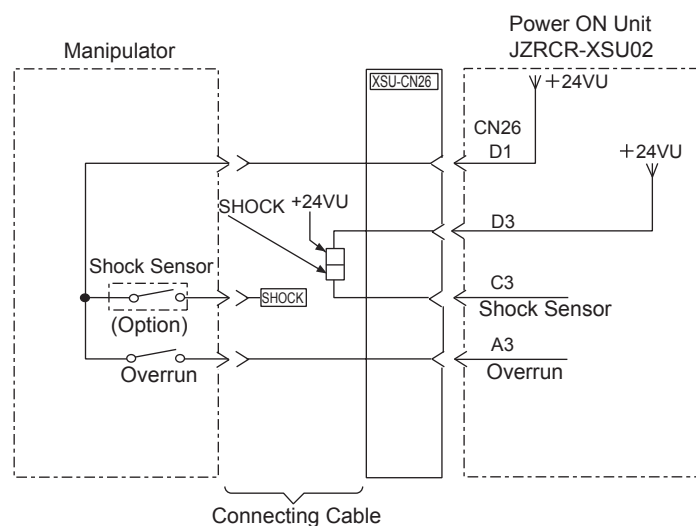
- Specific I/O circuit, for instance, servo power supply contactor I/O circuit and emergency stop circuit
- Brake power supply circuit and its output
- Overrun(OT) shock sensor(SHOCK) and lamp light power supply output to robot

■ 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		



Shock Sensor Connection



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 Reliasing” of the YASNAC XRC Instructions for details.

2.5 Power ON Unit (JZRRCR-XSU02)

■ 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.

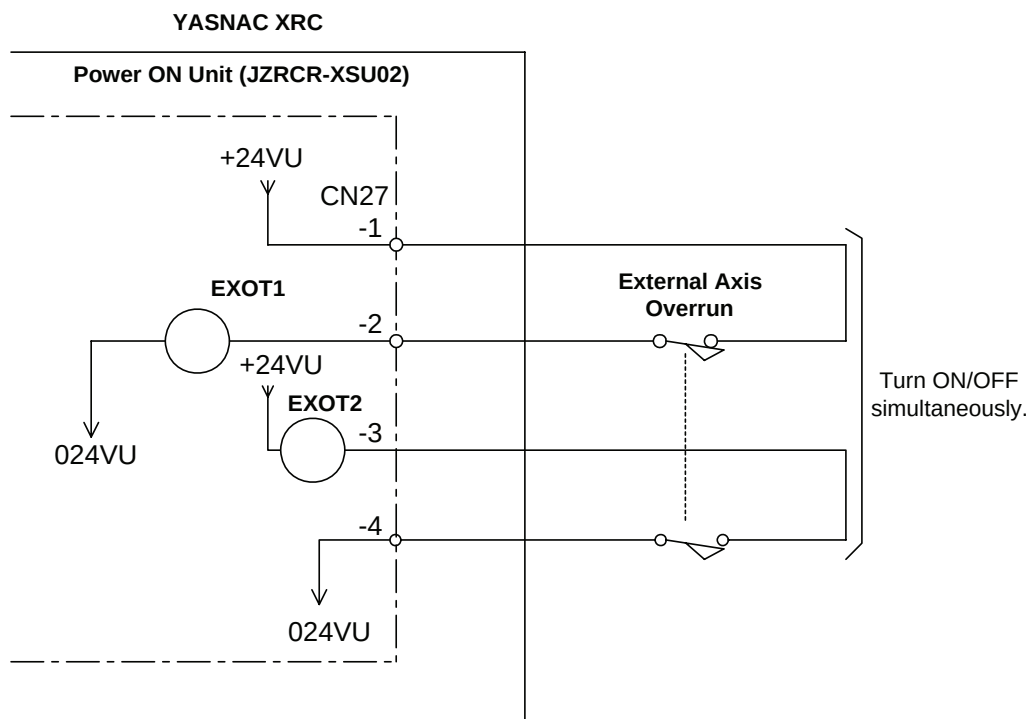
1. Remove jumper leads connected between CN27-1 and -2 , and CN27-3 and -4 of power ON unit (JZRRCR-XSU02).
2. Connect the overrun input of an external axis between CN27-1 and -2 , and CN27-3 and -4 of power ON unit (JZRRCR-XSU02) as shown in the figure below. The input switch for external axis overrun 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.

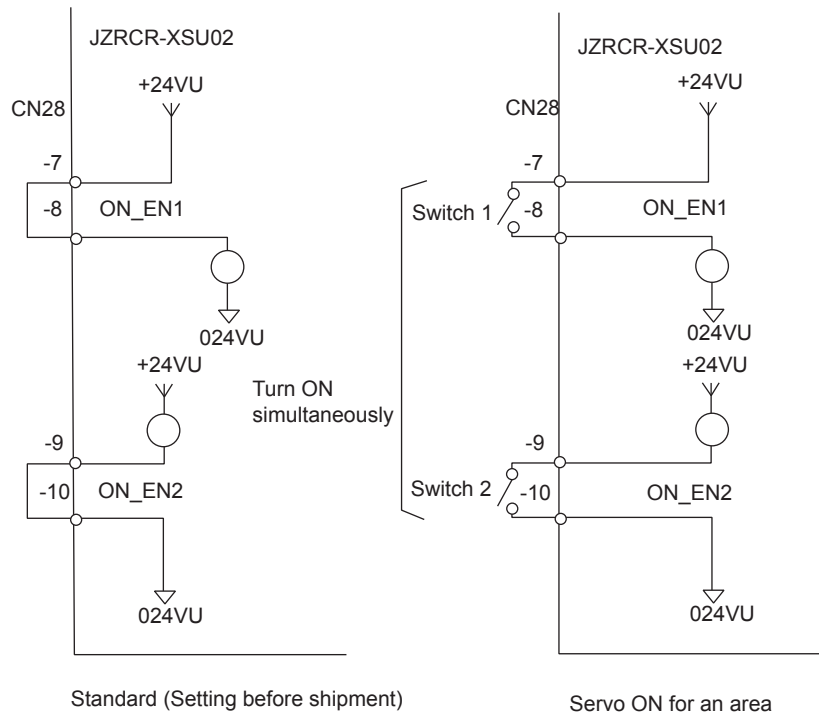


■ Servo ON Enable Input (ON_EN1 and 2)

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 (JZRCR-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

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 Configuration

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□	-

2.6 SERVOPACK

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-ACP25JAAY11	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□	-

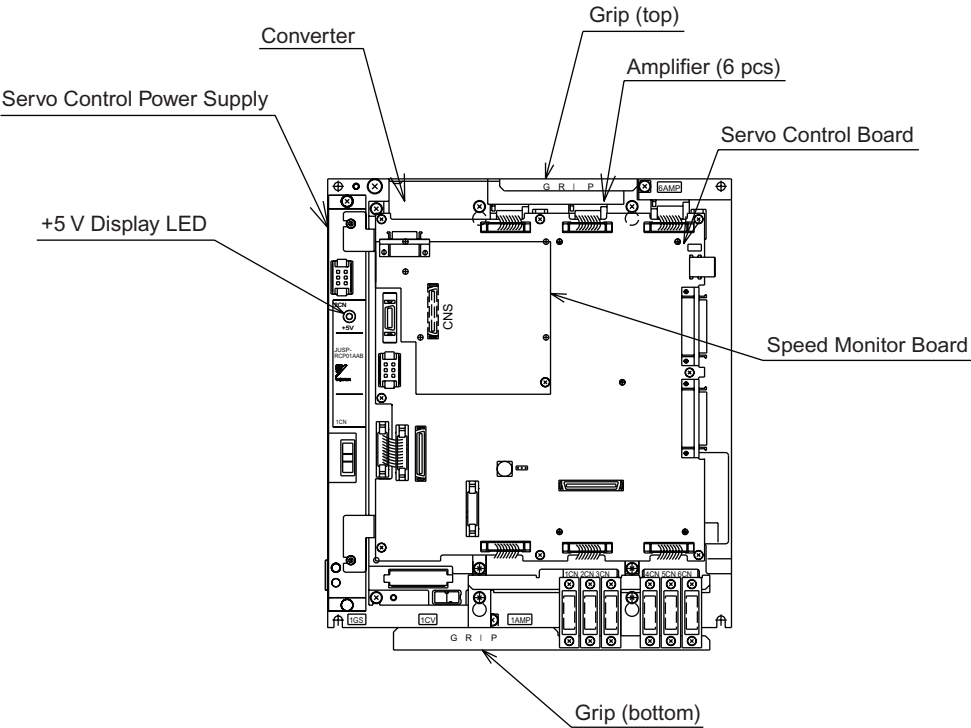
SERVOPACK Configuration (Large Capacity Type)

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□	-

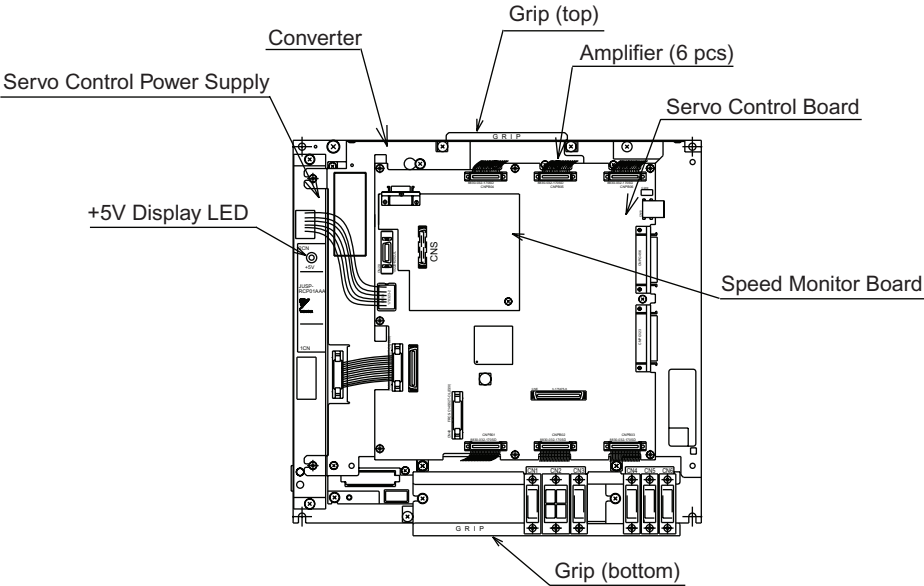
2.6 SERVOPACK

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□	-

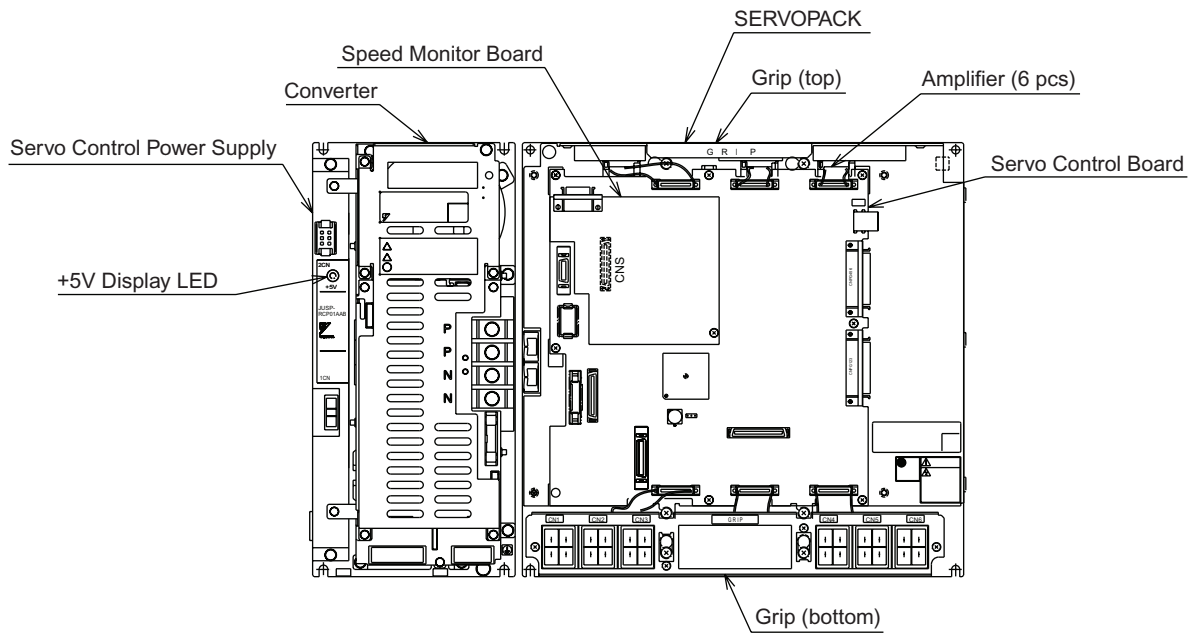


SV3X, UP6, SK16X SERVOPACK Configuration

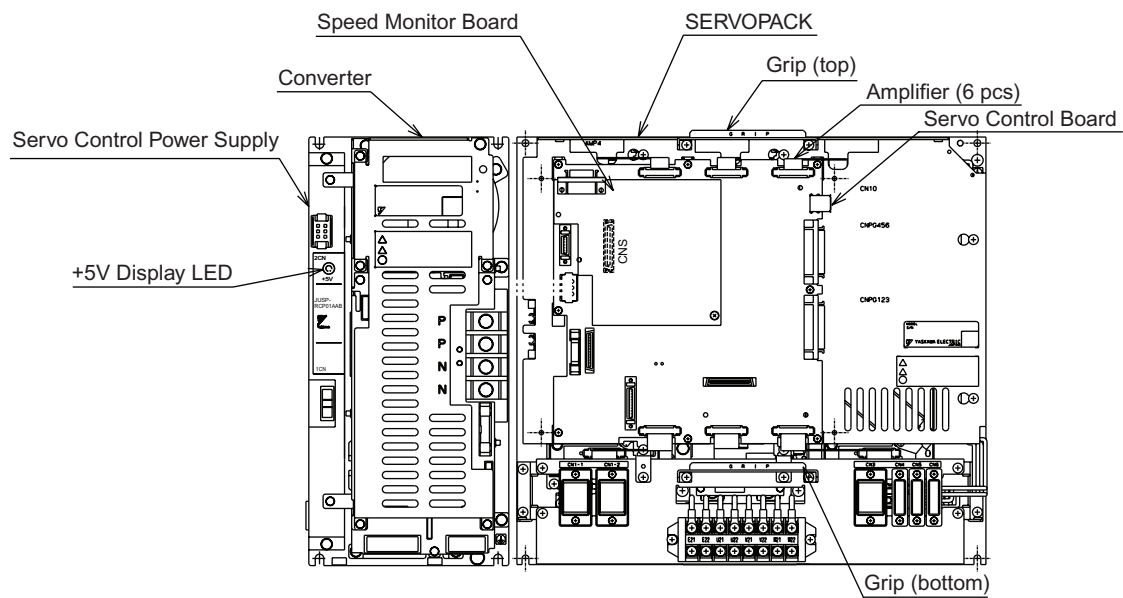


UP20 SERVOPACK Configuration

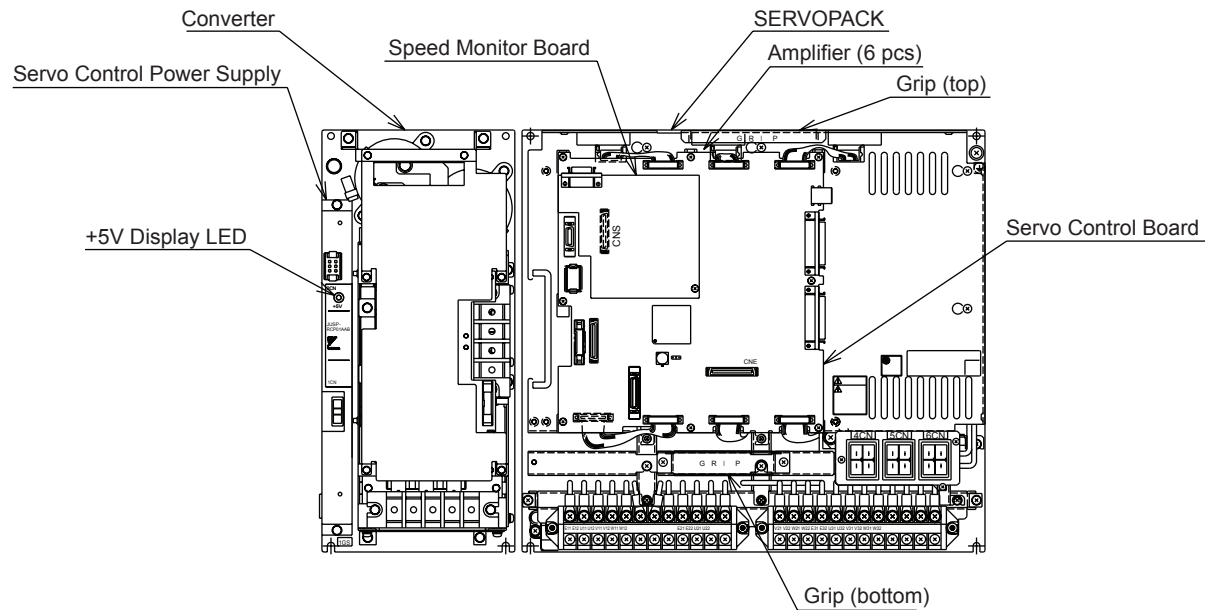
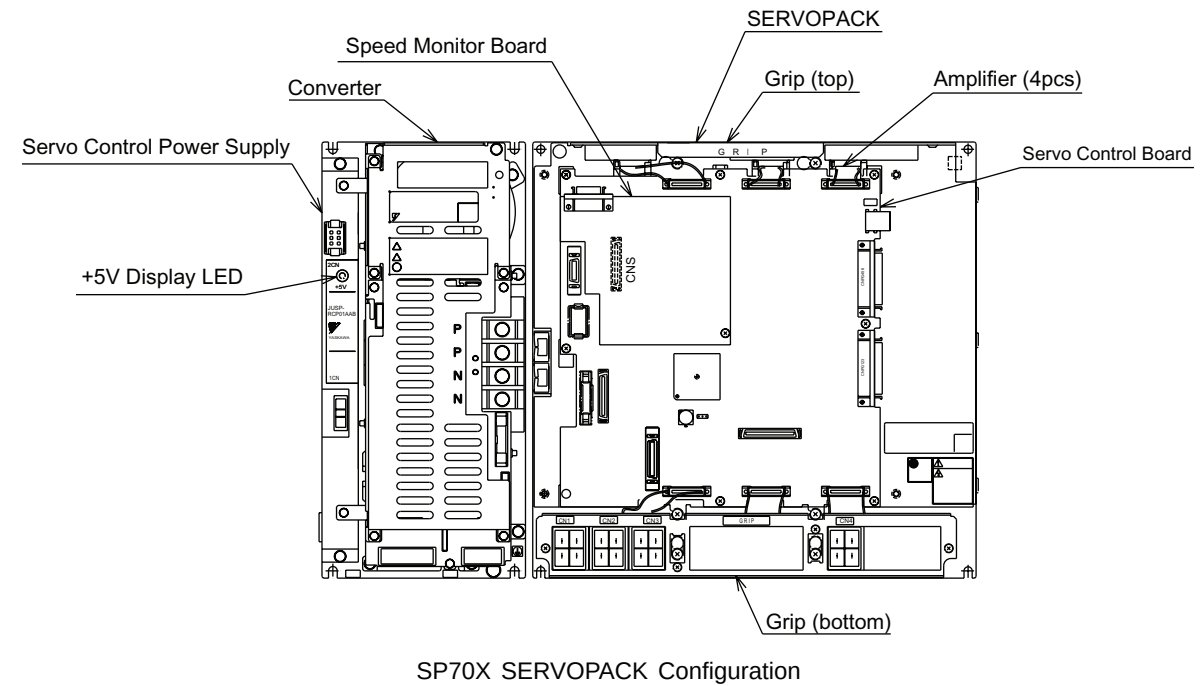
2.6 SERVOPACK



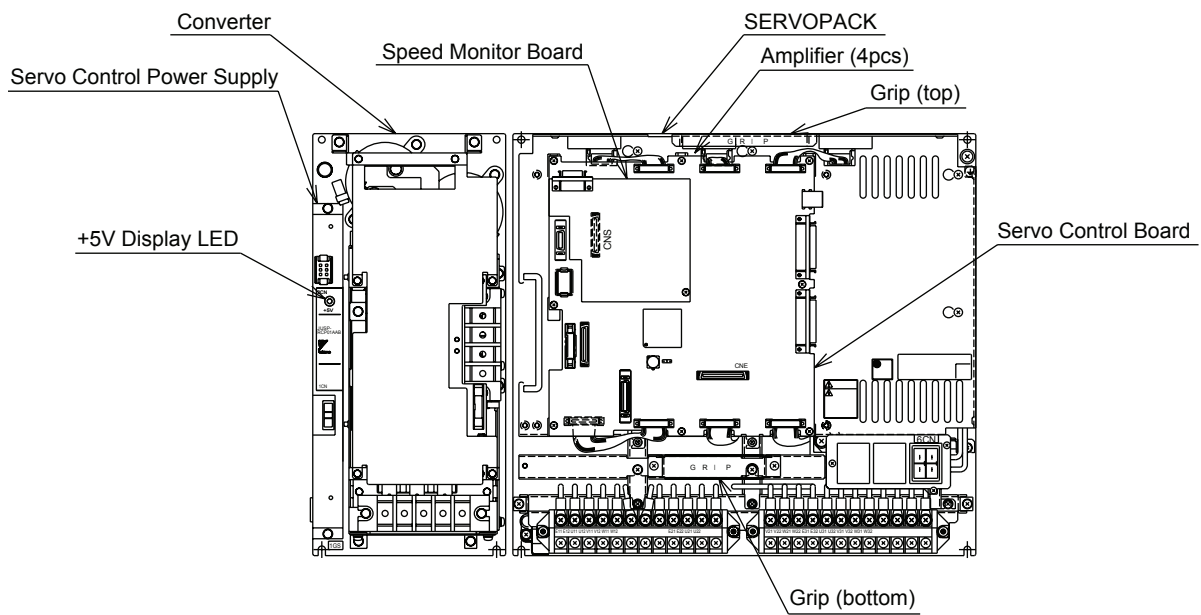
SK45X, SK16MX SERVOPACK Configuration



UP50, UP20M SERVOPACK Configuration



2.6 SERVOPACK



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 (JZRCR-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, ± 15 V) for servo control. AC input (Single phase:200/220VAC) is supplied by power supply unit.

Items		Specification
AC input	Rated Input Voltage	200 to 220VAC
	Voltage Fluctuation Range	+10% to -15% (AC170V to 242V)
	Frequency	50/60Hz (48Hz to 62Hz)
Output	+ 5V	5A
	+ 7V	2.5A
	± 15 V	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.

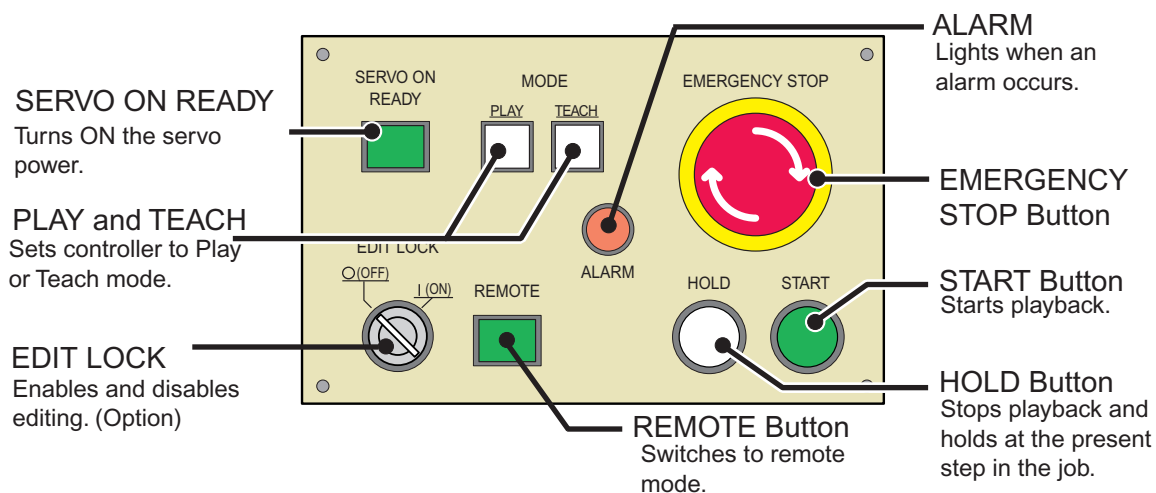
■ Speed Monitor Board (JANCD-XFC01)

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

2.7 Playback Panel

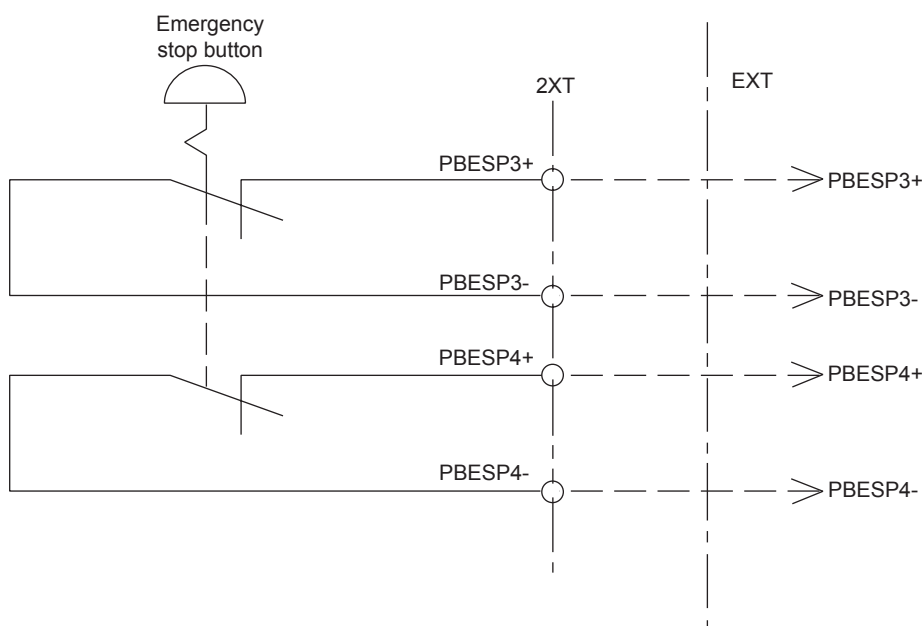
The playback panel is equipped with the buttons used to play back the manipulator.



■ Contact Output for Emergency Stop Button

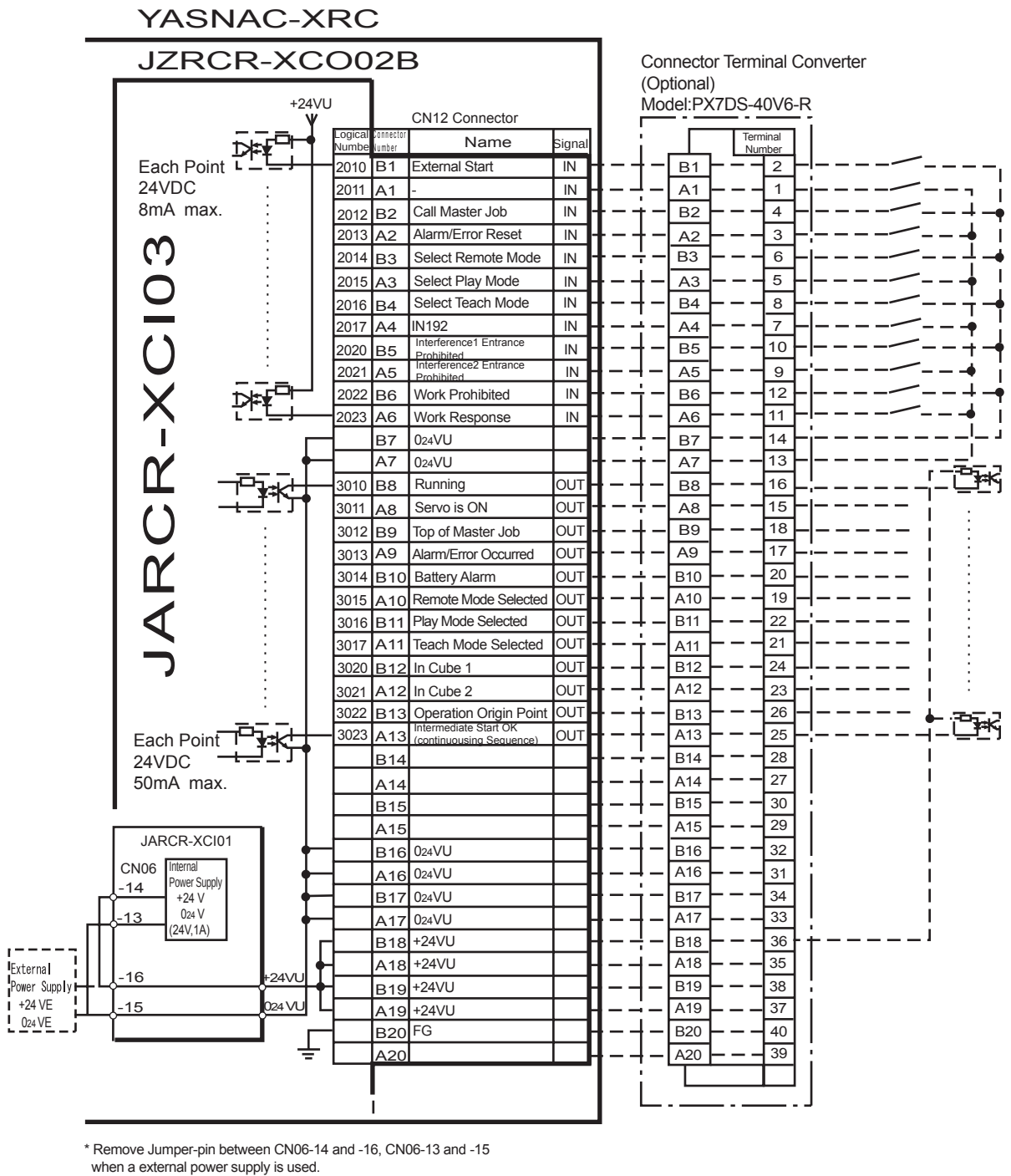
The contact output for the emergency stop button is on terminal block 2XT (Screw size: M3.5) at the bottom of the panel.

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)



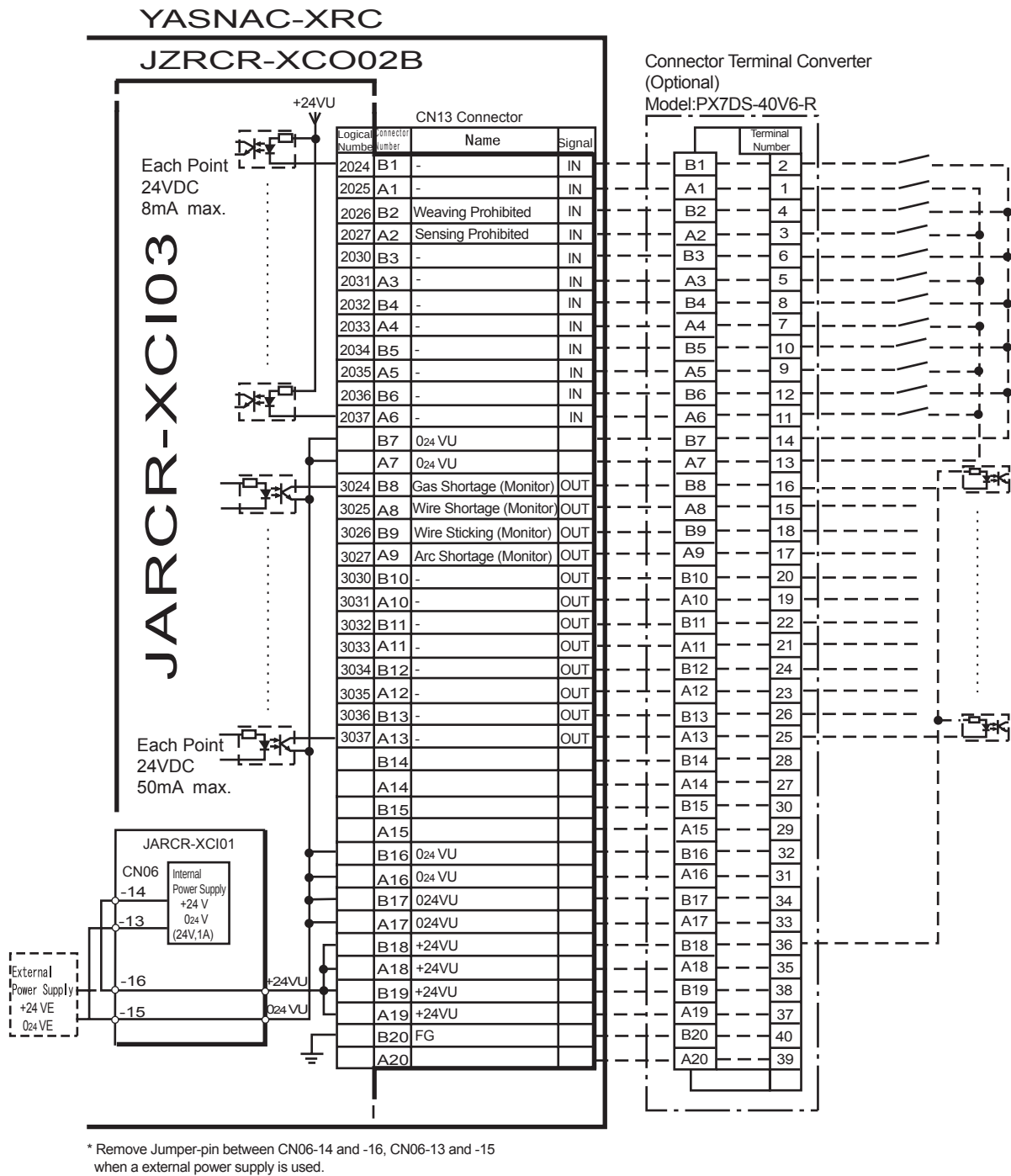
2.8 General I/O Signal Assignment

2.8.1 Arc Welding

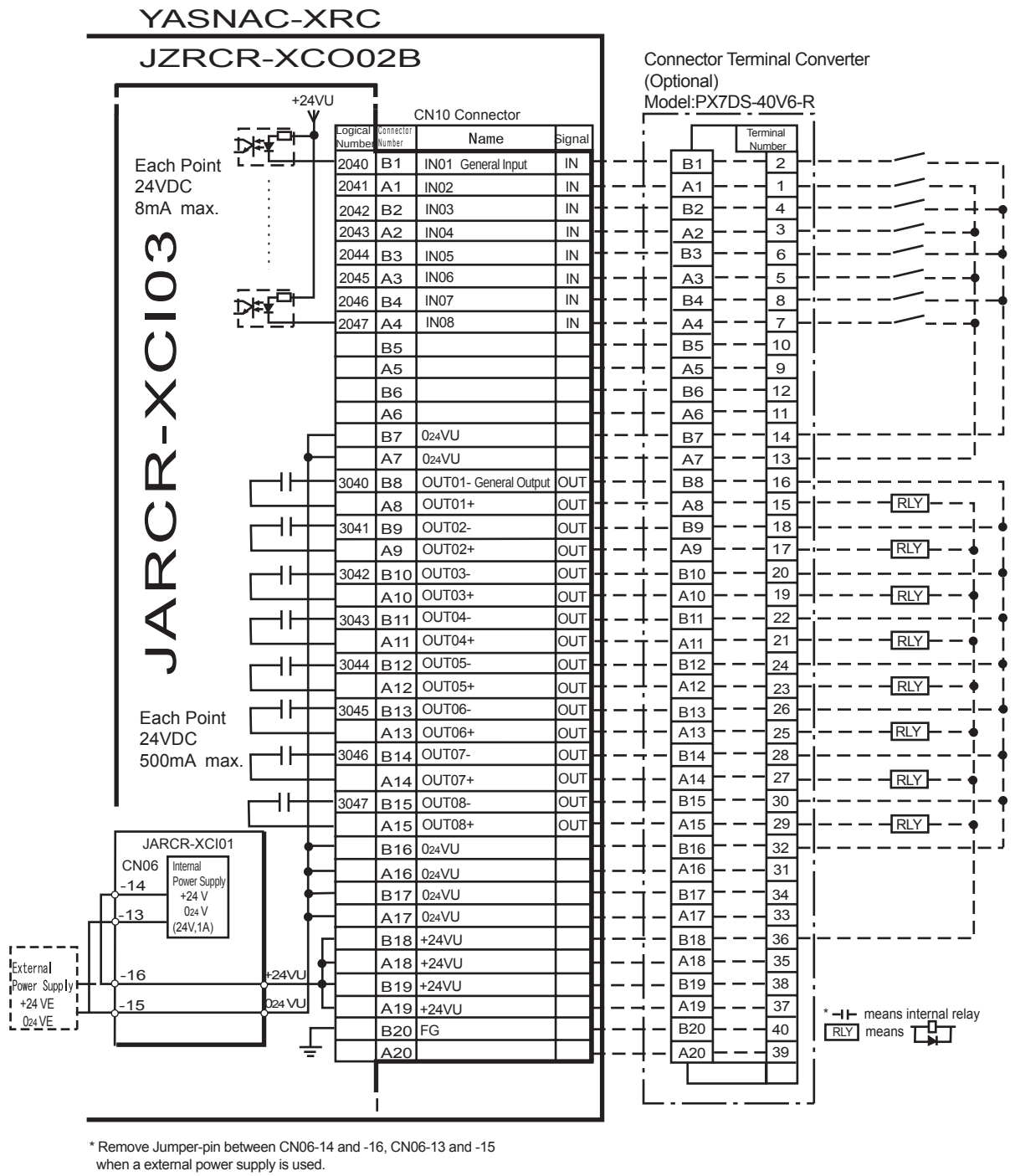


JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram

2.8 General I/O Signal Assignment

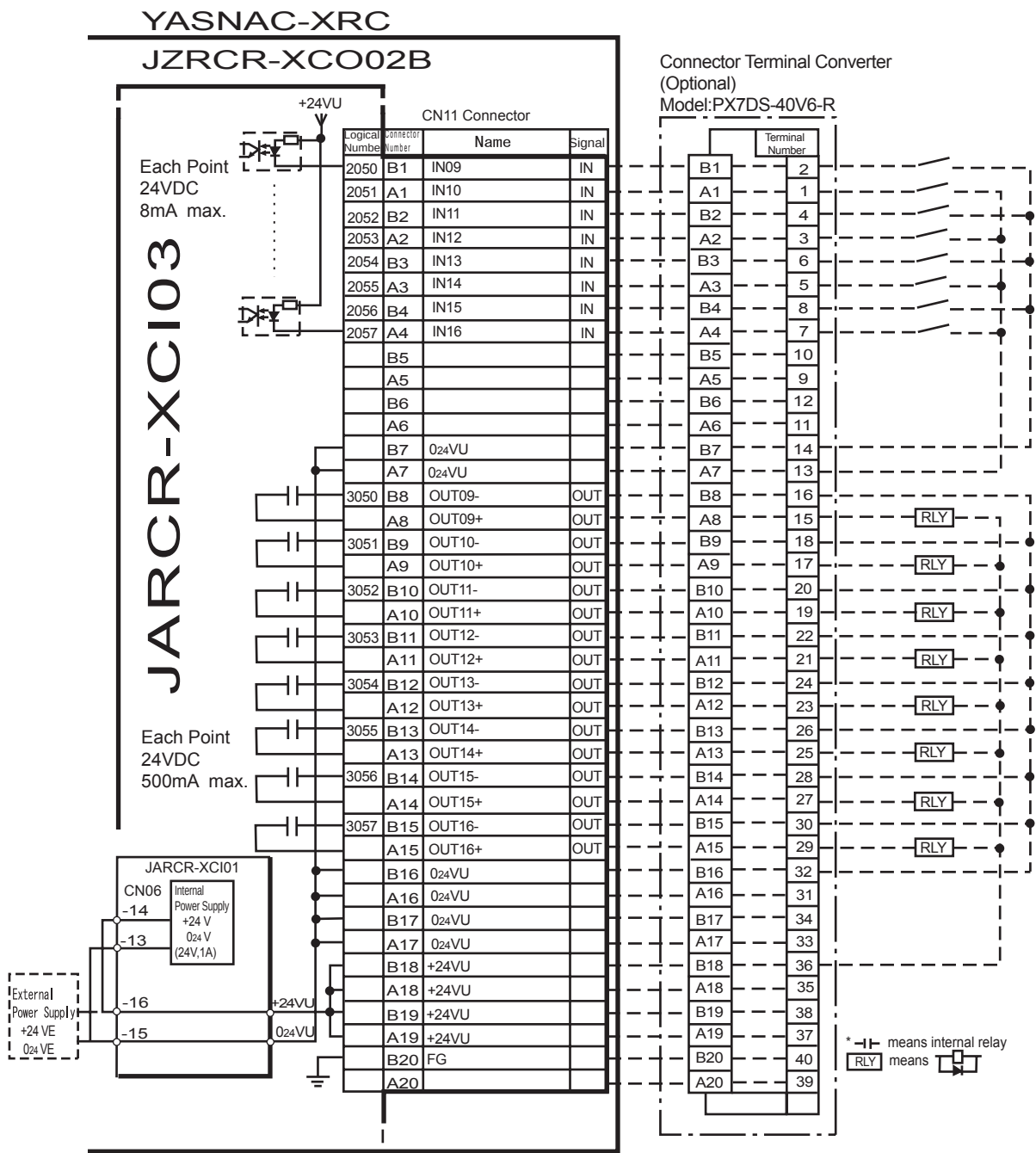


JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram



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

2.8 General I/O Signal Assignment



* 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	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.	2022	WORK PROHIBITED (Arc Generation Prohibited) 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.
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.	2023	WORK RESPONSE (Pseudo Arc ON Response) 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).
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.	2026	WEAVING PROHIBITED Weaving is prohibited while this signal is ON. Use this signal to check taught steps and movements without performing the weaving operation.

2.8 General I/O Signal Assignment

Specific Input List XCO02B (Arc Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
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.	2027	SENSING PROHIBITED 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	RUNNING 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	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*1 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	TOP OF MASTER JOB 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	INTERMEDIATE START OK (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.

Specific Output List XCO02B (Arc Welding)

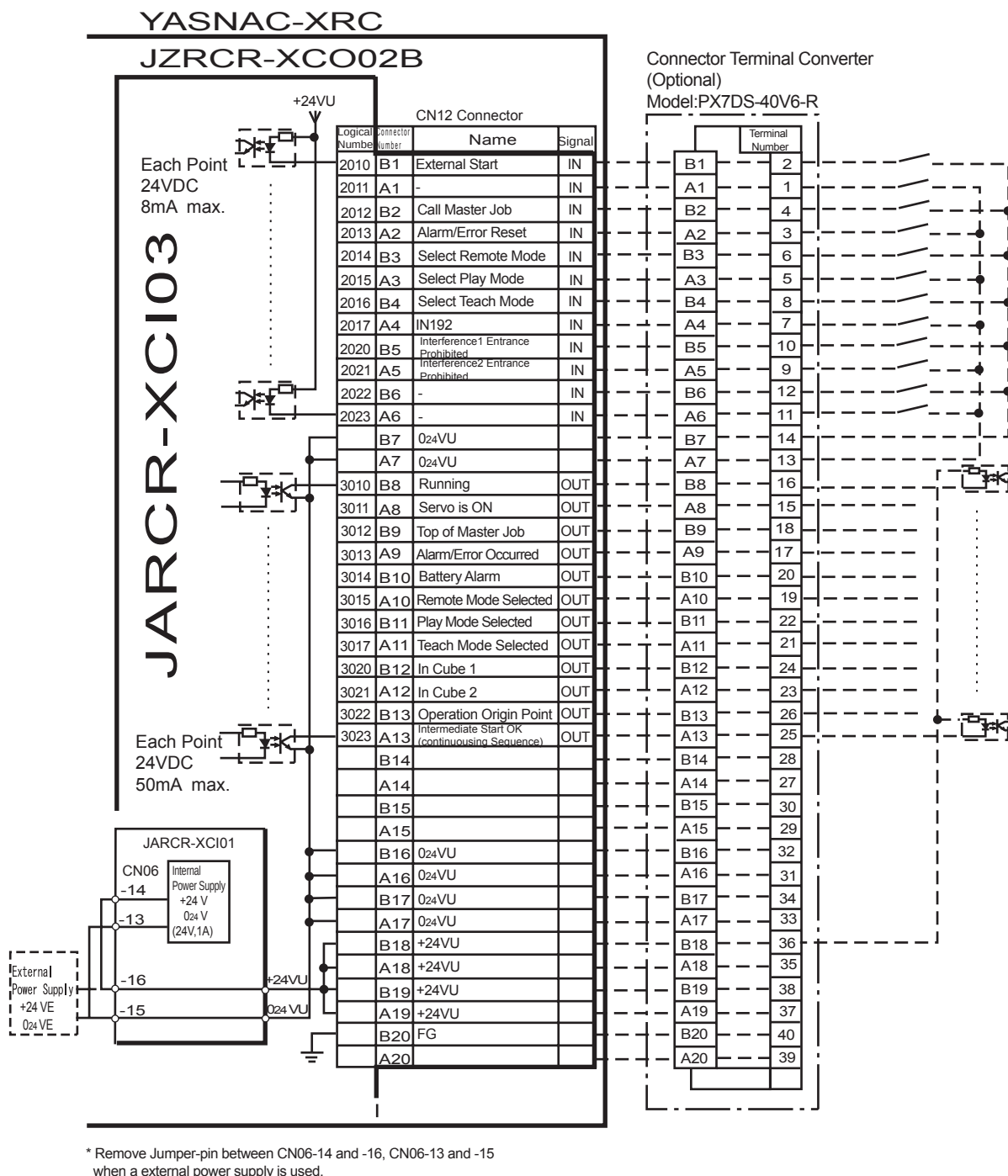
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3013	ALARM/ERROR OCCURRED This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.	3024	GAS SHORTAGE (MONITOR) This signal stays ON while the gas shortage signal from the welding power supply is ON.
3014	BATTERY ALARM 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	WIRE SHORTAGE (MONITOR) This signal status ON while the wire shortage signal from the welding power supply is ON.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WIRE STICKING (MONITOR) 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	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.	2027	ARC SHORTAGE (MONITOR) 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.

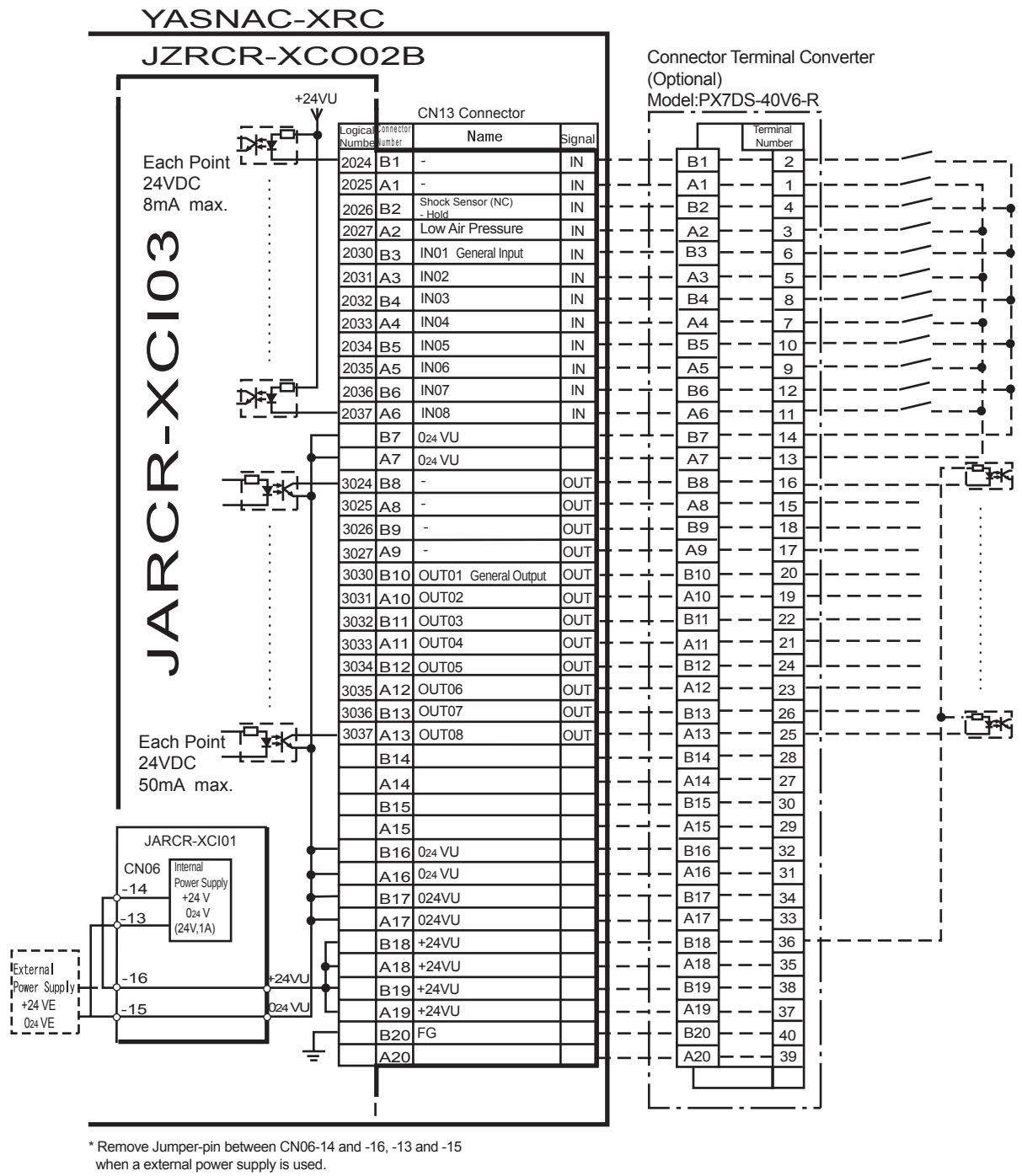
2.8 General I/O Signal Assignment

2.8.2 Handling



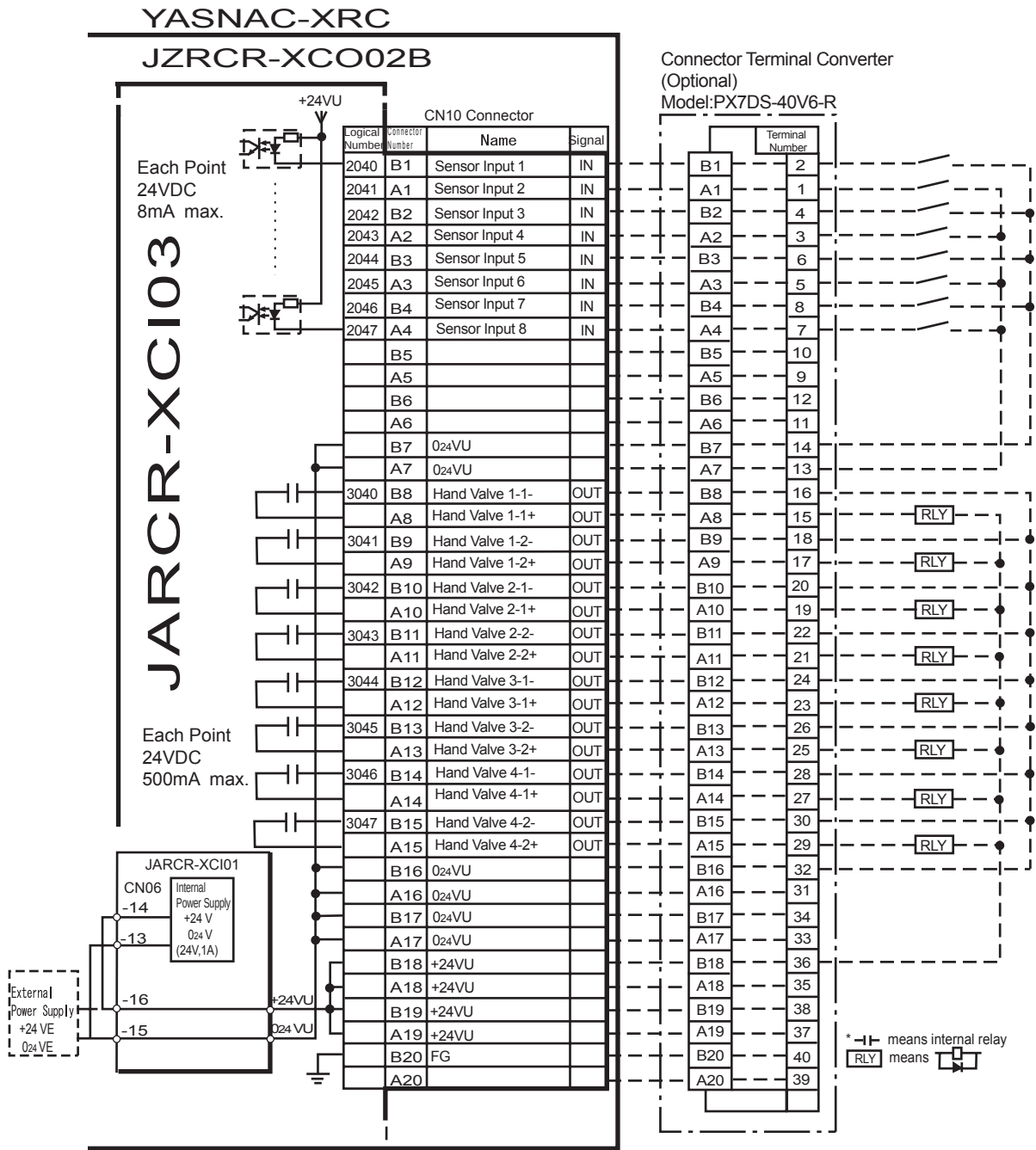
* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

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



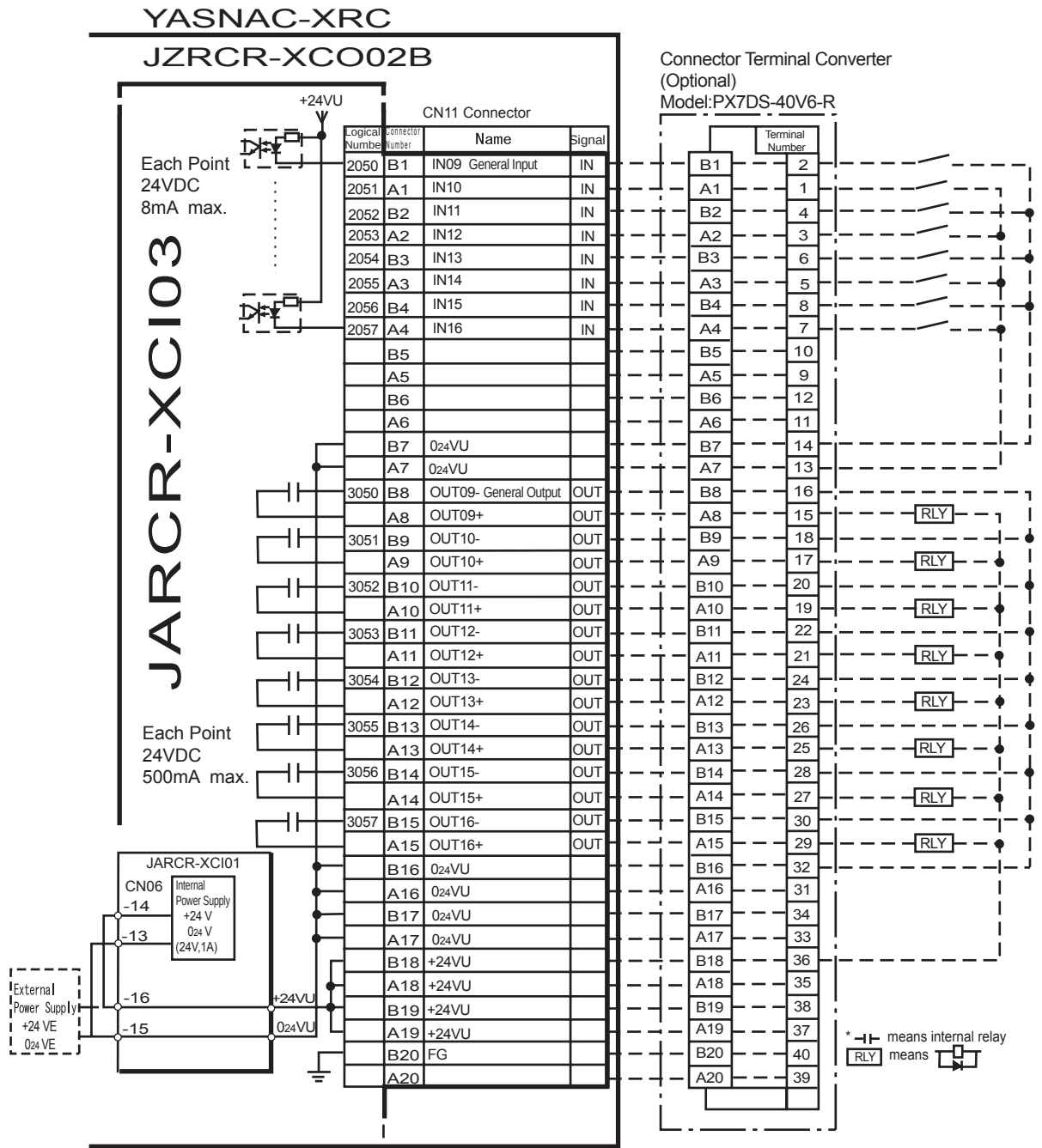
JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram

2.8 General I/O Signal Assignment



* 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 a external power supply is used.

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

2.8 General I/O Signal Assignment

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 PRESSURE 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	RUNNING 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	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*1 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	TOP MASTER JOB 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	INTERMEDIATE START OK (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.
3013	ALARM/ERROR OCCURRING 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	HAND VALVE 1-4 These outputs are controlled by the HAND handling specific instructions. Hand valves 1 to 4 correspond to HAND 1 to 4.
3014	BATTERY ALARM 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.		

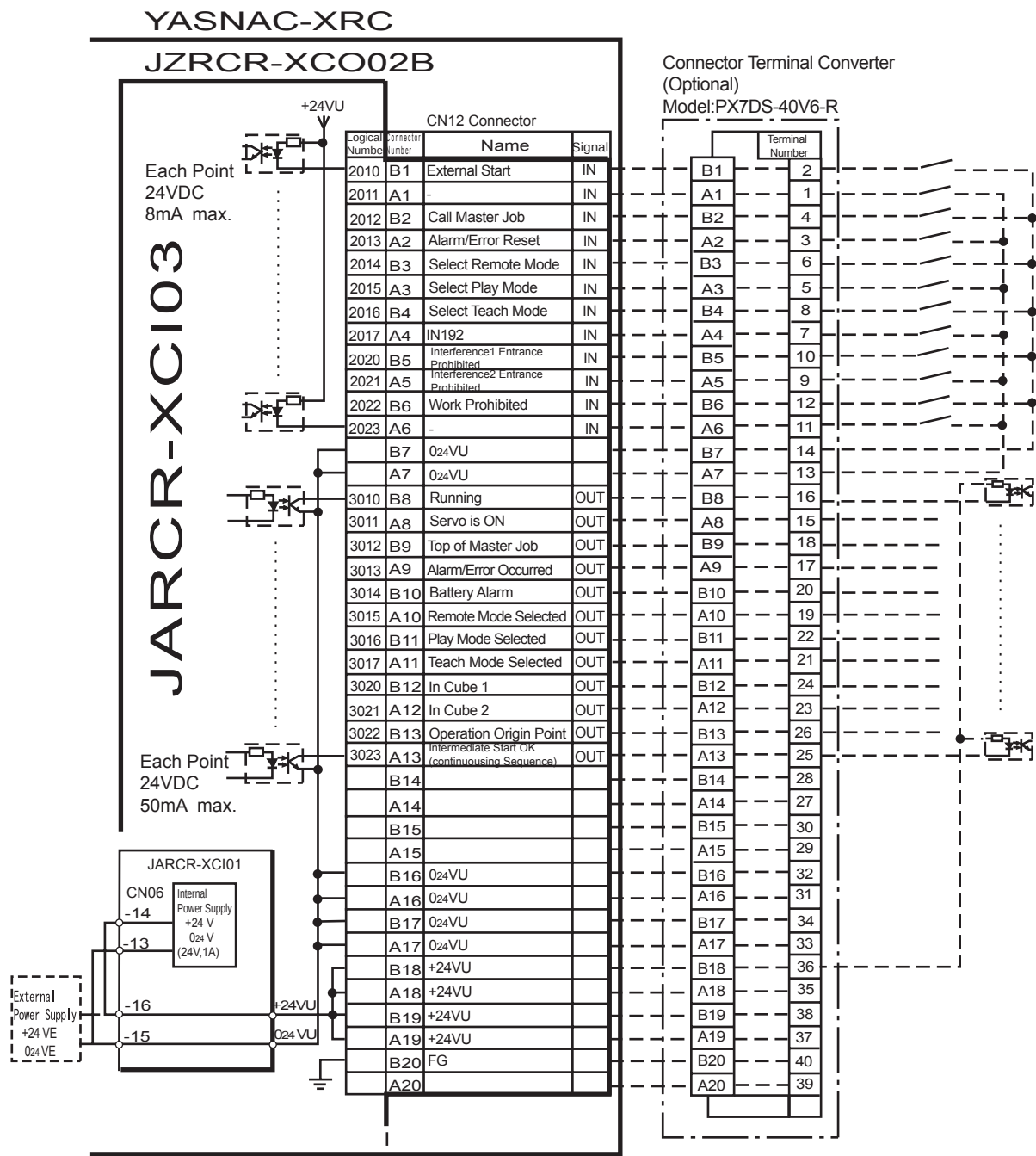
2.8 General I/O Signal Assignment

Specific Output List XCO02B (Handling)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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.		
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.		

- *1** The operation origin cube and Cube 24 are same.
- *2** This signal is not output during operation.

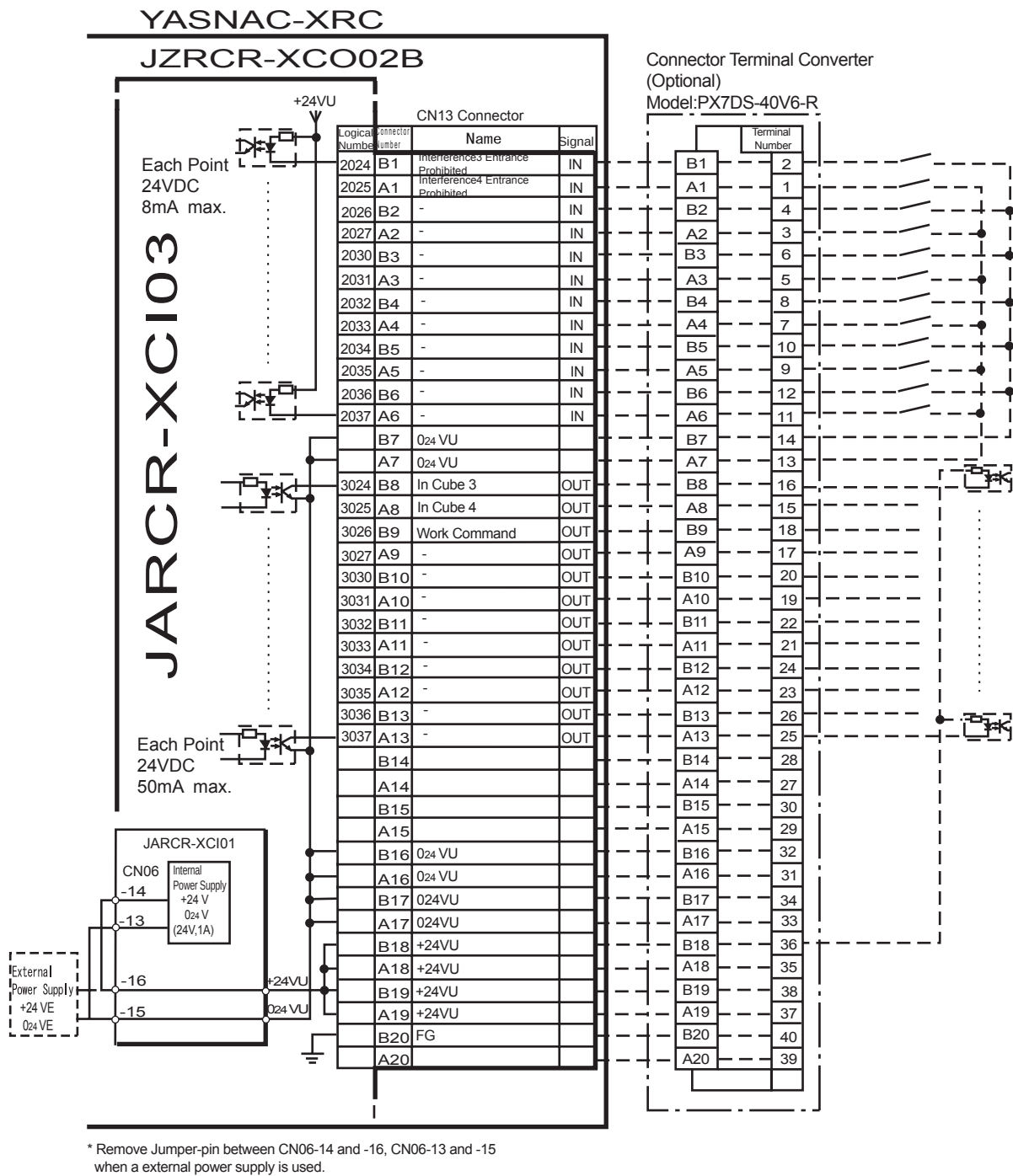
2.8.3 General Application



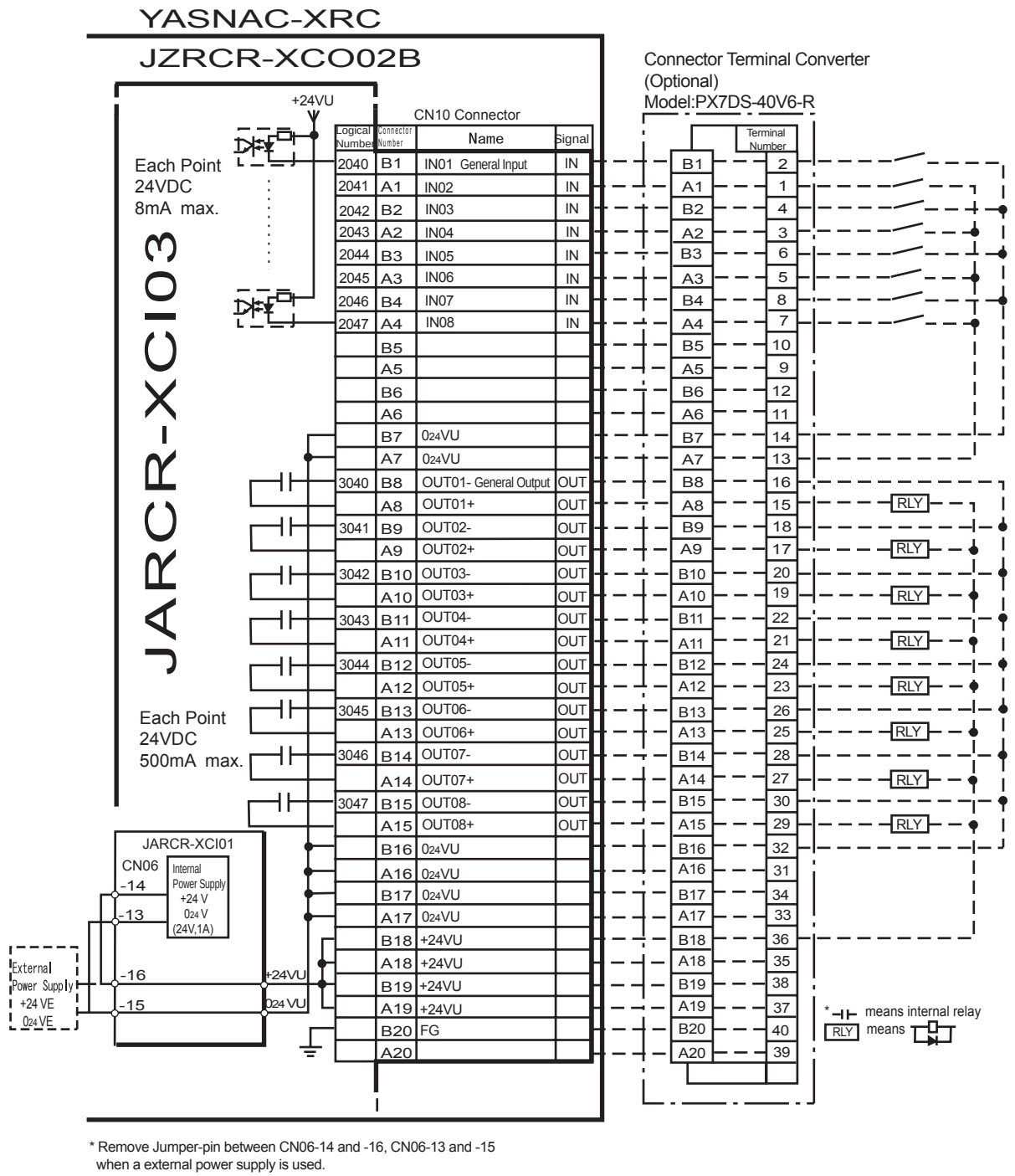
* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when a external power supply is used.

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

2.8 General I/O Signal Assignment

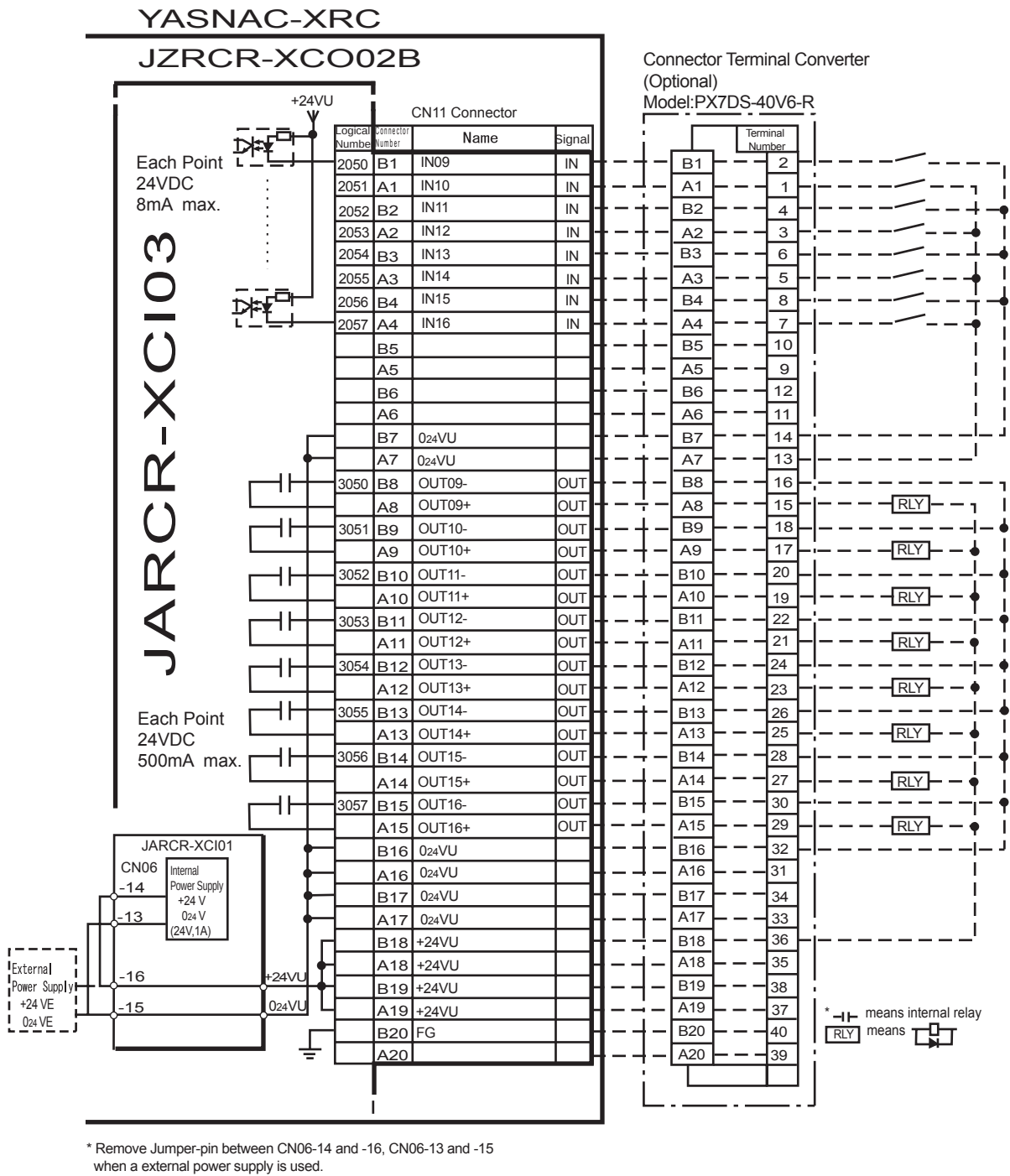


JARCR-XCI03 (CN13 Connector) I/O Allocation and Connection Diagram



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

2.8 General I/O Signal Assignment



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	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.	2022	WORK PROHIBITED (Tool ON Prohibited) Even if TOOLON instruction is executed, XRC doesn't output to external while this signal is ON.
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.	2024	INTERFERENCE 3 ENTRANCE PROHIBITED 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.
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.	2025	INTERFERENCE 4 ENTRANCE PROHIBITED 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.

2.8 General I/O Signal Assignment

Specific Input List XCO02B (General Application)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
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 (General Application)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING 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	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*1 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	TOP MASTER JOB 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	INTERMEDIATE START OK (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.

Specific Output List XCO02B (General Application)

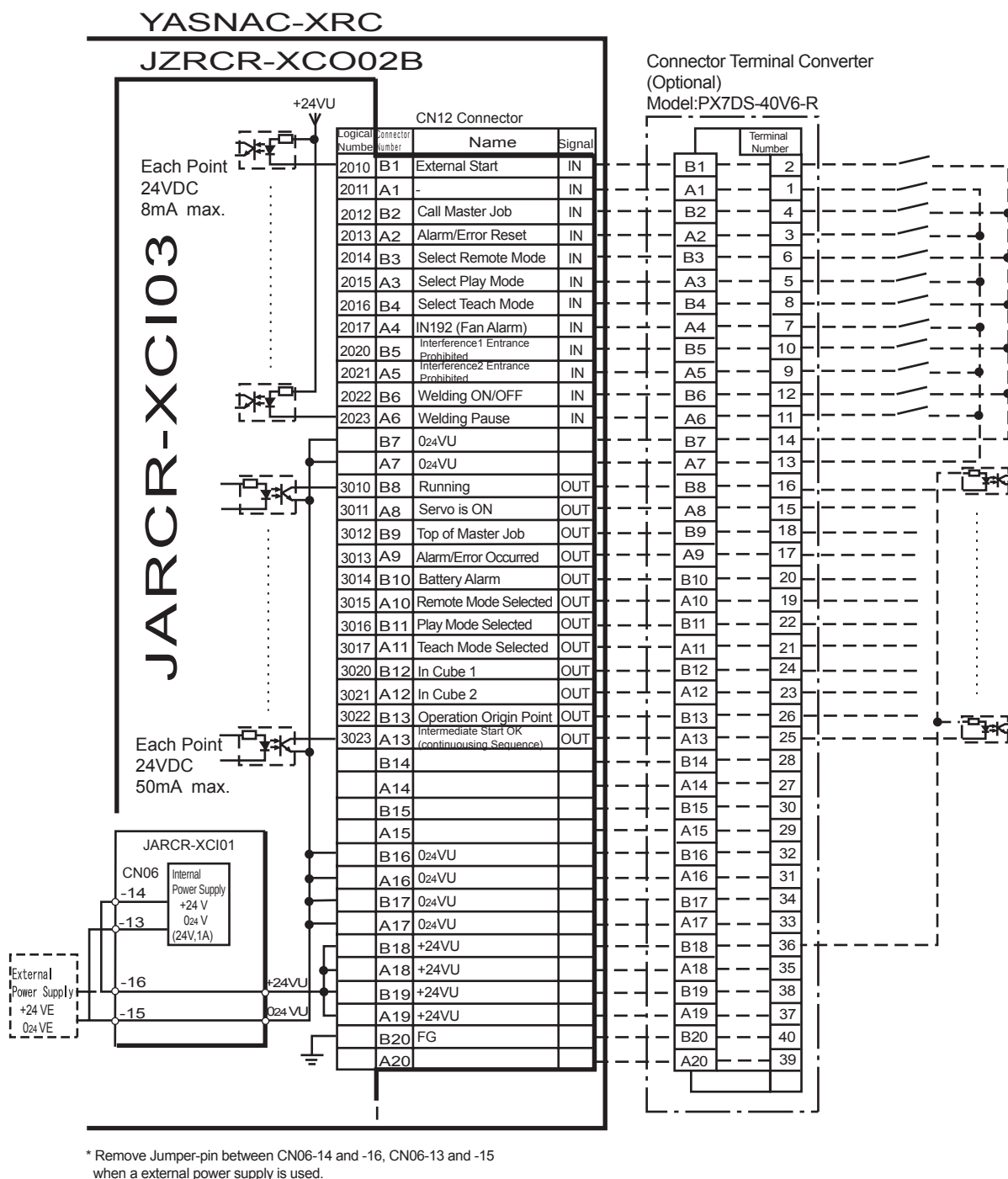
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3013	ALARM/ERROR OCCURRING This signal signifies that an alarm or an error occurred. If a major error occurs, this signal remains ON until the main power is turned OFF.	3024	IN CUBE 3 This signal turns ON when the current tool center point lies inside a pre-defined space (Cube 3). Use this signal to prevent interference with other manipulators and jigs.
3014	BATTERY ALARM 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	IN CUBE 4 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.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WORK COMMAND 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.
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.		

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

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

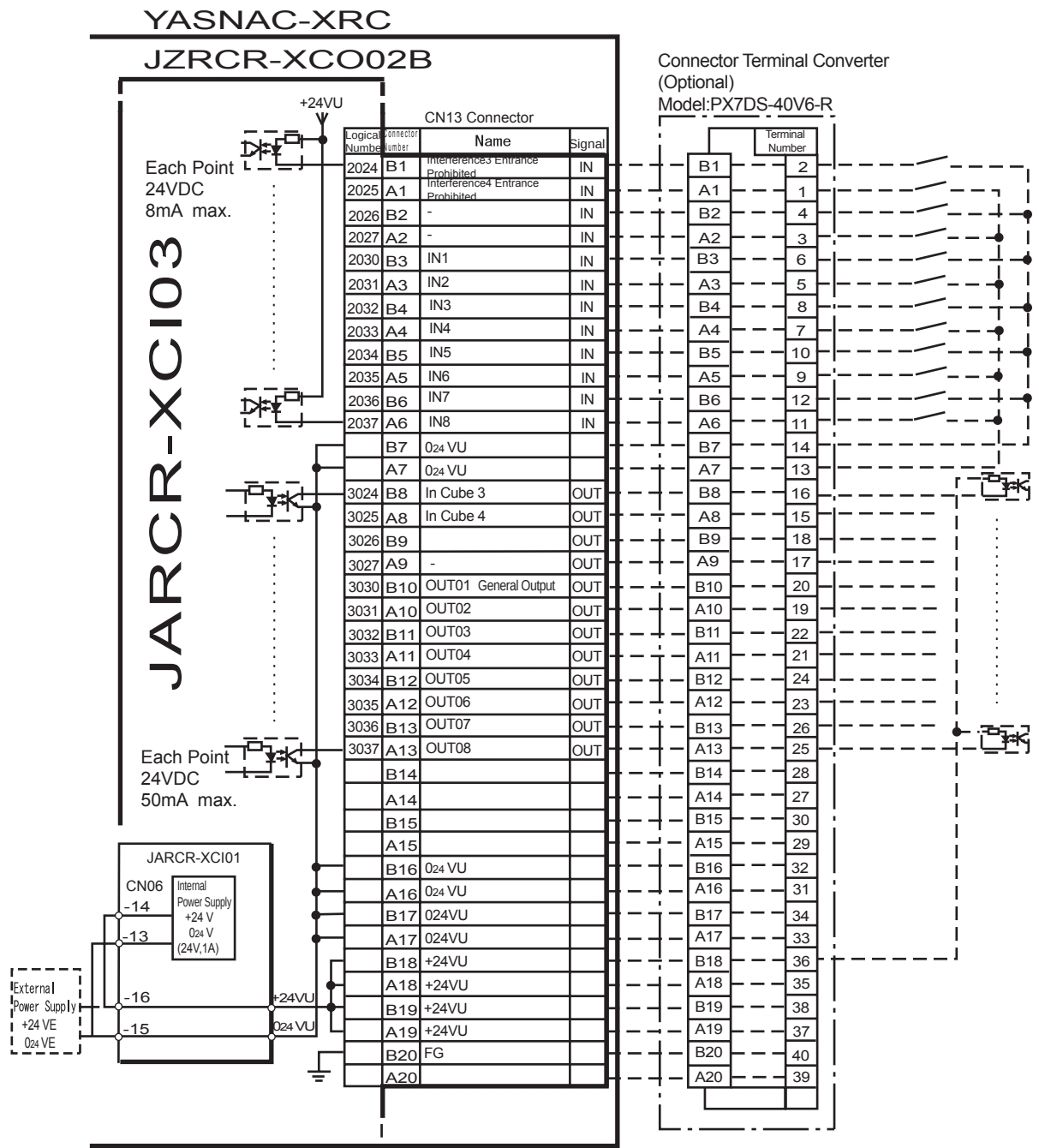
2.8 General I/O Signal Assignment

2.8.4 Spot Welding



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

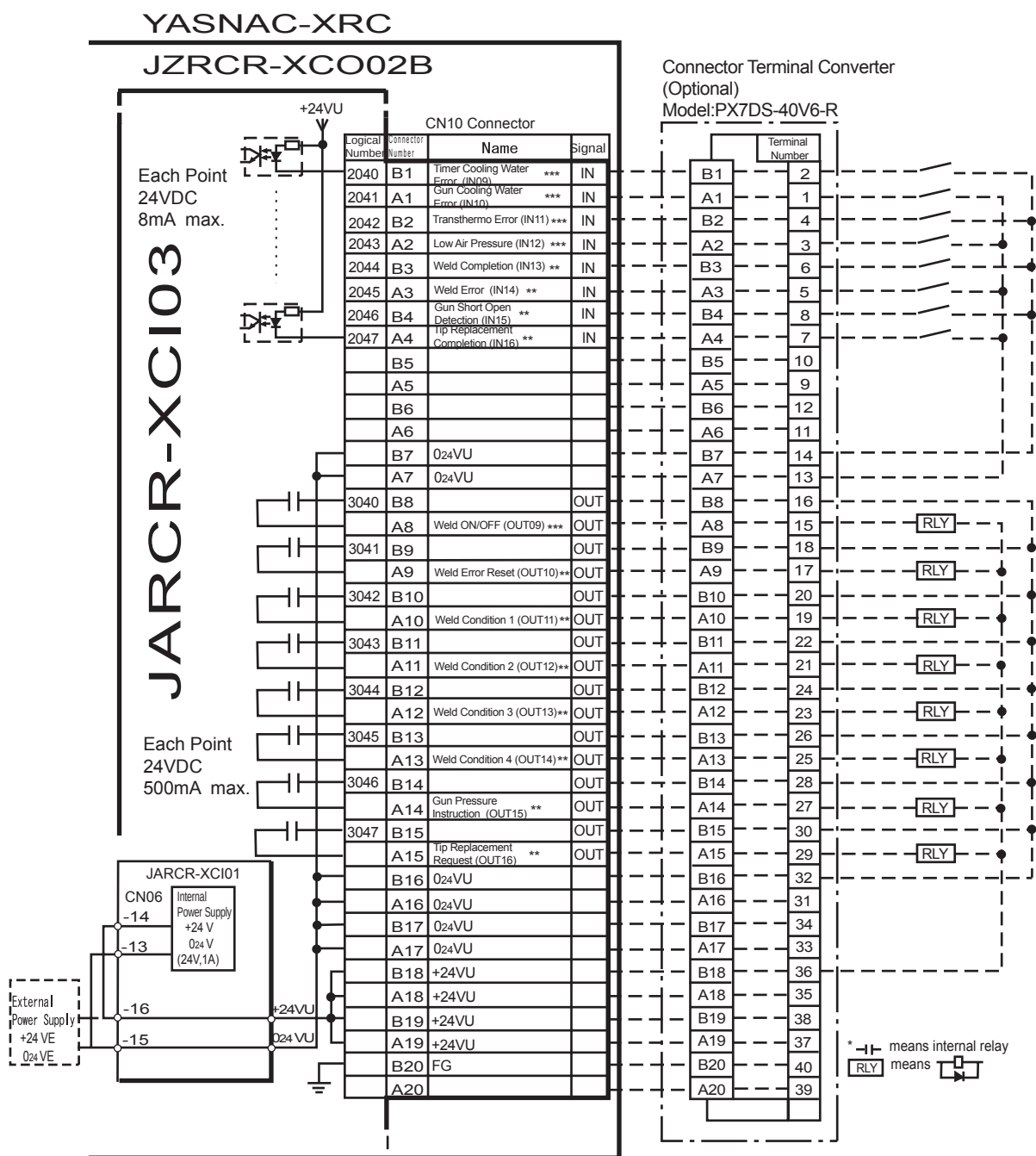
JARCR-XCI03 (CN12 Connector) I/O Allocation and Connection Diagram



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

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

2.8 General I/O Signal Assignment

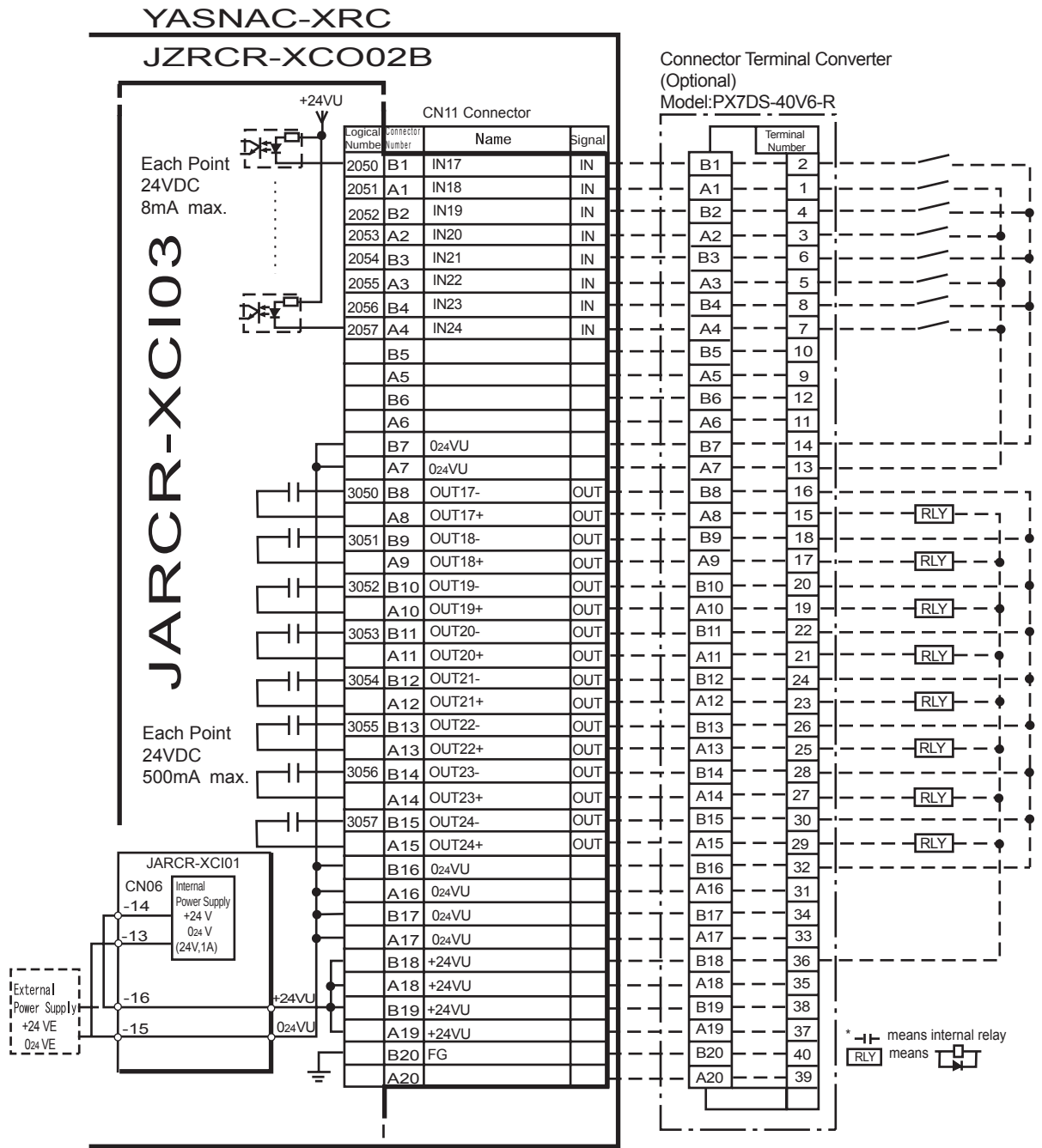


* Remove Jumper-pin between CN06-14 and -16, CN06-13 and -15 when an external power supply is used.

** 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 a external power supply is used.

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

2.8 General I/O Signal Assignment

Specific Input List XCO02B (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input 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.	2022	WELDING ON/OFF (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).
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).	2023	WELDING PAUSE (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.
2013	ALARM/ERROR RESET After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.	2024	INTERFERENCE 3 ENTRANCE PROHIBITED 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.
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.	2025	INTERFERENCE 4 ENTRANCE PROHIBITED 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.
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 *4	TIMER COOLING WATER ERROR 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.

Specific Input List XCO02B (Spot Welding)

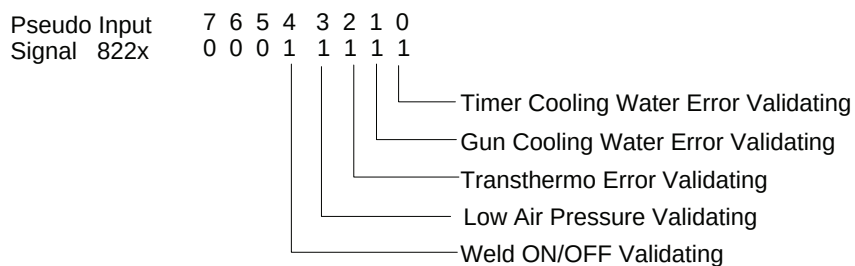
Logical Number	Input Name / Function	Logical Number	Input Name / Function
2016	SELECT TEACH MODE The TEACH mode is selected if this signal turns ON during PLAY mode. Switching to other modes is disabled while this signal is ON. If this signal turns ON while the SELECT PLAY MODE signal is ON, this signal takes priority and the TEACH mode is selected.	2041 *4	GUN COOLING WATER ERROR 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.
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.	2042 *4	TRANSTHERMO ERROR 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.
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.	2043 *4	LOW AIR PRESSURE When air pressure is reduced and this input is turned ON, an alarm occurs. The servo power supply remains ON.

2.8 General I/O Signal Assignment

Specific Input List XCO02B (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2044 *3	WELD COMPLETION 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 DETECTION 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)

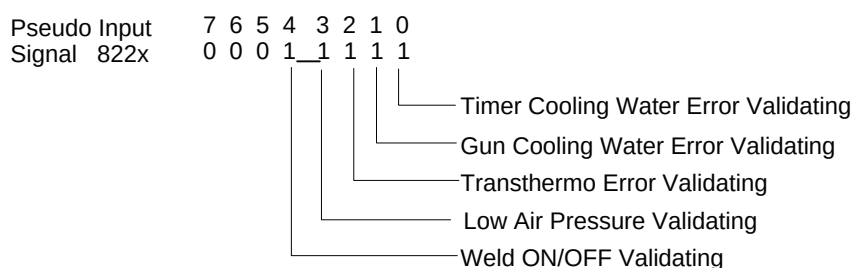
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3023	INTERMEDIATE START OK (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	SERVO IS ON 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	IN CUBE 3 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	TOP MASTER JOB 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	IN CUBE 4 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	ALARM/ERROR OCCURRING 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	WELD ON/OFF Outputs a signal input from the interlock panel, etc. considering the robot status.
3014	BATTERY ALARM 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	WELD ERROR RESET This signal commands the reset error status of the welder. This is operated with the programming pendant operation.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WELD CONDITION (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).

2.8 General I/O Signal Assignment

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)*1 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.



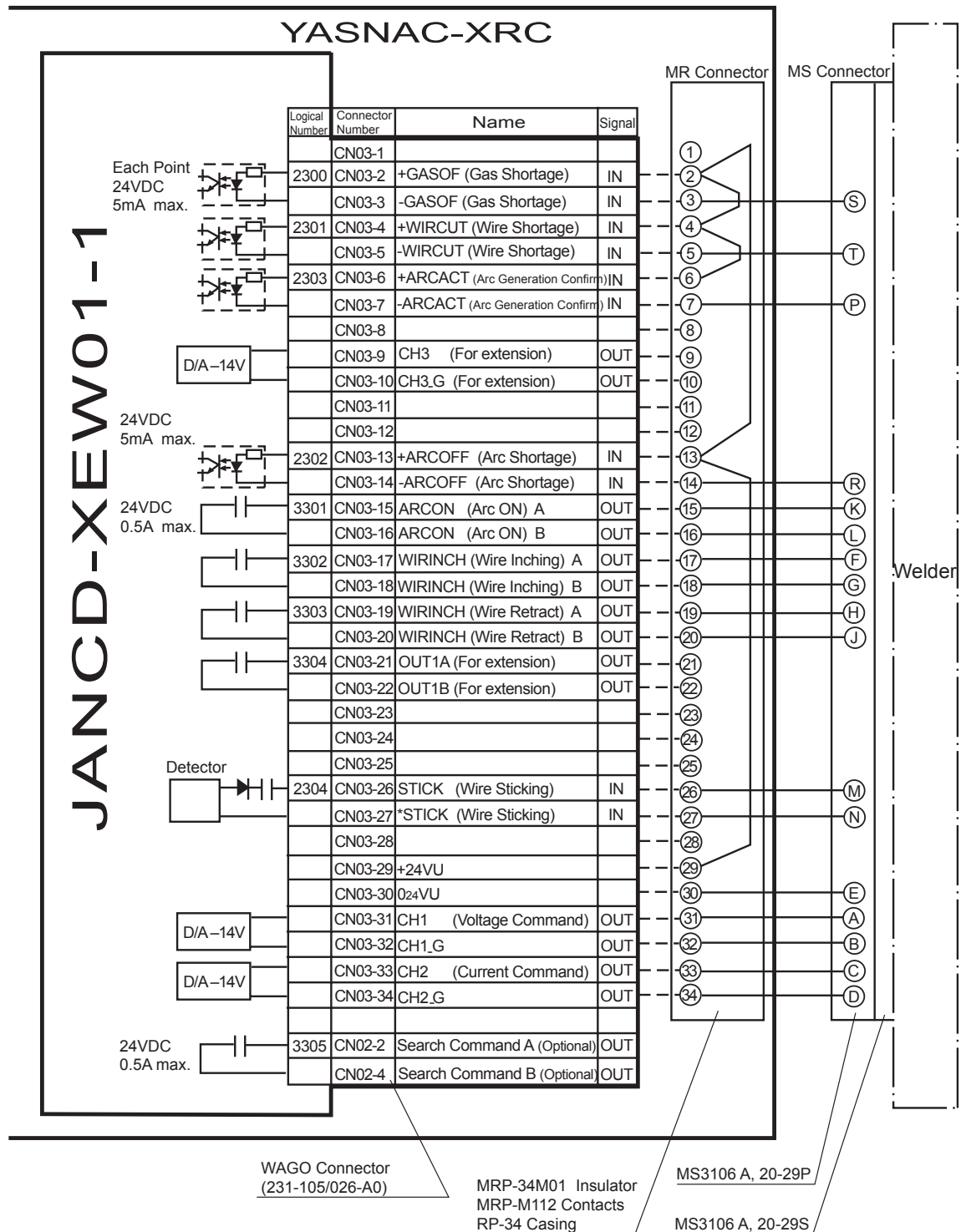
2.8.5 JANCD-XEW01 Circuit Board

■ 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	

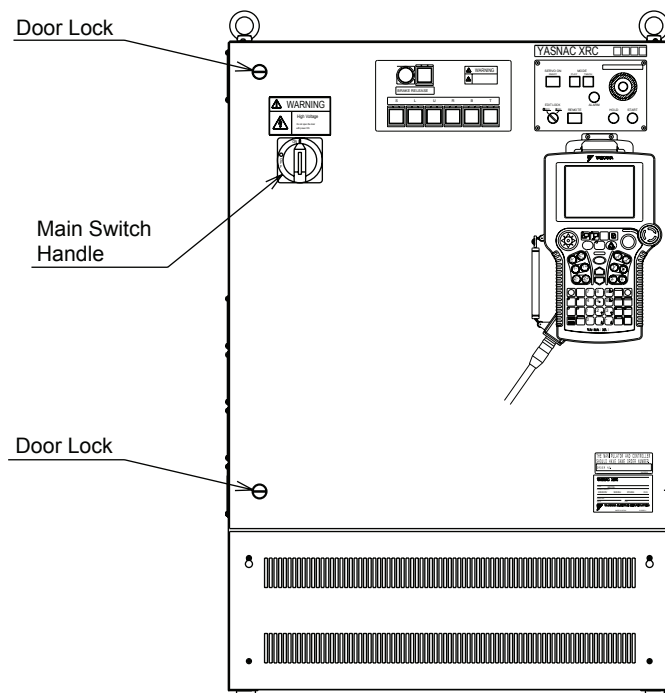
3.2 XRC Inspections

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

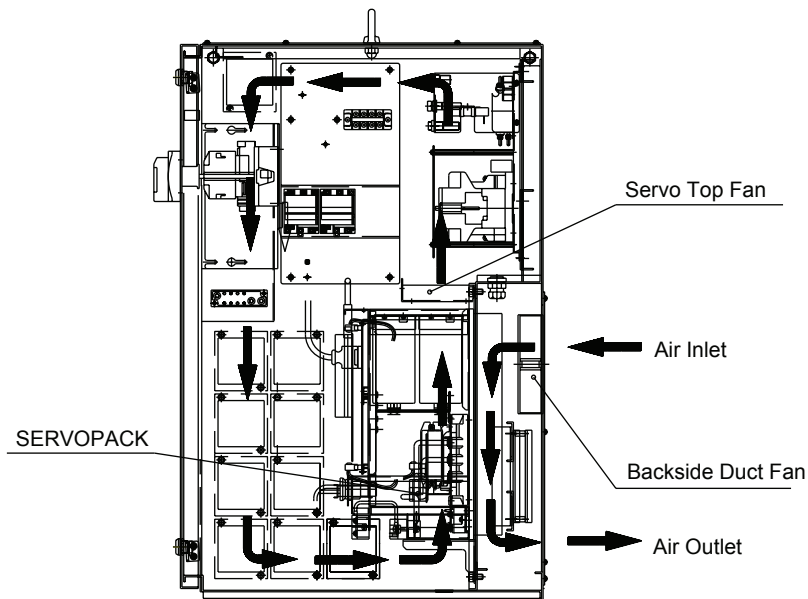
- Open the door and check that the seal around the door is undamaged.
- Check that the inside of the XRC is not excessively dirty. If it is dirty, determine the cause, take measures to correct the problem and immediately clean up the dirt.
- Fully close each door lock and check that no excessive gaps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

3.3 Cooling Fan Inspections

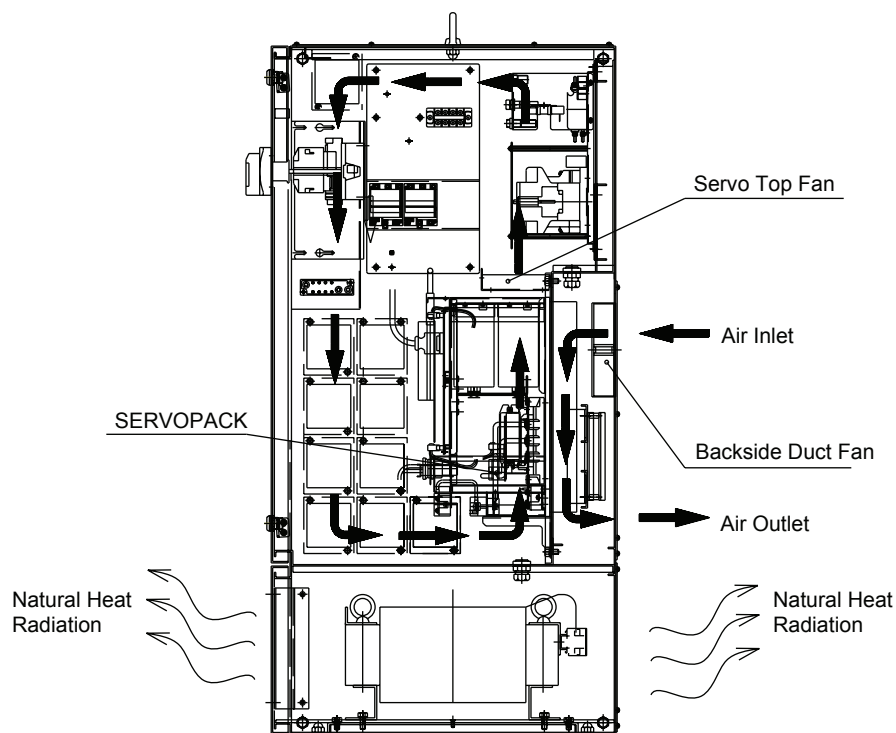
3.3 Cooling Fan Inspections

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)

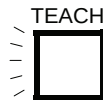
3.4 Emergency Stop Button Inspections

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.

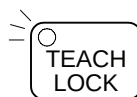
1. Press [TEACH] on the playback panel to switch to teach mode. The [TEACH] lamp lights.



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

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.

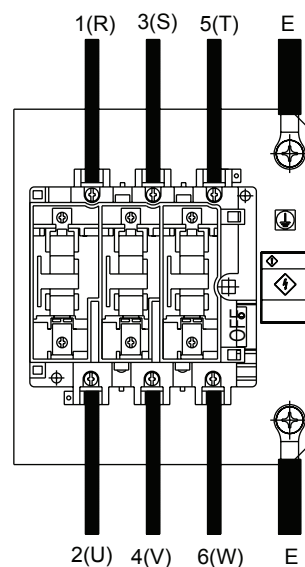
The way to replace the battery is described in "9.1.1 Replacing Parts of the CPU Rack" of the YASNAC XRC Instructions.

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

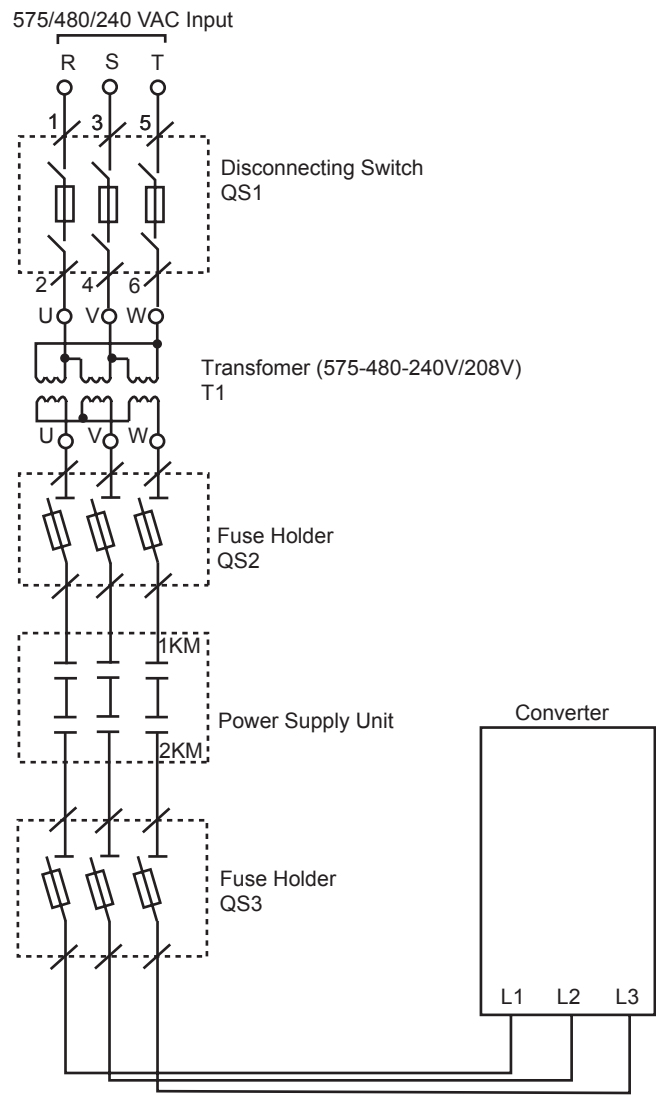


Disconnecting Switch (QS1)

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.

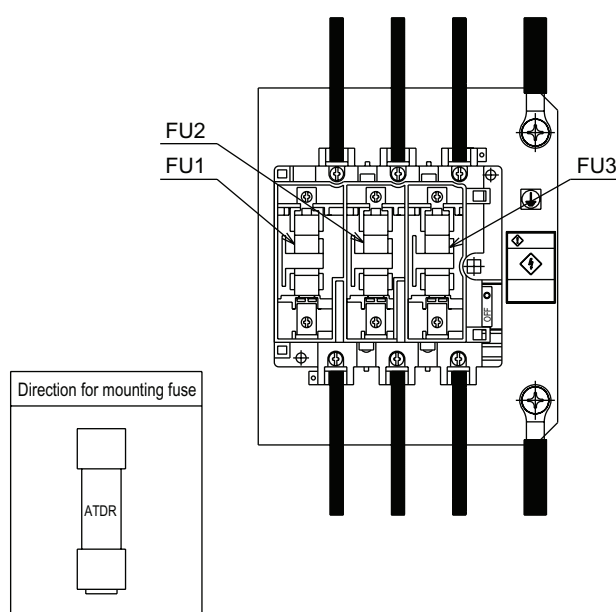
Failure to observe this caution may result in electric shock or injury.

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 ^{*1} TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)

***1** 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.

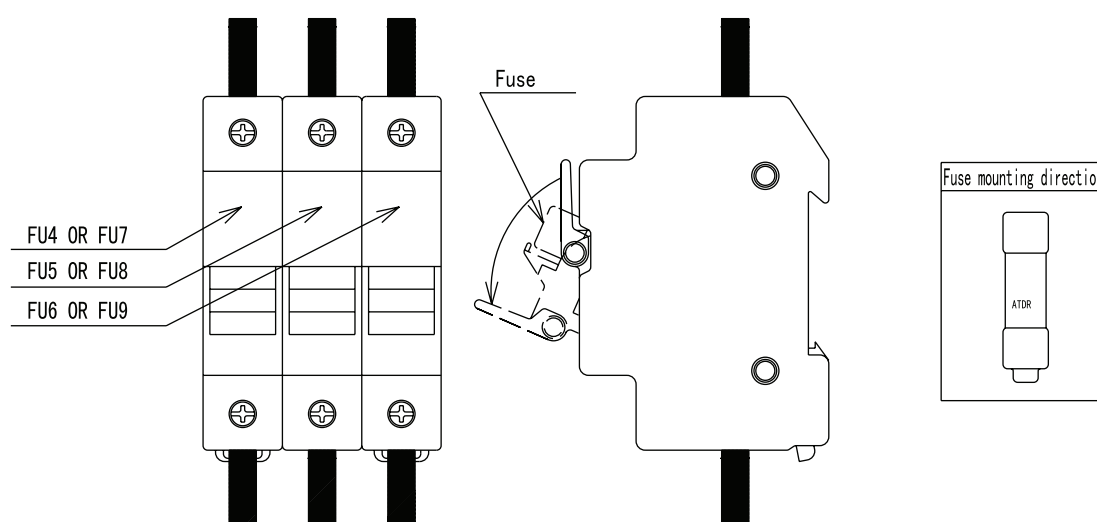
4.1 Replacing XRC Parts

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 ^{*1} TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)
QS3	FU7, FU8, FU9	Power Supply Fuse	600VAC ^{*1} TIME DELAY/CLASS CC (30A or less) TIME DELAY/CLASS J (40A or more)

***1** 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

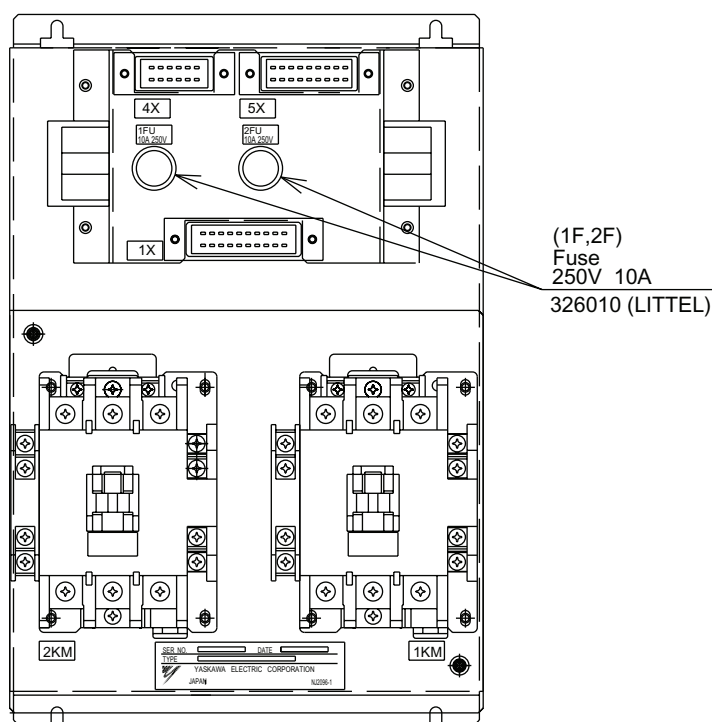
Time delay fuses of class CC (30A or less) or class J (40A or more) are used for QS1, QS2, and QS3.

4.1 Replacing XRC Parts

4.1.2 Replacing Parts of Power Supply Unit

The power supply unit (JZRCR-XPU05□, 06B, and 10□) 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-XPU05□	UP50, UP20M, SK45X, SK16MX, SP70X,
JZRCR-XPU05□ or JZRCR-XPU10□	UP130, UP165, UP165-100, UP200
JZRCR-XPU10□	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).



NOTE 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-XRK01□-□	
	Backboard	JANCD-XBB01	
	System control circuit board	JANCD-XCP01□	
	High speed serial interface circuit board	JANCD-XIF03 or JANCD-XIF04	
	Control power supply	CPS-150F	
3	I/O unit	JZRCR-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	JZRCR-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	4715□S-22T-B□0-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

4.2 YASNAC XRC Parts List

- *1** The type of the SERVOPACK depends on the robot model. For details, see the Tables. “SERVOPACK List (Small Capacity)” and “SERVOPACKs 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-SK16AAC	CACR-UP20AAA
Amplifier	S	JUSP-WS02AA	JUSP-WS05AAY17	JUSP-WS10AAY17	JUSP-WS10AA
	L	JUSP-WS02AA	JUSP-WS10AAY17	JUSP-WS10AAY17	JUSP-WS20AAY22
	U	JUSP-WS01AA	JUSP-WS05AAY17	JUSP-WS10AAY17	JUSP-WS10AAY17
	R	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS02AA	JUSP-WS02AA
	B	JUSP-WSA5AA	JUSP-WS01AA	JUSP-WS02AA	JUSP-WS02AA
	T	JUSP-WSA5AA	JUSP-WS01AA	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-RCP01AA□	JUSP-RCP01AA□	JUSP-RCP01AA□	JUSP-RCP01AA□

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-RCP01AA□	JUSP-RCP01AA□	JUSP-RCP01AA□

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-RCP01AA□	JUSP-RCP01AA□

4.2 YASNAC XRC Parts List

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-RCP01AA□	JUSP-RCP01AA□	JUSP-RCP01AA□

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-RCP01AA□	JUSP-RCP01AA□

Power Supply Unit Type

Type	Robot Type
JZRCCR-XPU06B	SV3X, UP6, SK16X, UP20
JZRCCR-XPU05□	SK45X, SK16MX, UP50, UP20M, SP70X
JZRCCR-XPU05□ or JZRCCR-XPU10□	UP130, UP165, UP165-100, UP200
JZRCCR-XPU10□	UP130R, SK300X, SP100X, UP130RL, SR200X

4.2 YASNAC XRC Parts List

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

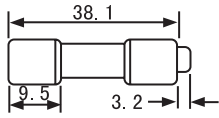
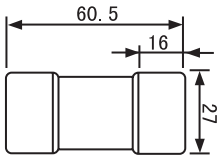
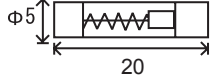
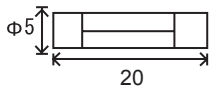
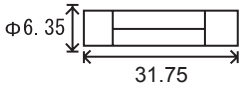
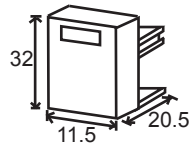
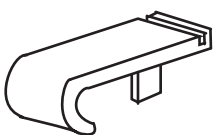
Robot Type		Fuse Type		
		QS1	QS2	QS3
SV3X	With trans- former built-in	3A	10A	5A
	Without trans- former	10A	-	5A
UP6	With trans- former built-in	5A	10A	10A
	Without trans- former	10A	-	10A
SK16X, UP20	With trans- former built-in	10A	15A	15A
	Without trans- former	15A	-	15A
SK45X, SK16MX, UP50, UP20M, 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- XPU05□, 06B, 10□ 1F,2F
5	4.0A Alarm fuse			2	GP40 4.0A 250V (Daito Tsushin)	JANCD-XSU02 FU5, 6
6	WAGO Connector wiring 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".

4.3 Supplied Parts List

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



For replacing parts in Rank B or Rank C, contact your Yaskawa representative.

4.4 Recommended Spare Parts

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 or 4715MS-22T-B50-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-RCP01AA□	SANRITZ	1	1	For Servo
15	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
16	B	Control Power Supply Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
17	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
18	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
19	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
20	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
21	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
22	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
23	C	Servopack	CACR-SV3AAA	Yaskawa	1	1	
24	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
25	C	I/O Unit	JZNC-XIU02B	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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 or 4715MS-22T-B50-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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP6AAC	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Power On Unit	JZNC-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZRCR-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 "Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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 or 4715MS-22T-B50-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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SK16AAC	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU06B	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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 or 4715MS-22T-B50-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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP20AAA	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU06B	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 "Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SK16MAAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU05□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power ON Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SK45AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZRRCR-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU05□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 " Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP20MAAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU05□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP50AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU05□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 " Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SP70AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU05□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JANCD-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP130AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU05□ or JZRRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 " Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP130AABY18	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU05□ or JZRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP130AABY18	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 "Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-UP130AABY21	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	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 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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SK300AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 "Programming Pendant" is ordered.

4.4 Recommended Spare Parts

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-RCP01AA□	SANRITZ	1	1	For Servo
14	B	SERVOPACK Control Board	JASP-WRCA01□	Yaskawa	1	1	
15	B	Control Power Supply 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 or JANCD-XIF04	Yaskawa	1	1	
18	B	Specific I/O Board 1	JARCR-XCI01	Yaskawa	1	1	
19	B	General I/O Board	JARCR-XCI03	Yaskawa	1	1	
20	B	Specific I/O Board 2	JARCR-XCU01B	Yaskawa	1	1	
21	B	Power On Board	JARCR-XCT01	Yaskawa	1	1	
22	C	SERVOPACK	CACR-SP100AAB	Yaskawa	1	1	
23	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
24	C	I/O Unit	JZRCR-XCO02B	Yaskawa	1	1	
25	C	I/O Power On Unit	JZNC-XSU02	Yaskawa	1	1	
26	C	Power Supply Unit	JZRCR-XPU10□	Yaskawa	1	1	
27	C	Programming Pendant	JZNC-XPP02B	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.27 " Programming Pendant" is ordered.

YASNAC XRC INSTRUCTIONS

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

YASKAWA ELECTRIC CORPORATION



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YASNAC XRC INSTRUCTIONS

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 ELECTRIC CORPORATION





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.

**NOTE** 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 is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and the manipulator 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 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, 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.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

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Setup • Diagnosis

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. Of these three, 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.

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	-
	RESERVED START (JOB)	Edit	Edit
	RESERVATION STATUS	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	-
	PSEUDO INPUT SIGNAL	Edit	Management
	NETWORK INPUT	Edit	-
	ANALOG OUTPUT	Edit	-
	SV POWER STATUS	Edit	-
	LADDER PROGRAM	Management	Management
	I/O ALARM	Management	Management
	I/O MESSAGE	Management	Management

2.1 Protection Through Security Mode Settings

Menu & Security Mode			
Top Menu	Sub Menu	Allowed Security Mode	
		DISPLAY	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
	SHOCK SENS LEVEL	Operation	Management
	USER COORDINATE	Edit	Edit
	HOME POSITION	Management	Management
	MANIPULATOR TYPE	Management	-
	ROBOT CALIBRATION	Edit	Edit
	ANALOG MONITOR	Management	Management
	OVERRUN&S-SENSOR	Edit	Edit
	LIMIT RELEASE	Edit	Management
	ARM CONTROL	Management	Management
	SHIFT VALUE	Operation	-
SYSTEM INFO	MONITORING TIME	Operation	Management
	ALARM HISTORY	Operation	Management
	I/O MSG HISTORY	Operation	Management
	VERSION	Operation	-
FD/PC CARD	LOAD	Edit	-
	SAVE	Operation	-
	VERIFY	Operation	-
	DELETE	Operation	-
	FORMAT	Operation	Operation
	DEVICE	Operation	Operation
	FOLDER	Operation	Management

Menu & Security Mode			
Top Menu	Sub Menu	Allowed Security Mode	
		DISPLAY	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	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
	KEY ALLOCATION	Management	Management
	RESERVED START (CONNECT)	Management	Management
ARC WELDING	ARC START CONDITION	Operation	Edit
	ARC END CONDITION	Operation	Edit
	ARC AUXILIARY CONDITION	Operation	Edit
	WELDER CONDITION	Operation	Edit
	ARC WELD DIAGNOSIS	Operation	Edit
	WEAVING	Operation	Edit
HANDLING	HANDLING DIAGNOSIS	Operation	Edit
SPOT WELDING	WELD DIAGNOSIS	Operation	Edit
	I/O ALLOCATION	Management	Management
	GUN CONDITION	Management	Management
	WELDER CONDITION	Management	Management
SPOT WELDING (MOTOR GUN)	WELD DIAGNOSIS	Operation	Edit
	GUN PRESSURE	Edit	Edit
	PRESSURE	Edit	Edit
	I/O ALLOCATION	Management	Management
	GUN CONDITION	Management	Management

2.1 Protection Through Security Mode Settings

Menu & Security Mode

Top Menu	Sub Menu	Allowed Security Mode	
		DISPLAY	EDIT
	GUN CONDITION AUX	Management	Management
	WELDER CONDITION	Management	Management
GENERAL	GENERAL DIAGNOSIS	Operation	Edit

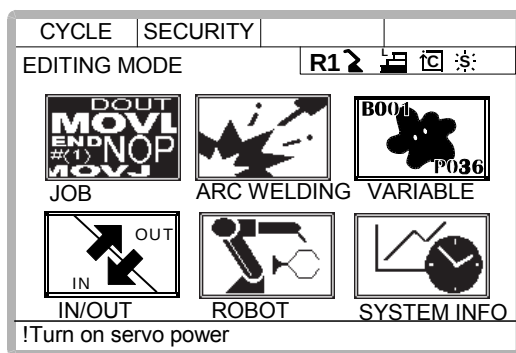
■ Modification of Security Mode

Operation

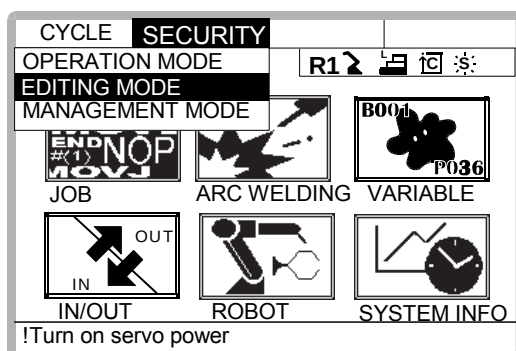
Select {SECURITY} under the top menu^{*1} ➡ Select the desired mode^{*2} ➡ Input the user ID ➡ Press [ENTER]^{*3}

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 user ID number are 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 possible to change.

2.1.2 User ID

User ID is requested when Editing Mode or Management Mode is operated.
User ID must be between 4 and 8 characters, and they must be numbers and symbols
("0~9", "-", and ".").

■ Changing a User ID

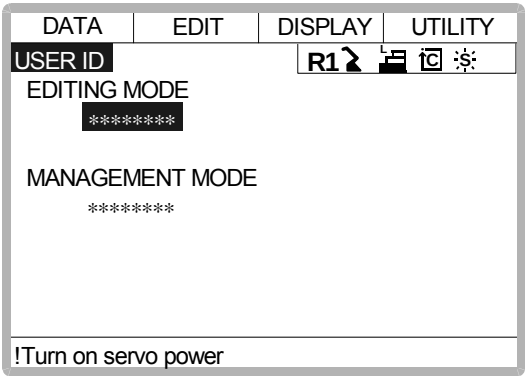
In order to change the user ID, the XRC must be in Editing Mode or Management Mode.
Higher security modes can make changes to lower security modes.

Operation

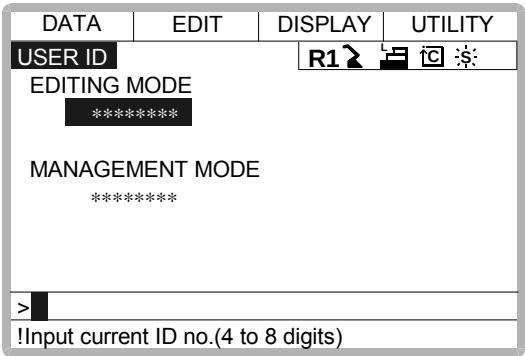
Select {SETUP} under the top menu ➡ Select {USER ID}^{*1} ➡ Select the desired ID^{*2}
➡ Input current ID and press [Enter]^{*3} ➡ Input new ID and press [Enter]^{*4}

Explanation

***1** User ID registration display is shown.

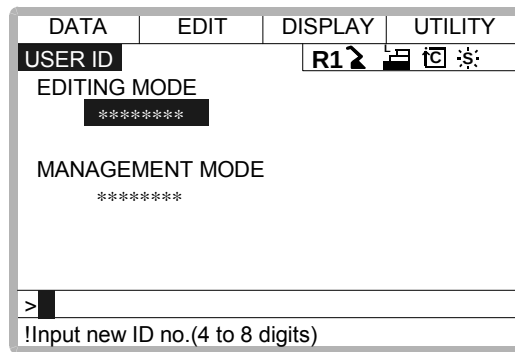


***2** The character input line is displayed, and the message "Input current ID no. (4 to 8 digits)" is displayed.



2.1 Protection Through Security Mode Settings

- *3** When the correct user ID is entered, a new ID is requested to be input. The message "Input new ID no. (4 to 8 digits)" is displayed.



- *4** User ID is changed.

3 System Setup and Backup

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.

3.1 Home Position Calibration



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, use the axis keys to calibrate the mark for the home position on each axis so that the manipulator can take its posture for the home position. 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. Refer to " 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}*1 ➡ Select {DISPLAY} under the menu*2 ➡ Select the desired control group ➡ Select {EDIT} under the menu*3 ➡ Select {SELECT ALL AXES}*4 ➡ Select "YES"*5

Explanation

*1 The home position calibration display is shown.

DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		R1	
SELECT		ABSOLUTE DATA	
R1:S	☒		*
L	☐		*
U	☐		*
R	☐		*
B	☐		*
T	☐		*
!			

*2 The pull down menu appears.

DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		ROBOT1	
SELECT		STATION1	
R1:S	☒		*
L	☐		*
U	☐		*
R	☐		*
B	☐		*
T	☐		*
!			

3.1 Home Position Calibration

- *3** The pull down menu appears.

DATA	EDIT	DISPLAY	UTILITY
SELECT ALL AXIS		R1	ABSOLUTE DATA
	SELECT		
R1:S	☐		*
L	☐		*
U	☐		*
R	☐		*
B	☐		*
T	☐		*
!			

- *4** The confirmation dialog box is displayed.

DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		R1	ABSOLUTE DATA
	SELECT		
R1:S	☐		*
Create home position? YES NO			
!			

- *5** Displayed position data of all axes are registered as home position.
When "NO" is selected, the registration will be canceled.

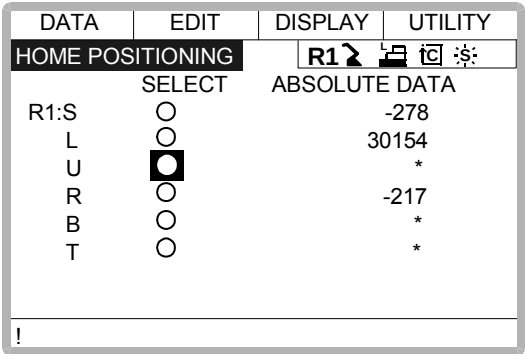
■ Registering Individual Axes

Operation

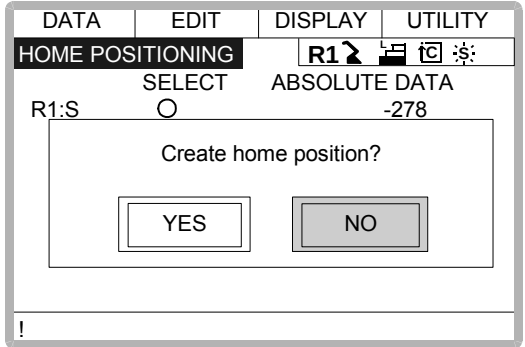
Select {ROBOT} under the top menu ➡ Select {HOME POSITION} ➡ Select {DISPLAY} under the menu ➡ Select the desired control group*1 ➡ Select the axis to be registered*2 ➡ Select “YES”*3

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 box is displayed.



***3** Displayed position data of axis are registered as home position. When “NO” is selected, the registration will be canceled.

■ Clearing Absolute Data

Operation

Select {ROBOT} under the top menu ➡ Select {HOME POSITION}^{*1} ➡ Select {DATA} under the menu ➡ Select {CLEAR ALL DATA}^{*2}

Explanation

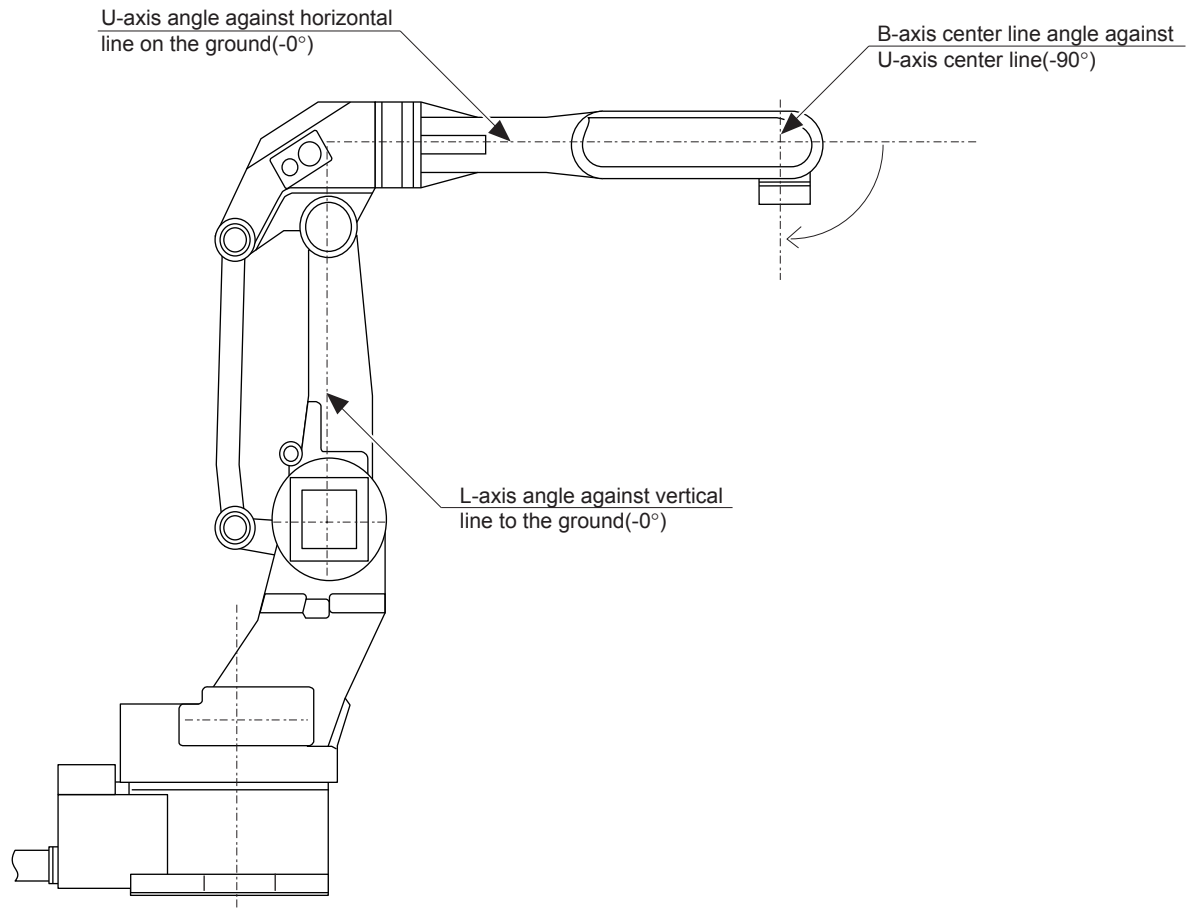
- *1** In the same way shown in Explanation *1, *2 in "Registering all axes at once", the home calibration display and select control group are shown.
- *2** The all absolute data are cleared.

DATA	EDIT	DISPLAY	UTILITY
HOME POSITIONING		R1	
	SELECT	ABSOLUTE DATA	
R1:S	☐		*
L	☐		*
U	☐		*
R	☐		*
B	☐		*
T	☐		*
!			

3.1 Home Position Calibration

3.1.3 Home Position of the Robot

In case of UP6, the home positions are as follows.



NOTE Other manipulator models have different positions. Always refer to the instruction manual 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.

3.2 Specified Point



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.

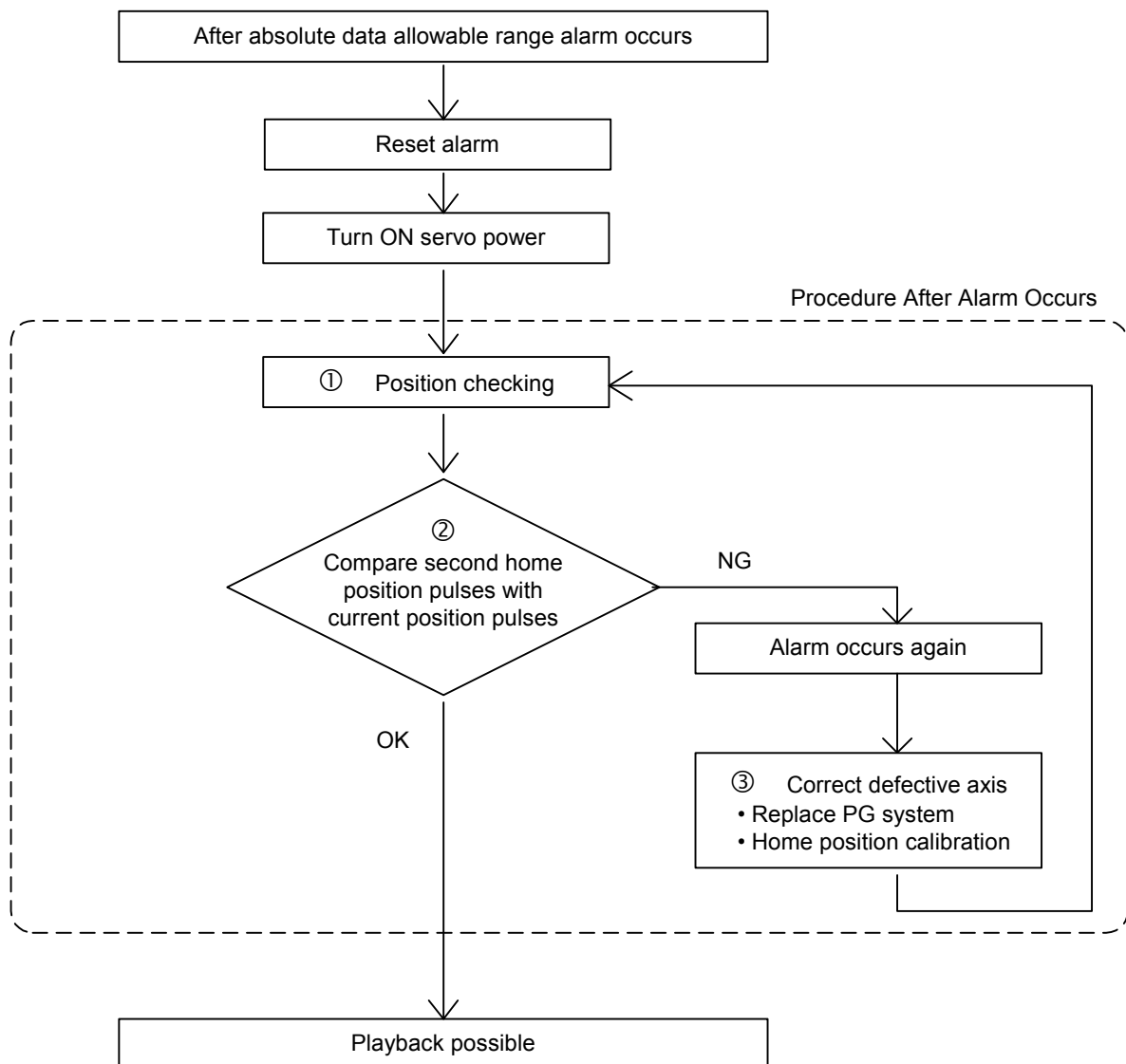
3.2.1 Purpose of Position Check Operation

If the absolute rotation data in the absolute encoder vary while the power supply is turned ON and while it is OFF, an alarm occurs after 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 move in unexpected directions when playback is started. When the absolute data allowable range error alarm occurred, to secure improved safety, playback or test runs cannot be performed unless the position is confirmed.



3.2 Specified Point

①Position 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.

②Pulse 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 ".

③Alarm 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.



- 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

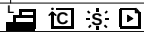
Apart from the normal home position of the manipulator, the specified point can be set up as a check point for absolute data. Use the following steps to set the specified point.
If two or more manipulators or stations are controlled by one control panel, the specified point must be set for each manipulator or station.

Operation

Select {ROBOT} under the top menu ➡ Select {SECOND HOME POS}^{*1} ➡ Press the page key  ^{*2} ➡ Press the axis keys^{*3} ➡ Press [MODIFY] and [ENTER]^{*4}

Explanation

- *1** The specified point display is shown.
The message “Available to move to any modify specified point” is shown.

DATA	EDIT	DISPLAY	UTILITY
SPECIFIED POINT		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** If there are several group axes, select a group axis which sets the specified point.
- *3** Move the manipulator to the new specified point.
- *4** The specified point position is modified.

3.2 Specified Point

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 following operations:

- 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".



Refer to " 5.7 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}*¹ ➡ Press the page key  *² ➡ Press [FWD]*³ ➡ Select {DATA} under the menu ➡ Select {CONFIRM POSITION}*⁴

Explanation

- *¹ The specified point display is shown.
- *² If there are several group axes, select a group axis which sets the specified point.
- *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. Set the clock inside the XRC controller with the correct time by the following operations.

Operation

Select {SETUP} under the top menu ➡ Select {DATE/TIME}^{*1} ➡ Select “DATE” or “CLOCK”^{*2} ➡ Input the new date or time^{*3} ➡ Press [ENTER]^{*4}

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		
!			

The input buffer line is displayed.

^{*2} For instance, if you want to set the date to May 1, 1998, input [1998.5.1]. To set the time at exactly ten o'clock, enter [10.00].

> 1998.5.1

^{*3} 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

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]*⁵

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 can be alternated by pressing 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.

When all limits are released, the the following limit checks are also released.

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.

3.5 All Limits Releasing

Operation

Select {ROBOT} under the top menu ➡ Select {LIMIT RELEASE}*1 ➡ Select “ALL LIMITS RELEASE”*2

Explanation

*1 The limit release display is shown.

DATA	EDIT	DISPLAY	UTILITY
LIMIT RELEASE		R1	  
SOFT LIMIT RELEASE			INVALID
ALL LIMITS RELEASE			INVALID
!			

*2 “VALID” and “INVALID” are displayed alternately every time [SELECT] is pressed. The message “All limits have been released” appears when “VALID” is set to “ALL LIMITS RELEASE”, and the message “All limits release has been canceled” appears for three seconds when “INVALID” is set..

DATA	EDIT	DISPLAY	UTILITY
LIMIT RELEASE		R1	  
SOFT LIMIT RELEASE			INVALID
ALL LIMITS RELEASE			VALID
!All limits have been released			

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.
- For your safety, it is recommended to operate the manipulator in low speed or by inching upon the jog operation.

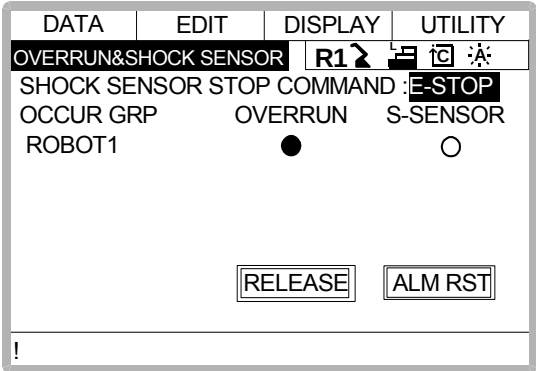
If the manipulator stops by overrun detection or shock sensor detection, release the overrun or shock sensor by the following procedures and move the manipulator using the axis keys.

Operation

Select {ROBOT} under the top menu ➡ Select {OVERRUN & S-SENSOR}^{*1} ➡
Select “RELEASE”^{*2} ➡ Select “ALM RST”^{*3}

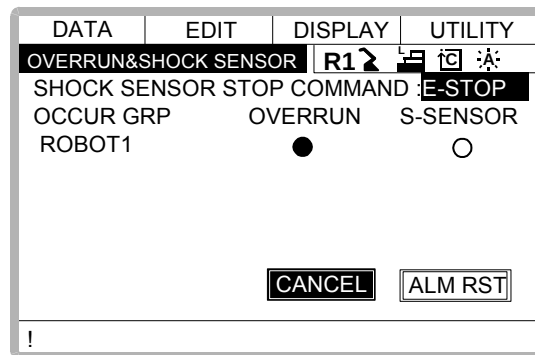
Explanation

- *1** The overrun & shock sensor release display is shown.
The stopping condition when the shock sensor is detected can be selected “E-STOP” or “HOLD” with the “SHOCK SENSOR STOP COMMAND”. “E-STOP” and “HOLD” are displayed alternately every time [SELECT] is pressed.



3.6 Overrun / Shock Sensor Releasing

- *2** “●” 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.



- 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.
- The axis operation can be performed only in the joint coordinate system.

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

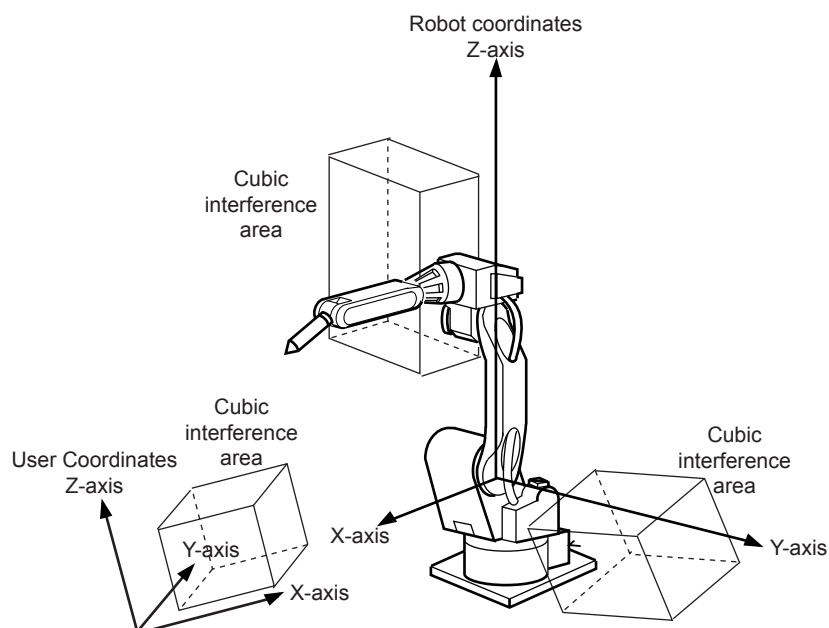
The XRC judges whether the tool center point of the manipulator is inside or outside of this area, and outputs this status as a signal.

If the tool center point of the manipulator is inside of the area, inside the interference 1 signal and inside the interference 2 signal are turned ON and the manipulator automatically decelerates to stop. The manipulator stands by till these signals are turned OFF. When it is turned OFF 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.



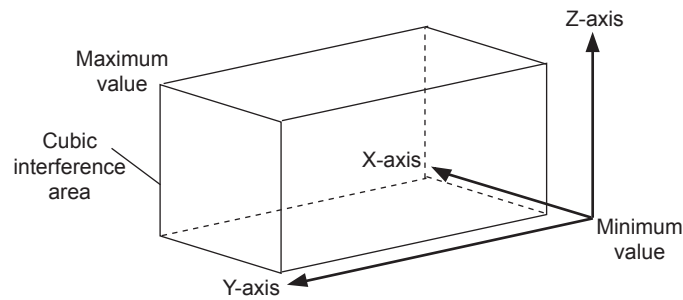
3.7 Interference Area

■ Setting Method

There are three ways to set cubic interference areas, as described in the following:

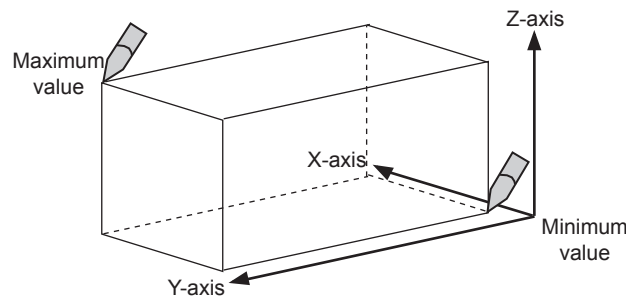
Number Input of Cube Coordinates

Enter the maximum and minimum values for the cube coordinates.



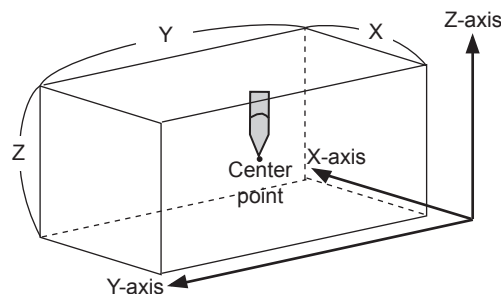
Teaching Corner

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.



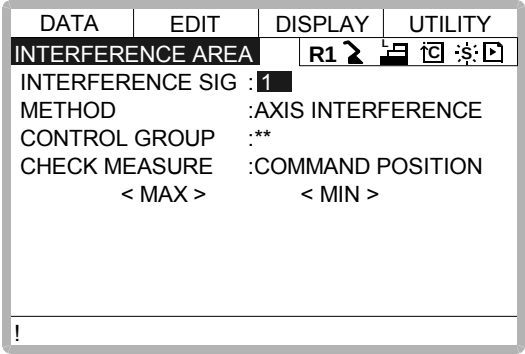
■ Setting Operation

Operation

Select {ROBOT} under the top menu ➡ Select {INTERFERENCE}*1 ➡ Select the desired cube number*2 ➡ Select "METHOD"*3 ➡ Select "CONTROL GROUP"*4 ➡ Select "REF COORDINATES" *5 ➡ Select "CHECK MEASURE"*6

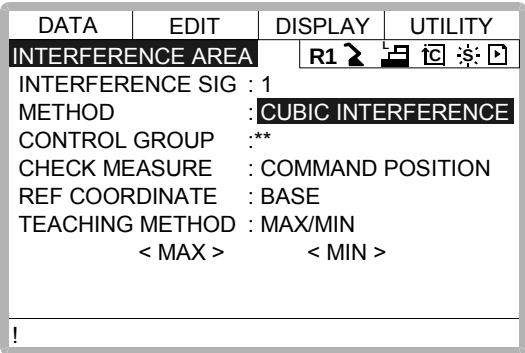
Explanation

*1 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.



3.7 Interference Area

- *4** The selection dialog is displayed. Select desired control group.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA			
INTERFERENCE SIG : 1			
METHOD : CUBE INTERFERENCE			
CONTROL GROUP : R1:ROBOT1			
CHECK MEASURE : R2:ROBOT2			
REF COORDINATE : BASE			
TEACHING METHOD : MAX/MIN			
< MAX > < MIN >			
!			

- *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].

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA			
INTERFERENCE SIG: 1			
METHOD : BASE			
CONTROL GROUP : ROBOT			
CHECK MEASURE : USER			
REF COORDINATE : BASE			
TEACHING METHOD : MAX/MIN			
< MAX > < MIN >			
X	0.000	0.000	
Y	0.000	0.000	
!			

- *6** Each time [SELECT] is pressed, "COMMAND POSITION" and "FEEDBACK POSITION" alternate.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA			
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	
!			

3.7 Interference Area

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
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	
!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
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	
!			

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.

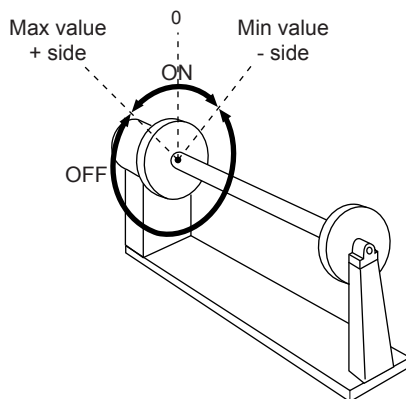
- *⁵ The current position is registered as the center point of the cube.

3.7 Interference Area

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

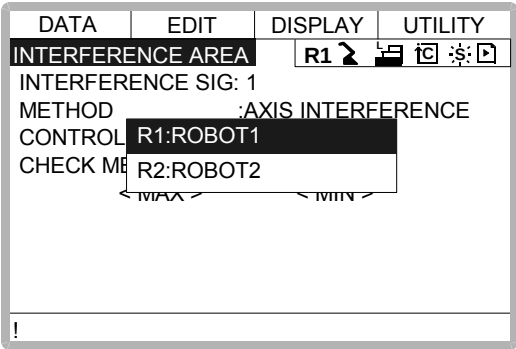
Select {ROBOT} under the top menu ➡ Select {INTERFERENCE}*¹ ➡ Select the desired interference signal number*² ➡ Select "METHOD"*³ ➡ Select "CONTROL GROUP"*⁴ ➡ Select "CHECK MEASURE"*⁵ ➡ Input data for desired axis and press [Enter]*⁶

Explanation

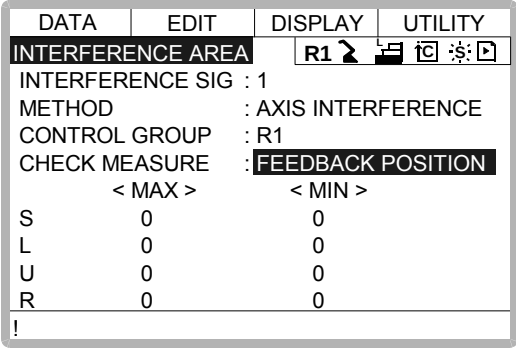
*¹ The cubic interference area display is shown.

DATA	EDIT	DISPLAY	UTILITY
INTERFERENCE AREA		R1	⏏ ⏏ ⏏ ⏏ ⏏ ⏏
INTERFERENCE SIG : 1			
METHOD : AXIS INTERFERENCE			
CONTROL GROUP : **			
CHECK MEASURE : COMMAND POSITION			
< MAX >		< MIN >	
!			

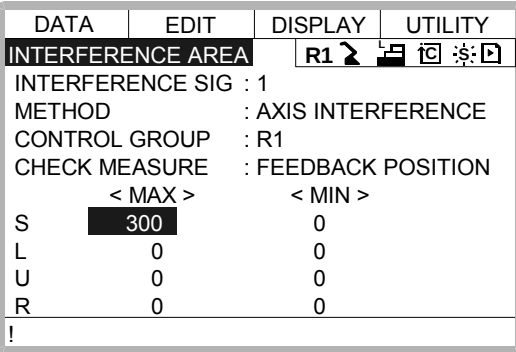
- *2 Select the desired interference signal number using the page key  or by number input.
The method for number input is as follows: Move cursor to "INTERFERENCE SIG" and press [ENTER] to display the number input line. Input desired signal number and press [ENTER].
- *3 "AXIS INTERFERENCE" and "CUBIC INTERFERENCE" are displayed alternately every time [SELECT] is pressed. Select "AXIS INTERFERENCE".
- *4 The selection dialog is displayed. Select desired control group.



- *5 Each time [SELECT] is pressed, "COMMAND POSITION" and "FEEDBACK POSITION" alternate.



- *6 The interference area is set.



3.7 Interference Area

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 unlumber 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	
!			

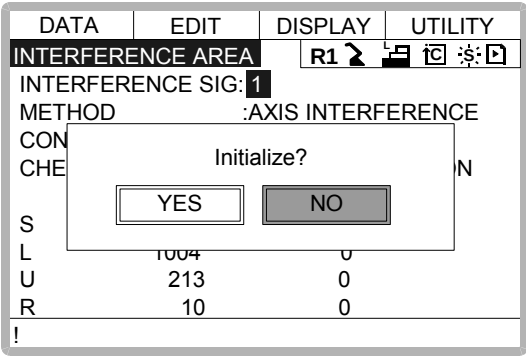
3.7.4 Clearing Interference Area Data

Operation

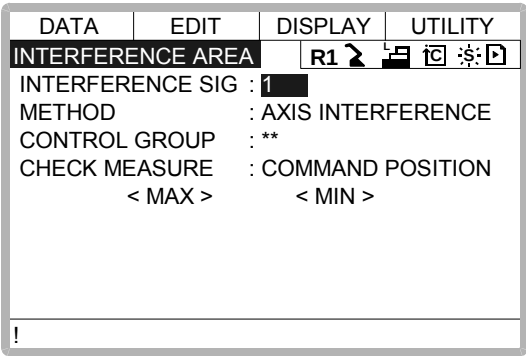
Select interference signal for clearing*1 ➡ Select {DATA} under the menu ➡ Select {CLEAR DATA}*2 ➡ Select “YES”*3

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 box 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}^{*1} ➡ Press the page key  ^{*2}

Explanation

***1** 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	
!			

***2** When two or more manipulators 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^{*1} ➡ Press [MODIFY] and [ENTER]^{*2}

Explanation

- *1 Move the manipulator to the new operation origin point.
- *2 New operation origin point is set.

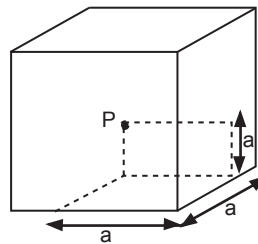


When the operation origin point is changed, the operation origin cube is automatically set as cube 24 to 21 in the base coordinate system.

- The cube 24 is for ROBOT1
- The cube 23 is for ROBOT2
- The cube 22 is for ROBOT3
- The cube 21 is for ROBOT4

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: μm). By changing this parameter setting, the size of the cube can be changed.

S3C412: The operation origin cube length of its sides (μm)



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.

3.8 Operation Origin Point Setting

■ Returning to the Operation Origin Point

In the teach mode

Operation

Press [FWD] in the operation origin point display^{*1}

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

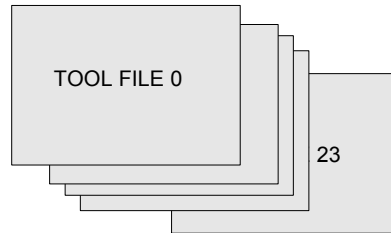
This signal is output any time the current position of the tool center point of the manipulator is checked and found to be within the operation origin cube.

3.9 Tool Data Setting

3.9.1 Registering Tool Files

■ Number of Tool Files

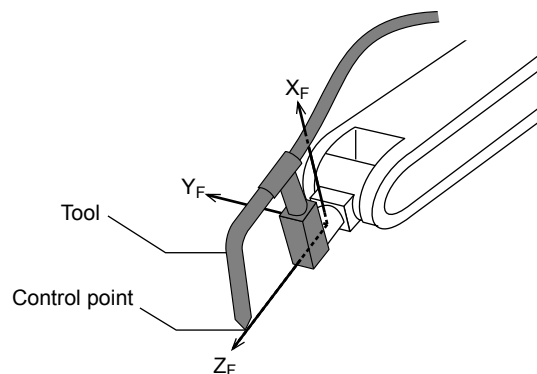
There are 24 tool files numbered 0 to 23. Each file is called as a tool file.



For the double-arm type of MOTOMAN-CSL series, tool data can be set to the each tool attached to the arm. In this case, it is recommended to set hand data by even-numbered tool file to the L-arm, and by odd-numbered tool file to the R-arm.

■ 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}^{*1} ➡ Select the desired tool number^{*2} ➡ Select the desired coordinate axis to modify^{*3} ➡ Input the tool data ➡ Press [ENTER]^{*4}

3.9 Tool Data Setting

Explanation

- *1** 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
TOOL COORDINATE		R1	  
NO.	NAME		
00	[TORCH1]		
01	[TORCH2]		
02	[]		
03	[]		
04	[]		
05	[]		
06	[]		
07	[]		
!			

DATA	EDIT	DISPLAY	UTILITY
TOOL			
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}.

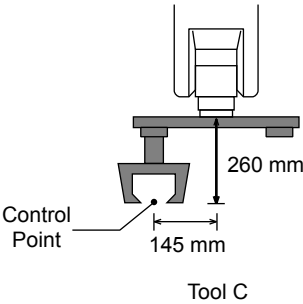
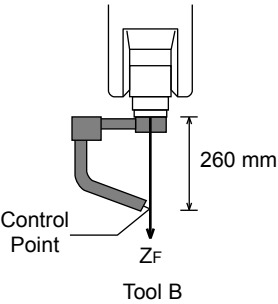
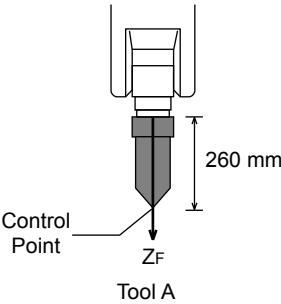
DATA	EDIT	DISPLAY	UTILITY
TOOL		LIST	
TOOL NO. : 00			
NAME :TORCH1			
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	0.00 deg.
!			

***3** The number input line is displayed.

***4** The tool data is registered

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	260.000 mm	Rz	0.00 deg.				
W 0.000 kg							
Xg 0.000 mm							
!							

<Setting Example>



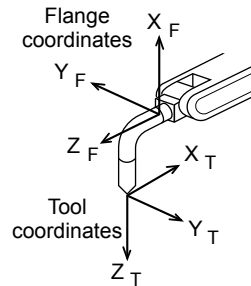
Case of Tool A, B				Case of Tool C			
X	0.000 mm	Rx	0.00 deg.	X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.	Y	145.000 mm	Ry	0.00 deg.
Z	260.000 mm	Rz	0.00 deg.	Z	260.000 mm	Rz	0.00 deg.

3.9 Tool Data Setting

■ Registering Tool Pose

The tool pose data is an 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 $R_z \rightarrow R_y \rightarrow R_x$.

The following, register $R_z=180$, $R_y=90$, $R_x=0$

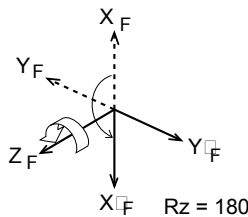


Operation

Select {ROBOT} under the top menu ➡ Select {TOOL} ➡ Select the desired tool number^{*1} ➡ Select the desired coordinate axis to modify^{*2} ➡ Input the tool pose data^{*3} ➡ Press [ENTER]^{*4}

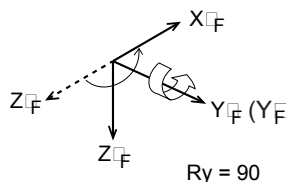
Explanation

- *1** In the same way shown in Explanation *1, *2 in "Registering coordinate data", the desired tool coordinate display is shown.
- *2** First, select R_z .
- *3** Input rotation angle around Z_F of the flange coordinates.



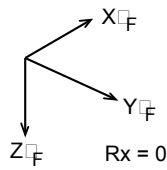
X	0.000 mm	Rx	0.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	0.000 mm	Rz	180.00 deg.

- *4** The rotation angle of R_z is registered.
In the same way, register the angle of R_y , R_x .
 R_y 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.

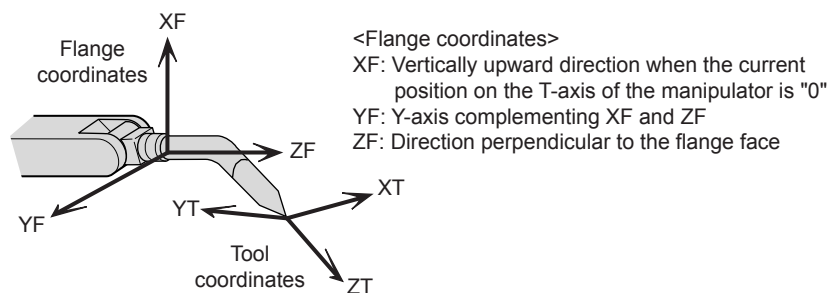
SUPPLEMENT

For more details on the tool load information, refer to" 3.11.3 Tool Load Information Setting ".

3.9.2 Tool Calibration

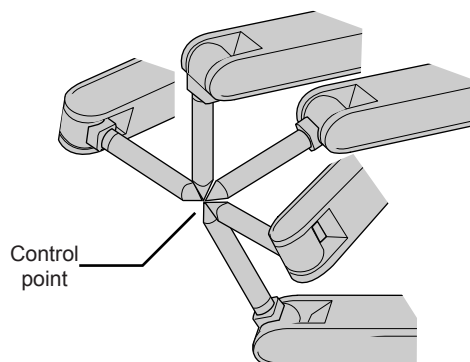
■ Tool Calibration

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 multi-hand, 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*1 ➡ Select {UTILITY} under the menu ➡ Select {CALIBRATION}*2 ➡ Select the robot*2 ➡ Select "POSITION"*4 ➡ Move the manipulator using the axis key ➡ Press [MODIFY] ➡ Press [MODIFY] and [ENTER]*5 ➡ Select "COMPLETE"*6

Explanation

*1 In the same way shown in Explanation *1, *2 in "Registering Coordinate Data ", the desired tool coordinate display is shown.

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		
!			

*2 The tool calibration setting display is shown.

DATA	EDIT	DISPLAY	UTILITY
TOOL CALIBRATION		R1    	
TOOL NO. : 00		POSITION : TC1	
**S	*	<STATUS>	
L	*	TC1	☐
U	*	TC2	☐
R	*	TC3	☐
B	*	TC4	☐
T	*	TC5	☐
		COMPLETE CANCEL	
!			

*3 Select the robot to calibrate. (When the robot has already been selected or there is only one robot, this operation should not be performed.) Select "***" in the tool calibration setting display and select the robot in the displayed selection dialog.

DATA	EDIT	DISPLAY	UTILITY
TOOL CALIBRATION		R1    	
TOOL NO. : 00		POSITION : TC1	
**S	*	<STATUS>	
L	*	TC1	☐
U	*	TC2	☐
R	*	TC3	☐
B	*	TC4	☐
T	*	TC5	☐
		COMPLETE CANCEL	
!			

3.9 Tool Data Setting

- *4** The selection dialog is displayed. Select the teaching point for calibration.

DATA	EDIT	DISPLAY	UTILITY
TOOL CALIBRATION		R1	
TOOL NO. : 00		POSITION : TC1	
R1:S *		<STATUS>	
L		TC1	
U		TC2	
R		TC3	
B		TC4	
T		TC5	
		COMPLETE CANCEL	

- *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.

DATA	EDIT	DISPLAY	UTILITY
TOOL CALIBRATION		R1	
TOOL NO. : 00		POSITION : TC4	
R1:S 0		<STATUS>	
L	10	TC1 ●	
U	1000	TC2 ●	
R	53	TC3 ●	
B	200	TC4 ●	
T	8	TC5 ○	
		COMPLETE CANCEL	

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
TOOL		R1	
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

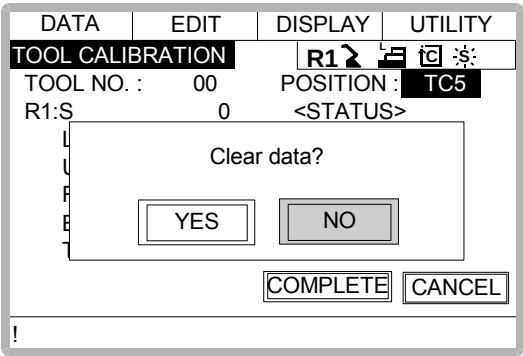
Before the calibration of a new tool, clear the robot information and calibration data.

Operation

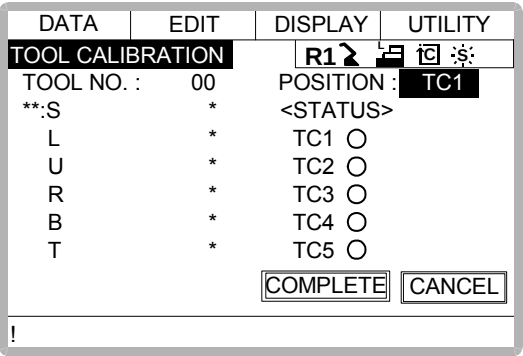
Select {DATA} under the menu ➡ Select {CLEAR DATA}*1 ➡ Select “YES”*2

Explanation

*1 The confirmation dialog box is shown.



*2 All data is cleared.

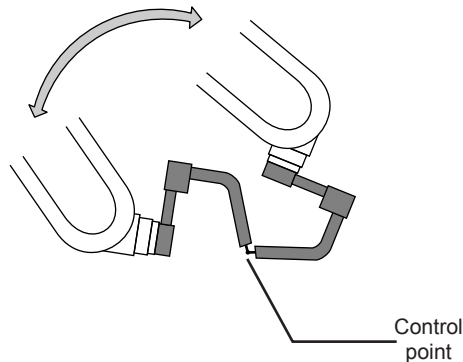


NOTE Only tool coordinate data are calculated using tool calibration. If tool pose data is required, input the data number in the tool coordinate display. Refer to " Registering Tool Pose " for the operation.

3.9 Tool Data Setting

■ 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

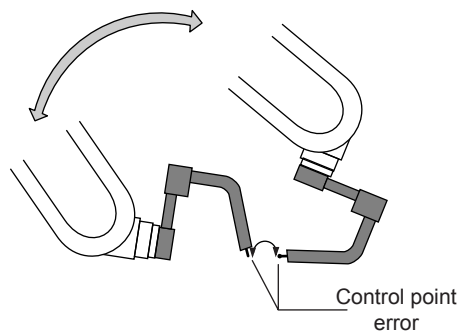
Press [COORD]^{*1} ➡ Select desired tool number^{*2} ➡ Move the R, B, or T axes using the axis key^{*3}

Explanation

- *1** Select any coordinate type except “ JOINT” by pressing [COORD].

DATA	EDIT	DISPLAY	UTILITY
TOOL			
TOOL NO. : 00			
NAME : TORCH1			
X 0.000 mm	Rx	0.00 deg.	

- *2** Show the tool coordinate display of the desired tool by pressing the page key or selecting it in the tool list.
- *3** 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, refer to 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.



This function is available for the models listed below. Contact your Yaskawa representative for information on other models.

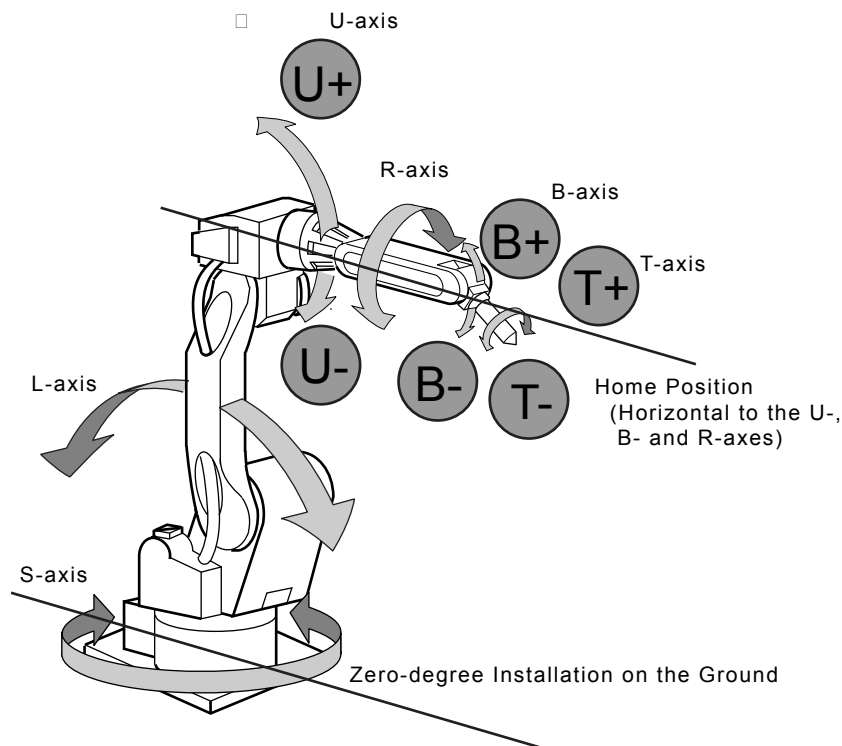
Applicable models: MOTOMAN UP6, SK16X, SK45X, and UP130.

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.



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.

3.9 Tool Data Setting

Operation

Select {ROBOT} under the top menu ➡ Select {TOOL}*¹ ➡ Select the desired tool number*² ➡ Select {UTILITY} under the menu ➡ Select {W.GRAV.POS MEASURE}*³ ➡ Press the page key *⁴ ➡ Press [NEXT]*⁵ ➡ Press [NEXT] again*⁶ ➡ Select "REGISTER"*⁷

Explanation

- *1** 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
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		
!			

- *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			
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	☐
Xg	*.*** mm	U	☐
Yg	*.*** mm	B	☐
Zg	*.*** mm	T(1)	☐
		T(2)	☐
REGISTER		CANCEL	
!			

- *4** In a system with several manipulators, 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, "○" 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

3.9 Tool Data Setting



- 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.

DATA	EDIT	DISPLAY	UTILITY
W.GRAV.POS MEASURE		R1	
TOOL	:00		
R1:W	4.513 kg	< STATUS >	
		HOME	●
Xg	10.112 mm	U	●
Yg	10.435 mm	B	●
Zg	55.123 mm	T(1)	●
		T(2)	●
		REGISTER	CANCEL
!			

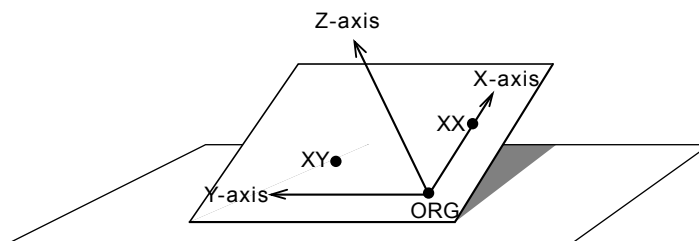
- *7** The measurements are registered in the tool file, and the tool coordinates are shown. Select “CANCEL” to call up the tool coordinates without registering the measurements in the tool file.

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

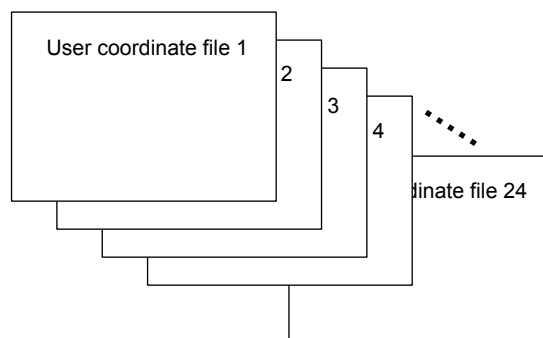
ORG is the home position, and XX is a point on the X-axis. XY is a point on the Y-axis side of the user coordinates that has been taught, and the directions of Y- and Z-axes are determined by point XY.



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 User Coordinates Setting

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
USER COORDINATE		R1	☰ ☒ ⚙
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
USER COORDINATE		R1	☰ ☒ ⚙
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
USER COORDINATE		R1	☰ ☒ ⚙
USER COORD NO.: 03		TOOL	:00
**S	*	SET POS.	ORG
L	*	<STATUS>	
U	*	○ :ORG	
R	*	○ :XX	
B	*	○ :XY	
T	*		
		COMPLETE	CANCEL

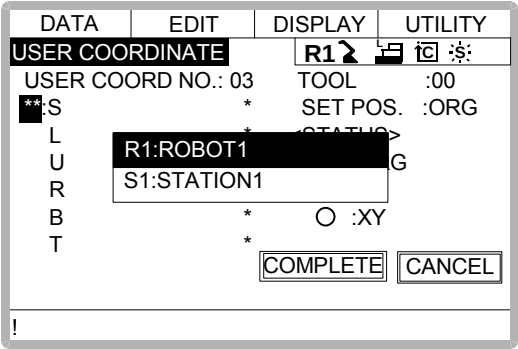
■ Teaching User Coordinates

Operation

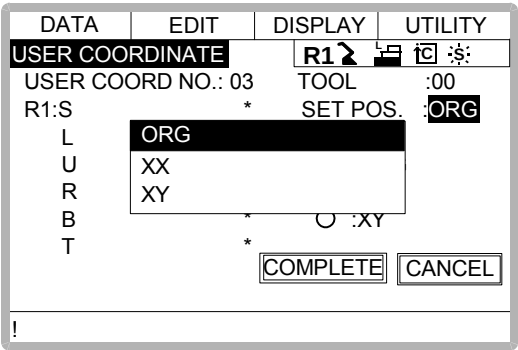
Select the robot^{*1} ➡ Select “SET POS”^{*2} ➡ Move the manipulator using the axis key
➡ Press [MODIFY] and [ENTER]^{*3} ➡ Select “COMPLETE”^{*4}

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.



3.10 User Coordinates Setting

***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.

DATA	EDIT	DISPLAY	UTILITY
USER COORDINATE		R1	
USER COORD NO.: 03		TOOL	:00
R1:S	0	SET POS.	XY
L	10	<STATUS>	
U	1000	●	:ORG
R	53	●	:XX
B	200	●	:XY
T	8		
		COMPLETE	CANCEL
!			

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
USER COORDINATE		R1	
NO.	SET	NAME	
00	●	[WORK1	]
01	●	[WORK2	]
02	○	[	]
03	●	[WORK3	]
04	○	[	]
05	○	[	]
06	○	[	]
07	○	[	]
!			

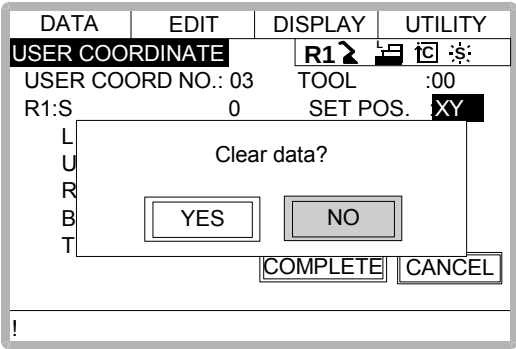
■ Clearing User Coordinates

Operation

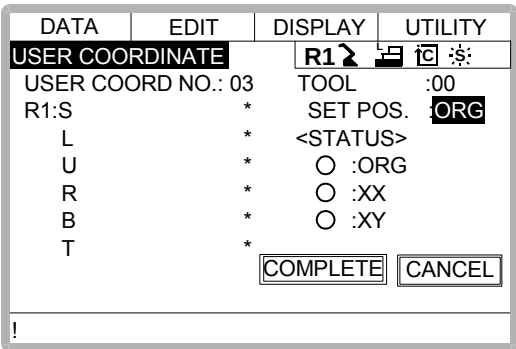
Select {DATA} under the menu ➡ Select {CLEAR DATA}*1 ➡ Select “YES”*2

Explanation

*1 The confirmation dialog box is shown.



*2 All data is cleared.



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

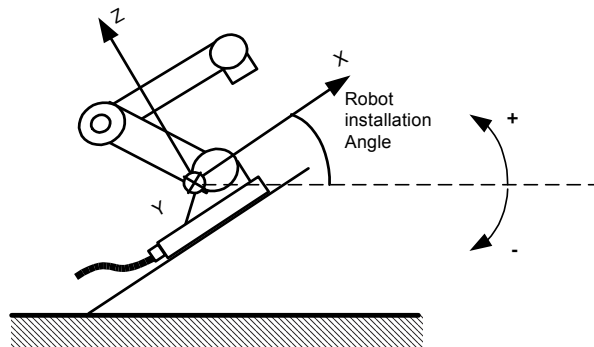
It is necessary to set the following robot setup condition to execute the ARM control appropriately.

- Robot installation angle
- S-head payload
- U-arm payload

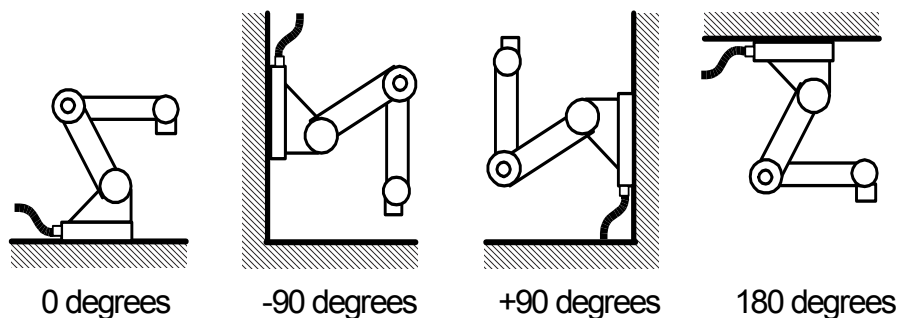
Robot Installation Angle

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.

3.11 ARM Control

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)

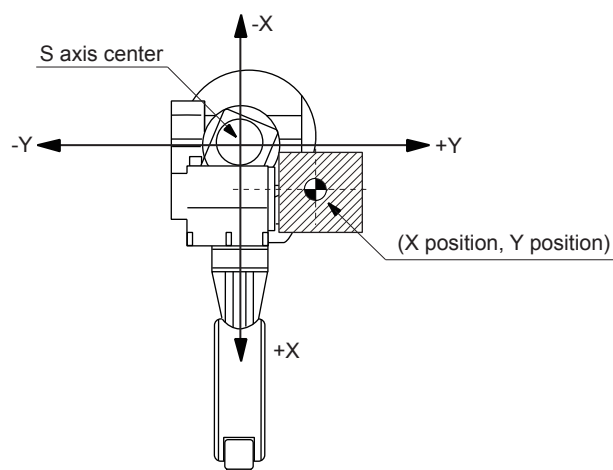
The weight of the installed load is set.

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.

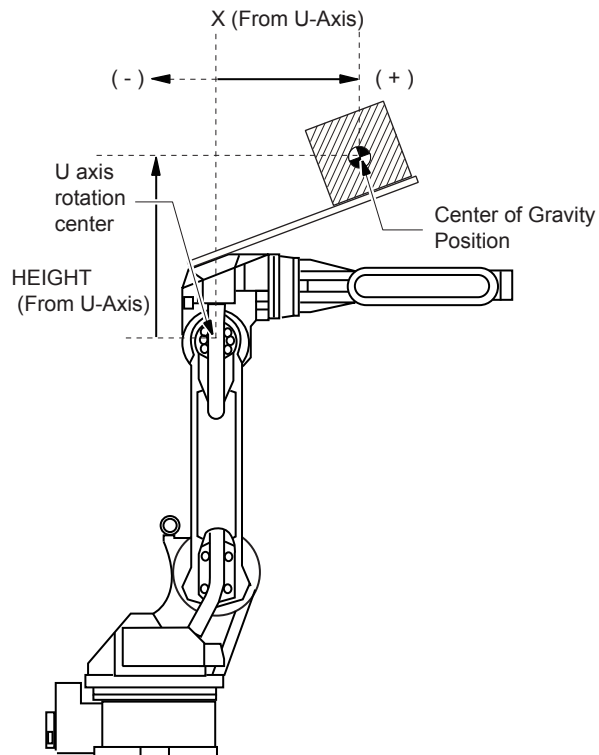
Set a little large value though it does not care by a rough value. (Rase to a unit in each 0.5 to 1kg)

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.



Load on U-arm: Center of gravity position (Side View)

3.11 ARM Control

■ 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}*1 ➡ Press the page key  *2 ➡ Select the desired item ➡ Input the value and press [ENTER]

Explanation

*1 ARM CONTROL display is shown.

DATA	EDIT	DISPLAY	UTILITY
ARM CONTROL			
CONTROL GROUP:ROBOT1			
<ROBOT SETUP CONDITION>			
ANGLE REL. TO GROUND		:	0.000 deg.
S-HEAD PAYLOAD			
WEIGHT		:	0.000 kg
X(FROM S-AXIS)		:	0.000 mm
Y(FROM S-AXIS)		:	0.000 mm
U-ARM PAYLOAD			
WEIGHT		:	20.000 kg
!			

*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.

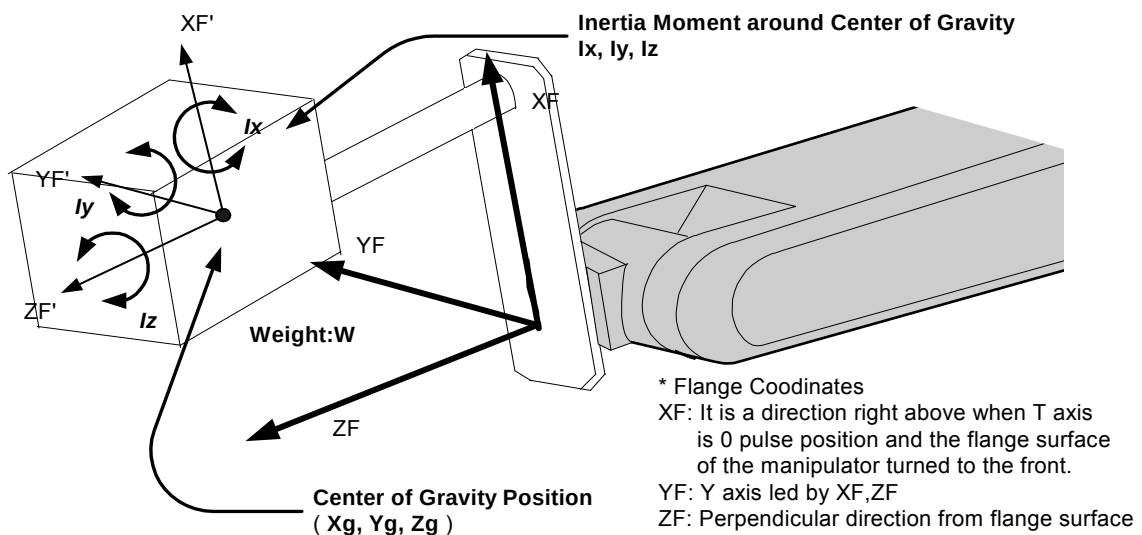
- Confirm the operation path of robot of each job which uses the tool file after the tool load information is changed.

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 installed tool is set.

Set a rather large value even if it is a rough value. Round up the setting value by 0.5 to 1kg for small and middle sized robots and by 1 to 5kg for large sized robots.

Center of gravity: x_g, y_g, z_g (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: I_x, I_y, I_z (Unit: $\text{kg}\cdot\text{m}^2$)

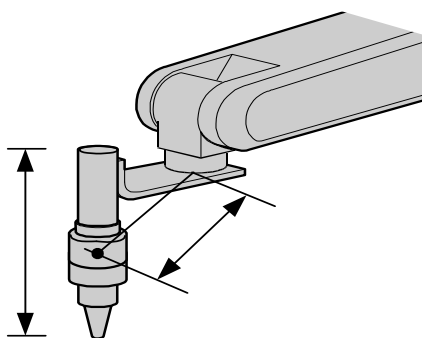
It is an moment of inertia of the tool at the center of gravity position.

The value is calculated around the each axis of the coordinates which is in parallel to the flange coordinates and which origin position is the center of gravity position of the tool.

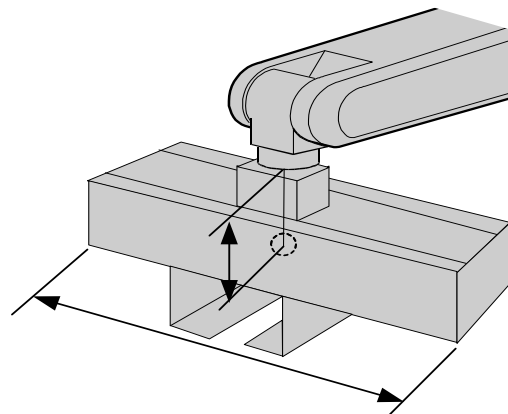
Set a little large value though it does not care by a rough value.

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.

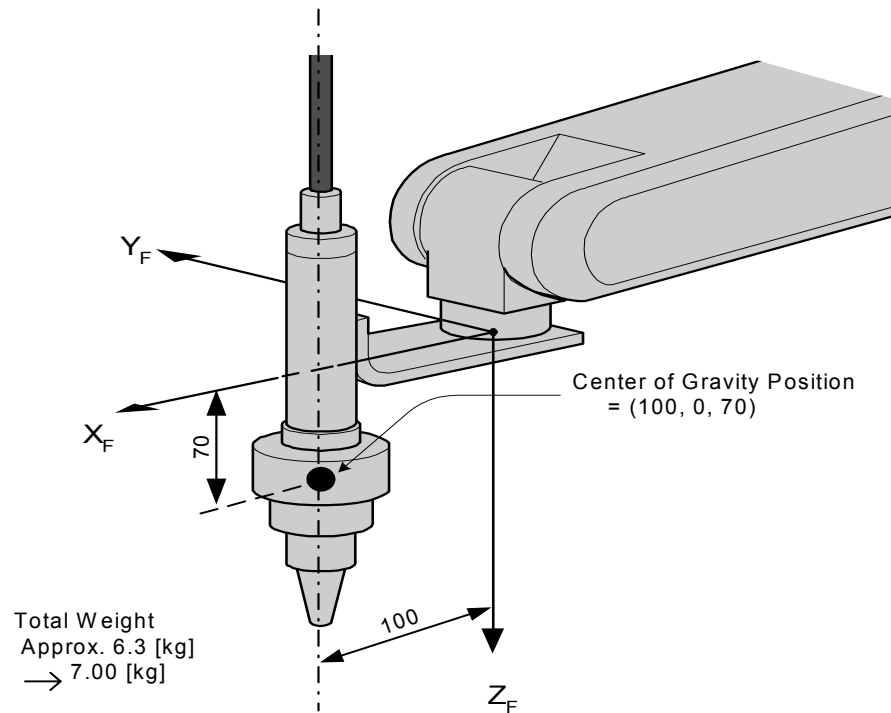
- Method to approximate the entire tool in hexahedron or cylinder.
- Method to calculate from each weight and center of gravity position of plural mass.

Refer to the following setting examples for details.

<Example1>

In the example of sealing gun of the figure below, it is assumed that there is a 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.



<Setting>

- W : 7.000 kg
- X_g : 100.000 mm
- Y_g : 0.000 mm
- Z_g : 70.000 mm
- I_x : 0.000 kg.m²
- I_y : 0.000 kg.m²
- I_z : 0.000 kg.m²

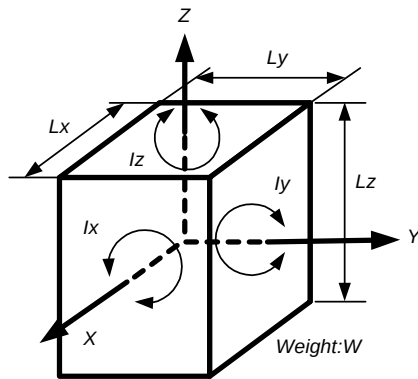
3.11 ARM Control



- 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.

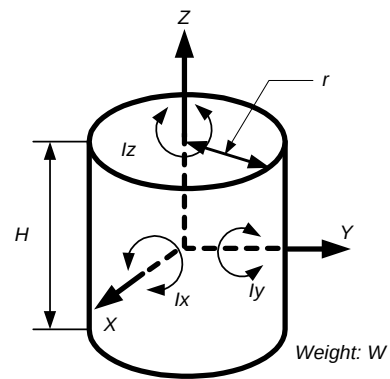
Refer the expression when the calculation of the moment of inertia at the center of gravity.



$$I_x = \frac{Ly^2 + Lz^2}{12} * W$$

$$I_y = \frac{Lx^2 + Lz^2}{12} * W$$

$$I_z = \frac{Lx^2 + Ly^2}{12} * W$$



$$I_x = I_y = \frac{3r^2 + H^2}{12} * W$$

$$I_z = \frac{r^2}{2} * W$$

* Unit of Weight : [kg]

* Unit of Length : [m]

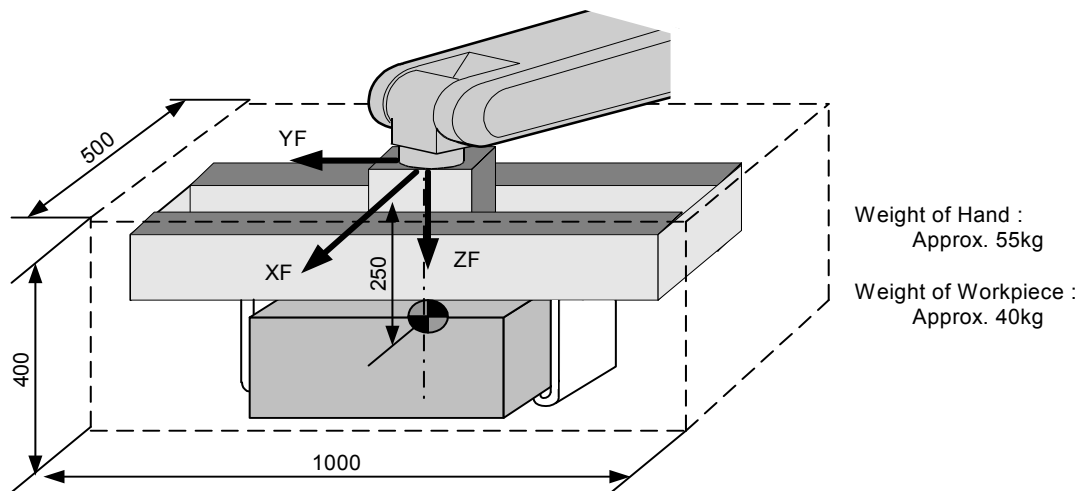
* Unit of Ix, Iy, Iz : [kg.m²]

<Example 2>

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

$(X_g, Y_g, Z_g) = (0, 0, 250)$

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,

$$I_x = (L_y^2 + L_z^2 / 12) * W$$

$$= ((0.400^2 + 1.000^2) / 12) * 100 = 9.667 = \text{approx. } 10.000$$

$$I_y = (L_x^2 + L_z^2 / 12) * W = ((0.500^2 + 0.400^2) / 12) * 100 = 3.417 = \text{approx. } 3.500$$

$$I_z = (L_x^2 + L_y^2 / 12) * W = ((0.500^2 + 1.000^2) / 12) * 100 = 10.417 = \text{approx. } 10.500$$

<Setting>

- W : 100.000 kg
- Xg : 0.000 mm
- Yg : 0.000 mm
- Zg : 250.000 mm
- Ix : 10.000 kg.m²
- Iy : 3.500 kg.m²
- Iz : 10.500 kg.m²



- 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]

$I_{cxi}, I_{c yi}, I_{c zi}$: 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.

$$\begin{aligned} I_x = & \{w_1 * ((y_1 - y_g)^2 + (z_1 - z_g)^2) * 10^{-6} + I_{cx1}\} \\ & + \{w_2 * ((y_2 - y_g)^2 + (z_2 - z_g)^2) * 10^{-6} + I_{cx2}\} \\ & \dots \dots \dots \\ & + \{w_i * ((y_i - y_g)^2 + (z_i - z_g)^2) * 10^{-6} + I_{cxi}\} \end{aligned}$$

$$\begin{aligned} I_y = & \{w_1 * ((x_1 - x_g)^2 + (z_1 - z_g)^2) * 10^{-6} + I_{cy1}\} \\ & + \{w_2 * ((x_2 - x_g)^2 + (z_2 - z_g)^2) * 10^{-6} + I_{cy2}\} \\ & \dots \dots \dots \\ & + \{w_i * ((x_i - x_g)^2 + (z_i - z_g)^2) * 10^{-6} + I_{c yi}\} \end{aligned}$$

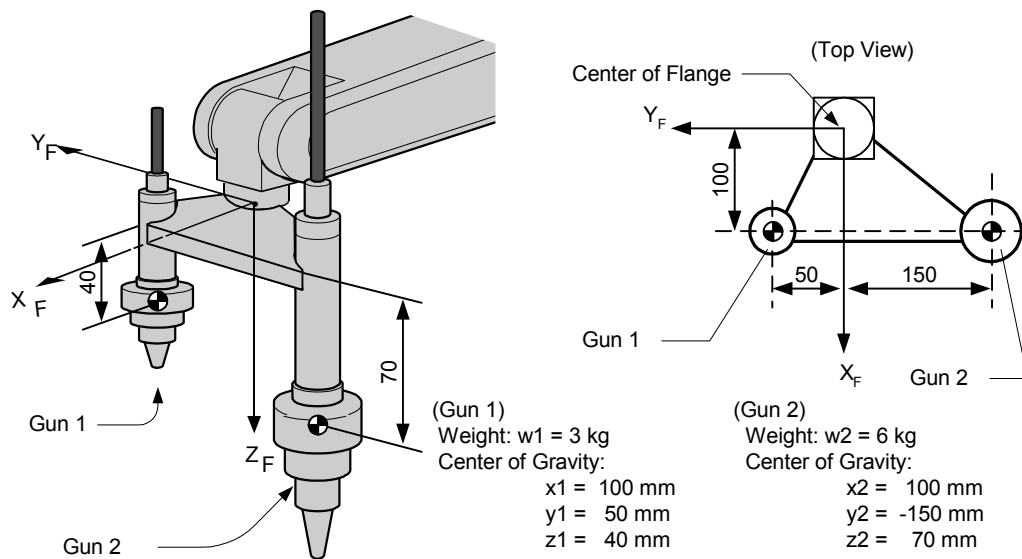
$$\begin{aligned} I_z = & \{w_1 * ((x_1 - x_g)^2 + (y_1 - y_g)^2) * 10^{-6} + I_{cz1}\} \\ & + \{w_2 * ((x_2 - x_g)^2 + (y_2 - y_g)^2) * 10^{-6} + I_{cz2}\} \\ & \dots \dots \dots \\ & + \{w_i * ((x_i - x_g)^2 + (y_i - y_g)^2) * 10^{-6} + I_{c zi}\} \end{aligned}$$

<Example 3>

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")

Following is the method No. 2 for calculating the value:



Weight : $W = w1 + w2$

$$= 3 + 6 = 9 = \text{approx. } 10[\text{kg}]$$

Center of gravity $Xg = (w1 * x1 + w2 * x2) / (w1 + w2)$

$$= (3 * 100 + 6 * 100) / (3+6) = 100.0 [\text{mm}]$$

$$Yg = (3 * 50 + 6 * (-150)) / (3+6) = -83.333 [\text{mm}]$$

$$Zg = (3 * 40 + 6 * 70) / (3+6) = 60.0 [\text{mm}]$$

The moment of inertia at the center of gravity position :

$$Ix = \{ w1 * ((y1 - Yg)^2 + (z1 - Zg)^2) * 10^{-6} + I_{cx1} \}$$

$$+ \{ w2 * ((y2 - Yg)^2 + (z2 - Zg)^2) * 10^{-6} + I_{cx2} \}$$

$$= 3 * ((50 - (-83))^2 + (40 - 60)^2) * 10^{-6}$$

$$+ 6 * (((-150) - (-83))^2 + (70 - 60)^2) * 10^{-6}$$

$$= 0.082 = \text{approx. } 0.100$$

$$Iy = 3 * ((100 - 100)^2 + (40 - 60)^2) * 10^{-6}$$

$$+ 6 * ((100 - 100)^2 + (70 - 60)^2) * 10^{-6}$$

$$= 0.002 = \text{approx. } 0.010$$

$$Iz = 3 * ((100 - 100)^2 + (50 - (-83))^2) * 10^{-6}$$

$$+ 6 * ((100 - 100)^2 + ((-150) - (-83))^2) * 10^{-6}$$

$$= 0.080 = \text{approx. } 0.100$$

3.11 ARM Control

* Here, the own moment of inertia (Icxi,Icyi,Iczi) 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
- Ix : 0.100 kg.m²
- Iy : 0.010 kg.m²
- Iz : 0.100 kg.m²

■ Tool load Information registering

Tool load Information is registered in the tool file.

Operation

Select {ROBOT} under the top menu ➡ Select {TOOL}*¹ ➡ Select the desired tool number*² ➡ Select the desired item to register and input the value*³ ➡ Press [ENTER]*⁴

Explanation

- *¹ 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.

DATA	EDIT	DISPLAY	UTILITY
TOOL			
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		
!			

- *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.

DATA	EDIT	DISPLAY	UTILITY
TOOL			
TOOL NO. : 00			
W	0.000 kg		
Xg 0.000 mm			
Yg 0.000 mm			
Zg 0.000 mm			
Ix 0.000 kg.m2			
ly 0.000 kg.m2			
!			

Weight

Center of Gravity Position

Inertia Moment at Center of Gravity

- *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:

When either of the following case, it is considered that data is not set correctly in tool load information.

- 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 the 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 urgently stops the manipulator to decrease damages by detecting the shock 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, it stops the manipulator instantaneously.



WARNING

This function cannot eliminate 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 for details.

Injuries or damages to machinery may result by collision with the manipulator.



This function is equipped with the under mentioned models.

Applied model: Motoman UP6, SK16X, UP20, SK45X, UP50, UP130

3.12.2 Shock Detection Function Setting

The shock detection function is set to detect the collision without any false positives even if the manipulator is operated with the maximum speed by the ratings load 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 works are required, 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.

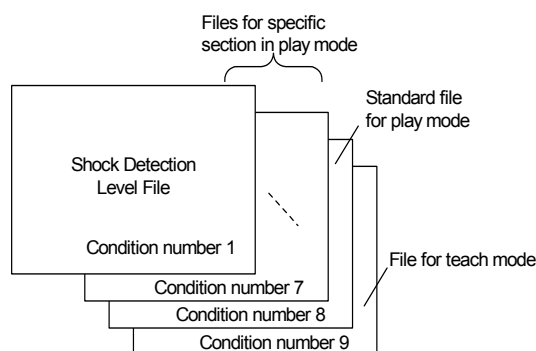
The shock detection set file are nine condition files as following figure.

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.

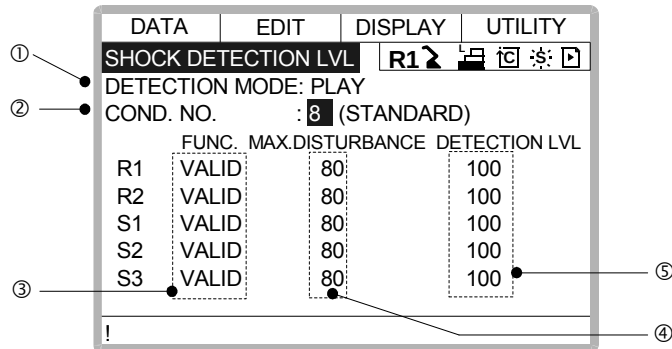
Method of Shock Detection Level File Setting

Operation

Select {ROBOT} under the top menu ➡ Select {SHOCK SENS LEVEL}^{*1} ➡ Select the desired condition number ➡ Select the desired item and set it

Explanation

***1** The shock detection level display is shown.



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 operation 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}.

3.12 Shock Detection Function

⑤ Detection Level (Level range: 1 to 500)

The shock detection level is specified here. Bigger value than the maximum disturbance force is set here.

The values which would not falsely detect the shock (The detection level:100) even if the robot is operated at the maximum speed are set here when shipped from the factory. The values which would not falsely detect the shock (The detection level:100) even if the robot is operated at the maximum speed are set here when shipped from the factory. Move the cursor to the robot or the station axis whose "Detection level" is desired to be changed. Then press [SELECT] so that the numeric values are ready to be input. Set the level to small value to raise the detection sensitivity or set the level to large value to lower sensitivity.



Set the level 20% or more greatly than the maximum disturbance force for the mis-detection prevention when the manipulator works.
An instantly stop of the manipulator by the 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.



"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}*1 ➡ Select the desired tool number*2 ➡ Select the desired item and set it

Explanation

***1** 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			
!				

***2** 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.

3.12 Shock Detection Function

DATA	EDIT	DISPLAY	UTILITY
TOOL			
TOOL NO. : 00			
W 0.000 kg			
Xg 0.000 mm Yg 0.000 mm Zg 0.000 mm			
Ix 0.000 kg.m2 Iy 0.000 kg.m2			

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 value are specified around each axis of the coordinates which is in parallel to the flange coordinates and which origin point is the center of gravity position.

Input the moment of inertia by a 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

① Robot / 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.

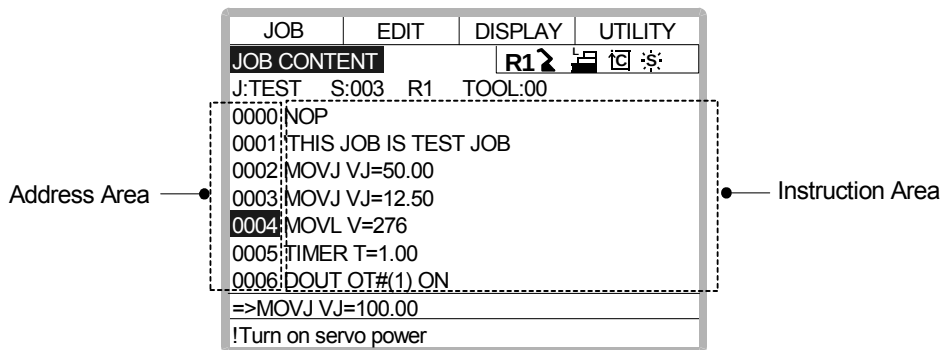
3.12 Shock Detection Function

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



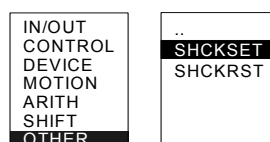
SHCKSET

Operation

Move the cursor to the line just before the location where SHCKSET instruction is desired to register ➡ Press [INFORM LIST]*¹ ➡ Select SHCKSET instruction*² ➡ Change the value of additional item and numerical data*³ ➡ Press [ADD] and [ENTER]*⁴

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 decreases the file number by pressing about [SHIFT] and the cursor key simultaneously.

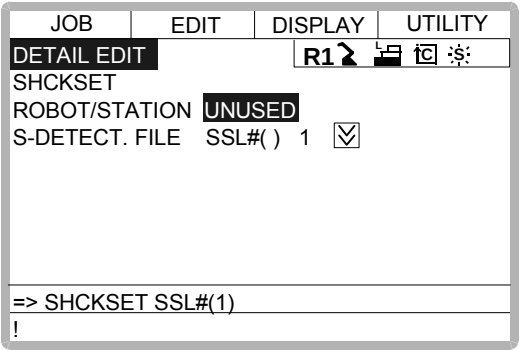
=> SHCKSET SSL#(2)

When the value is input with the numerical key, press [SELECT] to display the input buffer line.

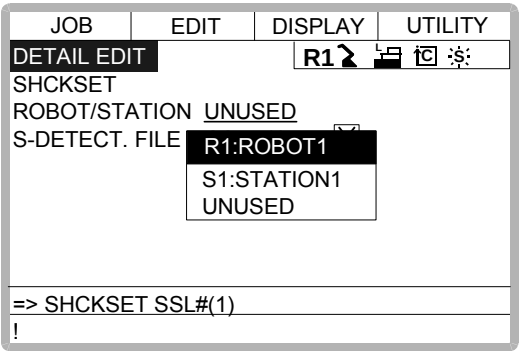


And press [ENTER] to change the number in the input buffer line.

- 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.

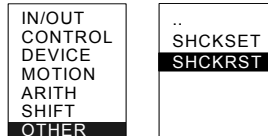
3.12 Shock Detection Function

SHCKRST**Operation**

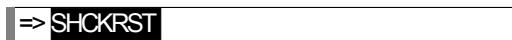
Move the cursor to the line just before the location where SHCKRST instruction is desired to register ➡ Press [INFORM LIST]^{*1} ➡ Select SHCKRST instruction^{*2} ➡ Change the value of additional item^{*3} ➡ Press [ADD] and [ENTER]^{*4}

Explanation

***1** The inform list dialog is shown.

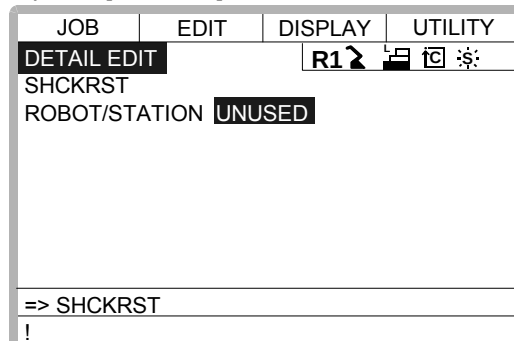


***2** SHCKRST instruction is displayed in the input buffer line.

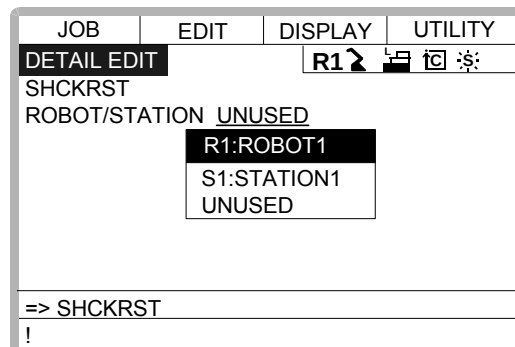


***3** < When register as it is >
Operate *4 procedure when the instruction the input buffer line as it is should be registered.

< 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].

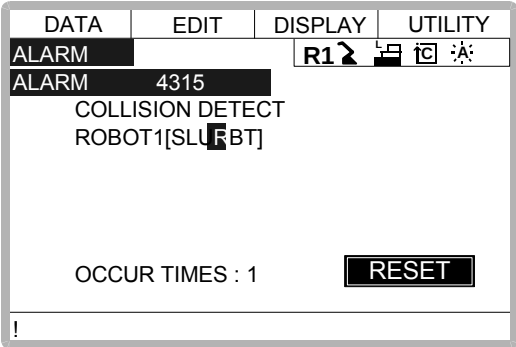


When the addition of the robot/the station ends, press [ENTER]. The detail edit display shuts and the job content display is shown.

***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 in the 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]^{*1} ➡ Operation after resetting the detection status^{*2}

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.

NOTE

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 Shock Detection Function

3.12.3 Alarm List

Alarm Number	Message	Cause	Remedy
4315	COLLISION DETECT Robot/Station [Axis Data]	• A collision from interference between robot and peripheral device etc. was detected. • The collision was mis-detected by the normal movement of the robot, because the detection level was small.	• Remove the object after resetting the alarm or move the robot to the safety position. • 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. • 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.

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.

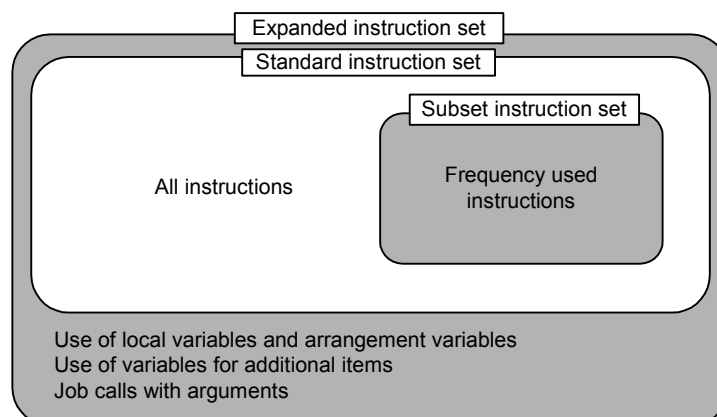
Standard Instruction Set / Expanded Instruction Set

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.



3.13 Instruction Level Setting

■ 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.

Register an instruction ➡

```
0003 WAIT IN#(1)=ON
0004 END
```

① An instructions are registered

The instruction and the additional items that were entered last time are displayed ➡

```
=> WAIT IN#(1)=ON
!
```

② The next time an attempt is made to register the same instruction as in 1, the same additional items as were registered last time are also displayed in the input buffer line.

3.13.2 Setting Instruction Set Level Operation

Operation

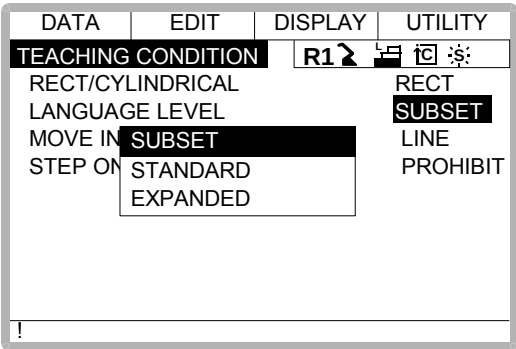
Select {SETUP} under the top menu ➡ Select {TEACHIG COND}*¹ ➡ Select "LANGUAGE LEVEL"*² ➡ Select desired language level*³

Explanation

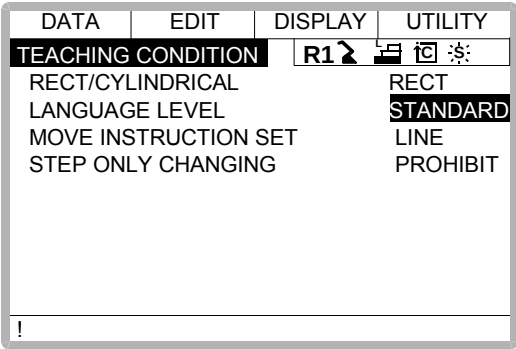
*¹ The teaching condition display is shown.

DATA	EDIT	DISPLAY	UTILITY
TEACHING CONDITION	R1	RECT	RECT
RECT/CYLINDRICAL			SUBSET
LANGUAGE LEVEL			LINE
MOVE INSTRUCTION SET			PROHIBIT
STEP ONLY CHANGING			
!			

***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 operations can be allocated to number keys on the programming pendant, decreasing the number of key operations reduce 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) function, 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) function, the manipulator operates according to the allocated function when the [INTERLOCK] and the number key are pressed at the same time. The followings show 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 Number Key Customize Function

3.14.3 Allocating an Operation

■ Allocation Display

Operation

Select {SETUP} under the menu ➡ Select {KEY ALLOCATION}*¹ ➡ Select {DIS-PLAY}*² ➡ Select {ALLOCATE SIM. KEY}*³

Explanation

*¹ 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			
!			

*² 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		ALLOCATE SIM. KEY	
KEY FUNCTION		ALLOCATION CONTENT	
- MAKER			
. MAKER			
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

*³ The key allocation (SIM) display is shown.

*⁴ 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

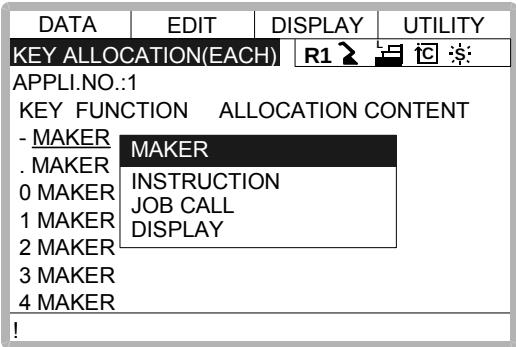
Use this function on the key allocation (EACH) display.

Operation

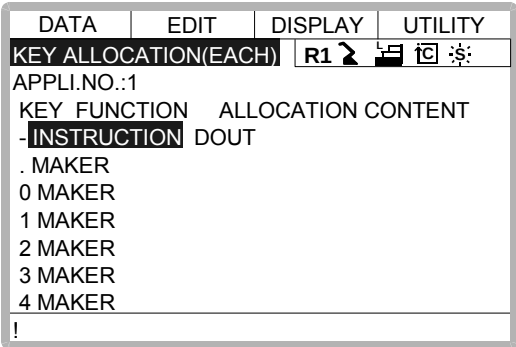
Move the cursor to “FUNCTION” of the key to be allocated ➡ Press [SELECT]*1 ➡
Select “INSTRUCTION”*2

Explanation

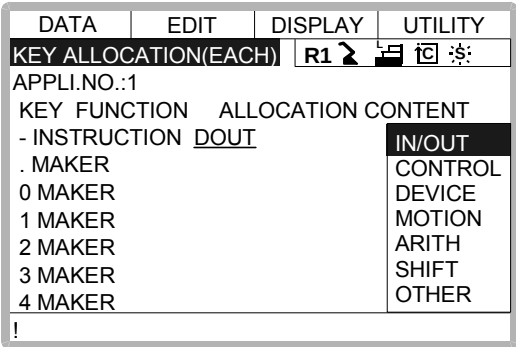
*1 The selection dialog box is shown.



*2 The instruction is displayed in the “ALLOCATION CONTENT”.



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.



3.14 Number Key Customize Function

When the instruction list dialog box is displayed, select the instruction to be changed.

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH) R1   			
APPLI.NO.:1			
KEY	FUNCTION	ALLOCATION CONTENT	
- INSTRUCTION	WAIT		
. MAKER			
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

■ Job Call Allocation

Use this function on the key allocation (EACH) display.

Operation

Move the cursor to the “FUNCTION” of the key to be allocated ➡ Press [SELECT]^{*1} ➡
Select “JOB CALL”^{*2}

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).

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(EACH) R1   			
APPLI.NO.:1			
KEY	FUNCTION	ALLOCATION CONTENT	
- INSTRUCTION	DOUT		
. JOB CALL	1		
0 MAKER			
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

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

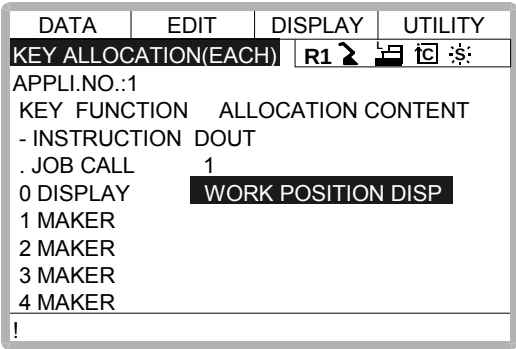
Use this function on the key allocation (EACH) display.

Operation

Move the cursor to the “FUNCTION” of the key to be allocated ➡ Press [SELECT]^{*1} ➡ Select “DISPLAY” ➡ Move the cursor to “ALLOCATION CONTENT” ➡ Press [SELECT]^{*2} ➡ Input the name of the reserved display and press [ENTER]^{*3} ➡ Open the display for allocation ➡ Press [INTERLOCK] and the allocated key at the same time^{*4}

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.

NOTE The display allocation functions the same as the reserved display call function. Only one display can be allocated to a key.

3.14 Number Key Customize Function

■ Alternate Output Allocation

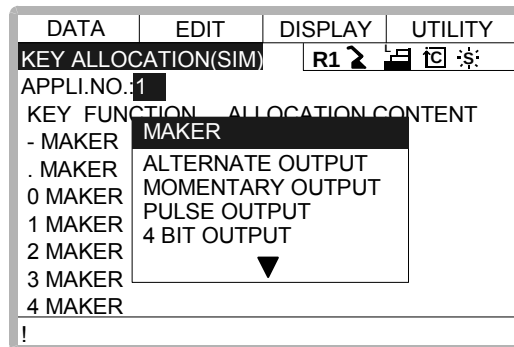
Use this function on the key allocation (SIM) display.

Operation

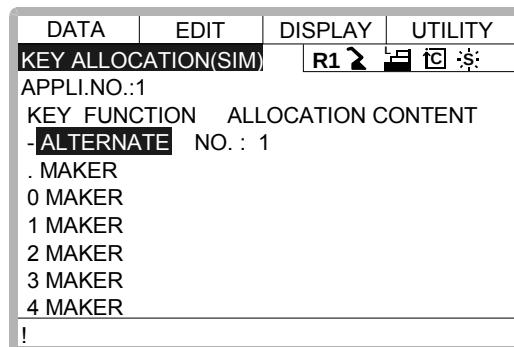
Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]^{*1} ➡
Select "ALTERNATE OUTPUT"^{*2}

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

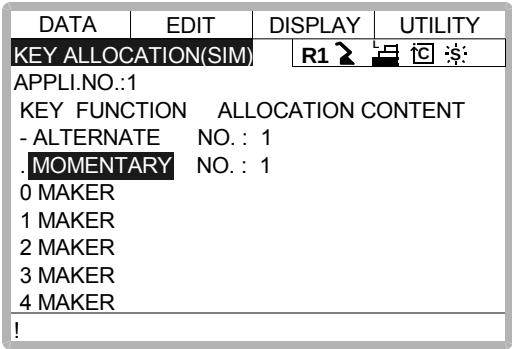
Use this function on the key allocation (SIM) display.

Operation

Move the cursor to the “FUNCTION” of the key to be allocated ➡ Press [SELECT]^{*1} ➡
Select “MOMENTARY OUTPUT”^{*2}

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].

3.14 Number Key Customize Function

■ Pulse Output Allocation

Use this function on 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".

DATA	EDIT	DISPLAY	UTILITY
KEY ALLOCATION(SIM)	R1	2	5
APPLI.NO.:1			
KEY FUNCTION		ALLOCATION CONTENT	
- ALTERNATE		NO. : 1	
. MOMENTARY		NO. : 1	
0 PULSE		NO. : 1 TIME: 0.01 SEC	
1 MAKER			
2 MAKER			
3 MAKER			
4 MAKER			
!			

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 on the key allocation (SIM) display.

Operation

Move the cursor to the “FUNCTION” of the key to be allocated ➡ Press [SELECT]^{*1} ➡
Select “4 BIT OUTPUT” or “8 BIT OUTPUT”^{*2}

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].

3.14 Number Key Customize Function

■ Analog Output Allocation

Use this function on the key allocation (SIM) display.

Operation

Move the cursor to the "FUNCTION" of the key to be allocated ➡ Press [SELECT]^{*1} ➡
Select "ANALOG OUTPUT"^{*2}

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)			
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 on 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”.

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	ANALOG INC	NO. : 1 INC : 1.00	
4	MAKER		
!			

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 Number Key Customize Function

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).

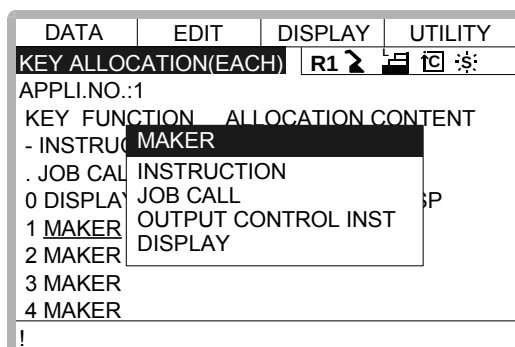
Function	Output Control Instruction To Be Allocated
Alternate output allocation	DOUT OT# (No.) ON
Momentary output allocation	
Pulse output allocation	PULSE OT# (No.) T = output time
Group output allocation (4-bit)	DOUT OGH (No.) output value
Group output allocation (8-bit)	DOUT OG# (No.) output value
Analog output allocation	AOUT AO# (No.) output voltage value

Operation

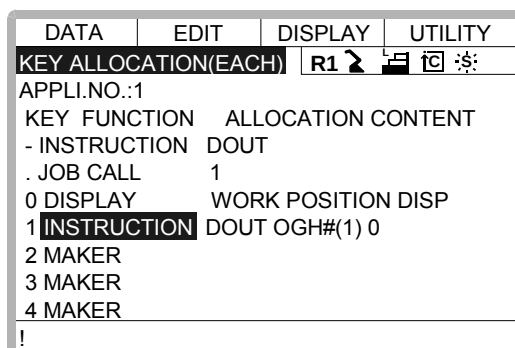
Move the cursor to the “FUNCTION” of the key that has been allocated with I/O control with key allocation (SIM) ➡ Press [SELECT]*1 ➡ Select “OUTPUT CONTROL INST”*2

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^{*1} ➡ Press [INSERT] and [ENTER]^{*2}

Explanation

^{*1} The allocated instruction is displayed in the input buffer line.

⇒ WAIT IN#(1) =ON

^{*2} 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^{*1} ➡ Press [INSERT] and [ENTER]^{*2}

Explanation

^{*1} The CALL instruction is displayed in the input buffer line.

⇒ CALL JOB: ARCON

^{*2} The CALL instruction displayed in the input buffer line is registered.

■ Executing the Display Allocation

Operation

Press the key allocated for the display allocation^{*1}

Explanation

^{*1} 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  and 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^{*1}

Explanation

^{*1} Allocated functions are executed.

3.15 Changing the Output Status

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 (refer to " 5.3.2 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.



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}^{*1} ➡ Select the desired signal for changing^{*2} ➡ Press [INTER LOCK]+[SELECT]^{*3}

Explanation

^{*1} 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	●	[]	

^{*2} Select the status (○ or ●) of the desired signal to change.

^{*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

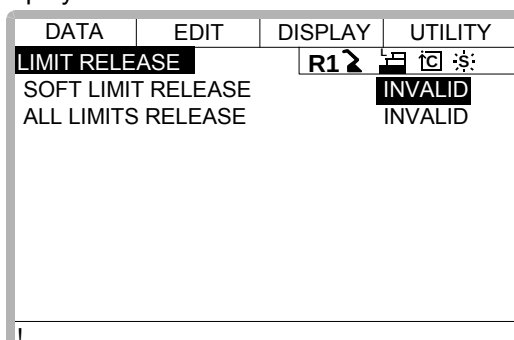
These soft limits are continually monitored by the system. When it is detected that the manipulator (tool center point) has reached a soft limit, the manipulator automatically stops. When the manipulator is stopped at a soft limit, temporarily release the soft limit by following the procedure below, then move the manipulator away from that which exceeded the soft limit.

Operation

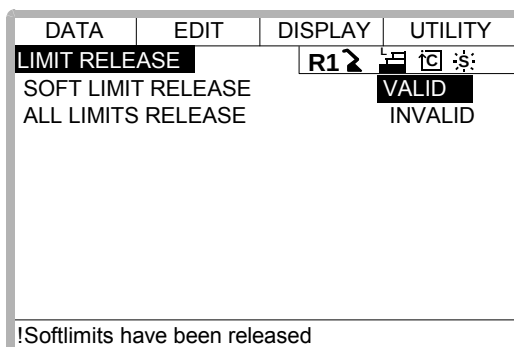
Select {ROBOT} under the top menu ➡ Select {LIMIT RELEASE}*1 ➡ Select “SOFT LIMIT RELEASE”*2

Explanation

*1 The limit release display is shown.



*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 Changing the Parameter Setting

The parameter settings can be changed only by the operator who has the correct user ID number for the management mode.

Operation

Select {PARAMETER} under the top menu ➡ Select the parameter type ^{*1} ➡ Move the cursor to the parameter number whose setting is to be changed^{*2}

Explanation

^{*1} The parameter display is shown. Select the desired parameter.

DATA	EDIT	DISPLAY	UTILITY
PARAMETER		R1	
S2C000	1	0000_0000	
S2C001	2	0000_0000	
S2C002	4	1000_0000	Binary Data
S2C003	8	0000_0000	
S2C004	16	0000_0000	Decimal Data
S2C005	32	0000_0000	
S2C006	64	0000_0000	
S2C007	89	0000_0000	

When the desired parameter number is not in the present display, move the cursor to a parameter number and press [SELECT]. Enter the desired parameter number with the number keys and press [ENTER]. The cursor moves to the selected parameter number.

The cursor moves to the selected parameter number. ➡

DATA	EDIT	DISPLAY	UTILITY
PARAMETER		R1	
S2C055	128	1000_0000	
S2C056	256	0000_1000	
S2C057	512	1100_0000	
S2C058	875	0000_0000	

Set the parameters in the following manner.

Operation

Select a parameter setting ^{*1} ➡ Enter the value ^{*2} ➡ Press [ENTER]

Explanation

- ^{*1} Move the cursor to the parameter number in the parameter display, and press [SELECT].
- To enter a decimal setting, select the decimal figure.
 - To enter a binary setting, select the binary figure.

3.17 Changing the Parameter Setting

DATA	EDIT	DISPLAY	UTILITY
PARAMETER		R12	⏏ ⏏ ⏏ ⏏
S2C055	128	1000_0000	
S2C056	256	0000_1000	
S2C057	512	0000_0000	
S2C058	0	0000_0000	
S2C059	0	0000_0000	
S2C060	0	0000_0000	
S2C061	0	0000_0000	
S2C062	0	0000_0000	
S2C063	0	0000_0000	
!			

- *2** If a decimal figure is selected, enter a decimal value with the number keys.

S2C056	0	0000_0000_0000_0000
> 256		

If a binary figure is selected, move the cursor to the numbers in the input buffer line, and press [SELECT]. Each time [SELECT] is pressed, “0” and “1” alternate in the display. “0” or “1” can also be entered with the number keys.

S2C056	0	0000_0000_0000_0000
> 0000_0000_1	00_0000	

- *3** The new setting appears in the position where the cursor is located.

DATA	EDIT	DISPLAY	UTILITY
PARAMETER		R12	⏏ ⏏ ⏏ ⏏
S2C055	192	1000_0000	
S2C056	256	0000_1000	
S2C057	512	0000_0000	
S2C058	0	0000_0000	
S2C059	0	0000_0000	
S2C060	0	0000_0000	
S2C061	0	0000_0000	
S2C062	0	0000_0000	
S2C063	0	0000_0000	
!			

3.18 File Initialize

NOTE

The teaching data cannot be entered while releasing software limit.

3.18.1 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}*1 ➡ Select “JOB”*2 ➡ Select “YES”*3

Explanation

*1 Initializing objects are shown.

INITIALIZE

☐ JOB

☐ FILE/GENERAL DATA

☐ PARAMETER

☐ I/O DATA

☐ SYSTEM DATA

!Maintenance Mode

Item marked by ■ can not be selected.

*2 The confirmation dialog box is displayed.

INITIALIZE

Initialize?

YES

NO

☐ JOB

☐ FILE

☐ PAR

☐ I/O D

☐ SYS

!Maintenance Mode

*3 Job data is initialized.

3.18 File Initialize

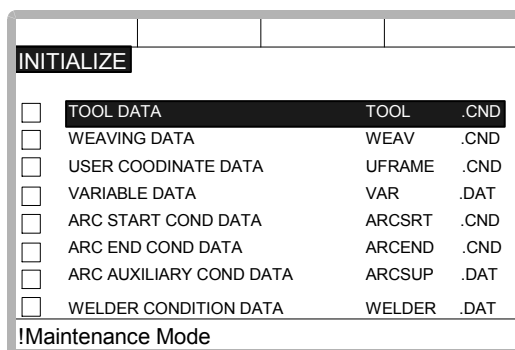
3.18.2 Initialize Data File

Operation

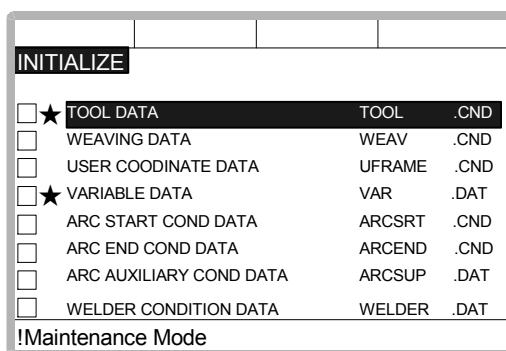
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Change the security mode to management mode ➡ Select {FILE} under the top menu ➡ Select {INITIALIZE} ➡ Select {FILE/GENERAL DATA}*¹ ➡ Select data file for initializing*² ➡ Presenter]*³ ➡ Select "YES"*⁴

Explanation

*¹ Data files are shown.

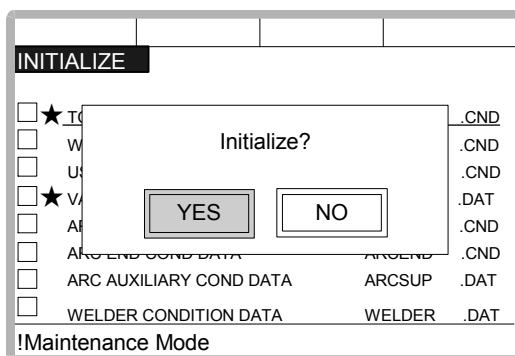


*² The selected data file is marked with "★".



File/Data marked by ■ can not be selected.

*³ The confirmation dialog box is displayed.



*⁴ Selected data file is initialized.

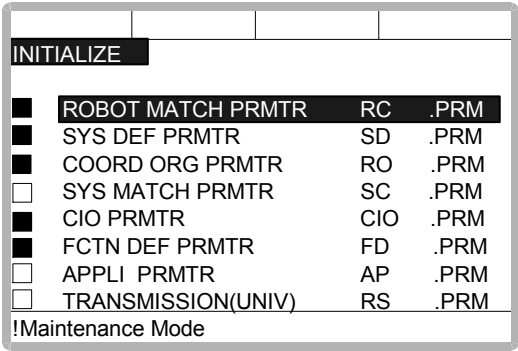
3.18.3 Initialize Parameter File

Operation

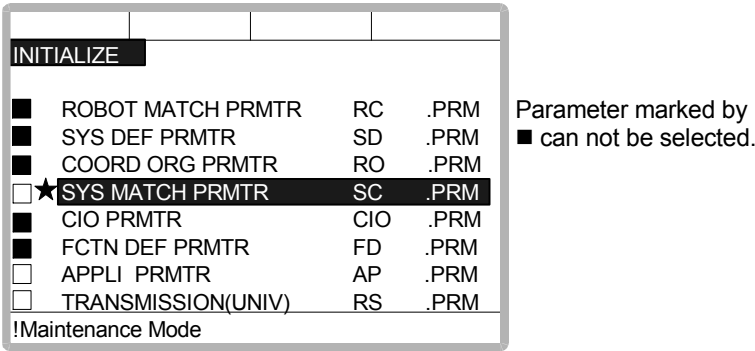
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Change the security mode to management mode ➡ Select {FILE} under the top menu ➡ Select {INITIALIZE} ➡ Select {PARAMETER}^{*1} ➡ Select parameter for initializing^{*2} ➡ Press [ENTER]^{*3} ➡ Select "YES"^{*4}

Explanation

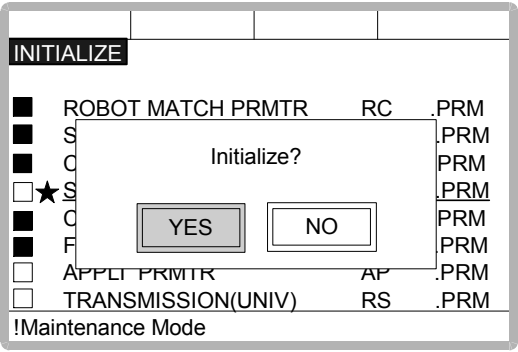
***1** Parameters are shown.



***2** The selected parameter is marked with "★".



***3** The confirmation dialog box is displayed



***4** Selected parameter is initialized.

3.18.4 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.

INITIALIZE		
☐	C·IO PRGM	CIOPRG .LST
☐	IO NAME DATA	IONAME .LST
☐	SIMULATED IN DATA	PSEUDOIN.DAT

!Maintenance Mode

*² The selected data is marked with "★".

INITIALIZE		
☐ ★	C·IO PRGM	CIOPRG .LST
☐	IO NAME DATA	IONAME .LST
☐	SIMULATED IN DATA	PSEUDOIN.DAT

!Maintenance Mode

Parameters marked by ■ can not be selected.

*³ The confirmation dialog box is displayed.

INITIALIZE		
☐ ★	C·IO PRGM	CIOPRG .LST
☐	IO NAME DATA	IONAME .LST
☐	SIMULATED IN DATA	PSEUDOIN.DAT

Initialize?

YES NO

!Maintenance Mode

*⁴ The selected data is initialized.

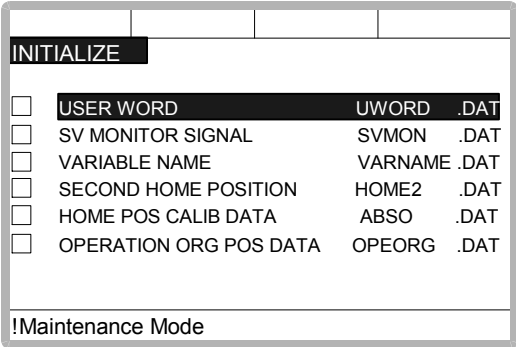
3.18.5 Initializing System Data

Operation

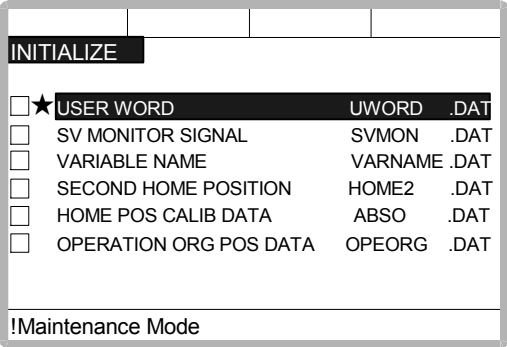
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Change the security mode to management mode ➡ Select {FILE} under the top menu ➡ Select {INITIALIZE} ➡ Select {SYSTEM DATA}^{*1} ➡ Select the parameter to be initialized^{*2} ➡ Press [ENTER]^{*3} ➡ Select “YES”^{*4}

Explanation

***1** The system data is shown.

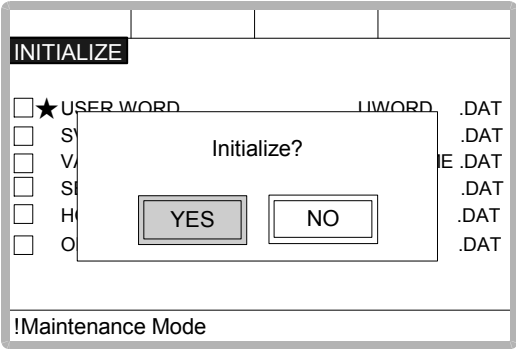


***2** The selected data is marked with “★”.



Parameter marked by ■ can not be selected.

***3** The confirmation dialog box is displayed.



***4** The selected data is initialized.

3.19 System Backup

For the XRC, the system data can be collectively backed up in advance so that the data is immediately loaded and restored in case of an unexpected trouble such as data loss.

3.19.1 Backup Data with XRC

For the XRC, three types of collective backup are available: CMOS.BIN, CMOSxx.HEX and ALCMSxx.HEX.

■ CMOS.BIN

For the normal backup, use this data.

Save: Perform in the maintenance mode (the editing mode or higher).

Load: Perform in the maintenance mode (the management mode).

As for the load/save procedures, refer to "3.19.3 Backup by CMOS.BIN".

Target Area: All areas of the internally stored data.

(Note that the monitoring time is not loaded)

■ CMOSxx.HEX

This data is loaded/saved in the FD/CF menu in the normal mode.

Save: Perform in the normal mode (the editing mode or higher).

Load: Perform in the normal mode (the management mode).

For details, refer to "7-1 Floppy Disk Unit" in "YASNAC XRC Operator's Manual"

Target Area: The collected data including "Job File", "Data File", "Parameter File", "System Data" and "I/O Data" which can be individually loaded/saved in the FD/CF menu.

Because the setting information of robot etc. are not included in this collected data, the system cannot be completely restored.

■ ALCMSxx.HEX

This data is for the manufacturer only. Users can save but cannot load this data.

3.19.2 Backup Timing

It is recommended to save CMOS.BIN data at the following timings so that the data can be immediately restored in case of an unexpected trouble such as data loss.

■ After the Teaching Operation

Backup the data after the operations such as modification of teaching, adding or deleting of jobs or editing of a condition file.

■ At Regular Intervals

Backup the data at regular intervals even if the teaching operation is not performed.

3.19.3 Backup by CMOS.BIN

Perform the backup by CMOS.BIN in the maintenance mode.

The chart below shows the availability of CMOS save/CMOS load in each security mode in the maintenance mode.

Security	Save	Load
Operation Mode	X	X
Editing Mode	O	X
Management Mode	O	O

3.19 System Backup

■ CMOS.BIN Save

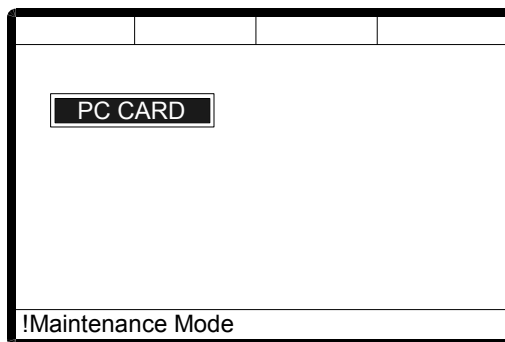
When saving CMOS.BIN, follow the procedures below after inserting the PC card into the PC card slot on XCP01 board.

Operation

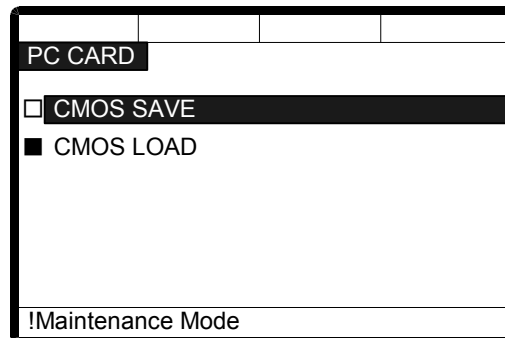
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Select {TOOL} under the top menu^{*1} ➡ Select {PC CARD}^{*2} ➡ Select {CMOS SAVE}^{*3} ➡ Select "YES"

Explanation

***1** The sub menu appears.

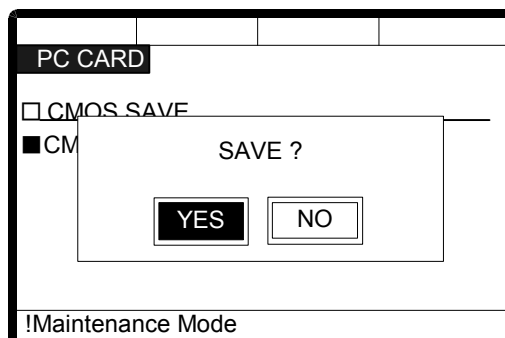


***2** PC card display appears.



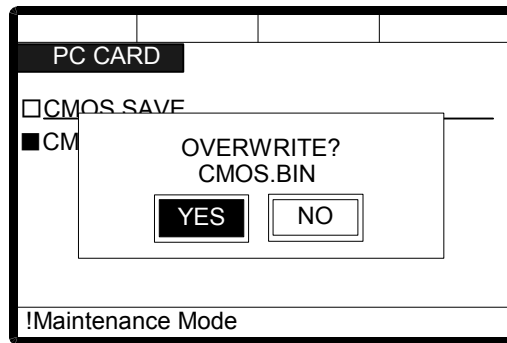
Parameters marked by
■ cannot be selected

***3** The confirmation dialog box appears.



Select {YES} to save the collective data in the PC card under the name of CMOS.BIN.

When saving the file, if CMOS.BIN file already exists in the PC card, the following confirmation dialog box appears.



Select {YES} to overwrite the collective data on CMOS.BIN file in the PC card.

The line pointed with the cursor becomes highlighted in reverse again when saving operation is completed.

3.19 System Backup

■ CMOS.BIN Load

When loading CMOS.BIN, follow the procedures below after inserting the PC card, in which the CMOS.BIN (collective data) is written, into the PC card slot on XCP01 board.

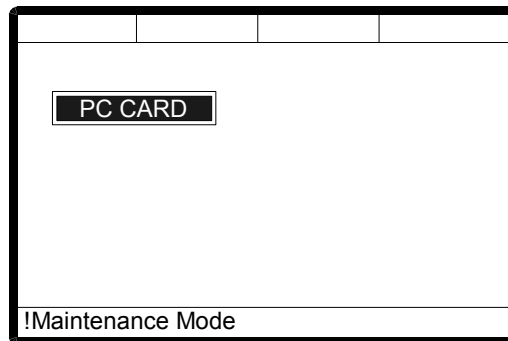
Before performing the load, make sure the existing collective data is backed up by CMOS save.

Operation

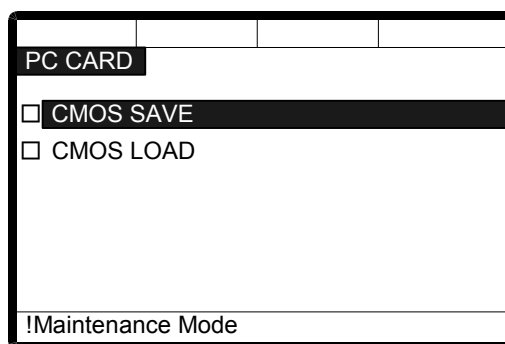
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Change the security mode to the maintenance mode ➡ Select {TOOL} under the top menu^{*1} ➡ Select {PC CARD}^{*2} ➡ Select {CMOS LOAD}^{*3} ➡ Select "YES"

Explanation

^{*1} The sub menu appears.

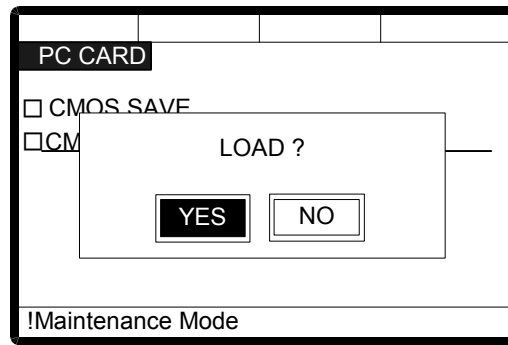


^{*2} PC card display appears.



Parameters marked by
■ cannot be selected

- *3** The confirmation dialog box appears.



Select {YES}, to load the contents of CMOS.BIN file in the PC card.

The line pointed with the cursor becomes highlighted in reverse again when loading operation is completed.

4 Modification of System Configuration

4.1 Addition of I/O Modules

For addition of I/O modules, turn the power supply OFF.



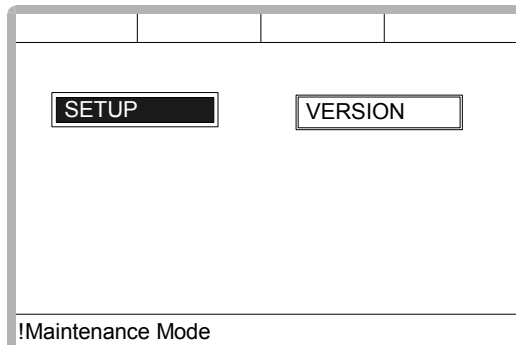
The additional operation must be done in the management mode.
In operation mode or editing mode, only confirmation of status setting is possible.

Operation

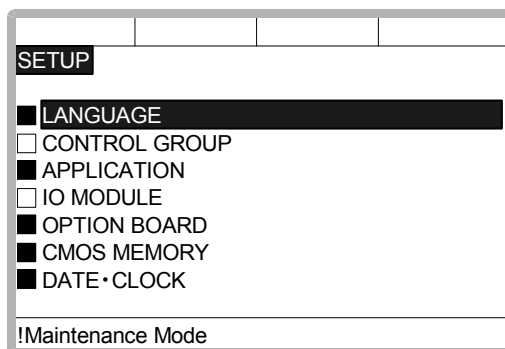
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Select {SYSTEM} under the top menu*¹ ➡ Select {SETUP}*² ➡ Select {IO MODULE}*³ ➡ Confirm the status of mounted I/O module*⁴ ➡ Press [ENTER]*⁵ ➡ Press [ENTER]*⁶ ➡ Select "YES"*⁷

Explanation

*¹ System display is shown.



*² The setup display is shown.



Item marked by
■ can not be set.

- *3** The current status of the mounted I/O module is displayed.

IO MODULE					
ST#	DI	DO	AI	AO	BOARD
01	008	008	002	002	
02	016	016	-	-	
03	-	-	-	-	NONE
04	-	-	-	-	NONE
05	-	-	-	-	NONE
06	-	-	-	-	NONE
07	-	-	-	-	NONE
08	-	-	-	-	NONE
!Maintenance Mode					

- *4** Confirm that each station (ST#) displays the I/O module's actual mounting status. The following information is displayed for each station.

ST#	Station number of I/O module
DI	Number of contact input points (*1)
DO	Number of contact output points (*1)
AI	Number of analog input points (*1)
AO	Number of analog output points (*1)
BOARD	Board type (*2)

*1 A hyphen, -, indicates that the corresponding I/O section is not mounted.

*2 If the system cannot recognize the board type, a row of stars (****) are displayed.

No problem will occur as long as the values displayed in DI, DO, AI, and AO are correct.

- *5** Confirm the statuses of the mounted I/O modules for the other stations.



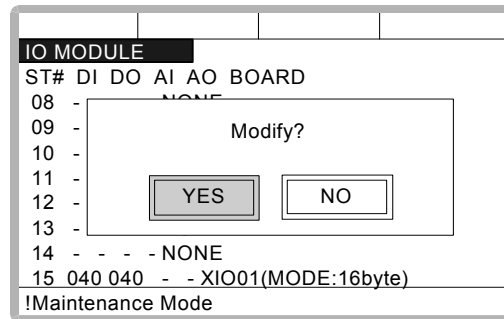
If the slot display is different, check the status again. If the status is correct, the I/O module may be defective. Contact your Yaskawa representative.

IO MODULE					
ST#	DI	DO	AI	AO	BOARD
08	-	-	-	-	NONE
09	-	-	-	-	NONE
10	-	-	-	-	NONE
11	-	-	-	-	NONE
12	-	-	-	-	NONE
13	-	-	-	-	NONE
14	-	-	-	-	NONE
15	040	040	-	-	XIO01(MODE:16byte)
!Maintenance Mode					

4.1 Addition of I/O Modules

- *6** The confirmation dialog box is shown.

For the XIO01 circuit board, the communication mode is displayed in parentheses.
In the following example, the communication mode is set to 16 bytes.



- *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.



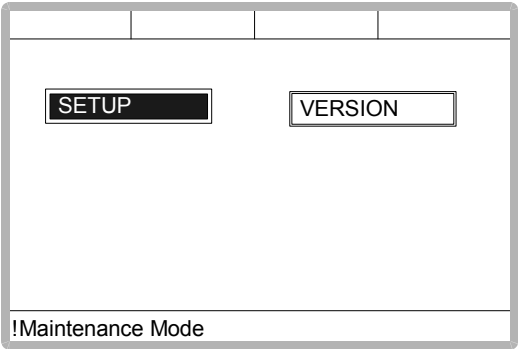
The additional operation must be done in the management mode.
In operation mode or editing mode, only confirmation of status setting is possible.

Operation

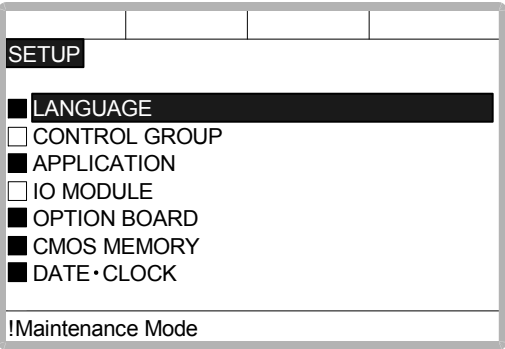
Turn the power supply ON while pressing [TOP MENU] simultaneously ➡ Select {SYSTEM} under the top menu^{*1} ➡ Select {SETUP}^{*2} ➡ Select {CONTROL GROUP}^{*3}
(Display moves to the control group display.)

Explanation

^{*1} The system display is shown.



^{*2} The setup display is shown.



Item marked by
■ can not be set.

4.2 Addition of Base and Station Axis

- *3** The display moves to the control group display shown in the followings.
The following items must be set for base and station axes.

- **TYPE**

Select one from the type list.

In case of base axis (B1,B2,B3)

Select one from RECT-X, -Y, -Z, -XY, -XZ, -YZ or -XYZ.

In case of station axis (S1,S2,S3,S4,S5,S6)

Select one from 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 from 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

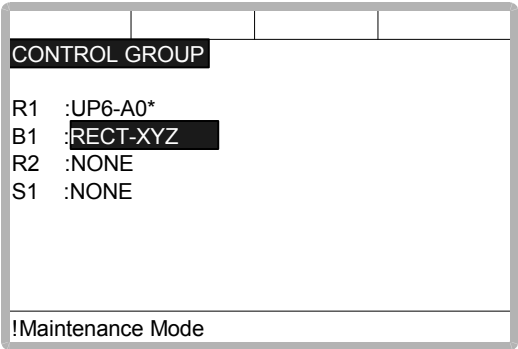
First, select a control group type

Operation

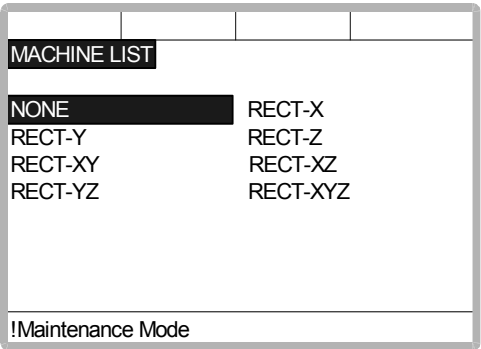
Confirm the type of control group in control group display^{*1} ➡ Select type of control group for changing^{*2} ➡ select one from the machine list^{*3} ➡ Press [ENTER] in control group display

Explanation

^{*1} The control group display is shown.



^{*2} Machine type selection display is shown.



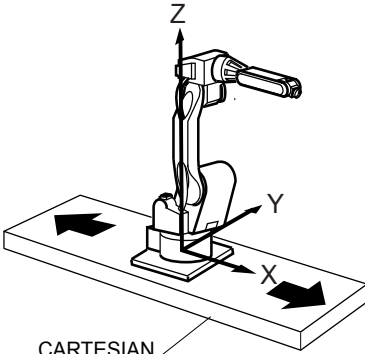
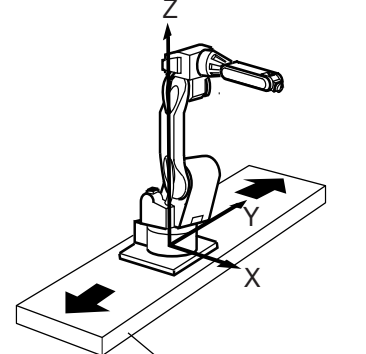
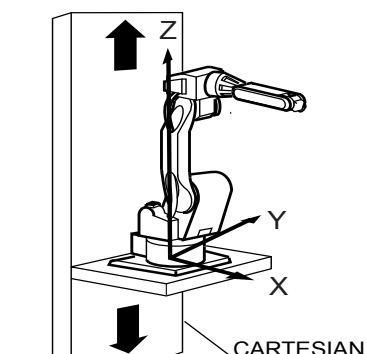
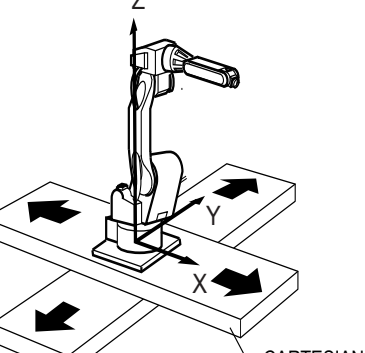
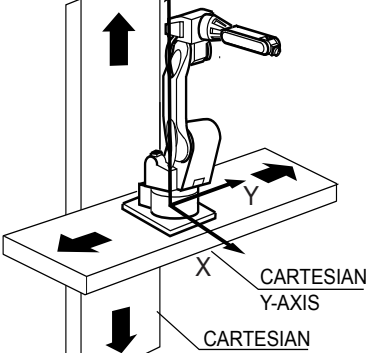
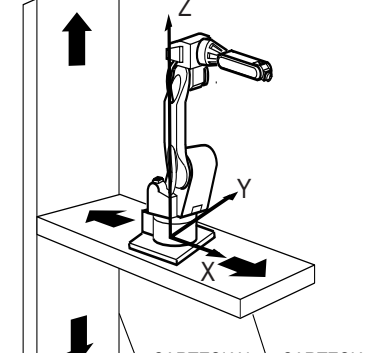
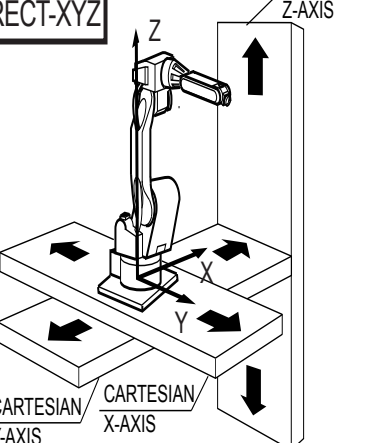
RECT-X :TRAVEL X-AXIS BASE
RECT-Y :TRAVEL Y-AXIS BASE
RECT-Z :TRAVEL Z-AXIS BASE
RECT-XY :TRAVEL XY-AXIS BASE
RECT-XZ :TRAVEL XZ-AXIS BASE
RECT-YZ :TRAVEL YZ-AXIS BASE
RECT-XYZ:TRAVEL XYZ-AXIS
BASE
(See following pages)

^{*3} After the type selection, the display returns to control group display.

^{*4} The display moves to the connection display.

4.2 Addition of Base and Station Axis

Direction of Base Axis

RECT-X  <u>CARTESIAN X-AXIS</u> Base axis advancing direction coincides with robot coordinate X-Axis.	RECT-Y  <u>CARTESIAN Y-AXIS</u> Base axis advancing direction coincides with robot coordinate Y-Axis.	RECT-Z  <u>CARTESIAN Z-AXIS</u> Base axis advancing direction coincides with robot coordinate Z-Axis.
RECT-XY  <u>CARTESIAN Y-AXIS</u> <u>CARTESIAN X-AXIS</u> Base 1st and 2nd axes advancing directions coincide with robot coordinate X-Axis and Y-Axis, respectively.	RECT-YZ  <u>CARTESIAN Y-AXIS</u> <u>CARTESIAN Z-AXIS</u> Base 1st and 2nd axes advancing directions coincide with robot coordinate Y-Axis and Z-Axis, respectively.	RECT-XZ  <u>CARTESIAN Z-AXIS</u> <u>CARTESIAN X-AXIS</u> Base 1st and 2nd axes advancing directions coincide with robot coordinate X-Axis and Z-Axis, respectively.
RECT-XYZ  <u>CARTESIAN Z-AXIS</u> <u>CARTESIAN X-AXIS</u> <u>CARTESIAN Y-AXIS</u> Base 1st, 2nd, and 3rd axes advancing directions coincide with robot coordinate X-Axis, Y-Axis, and Z-Axis, respectively.		

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 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.

Note: #□ is the SERVOPACK number. This number is set by the rotary switch ON the WRCA01 board.

*2 The items which can be set are shown.
When the item is selected the display returns to the connection display.

CONNECTION		
SV	CONTACT	CN< 1 2 3 4 5 6 7 8 9 >
R1 :#1	1	[1 2 3 4 5 6 - - -]
B1 :#1	#1	- - - 1 2 3]
	#2	
	#3	
	#4	
	#5	
	#6	

!Maintenance Mode

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)

4.2 Addition of Base and Station Axis

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.

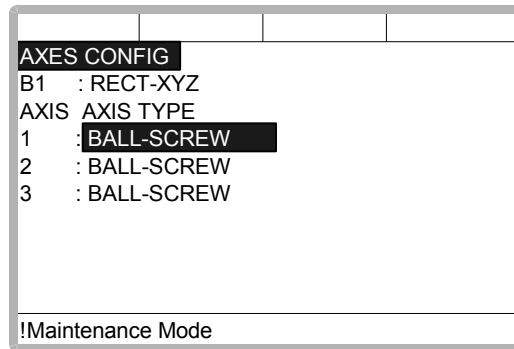
In the axes configuration display, the axis type and motor type are specified.

Operation

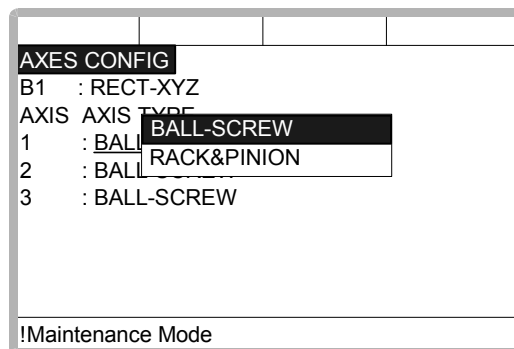
Confirm axis type of each axis in the axes configuration display^{*1} ➡ Select desired axis^{*2} ➡ Select desired axis type ➡ Press [ENTER] in the axes configuration display^{*3}

Explanation

- *1** The axis type of each axis is shown.



- *2** 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.

- *3** 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*1 ➡ Select desired item ➡ Input the value ➡ Press [ENTER]*2

Explanation

*1 The mechanical specification is shown.

The mechanical specification display (In case of BALL-SCREW type)

MECHANICAL SPEC		
B1	:RECT-XYZ	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)
- REDUCTION RATIO :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		
B1	:RECT-XYZ	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)

4.2 Addition of Base and Station Axis

- *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.

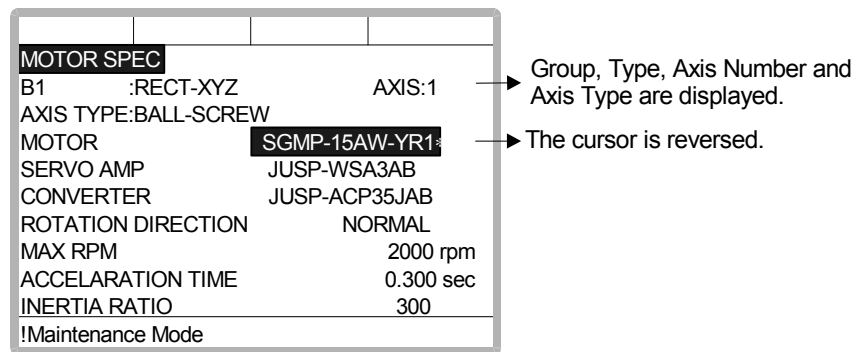
In the motor specification display, motor data are specified.

Operation

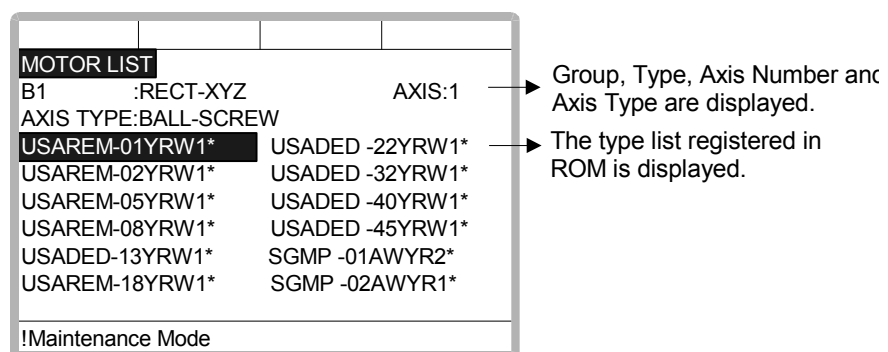
Confirm specification of each axis in the motor specification display^{*1} ➡ Select desired item^{*2} ➡ Input the value and press [ENTER] (Or move cursor to alternative and press [ENTER].)^{*3}

Explanation

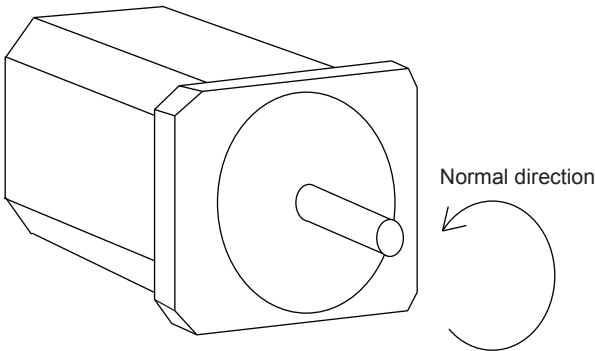
- *1** The motor specification of each axis is shown.



- *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 MOTOR (SERVO AMP, or CONVERTER) is shown.



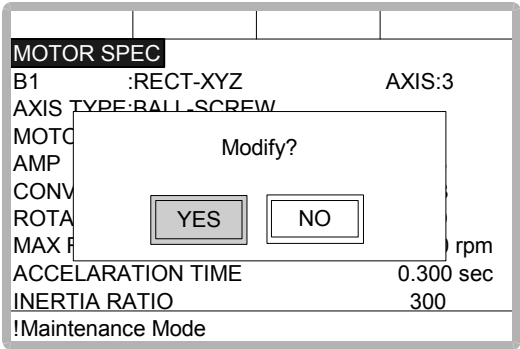
ROTATION DIRECTION : Set the rotation direction to which the current pulse data is increased. (The counterclockwise view from the loaded side is positioned normal.)



AC Servo Motor

- MAX. RPM : Input maximum rotation speed of a motor. (Unit: mm)
- ACCELARATION 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 box is shown.



If “YES” is selected, the system parameter is modified automatically.

The addition of the base axis setting is complete.

4.2 Addition of Base and Station Axis



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 Setting

Operation

Confirm the type of control group in control group display^{*1} ➡ Select type of control group for changing^{*2} ➡ Select desired type in the type list^{*3} ➡ Press [ENTER] in control group display^{*4}

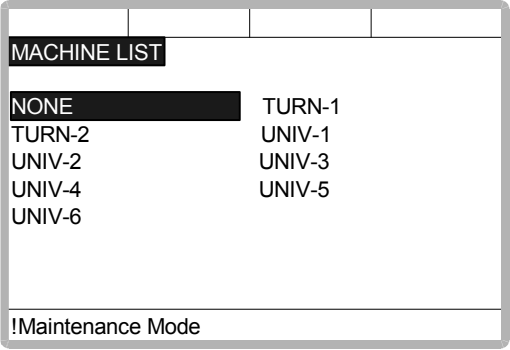
Explanation

^{*1} 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.

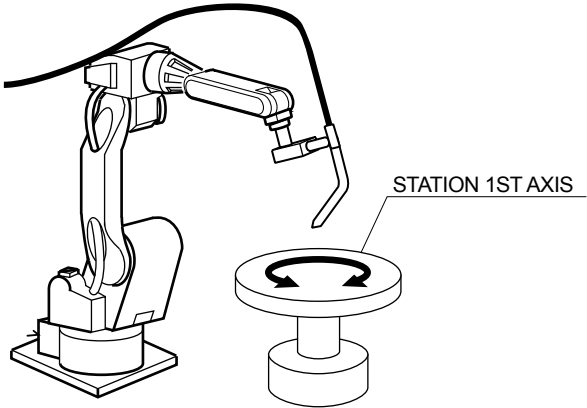


TURN-1:TURN 1 AXIS STATION
TURN-2:TURN 2 AXES STATION
UNIV-1:UNIVERSAL 1 AXIS STATION
UNIV-2:UNIVERSAL 2 AXES STATION
.....

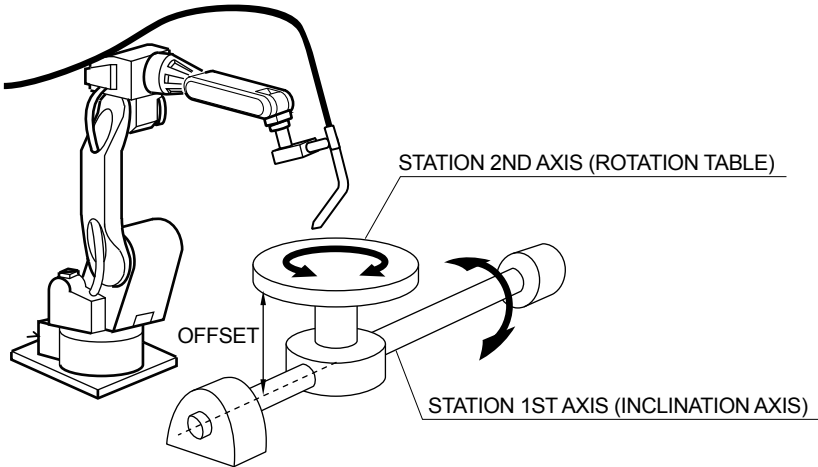
***3** After the type selection, the display returns to control group display.

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.

4.2 Addition of Base and Station 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^{*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.

CONNECTION									
	SV	CONTACT	CN< 1 2 3 4 5 6 7 8 9 >						
R1	#1	1	[1 2 3 4 5 6 - - -]						
S1	#1	2	[- - - - - 1 2 -]						
!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.

CONNECTION									
	SV	CONTACT	CN< 1 2 3 4 5 6 7 8 9 >						
R1	:#1	1	[1 2 3 4 5 6 - - -]						
S1	:#1	#1	[- - - 1 2 -]						
		#2							
		#3							
		#4							
		#5							
		#6							
!Maintenance Mode									

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)

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^{*1} ➡ Select desired axis^{*2} ➡
Select desired axis type ➡ Press [ENTER] in the axes form display^{*3}

Explanation

***1** The axis type of each axis is shown.

The axes form display (In case of TURN type)

AXES CONFIG

S1 : TURN-2

AXIS AXIS TYPE

1 : TURN

2 : TURN

!Maintenance Mode

➡ When axis type is "TURN-*" the axis type can not be changed.

The axes form display (In case of UNIVERSAL type)

AXES CONFIG

S1 : UNIV-3

AXIS AXIS TYPE

1 : BALL-SCREW

2 : RACK&PINION

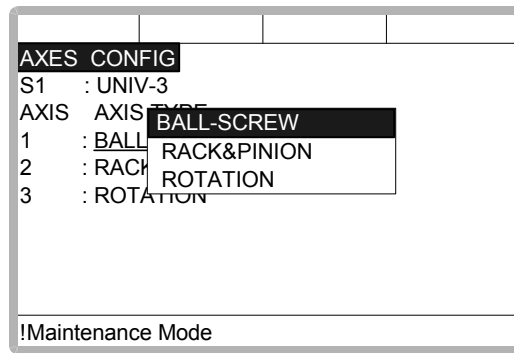
3 : TURN

!Maintenance Mode

➡ BALL-SCREW :TRAVEL
(BALL-SCREW)
RACK&PINION:TRAVEL
(RACK&PINION)
TURN :TURN

4.2 Addition of Base and Station Axis

***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.

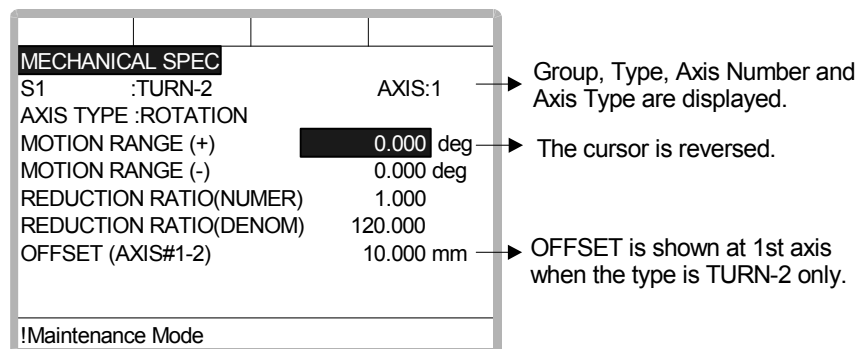
Operation

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)

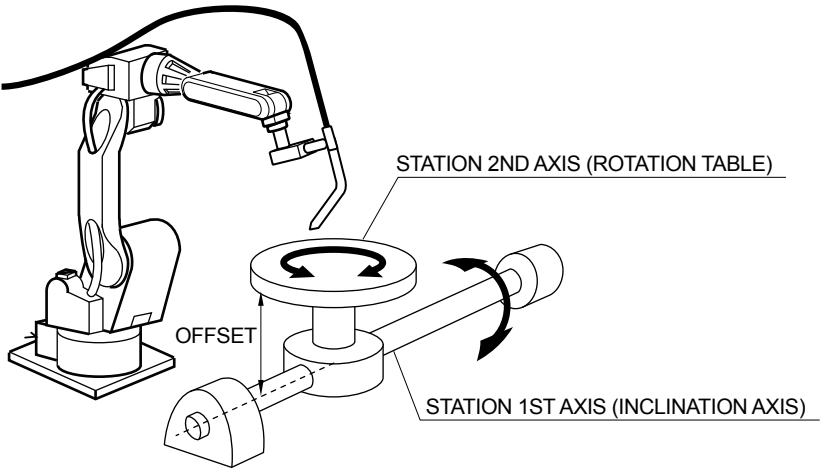


MOTION RANGE :Input maximum moving position (+ direction and - direction) from origin point. (Unit: deg)

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)
- REDUCTION RATIO :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)

4.2 Addition of Base and Station Axis

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^{*1} ➡ Select desired item^{*2} ➡ Input the value ➡ Press [ENTER] in the motor specification display^{*3}

Explanation

- *1** The motor specification of each axis is shown.

MOTOR SPEC			
S1	:TURN-2	AXIS:1	→ Group, Type, Axis Number and Axis Type are displayed.
AXIS TYPE:ROTATION			
MOTOR	SGMP-15AW-YR1* → The cursor is reversed.		
SERVO AMP	JUSP-WSA3AB		
CONVERTER	JUSP-ACP35JAB		
ROTATION DIRECTION		NORMAL	
MAX RPM		2000 rpm	
ACCELERATION TIME		0.300 sec	
INERTIA RATIO		300	
!Maintenance Mode			

➡ Group, Type, Axis Number and Axis Type are displayed.

➡ The cursor is reversed.

- *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.

MOTOR LIST			
S1	:TURN-2	AXIS:1	
AXIS TYPE:ROTATION			
USAREM-01YRW1*	USADED-22YRW1*		
USAREM-02YRW1*	USADED-32YRW1*		
USAREM-05YRW1*	USADED-40YRW1*		
USAREM-08YRW1*	USADED-45YRW1*		
USADED-13YRW1*	SGMP-01AWYR2*		
USAREM-18YRW1*	SGMP-02AWYR1*		
!Maintenance Mode			

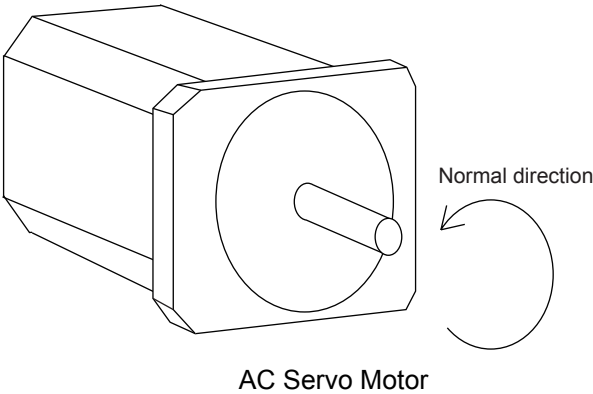
→ Group, Type, Axis Number and Axis Type are displayed.

→ The type list registered in ROM is displayed.

➡ Group, Type, Axis Number and Axis Type are displayed.

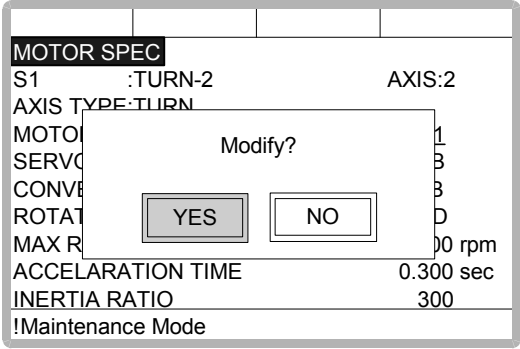
➡ The type list registered in ROM is displayed.

ROTATION DIRECTION : Set the rotation direction to which the current pulse data is increased. (The counterclock wise from view from the loaded side is positioned normal.)



- MAX. RPM : Input maximum rotation speed of a motor. (Unit: mm)
- ACCELARATION 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 box is shown.



- If “YES” is selected, the system parameters are modified automatically.
- Then addition of the station axis setting is complete.

4.2 Addition of Base and Station Axis



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.

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
VERSION		R1	  
SYSTEM :X1.00A(US)-00			
PARAM :1.00 A			
MODEL :UP130-A			
APPLI :SPOT WELD			
CPU	SYSTEM ROM	BOOT ROM	
XCP01	1.00	1.00	
XSP01	1.00	1.00	
WRCA#0	1.00-00	1.00	
!			

5.2 Robot Model

Operation

Select {ROBOT} under the top menu ➡ Select {MANIPULATOR TYPE}^{*1}

Explanation

^{*1} The robot axis configuration display is shown.

DATA	EDIT	DISPLAY	UTILITY
ROBOT AXIS CONFIG		R1	
AXIS CONFIGURATION			
R1 : UP130-A* 0011_1111 B1:0000_0001			
S1 : TURN-1			
!			

5.3 Input/Output Status

5.3 Input/Output Status

5.3.1 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
UNIVERSAL INPUT		R1	⏏ ⏏ ⏏ ⏏
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
UNIVERSAL INPUT		R1	⏏ ⏏ ⏏ ⏏
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	○ [		]

5.3.2 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
UNIVERSAL OUTPUT		R1	⏏ ⏏ ⏏ ⏏
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
UNIVERSAL OUTPUT		R1	⏏ ⏏ ⏏ ⏏
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	○ [		]
!			

Operation

Explanation

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL OUTPUT		R1	122.DEC. 7a:HEX.
GROUP	OG#01		
OUT#001 #1010		[	
OUT#002 #1011		[	
OUT#003 #1012		[	
OUT#004 #1013		[	
OUT#005 #1014		[	
OUT#006 #1015		[	
OUT#007 #1016		[	
OUT#008 #1017		[	

5.3.3 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
SPECIFIED INPUT		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
SPECIFIED INPUT		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	○		
!			

5.3 Input/Output Status

5.3.4 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
SPECIFIED OUTPUT		R1	123:DEC. 7b:HEX.
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
SPECIFIED OUTPUT		R1	123:DEC. 7b:HEX.
GROUP			
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	○		

5.3.5 RIN INPUT

■ RIN INPUT Display

Operation

Select {IN/OUT} under the top menu ➡ Select {RIN}*1

Explanation

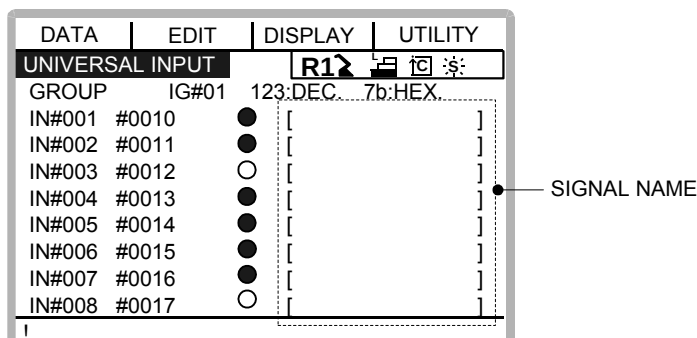
*1 RIN input display is shown.

DATA	EDIT	DISPLAY	UTILITY
RIN INPUT		R1	
RIN#001	☐	DIRECT IN1	
RIN#002	☐	DIRECT IN2	
RIN#003	☐	DIRECT IN3	
RIN#004	☐	DIRECT IN4	
!			

5.3 Input/Output Status

5.3.6 Modify the Signal Name

The name of the universal input or output signal can be modified.



The name can be modified in two ways.

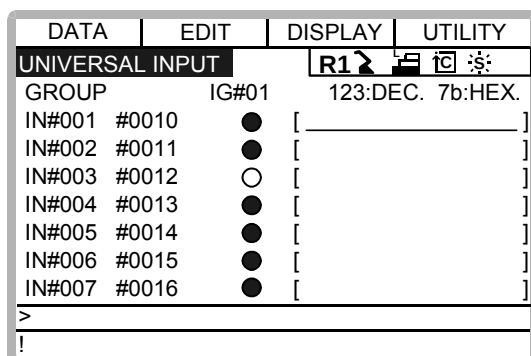
Direct Modify on the Detailed Display

Operation

Move the cursor to the signal name to be modified in the detailed display, and press [SELECT].*¹ ➡ Input the signal name*² ➡ Press [ENTER]*³

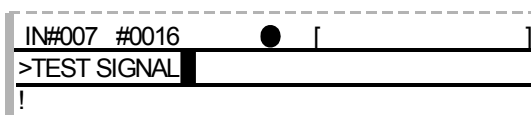
Explanation

*¹ Character input line is displayed.



*² 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.



***3** New signal name is registered.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT		R1	123:DEC. 7b:HEX.
GROUP	IG#01	123:DEC. 7b:HEX.	
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

Move the cursor to the signal name to be modified 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 SIGNAL NO.		R1	123:DEC. 7b:HEX.
SEARCH RELAY NO.		123:DEC. 7b:HEX.	
RENAME			
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	123:DEC. 7b:HEX.	
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	○	

5.3 Input/Output Status

5.3.7 Search the Signal Number

A signal number of universal input, universal output, specific input, or specific output can be searched.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT			
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	○	[]

SIGNAL NO. →

The signal number can be searched in the following two ways.

Direct Search on the Detailed Display

Operation

Move the cursor to a signal number in the detail display, and press [SELECT]*¹ ➡ Type the number of the signal *² ➡ Press [ENTER] to start the search*³

Explanation

*¹ Number input line is displayed.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT			
GROUP	IG#01	123:DEC.	7b:HEX.
IN#001	#0010	●	[TEST SIGNAL]
IN#002	#0011	●	[]
IN#003	#0012	○	[]
IN#004	#0013	●	[]
IN#005	#0014	●	[]
IN#006	#0015	●	[]
IN#007	#0016	●	[]
> []			
!			

*² Input the signal number in the number input line.

IN#007	#0016	●	[]
>41 []			
!			

*³ The page where the signal number exists is displayed.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT			
GROUP	IG#06	128:DEC	80:HEX.
IN#041	#0060	○	[]
IN#042	#0061	○	[]
IN#043	#0062	○	[]
IN#044	#0063	○	[]
IN#045	#0064	○	[]
IN#046	#0065	○	[]
IN#047	#0066	○	[]
IN#048	#0067	●	[]
!			

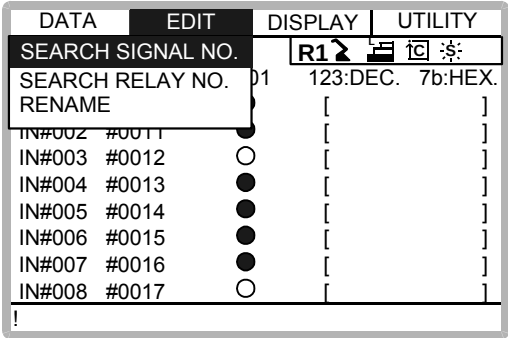
Search from the Menu

Operation

Select {EDIT} under the menu in the detail display*1 ➡ Select {SEARCH SIGNAL NO.}*2
➡ Type the number of the signal ➡ Press [ENTER] to start the search*3

Explanation

*1 The pull-down menu is shown.

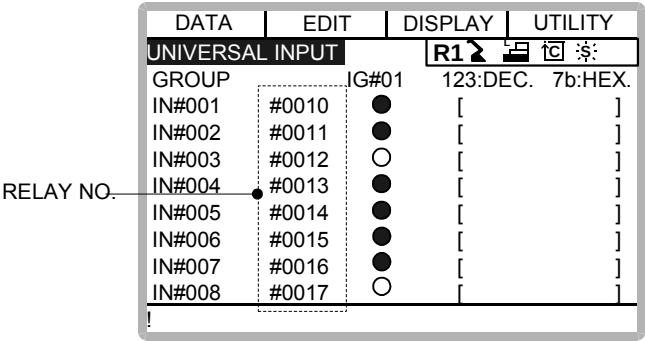


*2 Number input line is displayed.

*3 Input the signal number to be searched in the number input line, and press [ENTER].
The page where the signal number exists is displayed.

5.3.8 Relay Number Search

A search can be done for a relay number of a universal input or output signal or a specific input or output signal.



5.3 Input/Output Status

Direct Search on the Detail Display

Operation

Move the cursor to a relay number in the detail display, and press [SELECT]^{*1} ➡ Type the number of the relay^{*2} ➡ Press [ENTER] to start the search^{*3}

Explanation

***1** A number input line is displayed.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT			
GROUP	IG#01	123:DEC. 76:HEX.	R1
IN#001	#0010	●	[TEST SIGNAL]
IN#002	#0011	●	[]
IN#003	#0012	○	[]
IN#004	#0013	●	[]
IN#005	#0014	●	[]
IN#006	#0015	●	[]
IN#007	#0016	●	[]
>			
!			

***2** In the number input line, type the relay number.

IN#007	#0016	●	[]
>60			
!			

***3** The page where the input relay number can be found is displayed.

DATA	EDIT	DISPLAY	UTILITY
UNIVERSAL INPUT			
GROUP	IG#06	128:DEC 80:HEX.	R1
IN#041	#0060	○	[]
IN#042	#0061	○	[]
IN#043	#0062	○	[]
IN#044	#0063	○	[]
IN#045	#0064	○	[]
IN#046	#0065	○	[]
IN#047	#0066	○	[]
IN#048	#0067	●	[]
!			

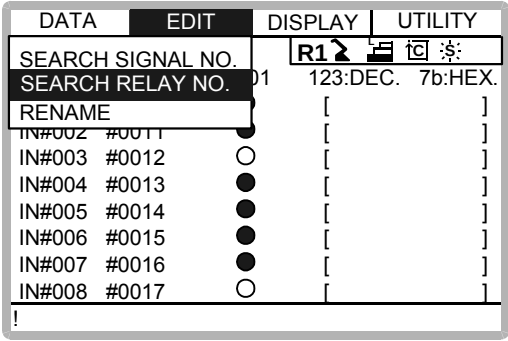
Search using the Menu

Operation

Select {EDIT} under the menu in the detail display*1 ➡ Select {SEARCH RELAY NO.}*2
➡ Type the number of the relay ➡ Press [ENTER] to start the search*3

Explanation

*1 A pull-down menu appears.



*2 A number input line is displayed.

*3 In the number input line, type the relay number and press [ENTER] to start the search.
The page where the relay number can be found is displayed.

5.4 System Monitoring Time

5.4.1 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
	SYS MONITORING TIME		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.

⑤ OPERATING 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.

5.4.2 Individual Display of the System Monitoring Time

If the page key  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
SERVO POWER TIME		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
PLAYBACK TIME		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
MOVING TIME		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
OPERATING TIME		R1	
APPLI1		(1998/07/06 10:00~)	
	2 3 8 5 : 4 2 ' 0 2		
APPLI2		(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.

5.4 System Monitoring Time

5.4.3 Clearing the System Monitoring Time

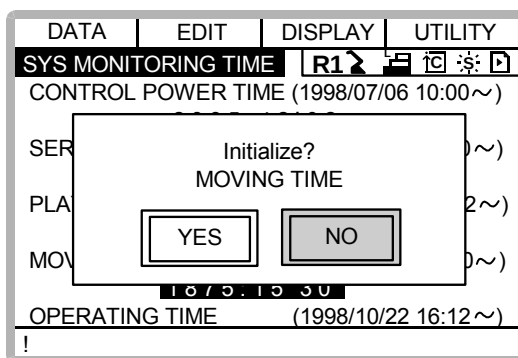
System monitoring times can be cleared and set back to 0 by following procedure. These operations can be performed in the system monitoring time display, or in the individual displays.

Operation

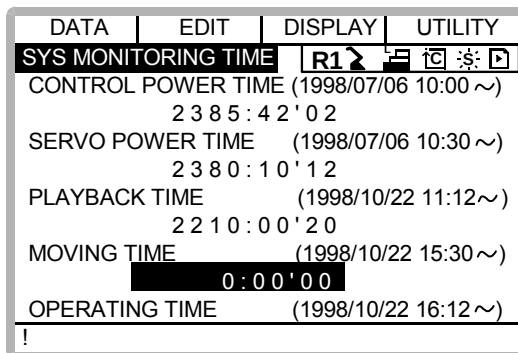
Select the time to be cleared*1 ➡ Select "YES"*2

Explanation

*1 The confirmation dialog box is displayed.



*2 The cumulative time value at the cursor line is reset to 0, and a new time measurement begins.



5.5 Alarm History

5.5.1 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}*1 ➡ Press the page key  to change the display*2

Explanation

*1 The alarm history display is shown.

DATA	EDIT	DISPLAY	UTILITY
MAJOR ALARM		R1	    
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			
!			

*2 Each time the page key  is pressed, the display changes "MAJOR ALARM"→ "MINOR ALARM" → "USER ALARM(SYSTEM)" → "USER ALARM(USER)" → "OFF-LINE."

5.5 Alarm History

5.5.2 Clearing the Alarm History

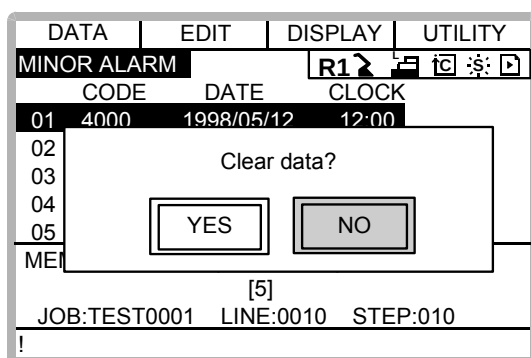
The history of the minor alarms and the user alarms (system and user) can be cleared.

Operation

Display the alarm history display to be cleared ➡ Select {DATA} under the menu ➡
Select {CLEAR HISTORY}*¹ ➡ Select "YES"*²

Explanation

*¹ The confirmation dialog box is displayed.



*² The alarm history displayed is reset.

5.6 I/O Message History

5.6.1 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.

DATA	EDIT	DISPLAY	UTILITY
I/O MESSAGE HISTORY		R1	   
0001	GAS SHORTAGE		
0002	WIRE STICKING		
0003			
0004			
0005			
0006			
0007			
DATE/TIME:1999/06/16 12:00			
JOB NAME :ARCON LINE:0006 STEP:004			
!			

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}^{*1} ➡ Input the history No. ➡
Press [ENTER]^{*2}

Explanation

***1** Character input line is displayed.

***2** The search for the input history number begins, and the I/O message is displayed.

5.6 I/O Message History

5.6.2 Clearing the I/O Message History

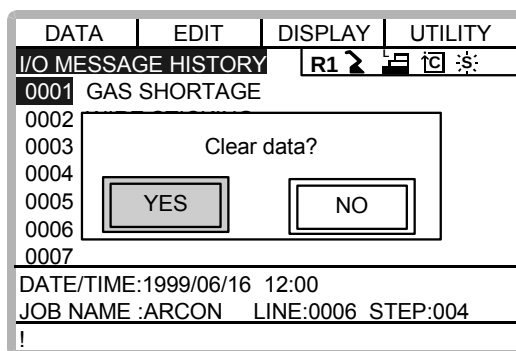
Use the following operation to clear the I/O message history.

Operation

Select {DATA} under the menu ➡ Select {CLEAR HISTORY}*¹ ➡ Select "YES"*²

Explanation

*¹ The confirmation dialog box is displayed.



*² The displayed I/O message history is cleared.



5.7 Position Data When Power is Turned ON/OFF

5.7.1 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 (ABSO DATA)" 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}*1

Explanation

*1 The power ON/OFF position display is shown.

DATA	EDIT	DISPLAY	UTILITY
POWER ON/OFF POSIT		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
!			

5.8 Current Position Display

5.8 Current Position Display

5.8.1 Current Position Display

Operation

Select {ROBOT} under the top menu ➡ Select {CURRENT POSITION} under the sub menu^{*1} ➡ Select the types of coordinates to be displayed^{*2} ➡ Select the desired coordinate system^{*3}

Explanation

***1** The current position display is shown.

DATA	EDIT	DISPLAY	UTILITY
CURRENT POSITION		R1	☰ ☒ ⚙
COORDINATE : PULSE			TOOL : 00
R1 : S	0		
L	0		
U	0		
R	0		
B	0		
T	0		
!			

***2** A pull-down menu appears.

DATA	EDIT	DISPLAY	UTILITY
CURRENT POSITION		R1	☰ ☒ ⚙
COORDINATE : PULSE			TOOL : 00
R1 : S			
L			
U			
R			
B			
T			
!			

***3** The type of coordinates being displayed is changed.

DATA	EDIT	DISPLAY	UTILITY
CURRENT POSITION		R1	☰ ☒ ⚙
COORDINATE : BASE			TOOL : 00
R1 : X	915.000 mm	Rx	180.00 deg.
Y	0.000 mm	Ry	0.00 deg.
Z	765.000 mm	Rz	0.00 deg.
<ROBOT TYPE>			
FRONT	S < 180		
UP	R < 180		
FLIP	T < 180		
!			

5.9 Servo Monitoring

5.9.1 Servo Monitor Display

The servo monitor display shows the servo-related data of each axis.

Monitor Items	Description
FEEDBACK PULSE	Feedback position (actual position) of each axis "0" at the home position.
ERROR PULSE	Difference between the command position and the feedback position of each axis.
SPEED DEVIATION	Difference between the command speed and the feedback speed of each axis.
SPEED INST	Speed reference of each axis.
FEEDBACK SPEED	Feedback speed (actual speed) of each axis.
TORQUE SPEC	Torque reference of each axis.
MAX. TORQUE	Keeps the maximum value of the torque reference of each axis. "0" when the maximum torque is cleared or the control power supply is turned ON or OFF.
ENCODER ROTATE SUM	Position after one rotation of the encoder when the control power supply of each axis is turned ON.
MOTOR ABSOLUTE	Absolute value of the motor is calculated by adding the position in one rotation to the sum of the accumulated rotations when the control power supply of each axis is turned ON.

■ Changing the Monitor Items

Operation

Set the security mode to Management mode ➡ Select {ROBOT} under the top menu
 ➡ Select {SERVO MONITOR}^{*1} ➡ Select {DISPLAY} under the menu ^{*2} ➡ Select
 MONITOR ITEM 1 or 2, and view the sub-menu choices by pressing the RIGHT ARROW
 KEY [→] ^{*3} ➡ Select a menu ^{*4}

5.9 Servo Monitoring

Explanation

- *1** The servo monitor display appears.

DATA	EDIT	DISPLAY	UTILITY
SERVO MONITOR		R1	   
FEEDBACK PULSE		ERROR PULSE	
R1 :S	1805	300	
L	234	0	
U	995	0	
R	123	0	
B	237	0	
T	2432	0	

- *2** A pull-down menu appears.
MONITOR ITEM 1 is the data on the left, and MONITOR ITEM 2 is the data on the right.

DATA	EDIT	DISPLAY	UTILITY
SERVO MONITOR		MONITOR ITEM1	>
FEEDBACK PULS		MONITOR ITEM2	>
R1 :S	1805	300	
L	234	0	
U	995	0	
R	123	0	
B	237	0	
T	2432	0	

- *3** The sub-menu choices are displayed.

DATA	EDIT	DISPLAY	UTILITY
SERVO MONITOR		FEEDBACK PULSE	
FEEDBACK PULS		ERROR PULSE	
R1 :S	1805	SPEED DEVIATION	
L	234	SPEED INST	
U	995	▼	
R	123	0	
B	237	0	
T	2432	0	

- *4** The type of monitor-related information is changed.

DATA	EDIT	DISPLAY	UTILITY
SERVO MONITOR		R1	   
SPEED INST		ERROR PULSE	
R1 :S	4000	300	
L	0	0	
U	0	0	
R	0	0	
B	0	0	
T	0	0	

■ Clearing Maximum Torque Data

The data for the maximum torque can be cleared when the maximum torque-related information is being displayed.

Operation

Select {DATA} under the menu *1 ➡ Select {MAX. TORQUE} *2

Explanation

*1 {CLEAR MAX TORQUE} is displayed.

DATA	EDIT	DISPLAY	UTILITY
CLEAR MAX TORQUE		R1	
	MAX TORQUE		ERROR PULSE
R1 :S	30		0
L	70		0
U	80		0
R	20		0
B	40		0
T	30		0

*2 The maximum torque data is cleared.

DATA	EDIT	DISPLAY	UTILITY
SERVO MONITOR		R1	
	MAX TORQUE		PULSE
R1 :S	0		0
L	0		0
U	0		0
R	0		0
B	0		0
T	0		0

Hardware

6 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.

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%)
Grounding	Grounding resistance : 100 Ω or less Exclusive grounding
Digital I/O	Specific signal (hardware) 11 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

6.1 Specification List

External Dimensions		
A-type panel	Small capacity	SV3X, UP6, or SK16X 470(W) × 760(H) × 320(D) mm
	Medium capacity	SK45X, SK16MX, or SP70X 550(W) × 860(H) × 420(D) mm
	Large capacity	UP130, UP165, UP165-100, UP200, UP130R, SK300X, or SP100X 650(W) × 860(H) × 420(D) mm
B-type panel	Small capacity	SV3X, UP6, or SK16X 700(W) × 750(H) × 420(D) mm
	Medium capacity	SK45X, SK16MX, or SP70X 900(W) × 860(H) × 420(D) mm
	Large capacity	UP130, UP165, UP165-100, UP200, UP130R, SK300X, or SP100X 900(W) × 860(H) × 420(D) mm
New A-type panel	Small capacity	SV3X, SV035X, UP6, SK16X, or UP20 500(W) × 900(H) × 420(D) mm
	Medium capacity	UP50, SK45X, SK16MX, SP70X, or UP20M 650(W) × 900(H) × 420(D) mm
	Large capacity	UP130, UP165, UP165-100, UP200, UP130T, SK300X, SP100X, SK506X, SR200X, UP130R, UP165R, UP200R, UP130RL ES165, ES200, ES165R or ES200R 650(W) × 900(H) × 420(D) mm
New B-type panel	Small capacity	SV3X, SV035X, UP6, SK16X, or UP20 500(W) × 1300(H) × 450(D) mm
	Medium capacity	UP50, SK45X, SK16MX, SP70X, or UP20M 650(W) × 1300(H) × 450(D) mm
	Large capacity	UP130, UP165, UP165-100, UP200, UP130T, SK300X, SP100X, SK506X, SR200X, UP130R, UP165R, UP200R, UP130RL ES165, ES200, ES165R or ES200R 650(W) × 1300(H) × 450(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-232C × 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

6.3 Programming Pendant

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

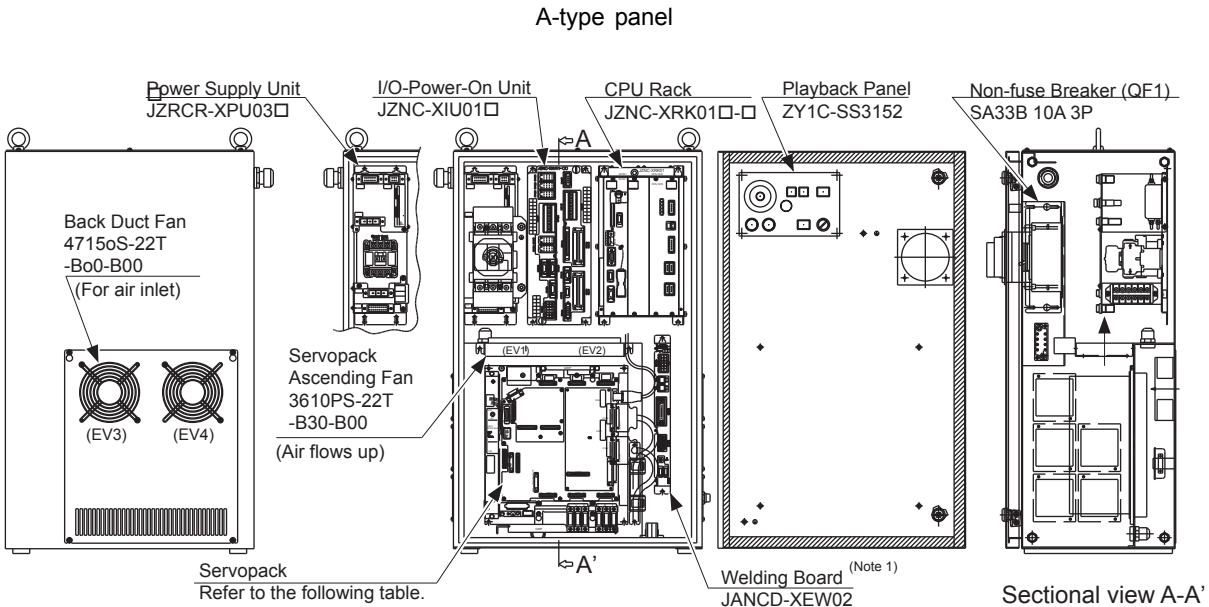
The XRC is comprised of individual units and modules (circuit boards). Malfunctioning components can generally be easily repaired after a failure by replacing a unit or a module. This section explains the configuration of the XRC equipment.

6.4.1 Arrangement of Units and Circuit Boards

■ Configuration

The arrangements of units and circuit boards in the A-type, the B-type, the new A-type, and the new B-type panels for small-capacity, medium-capacity, and large-capacity XRCs are shown.

Small Capacity



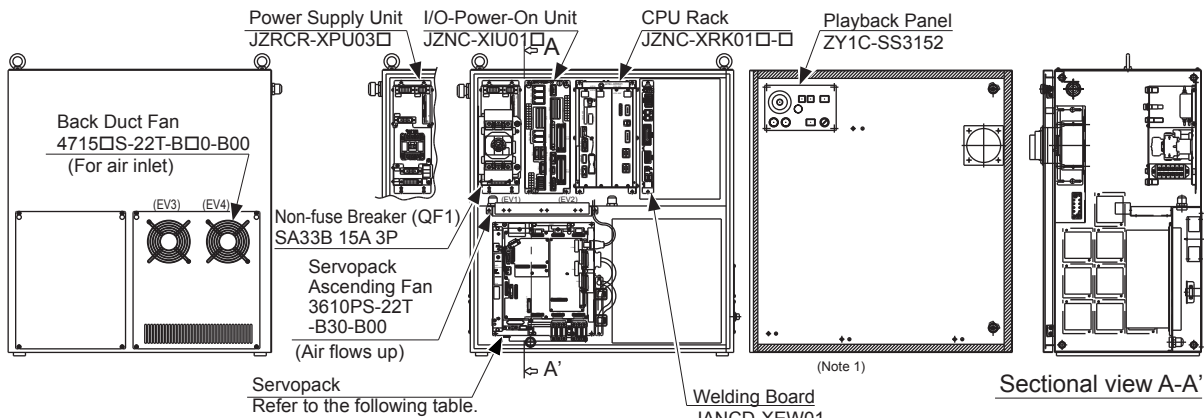
Note 1: Standard feature only for UP6 (welding specifications). Available as an option for other models.

Model	YASNAC XRC	Servopack	Converter (Integrated)	QF1	Power Supply Unit
SV3X	ERCR-SV3-RA00	CACR-SV3AAA	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□
UP6	ERCR-UP6-RA00	CACR-UP6AAC	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□
SK16X	ERCR-SK16-RA00	CACR-SK16AAC	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□
	ENCM-RX6003				JZNC-XPW03□

Configuration for Small-Capacity XRC in A-Type Panel

6.4 Equipment Configuration

2. B-type panel

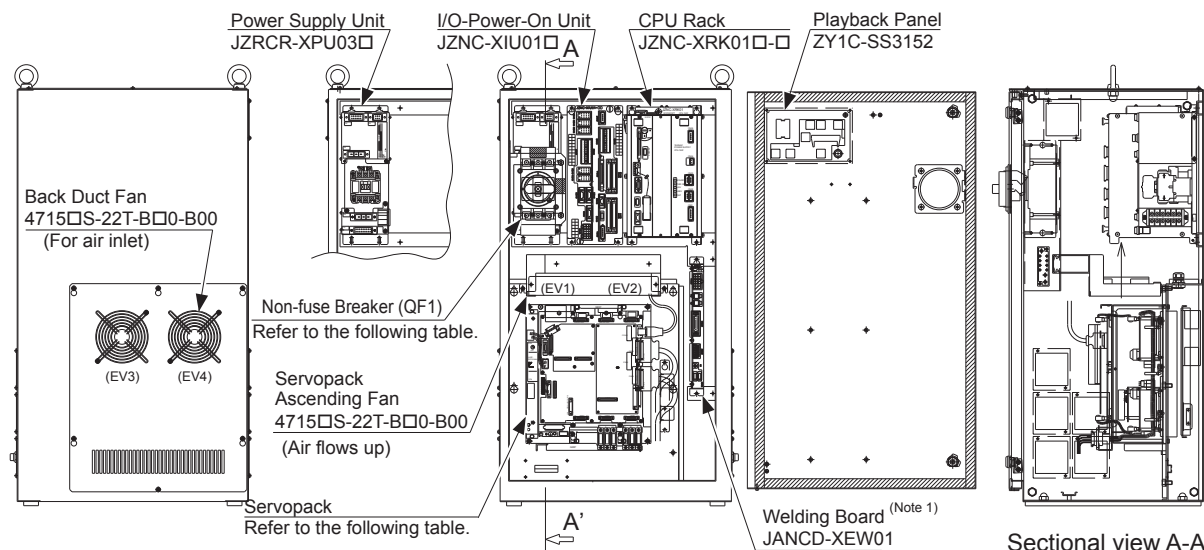


Note 1: Standard feature only for UP6 (welding specifications). Available as an option for other models.

Model	YASNAC XRC	Servopack	Converter (Integrated)	QF1	Power Supply Unit
SV3X	ERCR-SV3-RA01	CACR-SV3AAA	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□
UP6	ERCR-UP6-RA01	CACR-UP6AAC	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□
SK16X	ERCR-SK16-RA01	CACR-SK16AAC	JUSP-ACP05JAA	SA33B 15A	JZRCR-XPU03□

Configuration for Small-Capacity XRC in B Type Panel

3. New A-type panel

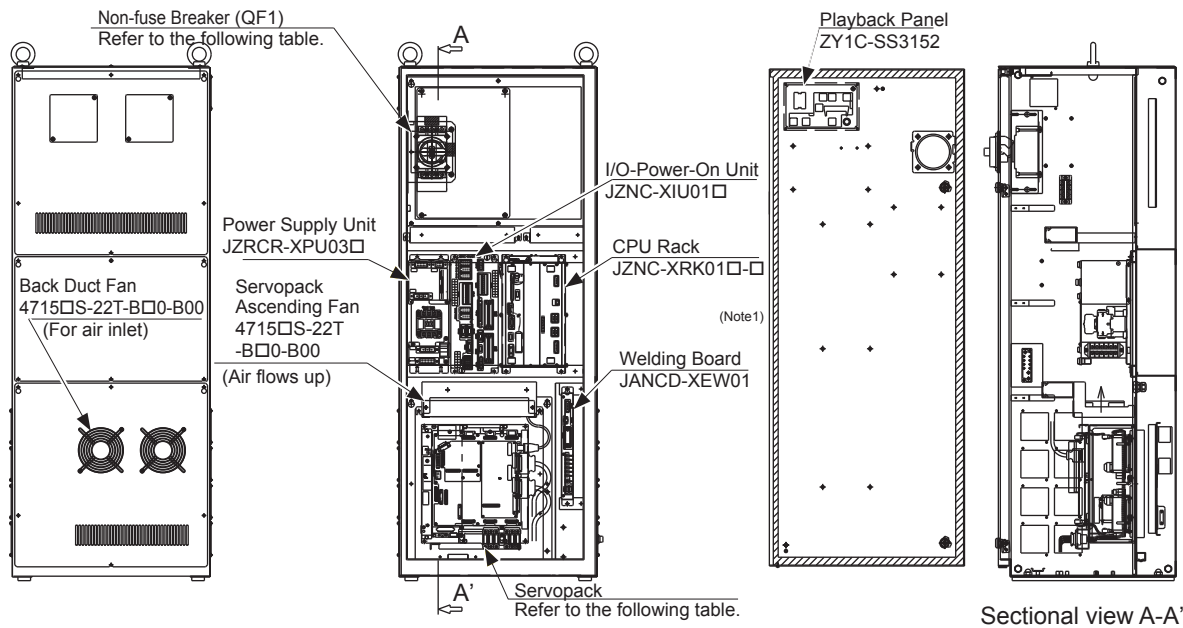


Note 1: Standard feature only for UP6 (welding specifications). Available as an option for other models.

Model	YASNAC XRC	Servopack	Converter (Integrated)	QF1	Power Supply Unit
SV035X	ERCR-SV035-RA10	CACR-SV035AAA	JUSP-ACP05JAA	SA33B/5A	JZRCR-XPU03□
SV3X	ERCR-SV3-RA10	CACR-SV3AAA	JUSP-ACP05JAA	SA33B/5A	JZRCR-XPU03□
UP6	ERCR-UP6-RA10 ENCM-RX6006	CACR-UP6AAC	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□ JZNC-XPW03□
SK16X	ERCR-SK16-RA10	CACR-SK16AAC	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□
UP20	ERCR-UP20-RA10 ENCM-RX6005	CACR-UP20AAA	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□ JZNC-XPW03□

Configuration for Small-Capacity XRC in New A Type Panel

4. New B-type panel



Note 1: Standard feature only for UP6 (welding specifications). Available as an option for other models.

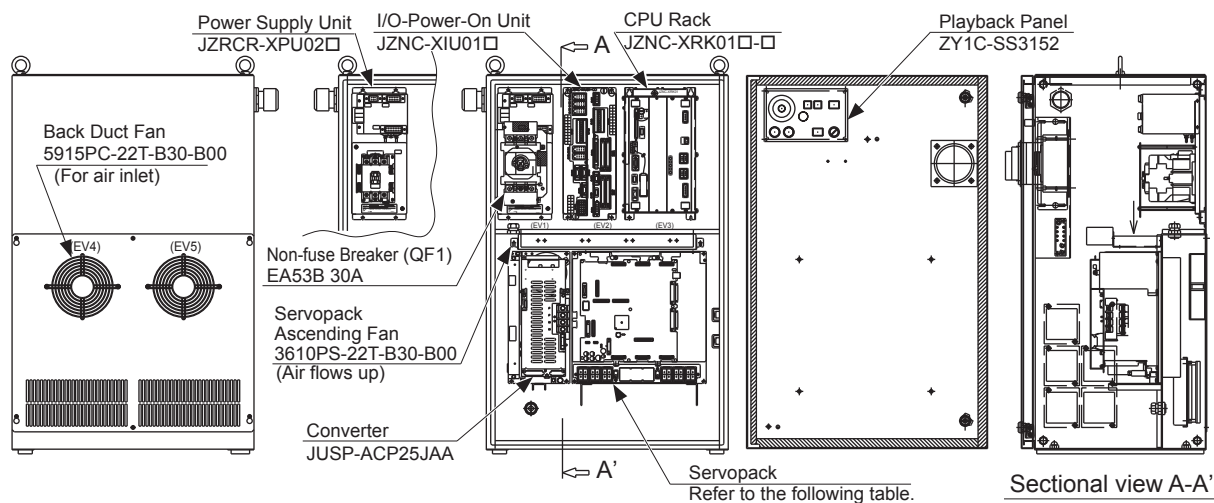
Model	YASNAC XRC	Servopack	Converter (Integrated)	QF1	Power Supply Unit
SV035X	ERCR-SV035-RA11	CACR-SV035AAA	JUSP-ACP05JAA	SA33B/5A	JZRCR-XPU03□
SV3X	ERCR-SV3-RA11	CACR-SV3AAA	JUSP-ACP05JAA	SA33B/5A	JZRCR-XPU03□
UP6	ERCR-UP6-RA11	CACR-UP6AAC	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□
SK16X	ERCR-SK16-RA11	CACR-SK16AAC	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□
UP20	ERCR-UP20-RA11	CACR-UP20AAA	JUSP-ACP05JAA	SA33B/15A	JZRCR-XPU03□

Configuration for Small-Capacity XRC in New B-Type Panel

6.4 Equipment Configuration

Medium Capacity

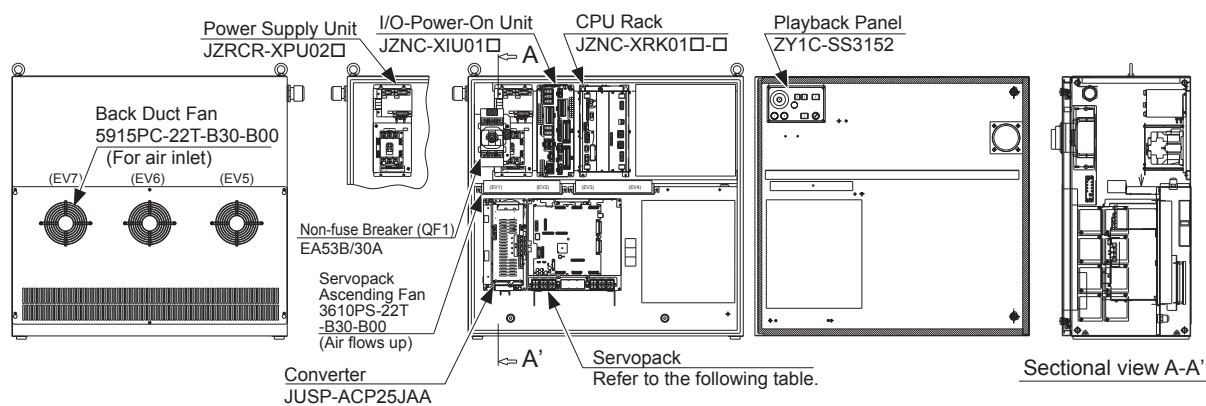
1. A-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
SK45X	ERCR-SK45-RA00	CACR-SK45AAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□
SK16MX	ERCR-SK16M-RA00	CACR-SK16MAAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□
SP70X	ERCR-SP70-RA00	CACR-SP70AAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□

Configuration for Medium-Capacity XRC in A-Type Panel

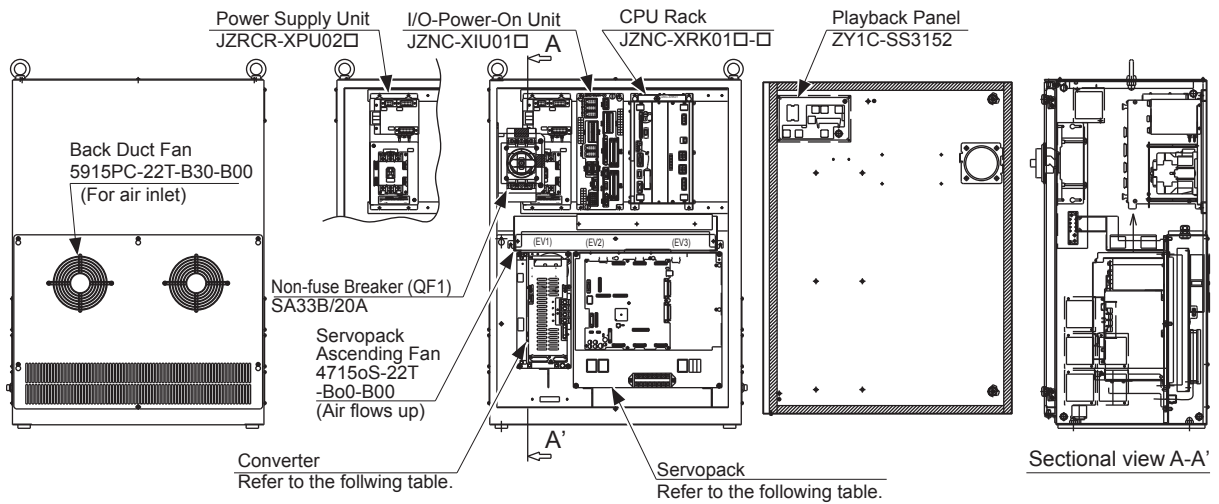
2. B-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
SK45X	ERCR-SK45-RA01	CACR-SK45AAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□
SK16MX	ERCR-SK16M-RA01	CACR-SK16MAAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□
SP70X	ERCR-SP70-RA01	CACR-SP70AAB	JUSP-ACP25JAA	EA53B/30A	JZRCR-XPU02□

Configuration for Medium-Capacity XRC in B-Type Panel

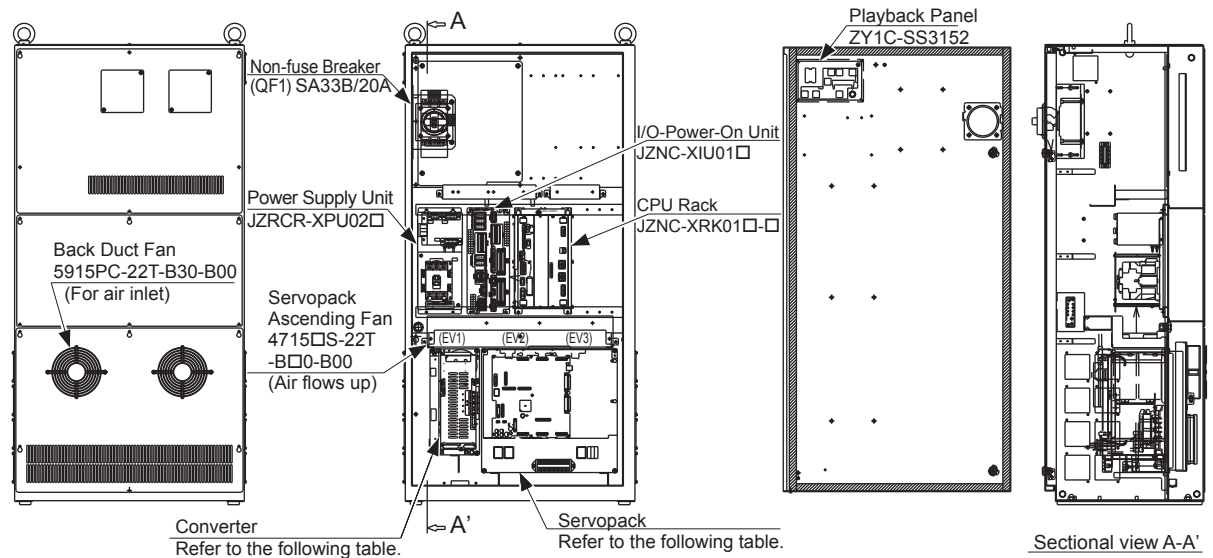
3. New A-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
UP50	ERCR-UP50-RA10	CACR-UP50AAB	JUSP-ACP25JAAY11	SA33B/20A	JZRCR-XPU02□
SK45X	ERCR-SK45-RA10	CACR-SK45AAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
SK16MX	ERCR-SK16M-RA10	CACR-SK16MAAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
SP70X	ERCR-SP70-RA10	CACR-SP70AAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
UP20M	ERCR-UP20M-RA10	CACR-UP20MAAB	JUSP-ACP25JAAY11	SA33B/20A	JZRCR-XPU02□

Configuration for Medium-Capacity XRC in New A-Type Panel

4. New B-type panel



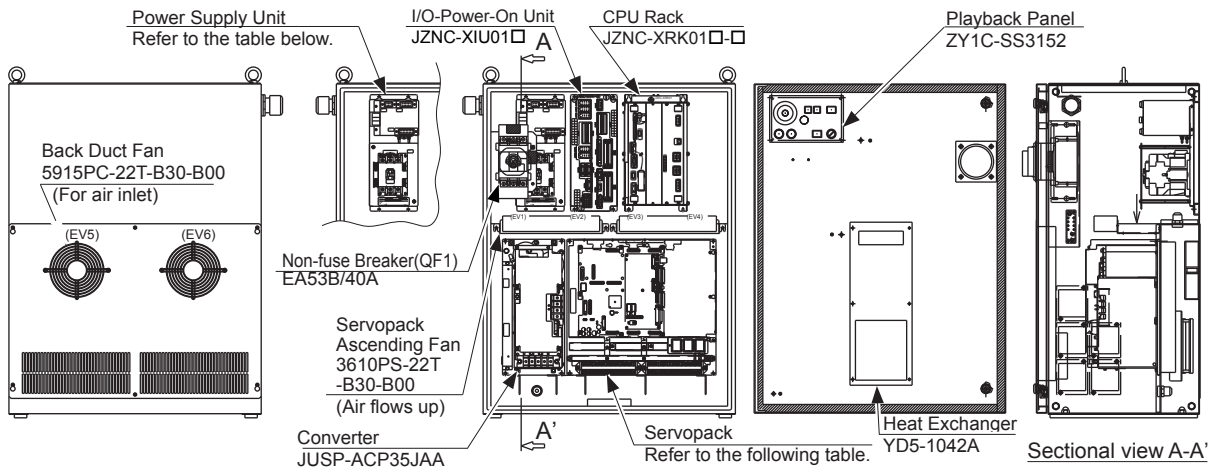
Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
UP50	ERCR-UP50-RA11	CACR-UP50AAB	JUSP-ACP25JAAY11	SA33B/20A	JZRCR-XPU02□
SK45X	ERCR-SK45-RA11	CACR-SK45AAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
SK16MX	ERCR-SK16M-RA11	CACR-SK16MAAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
SP70X	ERCR-SP70-RA11	CACR-SP70AAB	JUSP-ACP25JAAY	SA33B/20A	JZRCR-XPU02□
UP20M	ERCR-UP20M-RA11	CACR-UP20MAAB	JUSP-ACP25JAAY11	SA33B/20A	JZRCR-XPU02□

Configuration for Medium-Capacity XRC in New B-Type Panel

6.4 Equipment Configuration

Large Capacity

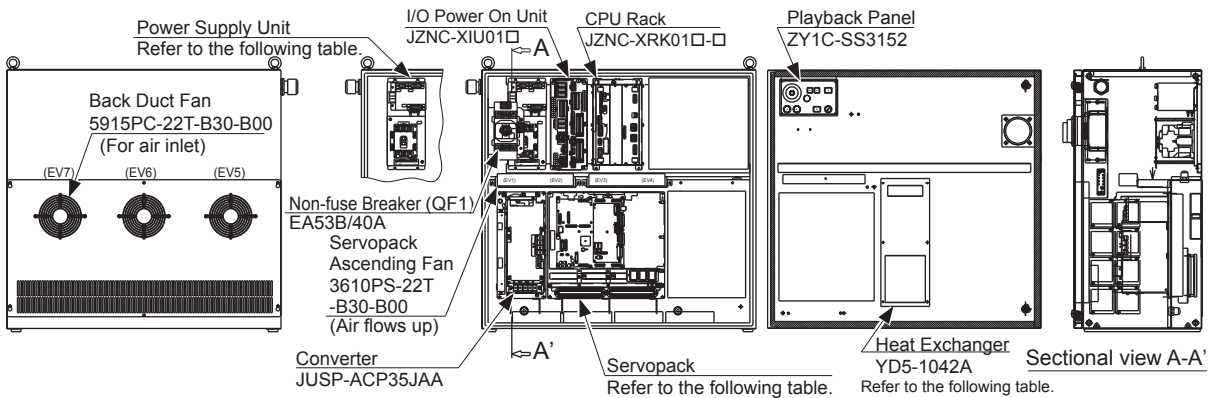
1. A-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
UP130	ERCR-UP130-RA00	CACR-UP130AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01
UP165	ERCR-UP165-RA00	CACR-UP130AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01
UP165-100	ERCR-UP165-RA03	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01
UP200	ERCR-UP200-RA00	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01
UP130R	ERCR-UP130R-RA00	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01
SK300X	ERCR-SK300-RA00	CACR-SK300AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01
SP100X	ERCR-SP100-RA00	CACR-SP100AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01

Configuration for Large-Capacity XRC in A-type Panel

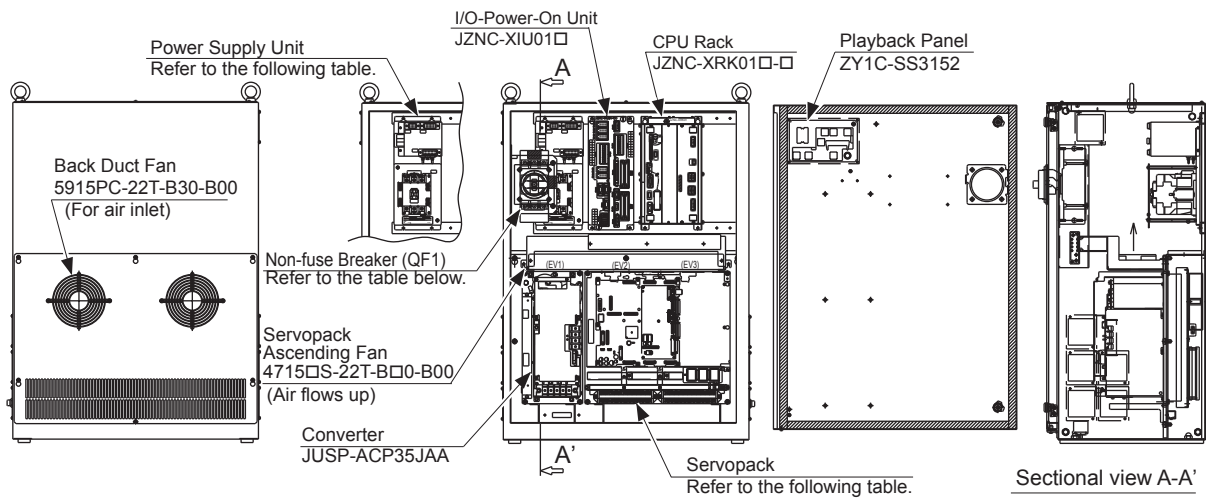
2. B-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit	Heat Exchanger
UP130	ERCR-UP130-RA01	CACR-UP130AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01	With
UP165	ERCR-UP165-RA01	CACR-UP130AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01	With
UP165-100	ERCR-UP165-RA04	CACR-UP130Y18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01	With
UP200	ERCR-UP200-RA01	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU02 or JZRCR-XPU01	With
UP130R	ERCR-UP130R-RA01	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01	With
SK300X	ERCR-SK300-RA01	CACR-SK300AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01	With
SK506X	ERCR-SK506-RA01	CACR-UP130AABY18	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01	With
SP100X	ERCR-SP100-RA01	CACR-SP100AAB	JUSP-ACP35JAA	EA53B/40A	JZRCR-XPU01	Without

Configuration for Large-Capacity XRC in B-Type Panel

3. New A-type panel

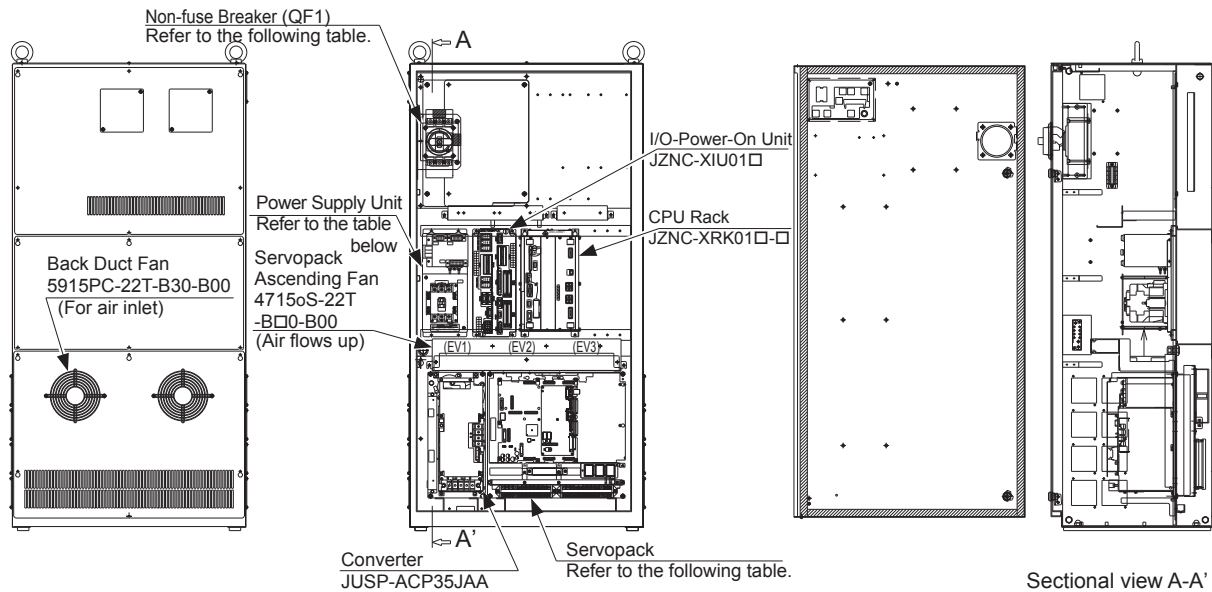


Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
UP130	ERCR-UP130-RA10	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP165	ERCR-UP165-RA10	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP165-100	ERCR-UP165-RA13	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP200	ERCR-UP200-RA10	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP130T	ERCR-UP130T-RA10	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
ES165	ERCR-ES165-RA10	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
ES200	ERCR-ES200-RA10	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
SK300X	ERCR-SK300-RA10	CACR-SK300AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SP100X	ERCR-SP100-RA10	CACR-SP100AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SK506X	ERCR-SK506-RA10	CACR-UP130AABY18	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SR200X	ERCR-SR200-RA10	CACR-SK300AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP130R	ERCR-UP130R-RA10	CACR-UP130AABY18	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP165R	ERCR-UP165R-RA10	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP200R	ERCR-UP200R-RA10	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP130RL	ERCR-UP130RL-RA10	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
ES165R	ERCR-ES165R-RA10	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
ES200R	ERCR-ES200R-RA10	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□

Configuration for Large-Capacity XRC in New A-Type Panel

6.4 Equipment Configuration

4. New B-type panel



Model	YASNAC XRC	Servopack	Converter (Separated)	QF1	Power Supply Unit
UP130	ERCR-UP130-RA11	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP165	ERCR-UP165-RA11	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP165-100	ERCR-UP165-RA14	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP200	ERCR-UP200-RA11	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
UP130T	ERCR-UP130T-RA11	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
ES165	ERCR-ES165-RA11	CACR-UP130AAB	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
ES200	ERCR-ES200-RA11	CACR-UP130AABY18	JUSP-ACP35JAA	SA33B/30A	JZRCR-XPU02□ or JZRCR-XPU01□
SK300X	ERCR-SK300-RA11	CACR-SK300AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SP100X	ERCR-SP100-RA11	CACR-SP100AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SK506X	ERCR-SK506-RA11	CACR-UP130AABY18	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
SR200X	ERCR-SR200-RA11	CACR-SK300AAB	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP130R	ERCR-UP130R-RA11	CACR-UP130AABY18	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP165R	ERCR-UP165R-RA11	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP200R	ERCR-UP200R-RA11	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
UP130RL	ERCR-UP130RL-RA11	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
ES165R	ERCR-ES165R-RA11	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□
ES200R	ERCR-ES200R-RA11	CACR-UP130AABY21	JUSP-ACP35JAA	SA53B/40A	JZRCR-XPU01□

Configuration for Large-Capacity XRC in New B-Type Panel

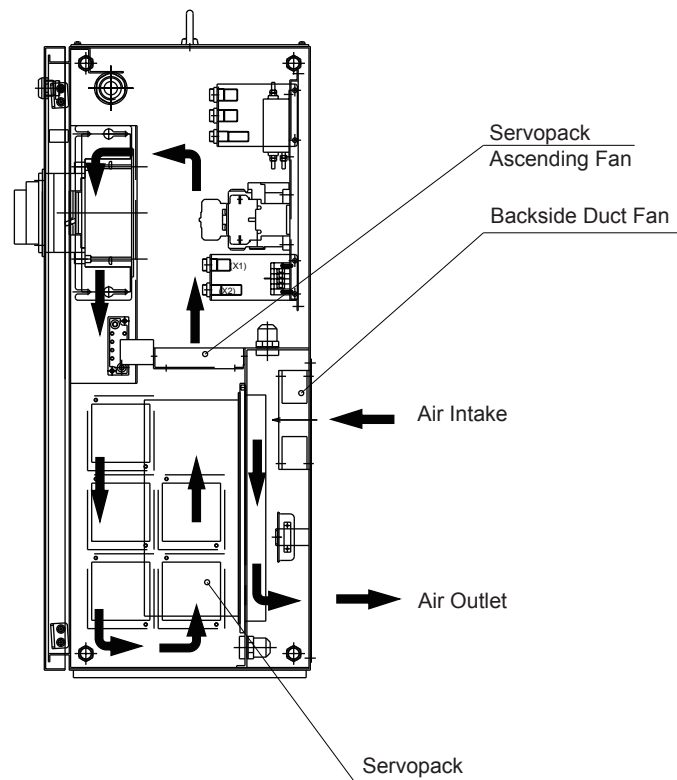
■ Location

Section	Unit	
Door	Playback panel(ZY1C-SS3125)	
	Heat exchange board (Large capacity XRC in A and B type panel)	
Front section	Servopack (CACR-□□□□AA□) (Separated type converter for medium and large capacity XRC)	Control circuit board (JASP-WRCA01□)
		Control power supply (JUSP-RCP01□□□)
		Converter (JUSP-ACP□□JAA)
		Amplifier (JUSP-WS□□AA)
	I/O, TU unit (JZNC-XIU01□)	
	CPU Rack (JZNC-XRK01□-□)	System control circuit board (JANCD-XCP01□)
		CPU power supply (CPS-150F)
	Power Supply unit (JZNC-XPW03□, JZRCR-XPU□□□)	

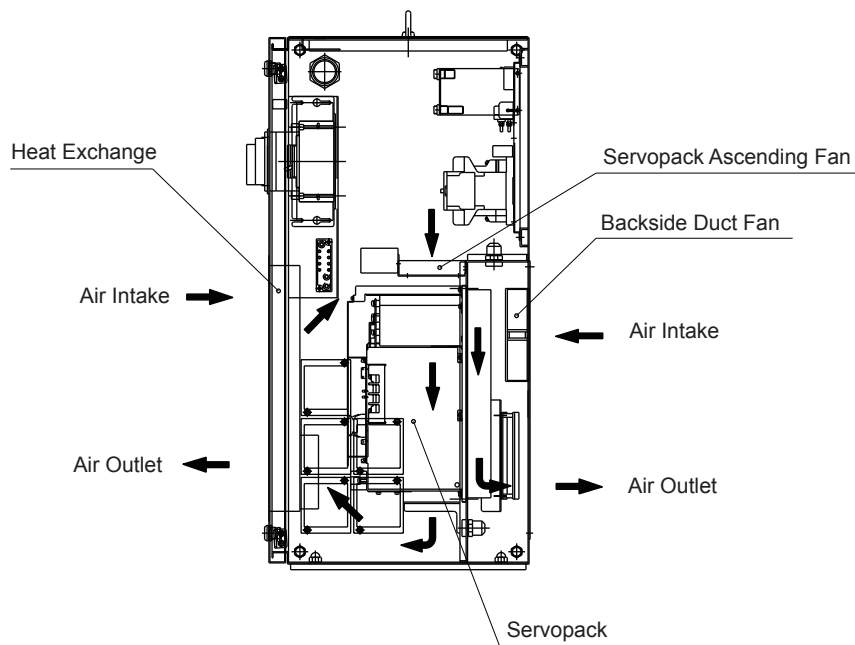
6.4.2 Cooling System of the Controller Interior

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. Large capacity XRC in A and B type panel are equipped with a heat exchanger on the door to cool the interior of the XRC.

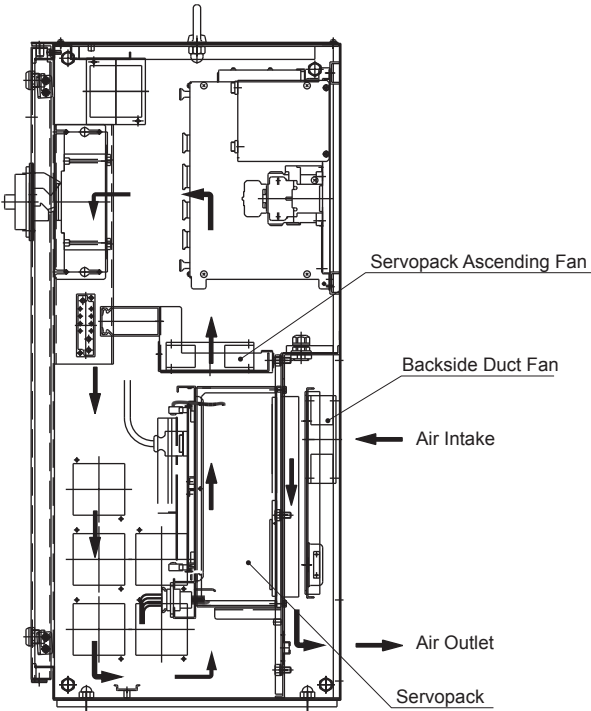
6.4 Equipment Configuration



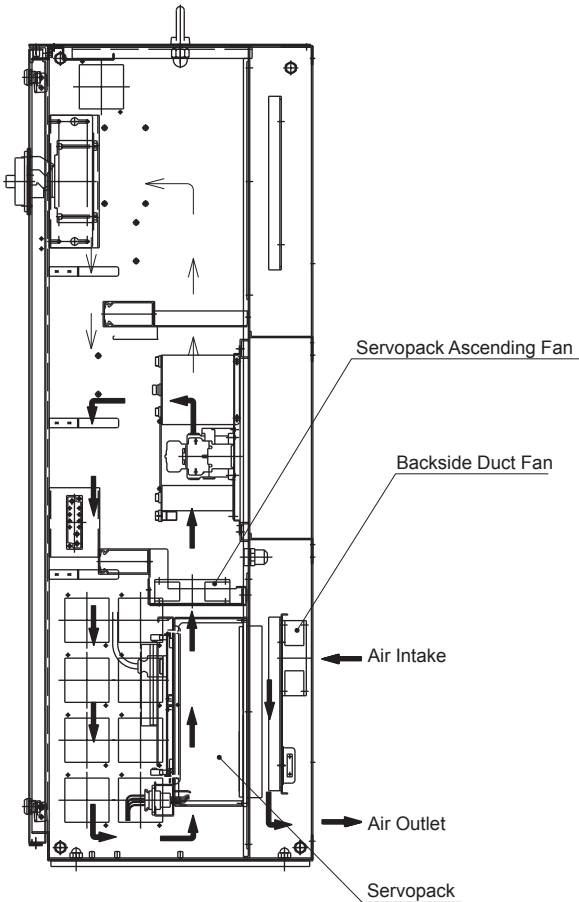
Cooling Configuration (Small and medium capacity XRC in A and B type panel)



Cooling Configuration (Large capacity XRC in A and B type panel)



Cooling Configuration (New A type panel)



Cooling Configuration (New B type panel)

7 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.

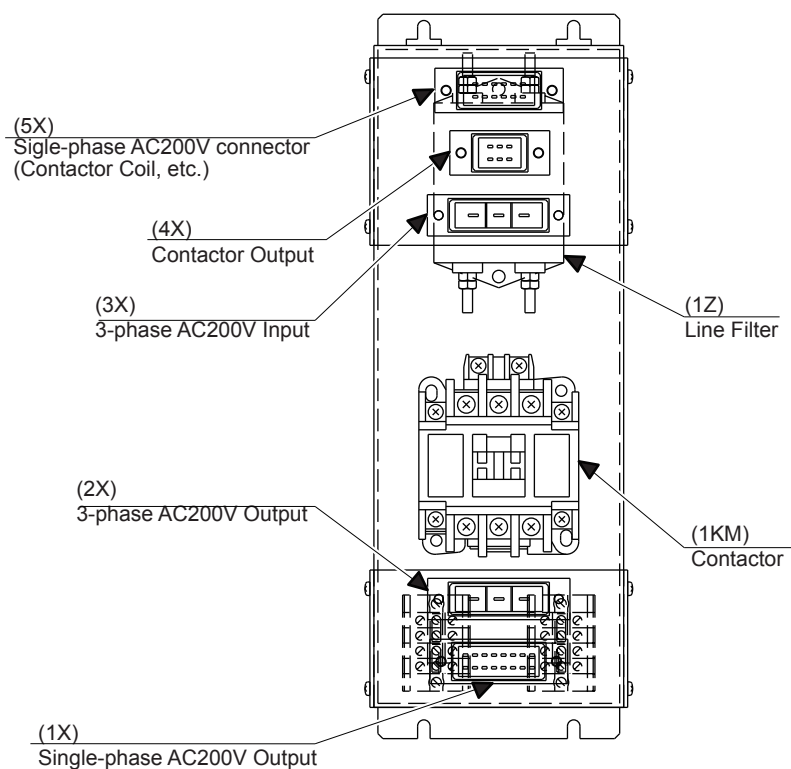
7.1 Power Supply Unit

The power supply unit consists of the contactor (1KM) for servo power and the line filter (1LF). It turns the contactor servo power ON and OFF using the signal for servo power control from the I/O contactor 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 and I/O contactor unit and servopack (servo controlled power supply) via the line filter.

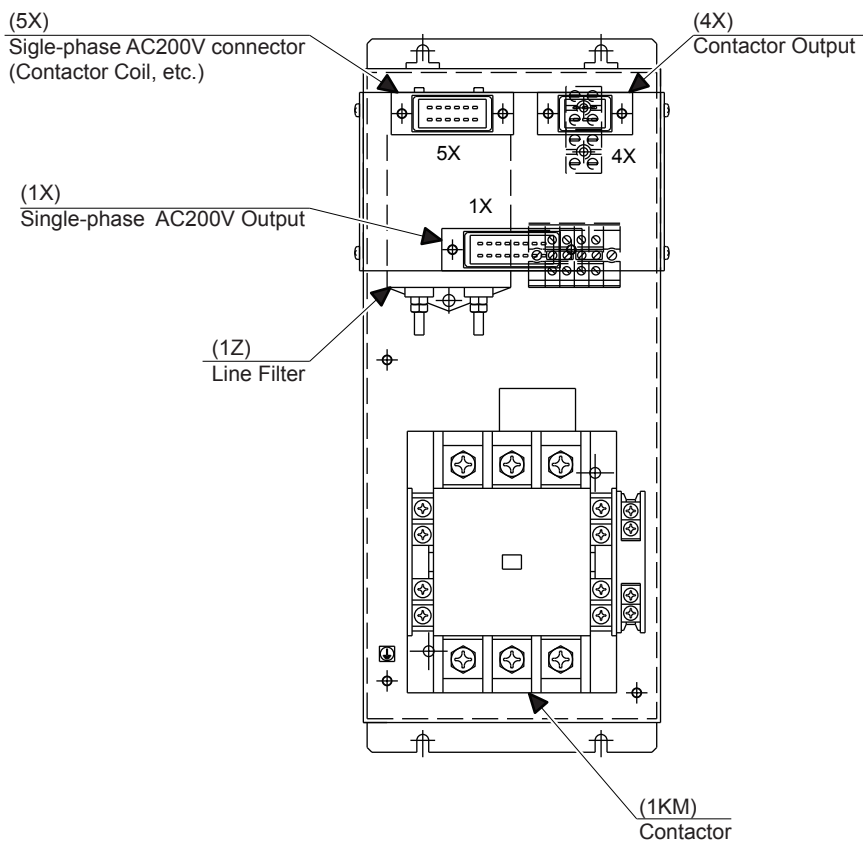
Power Supply Unit Models

Model	Robot Type
JZNC-XPW03□ or JZRCR-XPU03□	SV3X, SV035X, UP6, SK16X, UP20
JZRCR-XPU02□	SK16MX, SK45X, SP70X, UP50, UP20M
JZRCR-XPU02□ or JZRCR-XPU01□	UP130, UP165, UP165-100, UP200, UP130T, ES165, ES200
JZRCR-XPU01□	SK300X, SP100X, SK506X, SR200X, UP130R, UP165R, UP200R, UP130RL, ES165R, ES200R

7.1 Power Supply Unit



Power Supply Unit Configuration (JZNC-XPW03□, JZRCR-XPU03□)

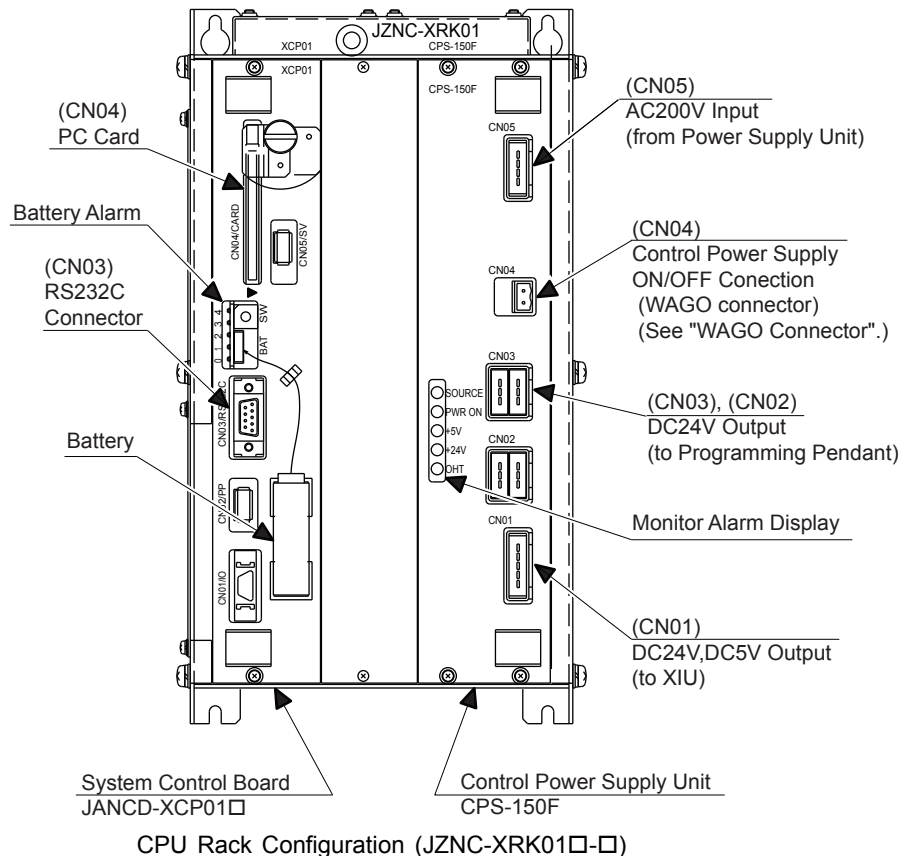


Power Supply Unit Configuration (JZRCR-XPU01□, JZRCR-XPU02□)

7.2 CPU Rack

7.2.1 CPU Rack Configuration

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



7.2.2 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 or JANCD-XIF04). 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 (DC5V, 24V) to the I/O contactor unit (JZNC-XIU 01□) and the programming pendant. It is also equipped with the input function for turning the control power supply ON and OFF.

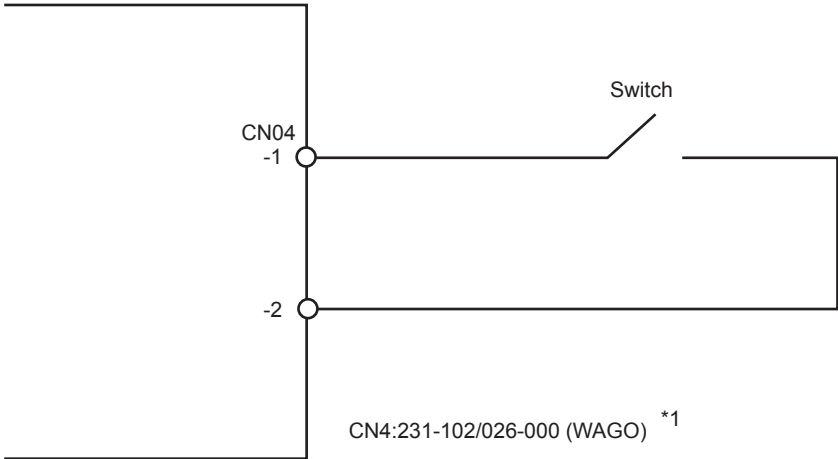
7.2 CPU Rack

Items	Specifications		
Input	Rated Input Voltage: AC200/220 Voltage Fluctuation Range: +10% to -15% (AC170 to 242V} Frequency: 50/60Hz $\pm$ 2Hz (48 to 62Hz)		
Output Voltage	DC + 5V : 10A DC +24V : 4.0A		
Indicator	DISPLAY	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		



When the message of the "Cooling fan in control box stopped" is displayed, it may be caused by the error occurrence at the cooling fan (JZNC-XZU02) on the CPU rack. The playback operation (execution of the JOB) is not performed when the error is occurred at the cooling fan. In this case, the alarm 4119 "FAN ERROR (IN CONTROL BOX)" is appeared by 72 hours later.

The message of the "Cooling fan in control box stopped" is displayed, carry out an inspection and the replacement of the cooling fan on the CPU rack as soon as possible.

Items	Specifications
Control Power ON/OFF	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 shortened when shipment) Control Power Supply Unit (CPS-150F)  CN4:231-102/026-000 (WAGO) *1 Connection to Control Power Supply Unit Refer to " WAGO Connector " for wiring of CN04 connector.

■ WAGO Connector

CN05, 06, 26 and 27 on the I/O contactor unit (JZNC-XIU01□) and CN04 on the control power supply unit are equipped with a connector made by WAGO.

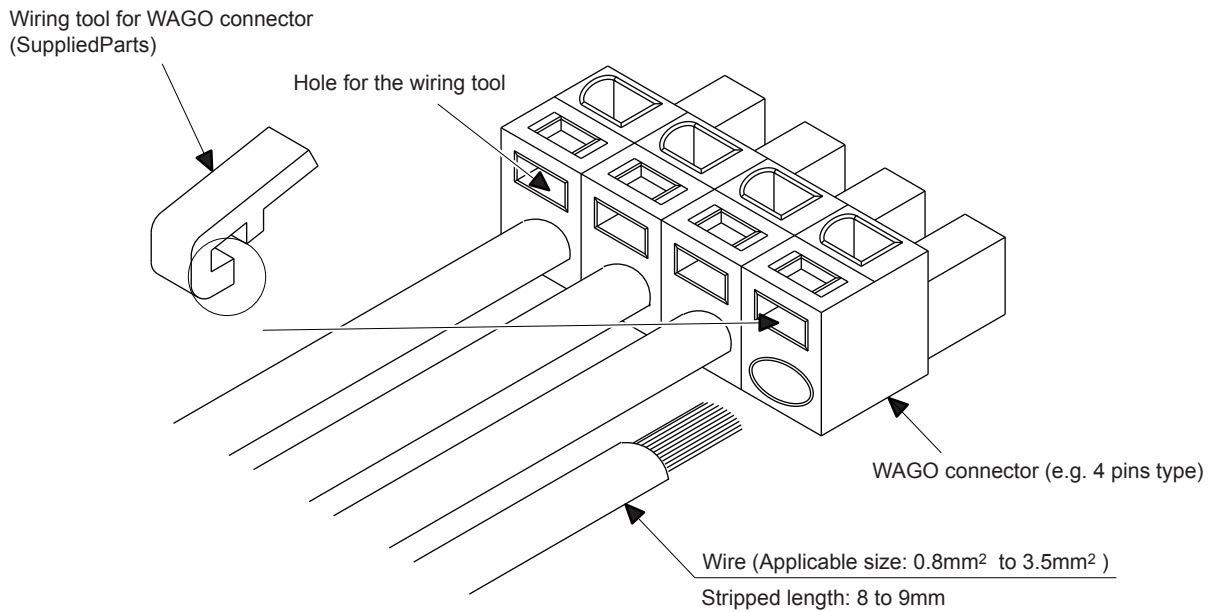
The “wiring tool for the WAGO connector” is necessary to wire the WAGO connector.

Two of these tools are supplied with the XRC.

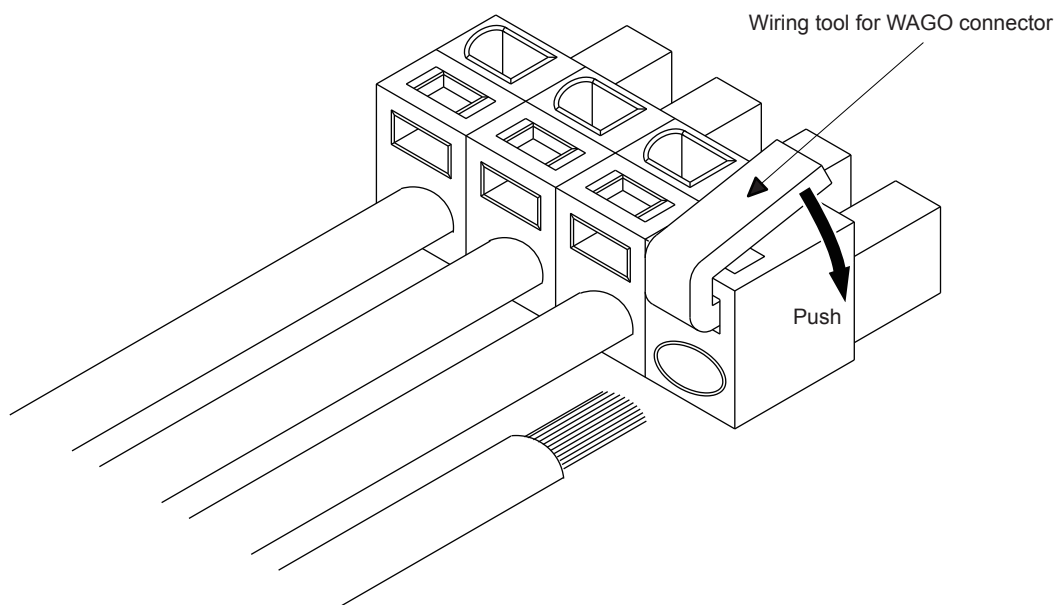
The wiring procedure is described as follows:

7.2 CPU Rack

1. Insert part A of the wiring tool into one of the holes designed for the tool.



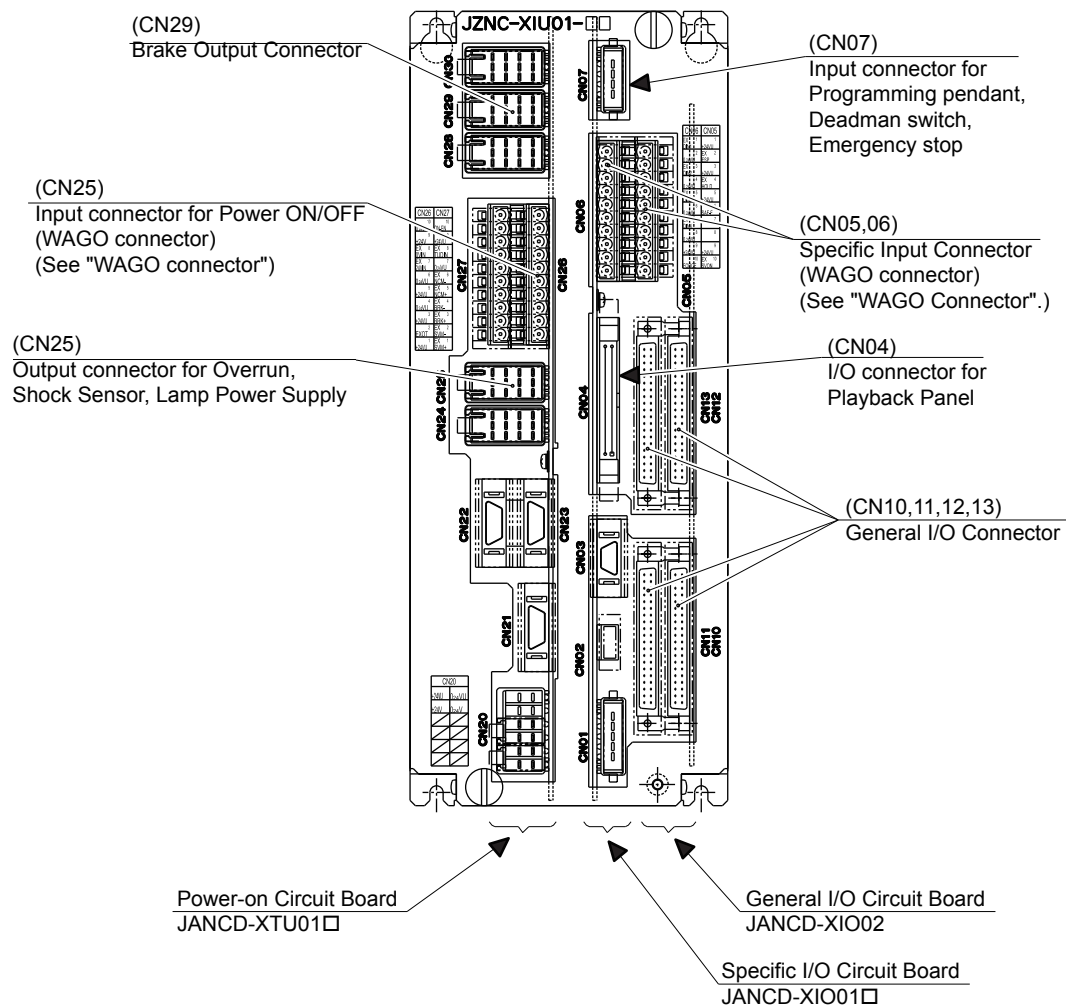
2. Insert or pull out the wire while pushing the wiring tool downward (Direction of the arrow).



3. Remove the wiring tool from the connector. (Complete)
Keep this wiring tool for the future use.

7.3 I/O Contactor Unit (JZNC-XIU01□)

The I/O contactor unit consists of the Specific I/O circuit board (JANCD-XIO01□), General I/O circuit board (JANCD-XIO02) and Contactor circuit board (JANCD-XTU01□) to control the contactor sequence of the servo power supply.



I/O Contactor Unit Configuration (JZNC-XIU01□)



Refer to "WAGO Connector".

7.3 I/O Contactor Unit (JZNC-XIU01□)

7.3.1 Specific Input Circuit Board (JANCD-XIO01□)

The specific input circuit board is controlled by the system control circuit board (JANCD-XCP 01□), and the main function of this board is as follows:

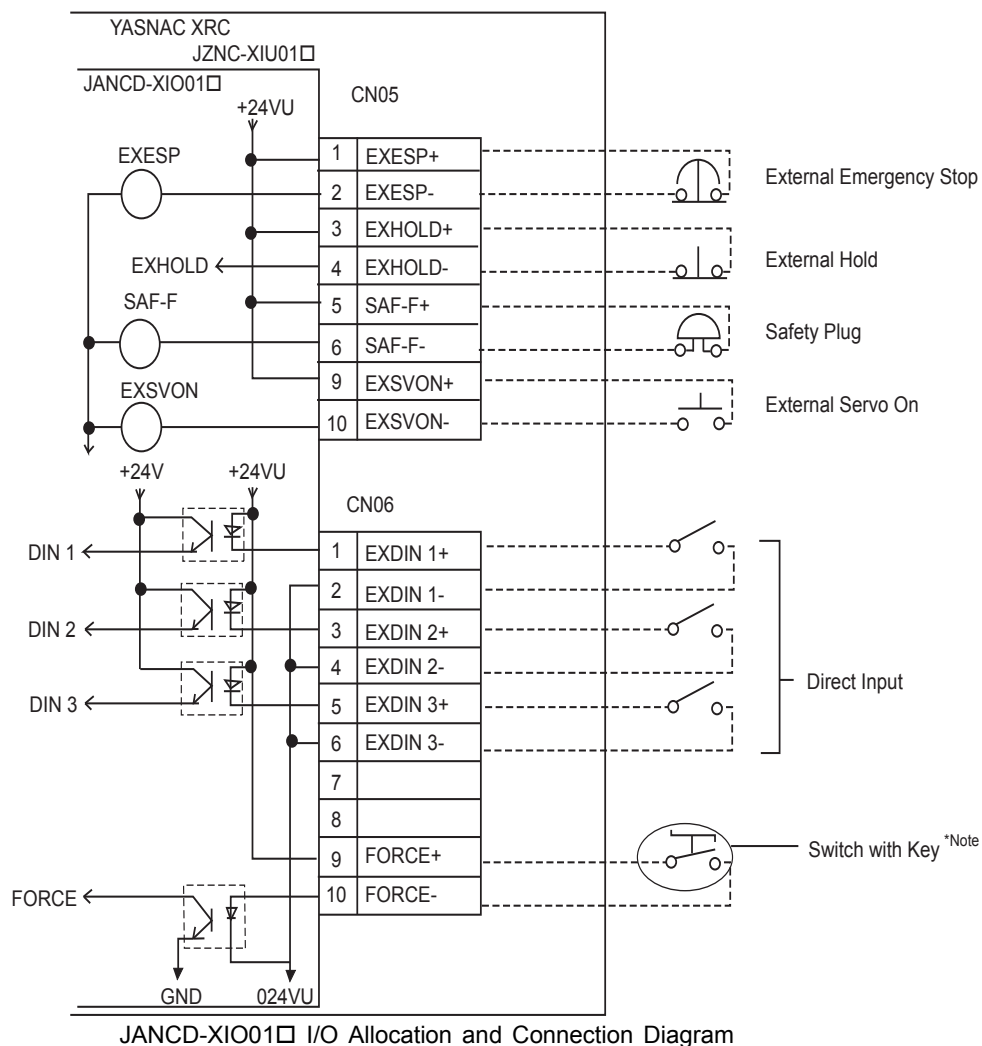
- Specific I/O circuit, for instance I/O circuit for servo power supply contactor and emergency stop circuit
- I/O for playback panel (IN / OUT = 8 points / 8 points)
- Direct input (3 points)
- Deadman Switch Control Circuit



CAUTION

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

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





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.

Specific Input List (JANCD-XIO01□)

Terminal	Input Name / Function	Factory Setting
EXESP	External emergency stop	Disabled by jumper lead
CN05 -1 CN05 -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.	
EXHOLD	External hold	Disabled by jumper lead
CN05 -3 CN05 -4	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.	
SAF-P	Safety plug	Disabled by jumper lead
CN05 -5 CN05 -6	This signal turns OFF the servo power when the door of the safe-guard 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.	
EXSVON	Servo ON	Open
CN05 -9 CN05 -10	Use to connect the servo On switch of an external operation device. The servo power turns ON when this signal is input.	
DIN1	Direct-in 1	Open
CN06 -1 CN06 -2	Used for the search function.	
DIN2	Direct-in 2	Open
CN06 -3 CN06 -4	Used for the search function.	

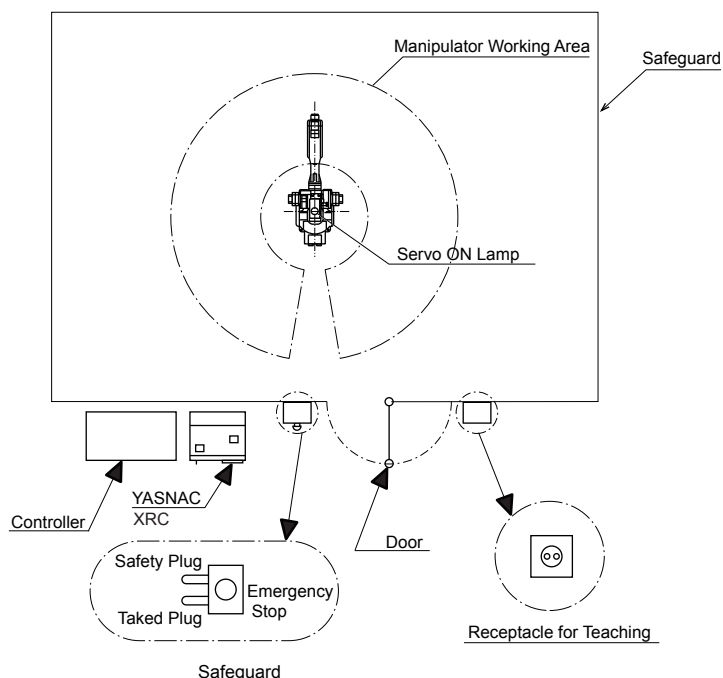
7.3 I/O Contactor Unit (JZNC-XIU01□)

Specific Input List (JANCD-XIO01□)

Terminal	Input Name / Function	Factory Setting
DIN3	Direct-in 3	Open
CN06 -5 CN06 -6	Used for the search function.	
CN06 -7 CN06 -8	For future expansion function	Open
FORCE	Forced reset, input	Open
CN06 -9 CN06 -10	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.	

■ 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.

7.3.2 General I/O Circuit Board (JANCD-XIO02)

The general I/O circuit board is controlled by the system control circuit board (JANCD-XCP 01□) through the specific I/O circuit board (JANCD-XIO01□).

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

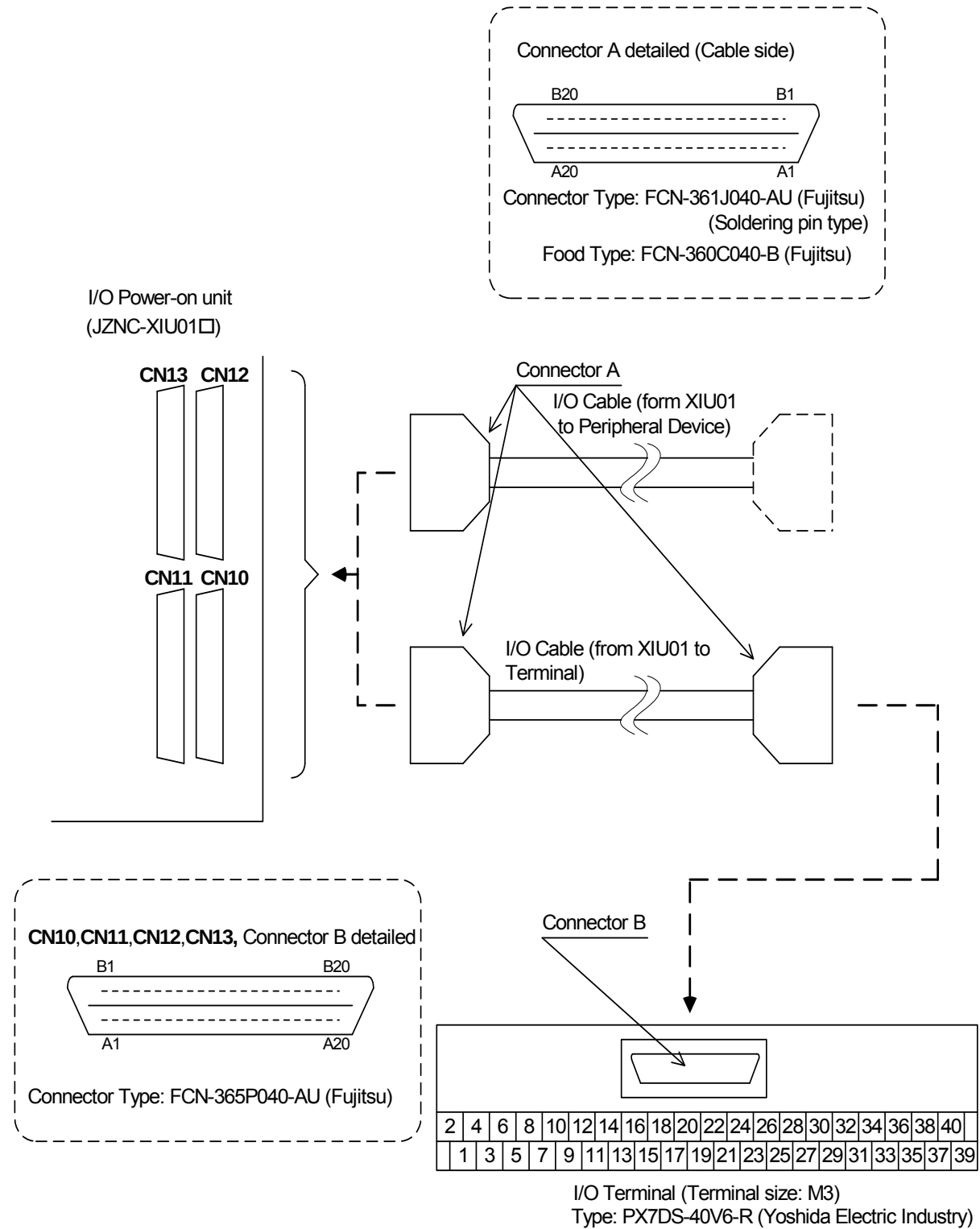
- Specific I/O : IN/OUT = 24 points / 24 points
- General I/O : IN/OUT= 16 points / 16 points (relay contact output)

The specific I/O is a signal to which its role is divided 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 " 7.7 General I/O Signal Assignment ". The main example using specific I/O is shown as follows.

7.3 I/O Contactor Unit (JZNC-XIU01□)

■ 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)

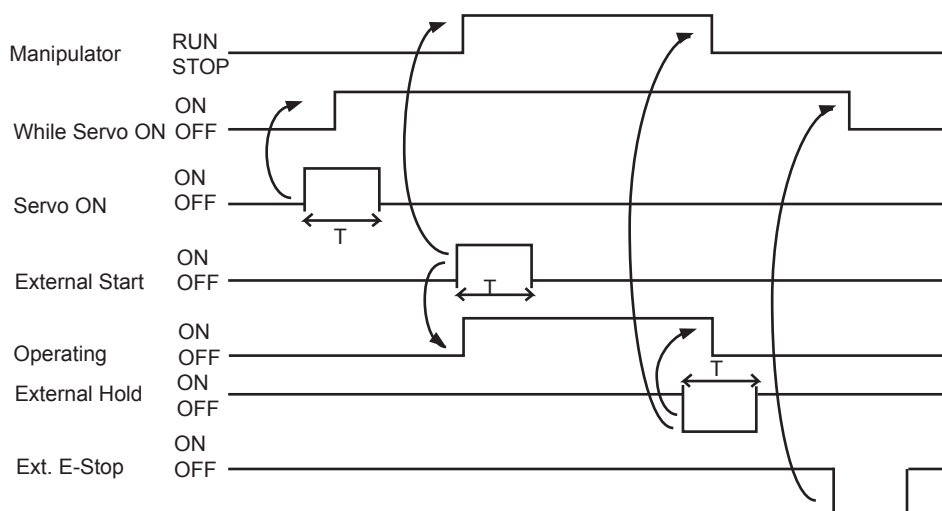


■ Specific I/O Signal Related to Start and Stop

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

- Servo On (depending on application: JANCD-XIO02)
- External Servo On (common to all application: JANCD-XIO01□)
- External Start (depending on application: JANCD-XIO02)
- Operating (depending on application: JANCD-XIO02)
- External Hold (common to all application: JANCD-XIO01□)
- External Emergency Stop (common to all application: JANCD-XIO01□)

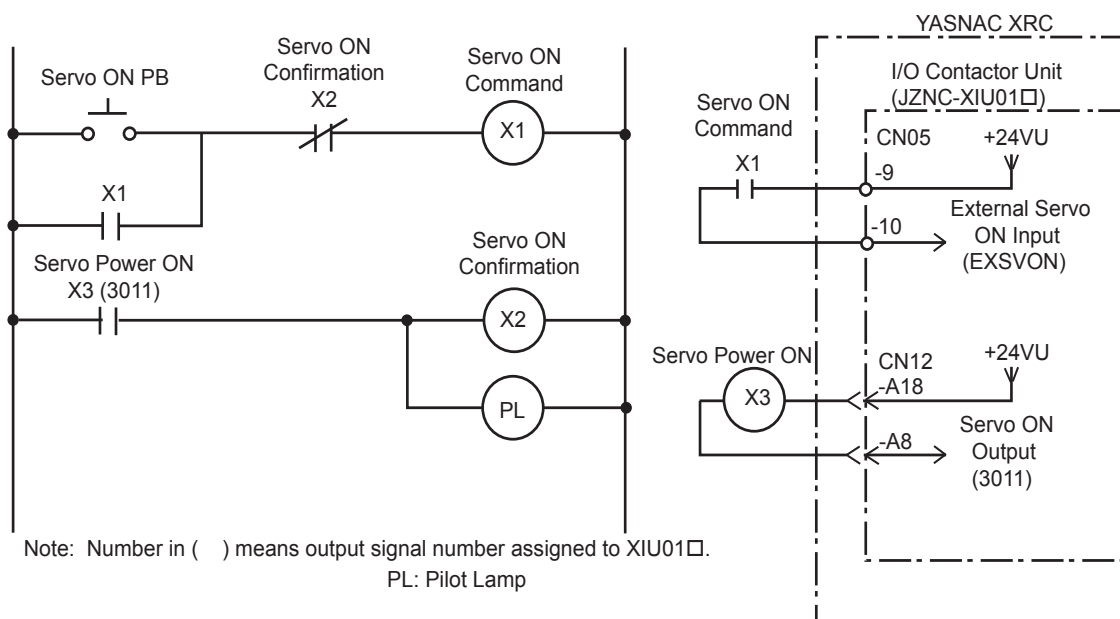
<Timing Chart>



Note: Set T=100msec or more

Example of Servo ON Sequence Circuit from External Device

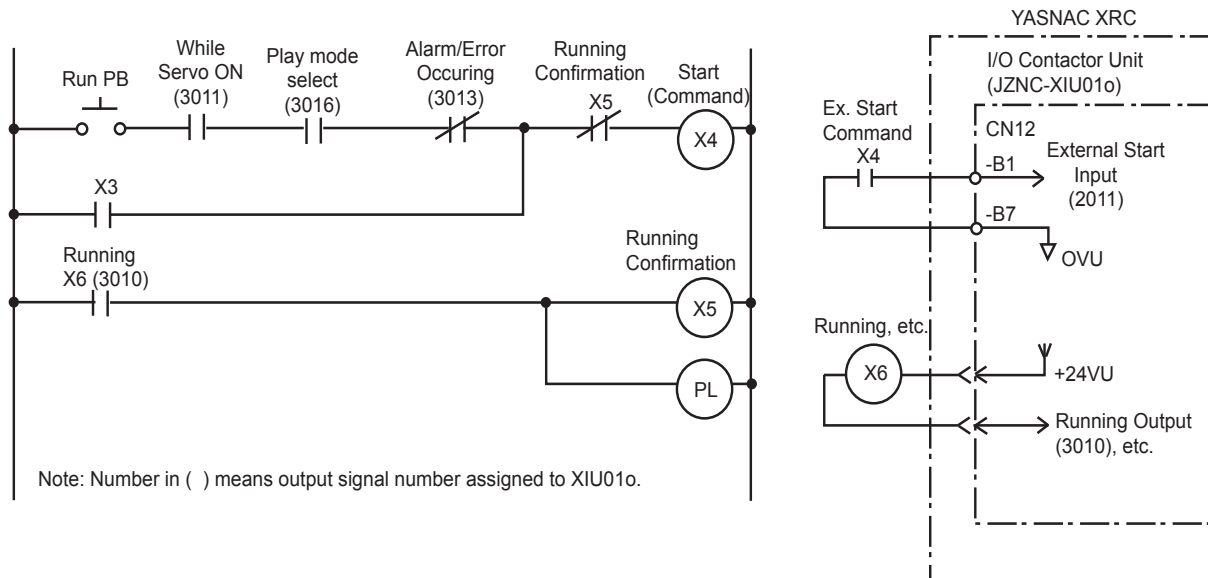
Only the rising edge of the servo ON signal is valid. This signal turns ON the manipulator servo power supply. The set and reset timings are shown in the following.



7.3 I/O Contactor Unit (JZNC-XIU01□)

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.



7.3.3 Power-ON Circuit Board (JANCD-XTU01□)

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

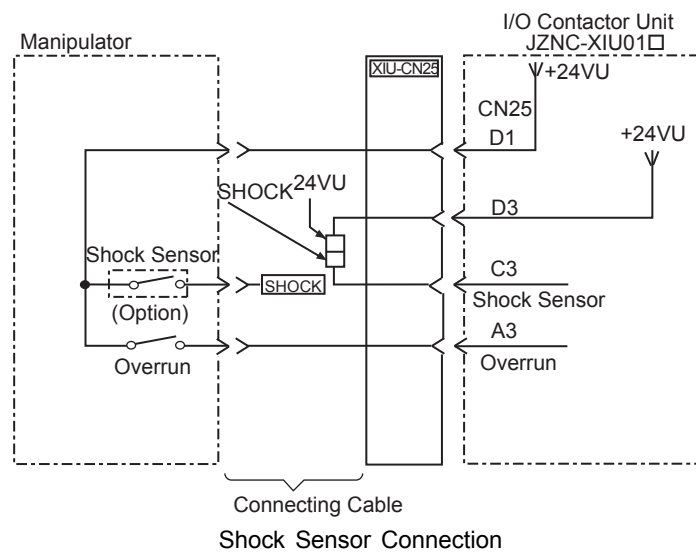
- Specific I/O circuit, for instance, servo power supply contactor I/O circuit and emergency stop circuit
- Brake power supply circuit and its output
- Overrun (OT) shock sensor (SHOCK) and lamp light power supply output to robot

■ Connection of Shock Sensor

Remove SHOCK- and +24VU from XIU-CN25 (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		



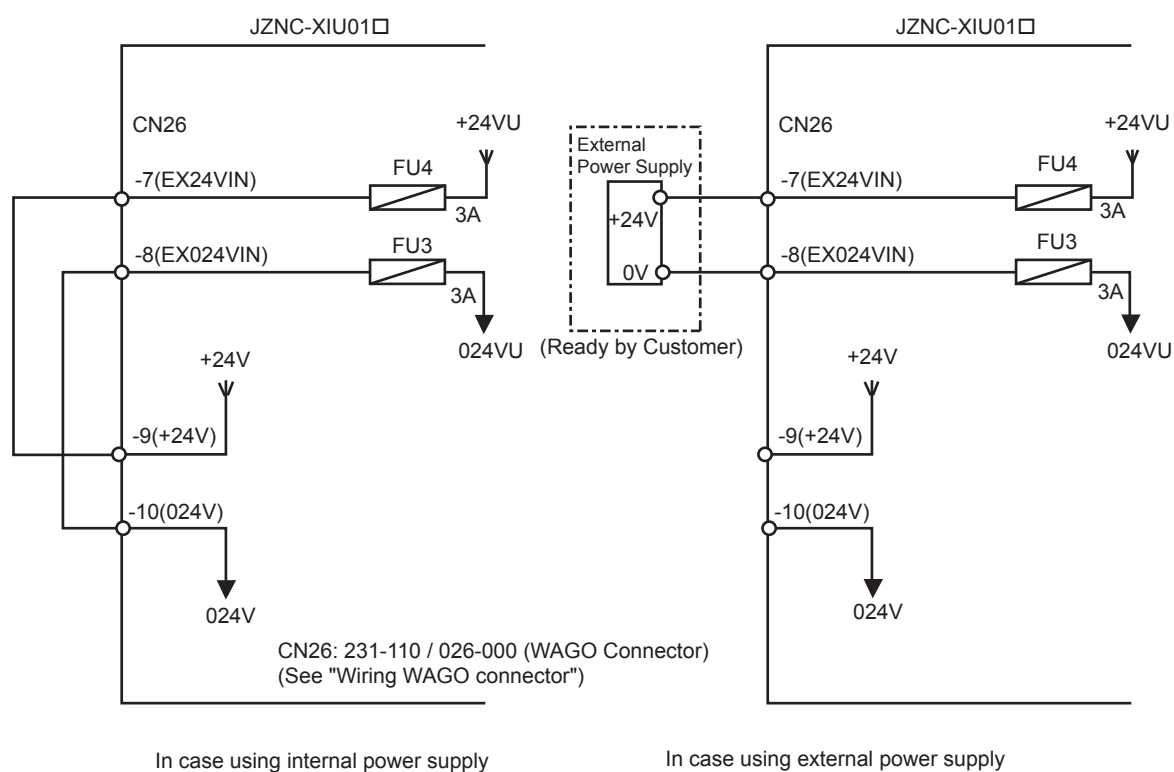
When the shock sensor input signal is used, the stopping method of the robot can be specified. The stopping methods are hold stop and servo power supply OFF. Selection of the stopping method is set in the display of the programming pendant. Refer to Explanation *1 in " 3.6 Overrun / Shock Sensor Releasing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

■ Connection of External Power Supply for I/O

At factory setting, the internal power supply for I/O is used. If the external power supply for I/O is used, connect it with following procedure.

1. Remove the wire connected between CN26-7 to -9 and CN26-8 to -10 of the I/O contactor unit: JZNC-XIU01□.
2. Connect +24V of the external power supply to CN26-7 and 0V to CN26-8 of the I/O contactor unit: JZNC-XIU01□.

7.3 I/O Contactor Unit (JZNC-XIU01□)

**NOTE**

- The internal power supply of 24V of about 1A of XRC can be used for I/O. Use external 24V power supply for higher currents and to isolate the circuit inside and outside the XRC.
- The I/O power supply (+24 VU, 024 VU) has 3A fuses (FU3, FU4).
- Install the external power supply outside the XRC to avoid electric noise problems.
- When the internal power supply is selected, do not connect the line of the external power supply to the +24VU and 0VU terminals. The unit may malfunction if the external power supply is also connected.

■ Method of Connecting External Axis Overrun Signal

In a standard specification, the external axis overrun input is unused.

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

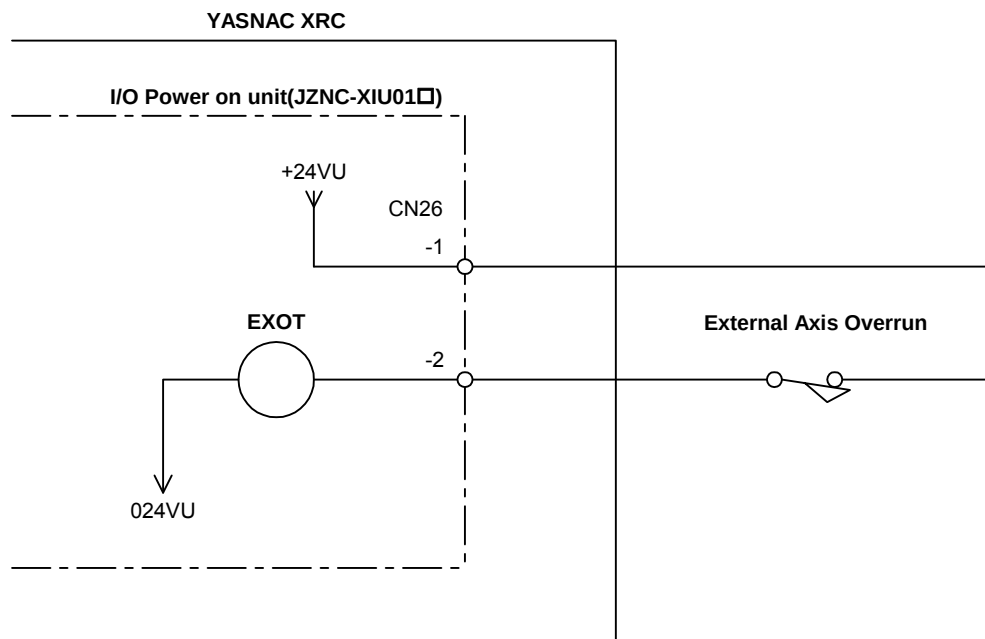
1. Remove wire (jumper) connected with CN26-1--2 of I/O power ON unit JZNC-XIU01□.
2. The overrun input of an external axis is connected between CN26-1 and -2 of I/O power ON unit JZNC-XIU01□ as shown in below.



CAUTION

- Remove a jumper when there is a jumper in the special input signal used.

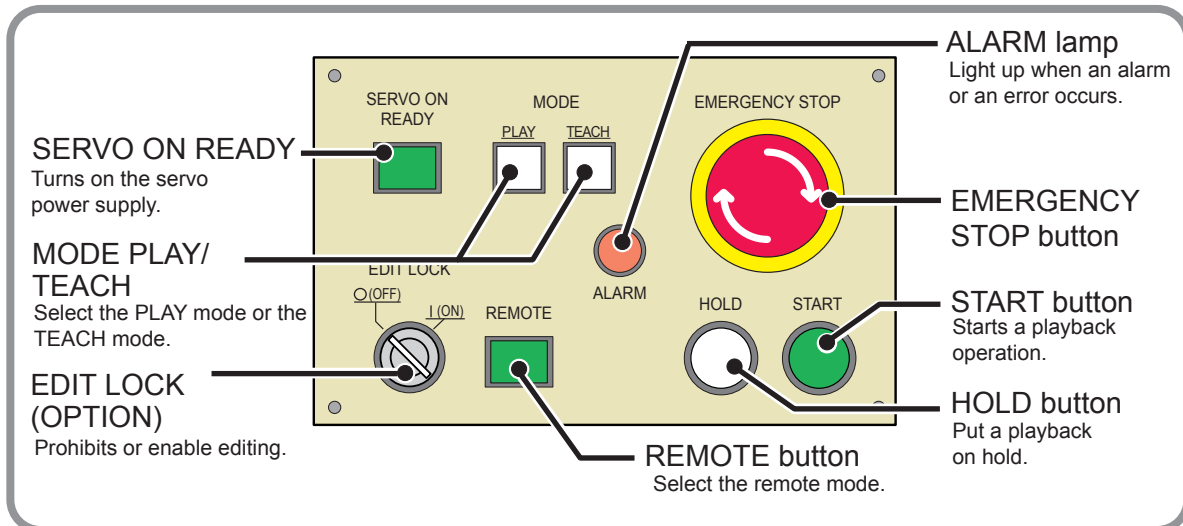
The injury and damage may result because it doesn't function even if the specific signal is input.



7.4 Playback Panel

7.4 Playback Panel

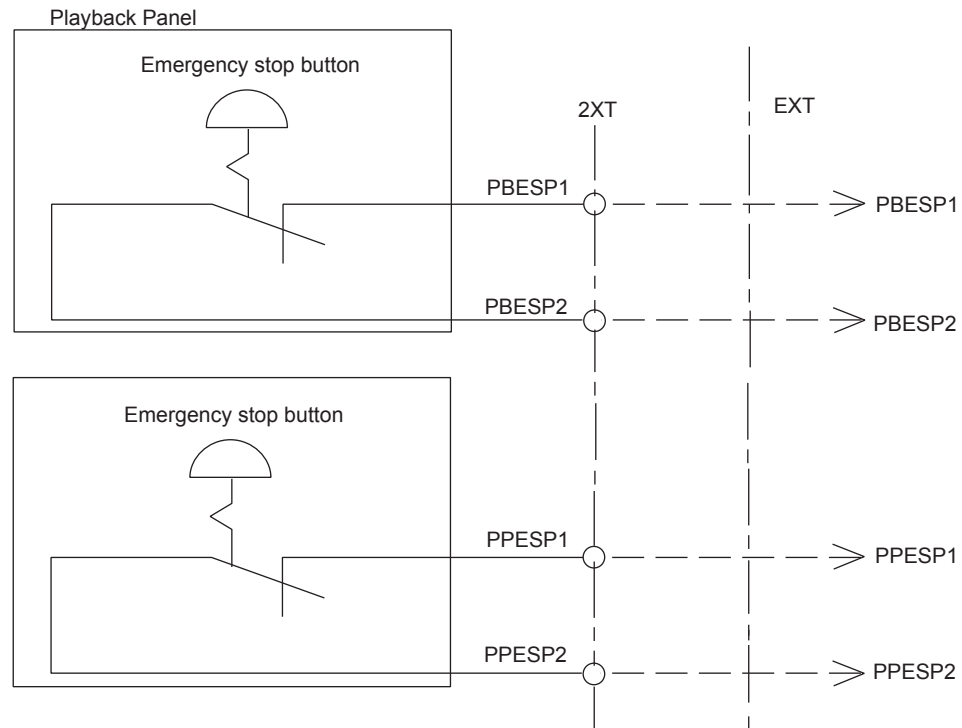
Robot motion mode setting button, Servo ON button, playback hold/start button, emergency stop button are provided on the playback panel.



7.5 Contact Output of Emergency Stop Button

The contact output terminals for the emergency stop button on the programming pendant and the playback panel are provided on the terminal board 2XT (screw size M3.5) on the bottom of XRC.

These contact outputs are always valid no matter of the XRC main power supply status ON or OFF. (Status output signal: normally closed contact)



7.6 Servopack

7.6 Servopack

A Servopack consists of a servo control circuit board (JASP-WRCA01□), a servo control power supply (JUSP-RCP01□□□), a converter and an amplifier (Refer to attached table “Servopack Configuration”).

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

7.6.1 Servopack Configuration

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-RCP01□□□	-	JUSP-RCP01□□□	-

Component		SV035X	
		Type	Capacity
Servopack		CACR-SV035AAA	-
Converter		JUSP-ACP05JAA	5A
Amplifier	S	JUSP-WS04AA	400W
	L	JUSP-WS04AA	400W
	U	JUSP-WS04AA	400W
	R	-	-
	B	JUSP-WS01AA	100W
	T	JUSP-WS01AA	100W
Servo control circuit board		JASP-WRCA01□	-
Servo control power supply		JUSP-RCP01□□□	-

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-RCP01□□□	-	JUSP-RCP01□□□	-

7.6 Servopack

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□	-
Converter		JUSP-ACP25JAA	25A	JUSP-ACP25JAA	25A
Servo control power supply		JUSP-RCP01□□□	-	JUSP-RCP01□□□	-

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□	-
Converter		JUSP-ACP25JAAY11	25A	JUSP-ACP25JAAY11	25A
Servo control power supply		JUSP-RCP01□□□	-	JUSP-RCP01□□□	-

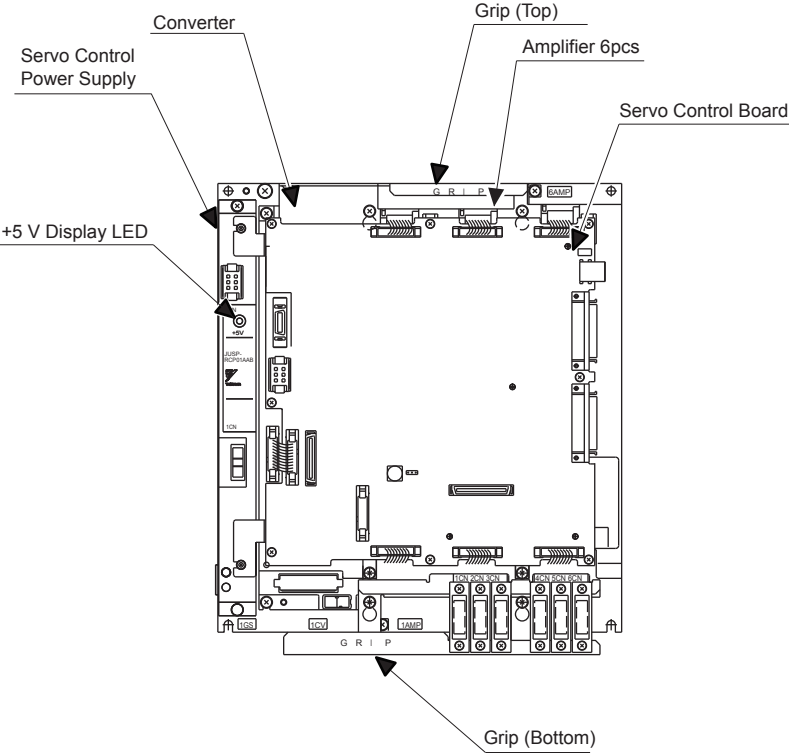
Component		SP70X	
		Type	Capacity
Servopack		CACR-SP70AAB	-
Amplifier	S	JUSP-WS20AA	2kW
	L	JUSP-WS15AA	1.5kW
	U	JUSP-WS44AA	4.4kW
	R	JUSP-WS05AA	500W
	B	-	-
	T	-	-
Servo control circuit board		JASP-WRCA01□	-
Converter		JUSP-ACP25JAA	25A
Servo control power supply		JUSP-RCP01□□□	-

7.6 Servopack

Component		UP130, UP165, ES165		UP130R, UP200, UP165-100, UP130T, SK506K, ES200	
		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□	-
Converter		JUSP-ACP35JAA	35A	JUSP-ACP35JAA	35A
Servo control power supply		JUSP-RCP01□□□	-	JUSP-RCP01□□□	-

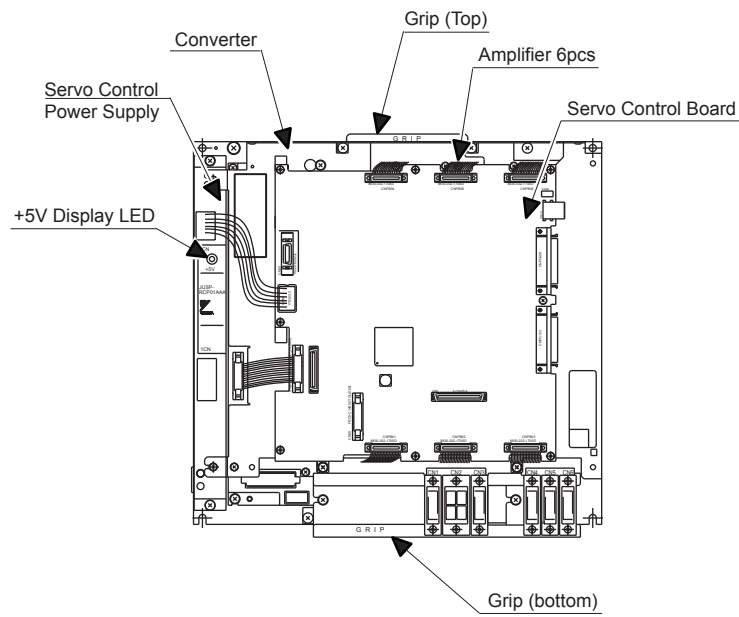
Component		UP165R, UP200R, UP130RL ES165R, ES200R	
		Type	Capacity
Servopack		CACR-UP130AABY21	-
Amplifier	S	JUSP-WS60AAY18	6kW
	L	JUSP-WS60AAY18	6kW
	U	JUSP-WS60AAY18	6kW
	R	JUSP-WS20AAY13	2kW
	B	JUSP-WS15AAY13	1.5kW
	T	JUSP-WS15AAY13	1.5kW
Servo control circuit board		JASP-WRCA01□	-
Converter		JUSP-ACP35JAA	35A
Servo control power supply		JUSP-RCP01□□□	-

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	2kW	-	-
	B	JUSP-WS30AAY18	3kW	-	-
	T	JUSP-WS30AAY18	3kW	JUSP-WS20AAY19	2kW
Servo control circuit board		JASP-WRCA01□	-	JASP-WRCA01□	-
Converter		JUSP-ACP35JAA	35A	JUSP-ACP35JAA	35A
Servo control power supply		JUSP-RCP01□□□	-	JUSP-RCP01□□□	-

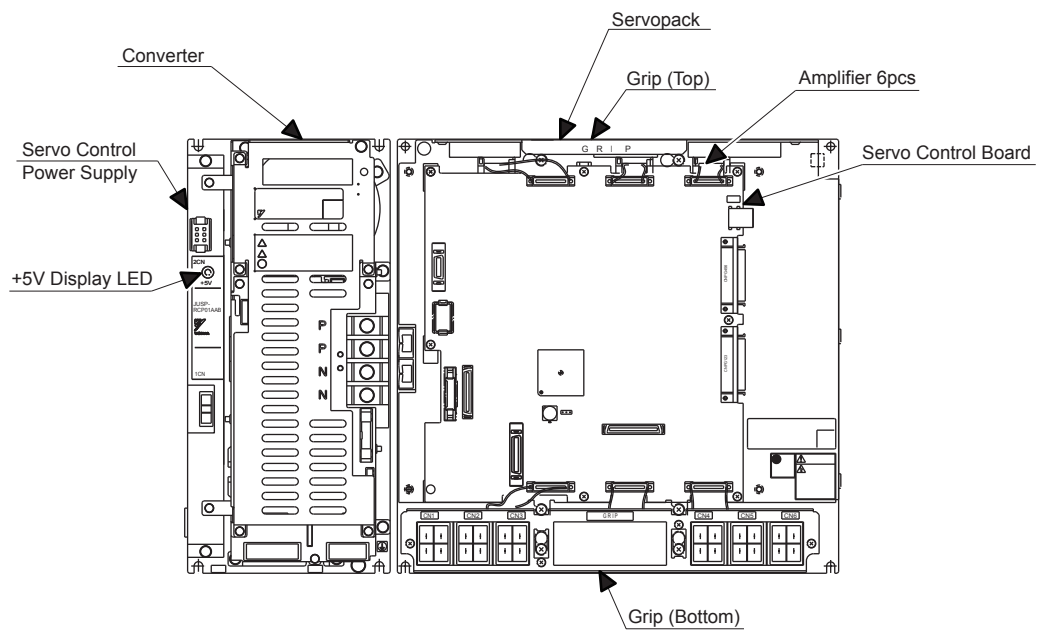


Servopack Configuration for SV3X, SV035X, UP6, SK16X

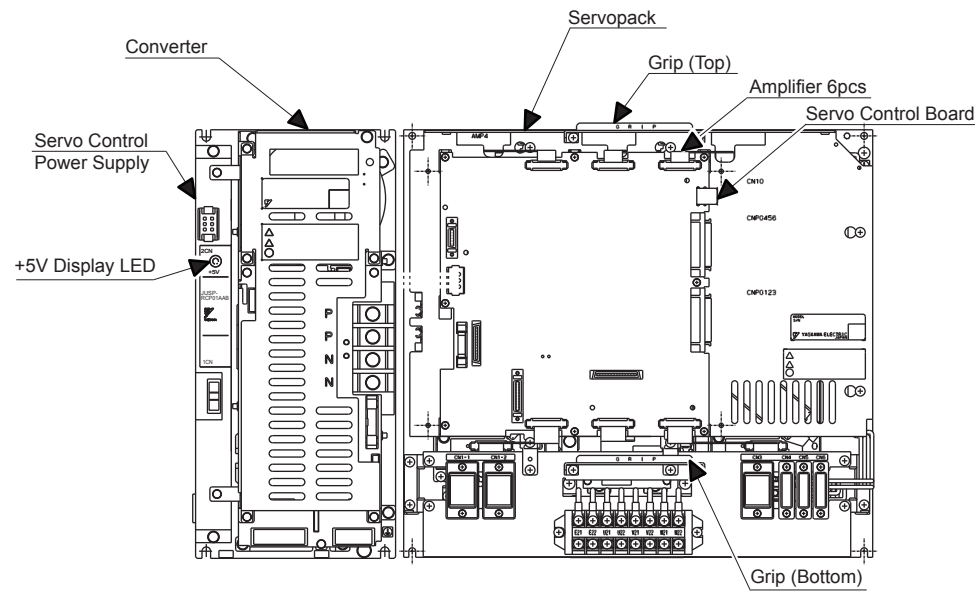
7.6 Servopack



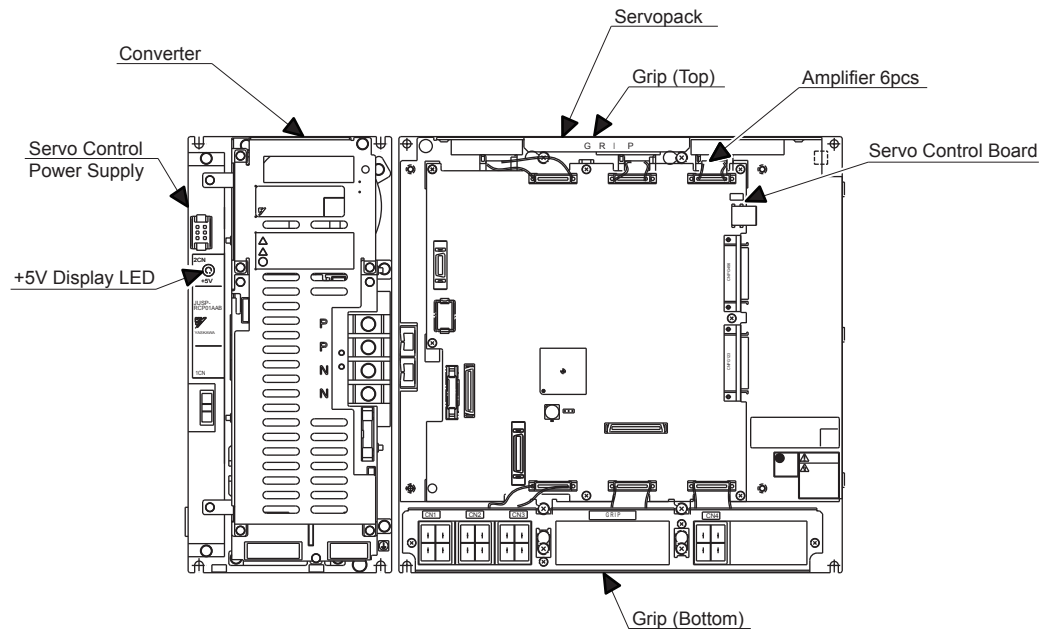
Servopack Configuration for UP20



Servopack Configuration for SK45X, SK16MX

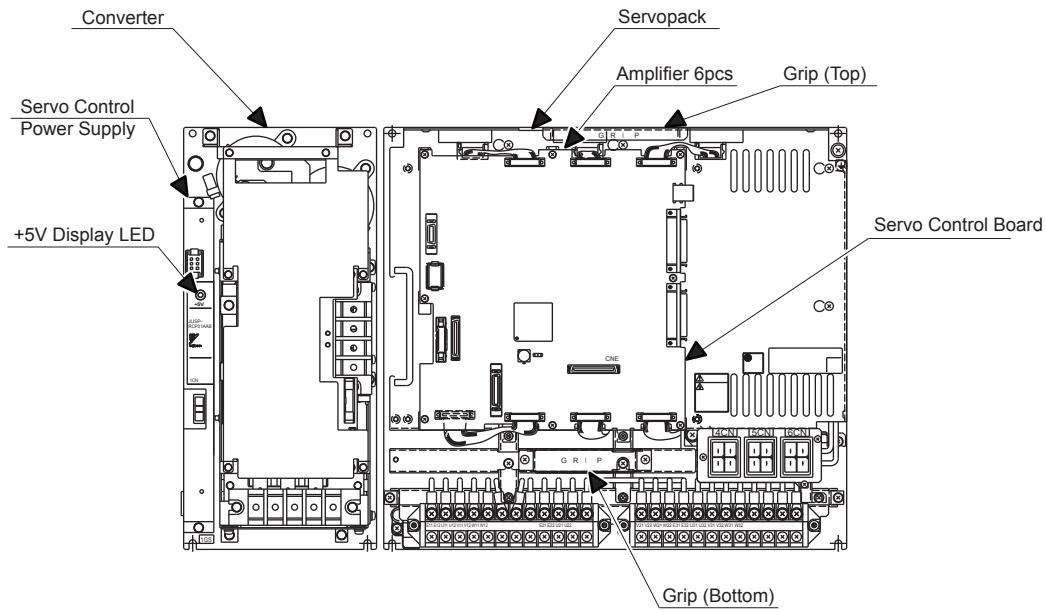


Servopack Configuration for UP50, UP20M

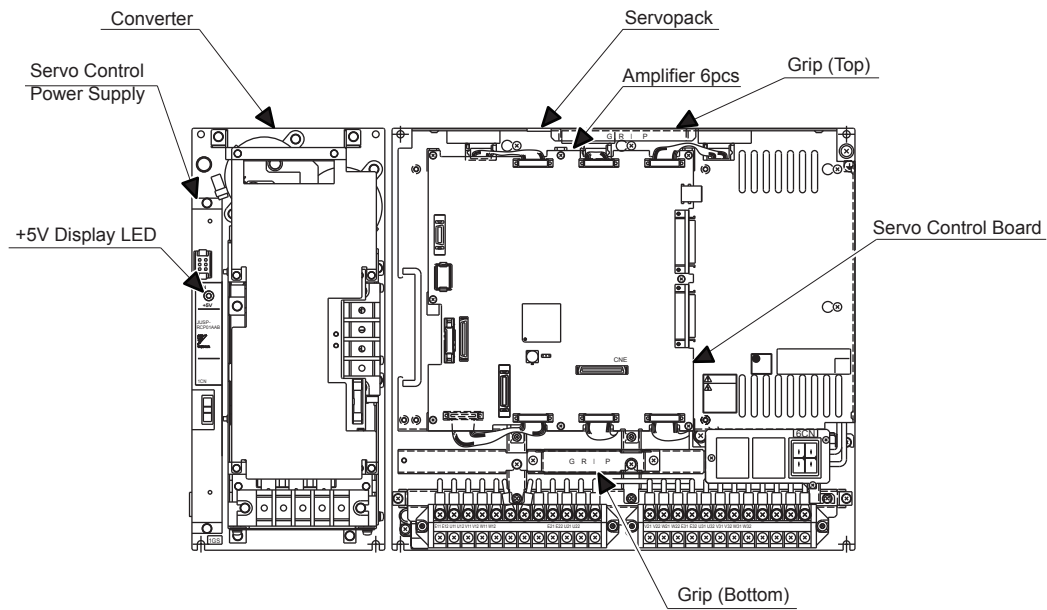


Servopack Configuration for SP70X

7.6 Servopack



Servopack Configuration for UP130, UP165, UP200, UP130T, UP130R, UP165R, UP200R, UP130RL, UP165-100, SK506X, SK300, SP200X, ES165, ES200, ES165R, ES200R



Servopack Configuration for SP100X

7.6.2 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 contactor circuit board (JANCD-XTU01□) of the I/O contactor unit. The power source is supplied by a servo control power supply.

■ Servo Control Power Supply (JUSP-RCP01□□□)

This unit generates DC power (+5V, +7V, ± 15 V) for the servo control board. AC input (Single phase:AC200/220V) is supplied by power supply unit.

Items		Specification
AC input	Rated Input Voltage	AC200V to 220V
	Voltage Fluctuation Range	+10% to -15% (AC170V to 242V)
	Frequency	50/60Hz (48Hz to 62Hz)
Output	+ 5V	5A
	+ 7V	2.5A
	± 15 V	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: AC200/220V) supplied by the power supply unit for DC power source and supplies the power to amplifiers for each axis.

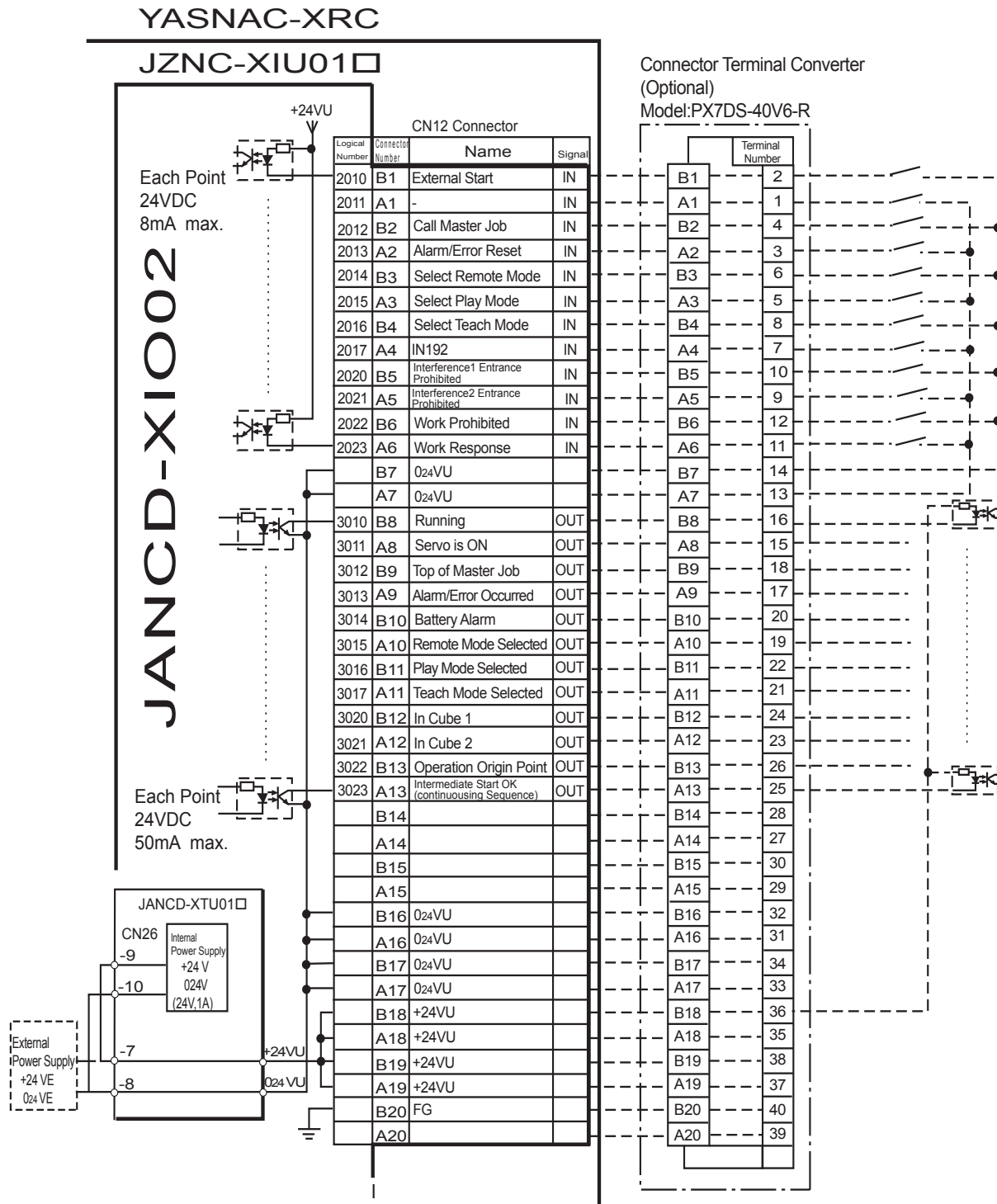
■ Amplifier

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

7.7 General I/O Signal Assignment

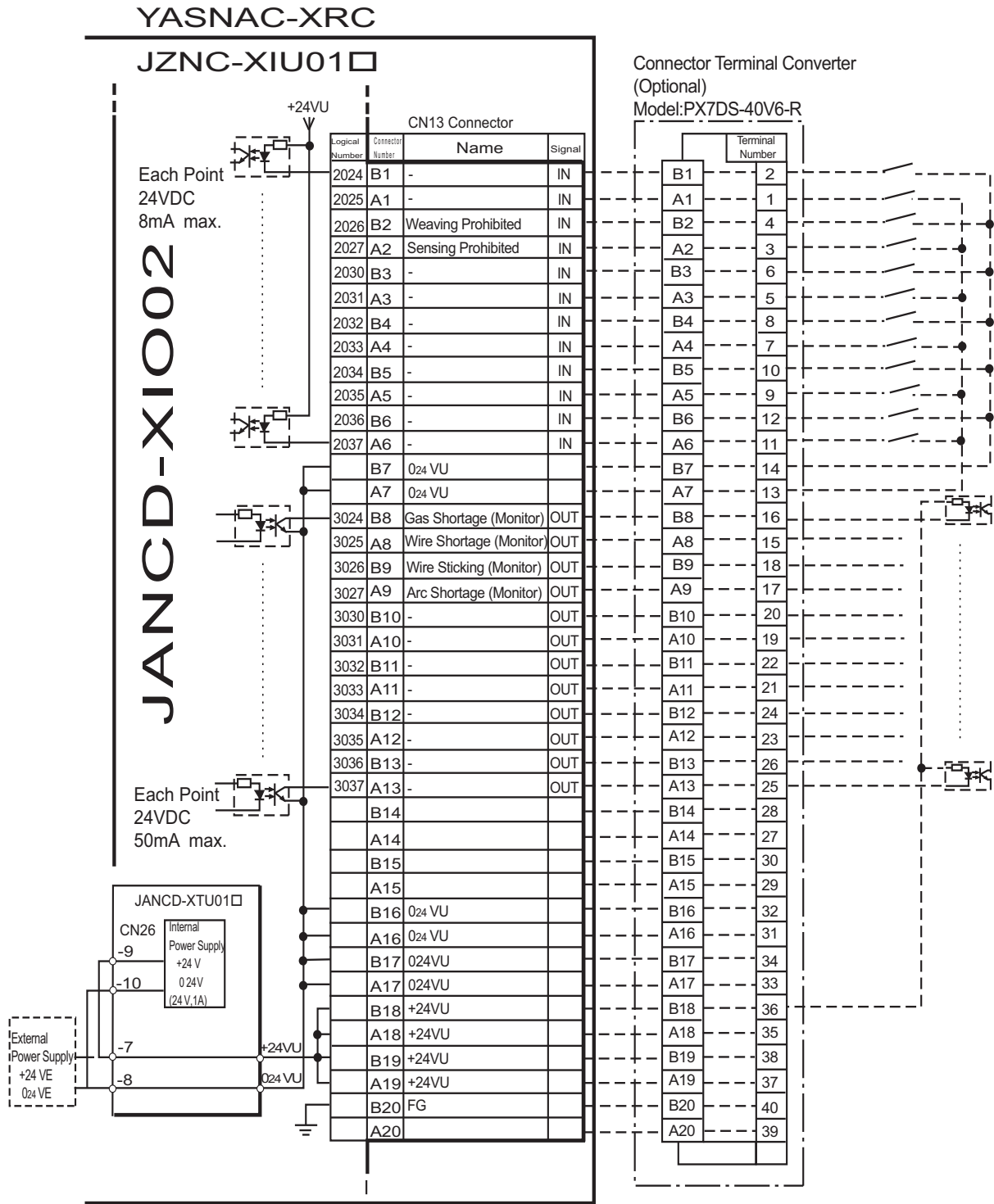
7.7 General I/O Signal Assignment

7.7.1 Arc Welding



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

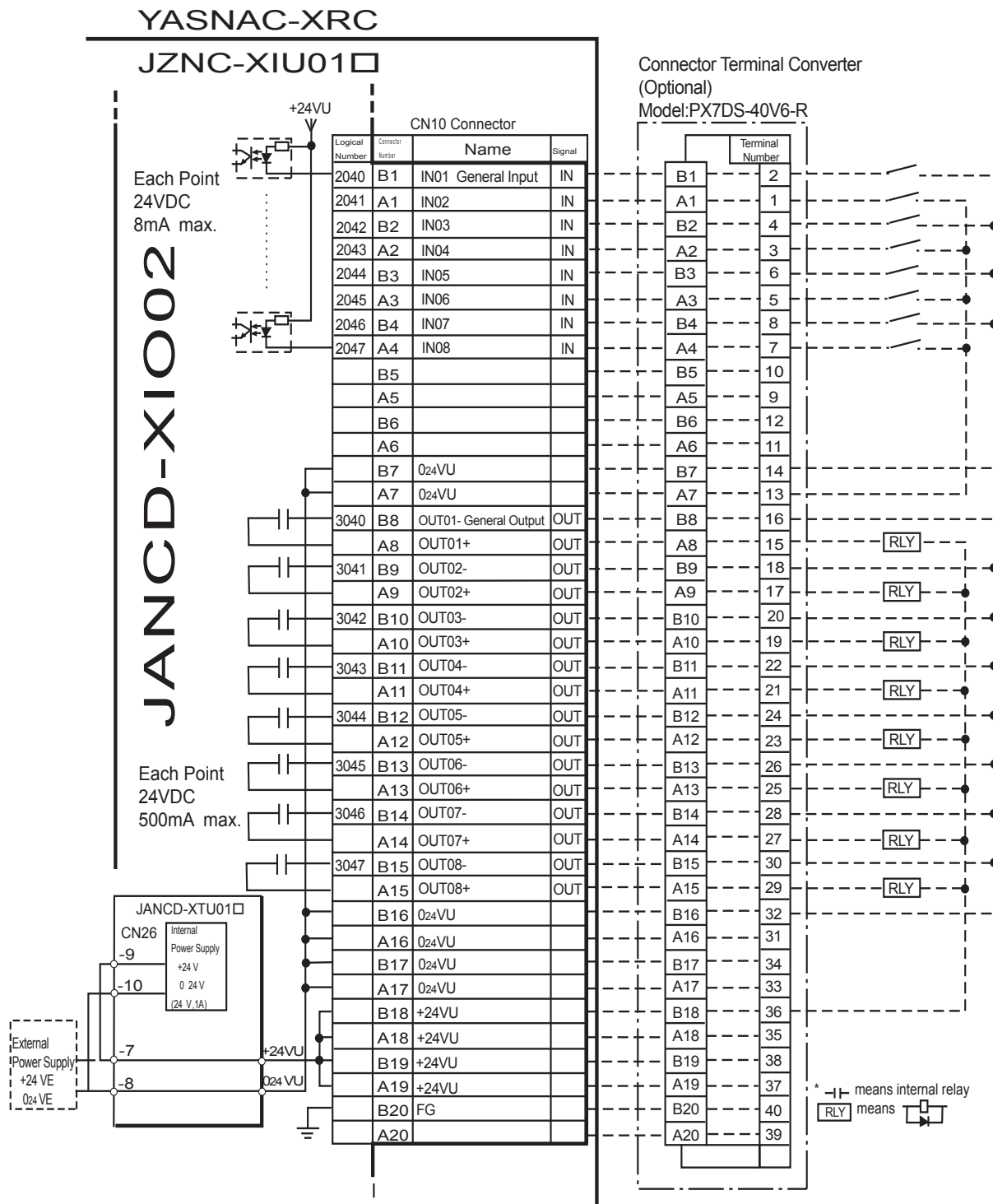
JANCD-XIO02 (CN12 Connector) I/O Allocation and Connection Diagram (For Arc Welding)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

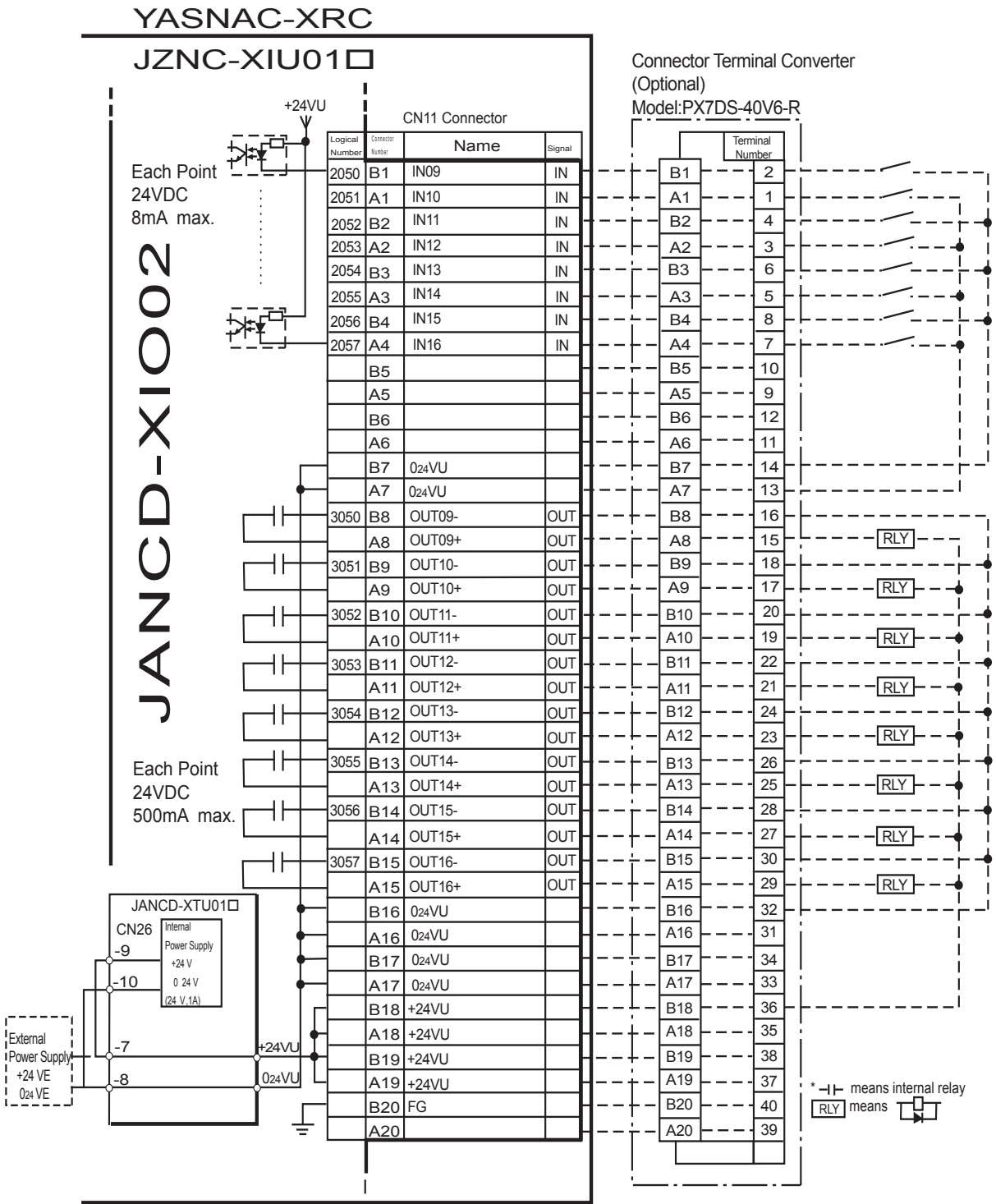
JANCD-XIO02 (CN13 Connector) I/O Allocation and Connection Diagram (For Arc Welding)

7.7 General I/O Signal Assignment



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when an external power supply is used.

JANCD-XIO02 (CN10 Connector) I/O Allocation and Connection Diagram (For Arc Welding)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

JANCD-XIO02 (CN11 Connector) I/O Allocation and Connection Diagram (For Arc Welding)

7.7 General I/O Signal Assignment

Specific Input List XIU01□ (Arc Welding)

Logical Number	Input Name / Function	Logical Number	Input 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.	2022	WORK PROHIBITED (Arc Generation Prohibited) 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.
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.	2023	WORK RESPONSE (Pseudo Arc ON Response) 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).
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.	2026	WEAVING PROHIBITED Weaving is prohibited while this signal is ON. Use this signal to check taught steps and movements without performing the weaving operation.
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.	2027	SENSING PROHIBITED 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** Refer to " 3.7 Interference Area ".

Specific Output List XIU01□ (Arc Welding)

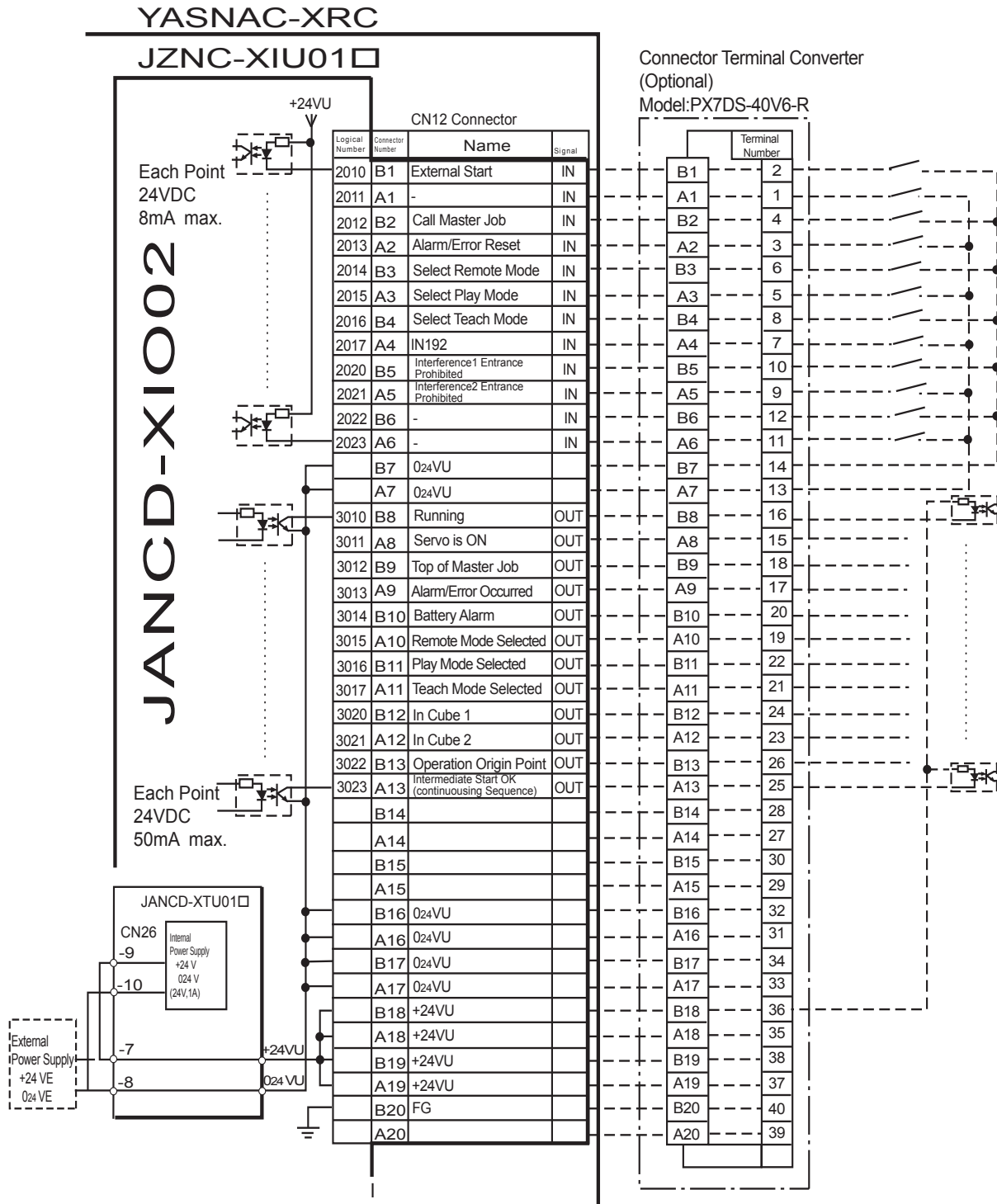
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*1 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	TOP OF MASTER JOB 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	INTERMEDIATE START OK 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	ALARM/ERROR OCCURRED 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	GAS SHORTAGE (MONITOR) This signal stays ON while the gas shortage signal from the welding power supply is ON.
3014	BATTERY ALARM 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	WIRE SHORTAGE (MONITOR) This signal status ON while the wire shortage signal from the welding power supply is ON.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WIRE STICKING (MONITOR) 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	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.	3027	ARC SHORTAGE (MONITOR) 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.

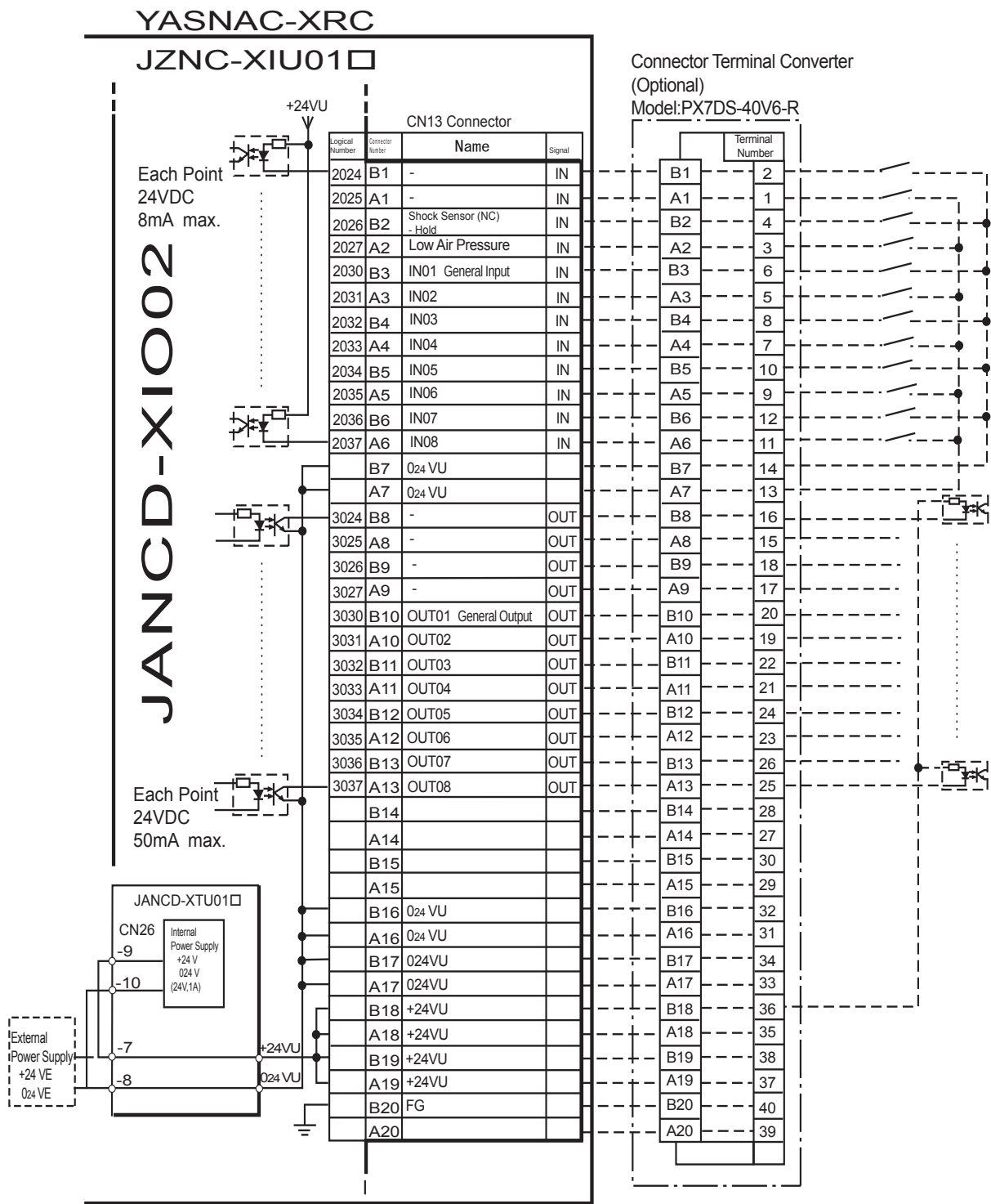
7.7 General I/O Signal Assignment

7.7.2 Handling



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

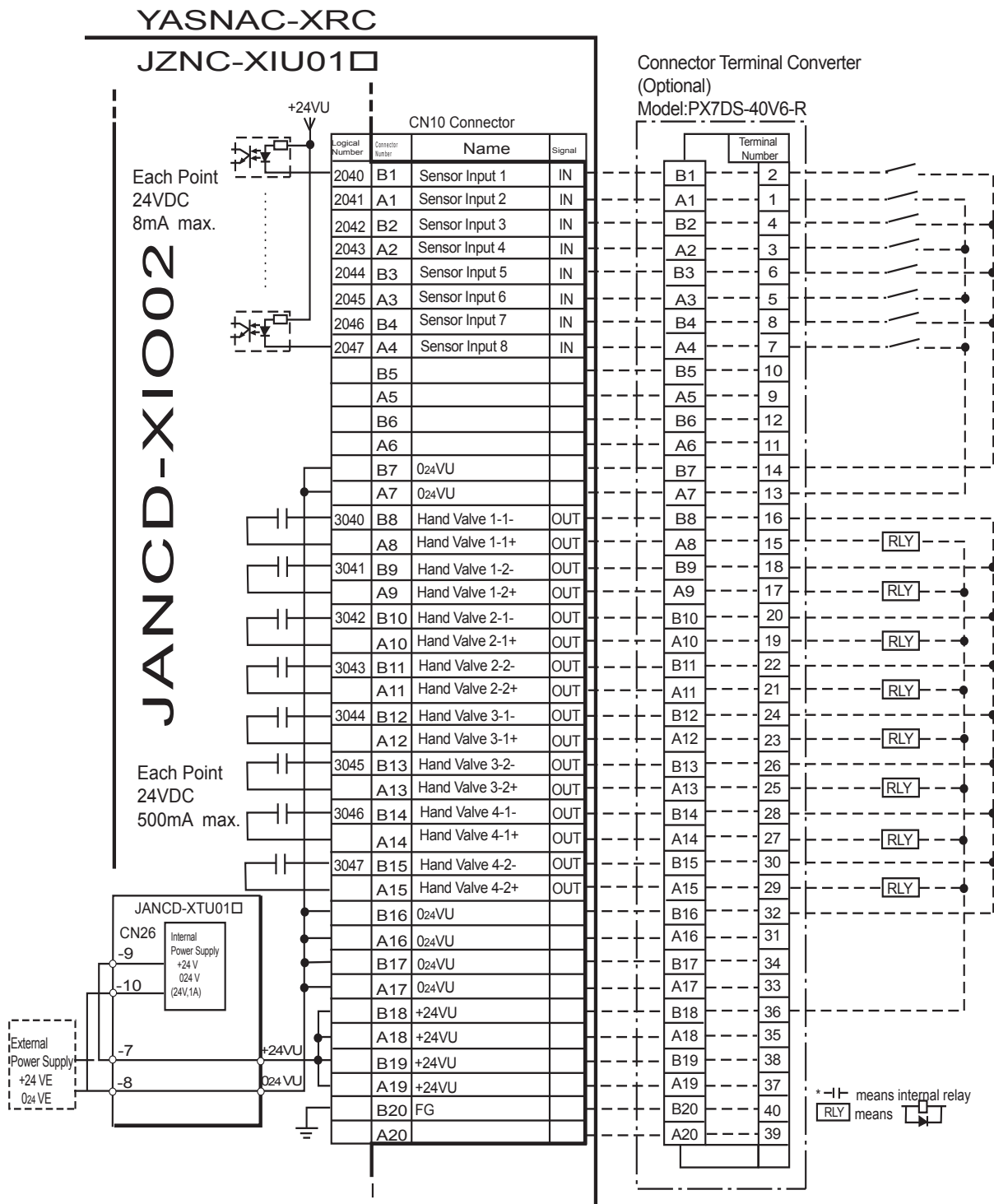
JANCD-XIO02 (CN12 Connector) I/O Allocation and Connection Diagram (For Handling)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

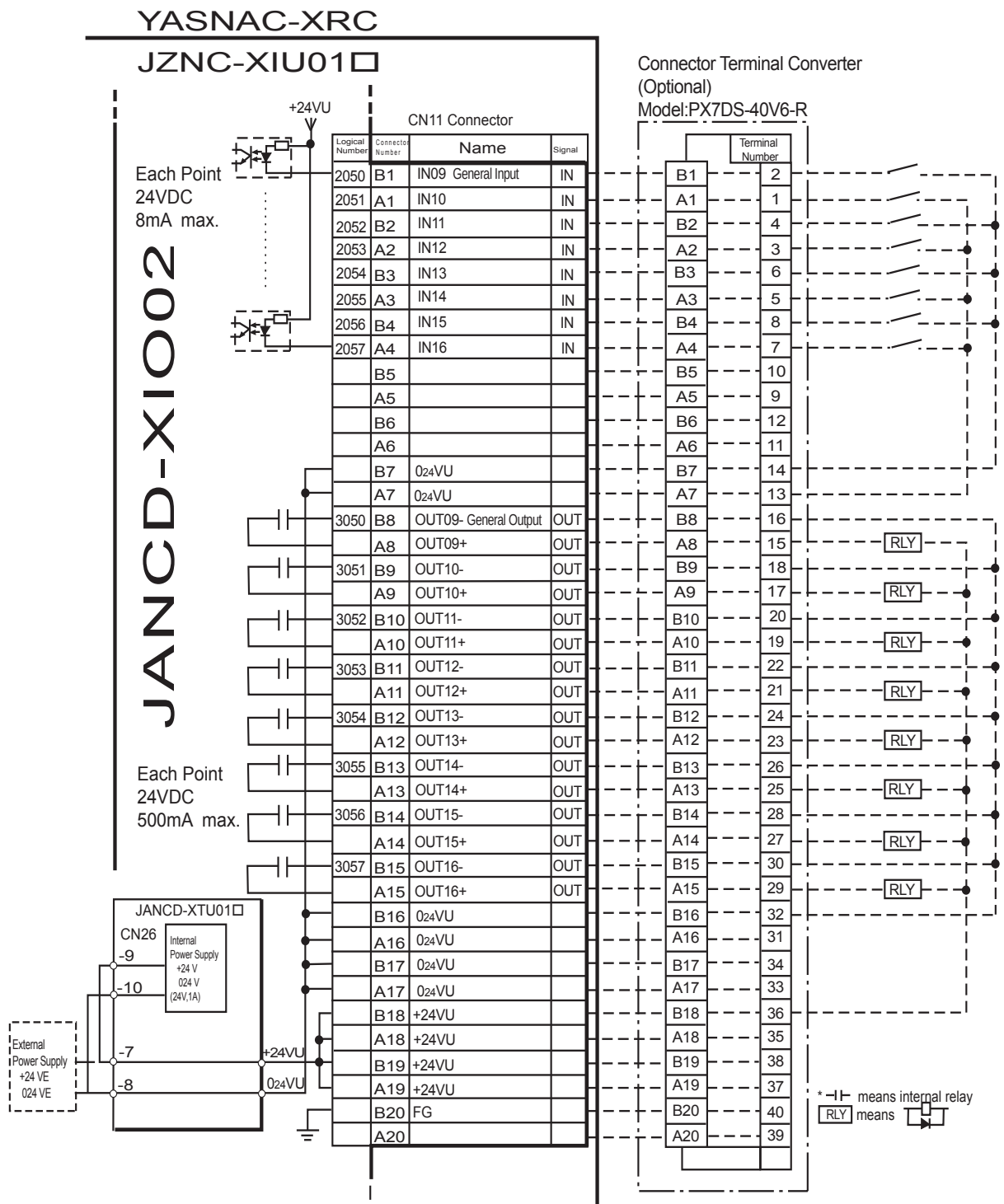
JANCD-XIO02 (CN13 Connector) I/O Allocation and Connection Diagram (For Handling)

7.7 General I/O Signal Assignment



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8
when a external power supply is used.

JANCD-XIO02 (CN10 Connector) I/O Allocation and Connection Diagram (For Handling)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

JANCD-XIO02 (CN11 Connector) I/O Allocation and Connection Diagram (For Handling)

7.7 General I/O Signal Assignment

Specific Input List XIU01□ (Handling)

Logical Number	Input Name / Function	Logical Number	Input 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 PRESSURE 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** Refer to " 3.7 Interference Area ".

Specific Output List XIU01□ (Handling)

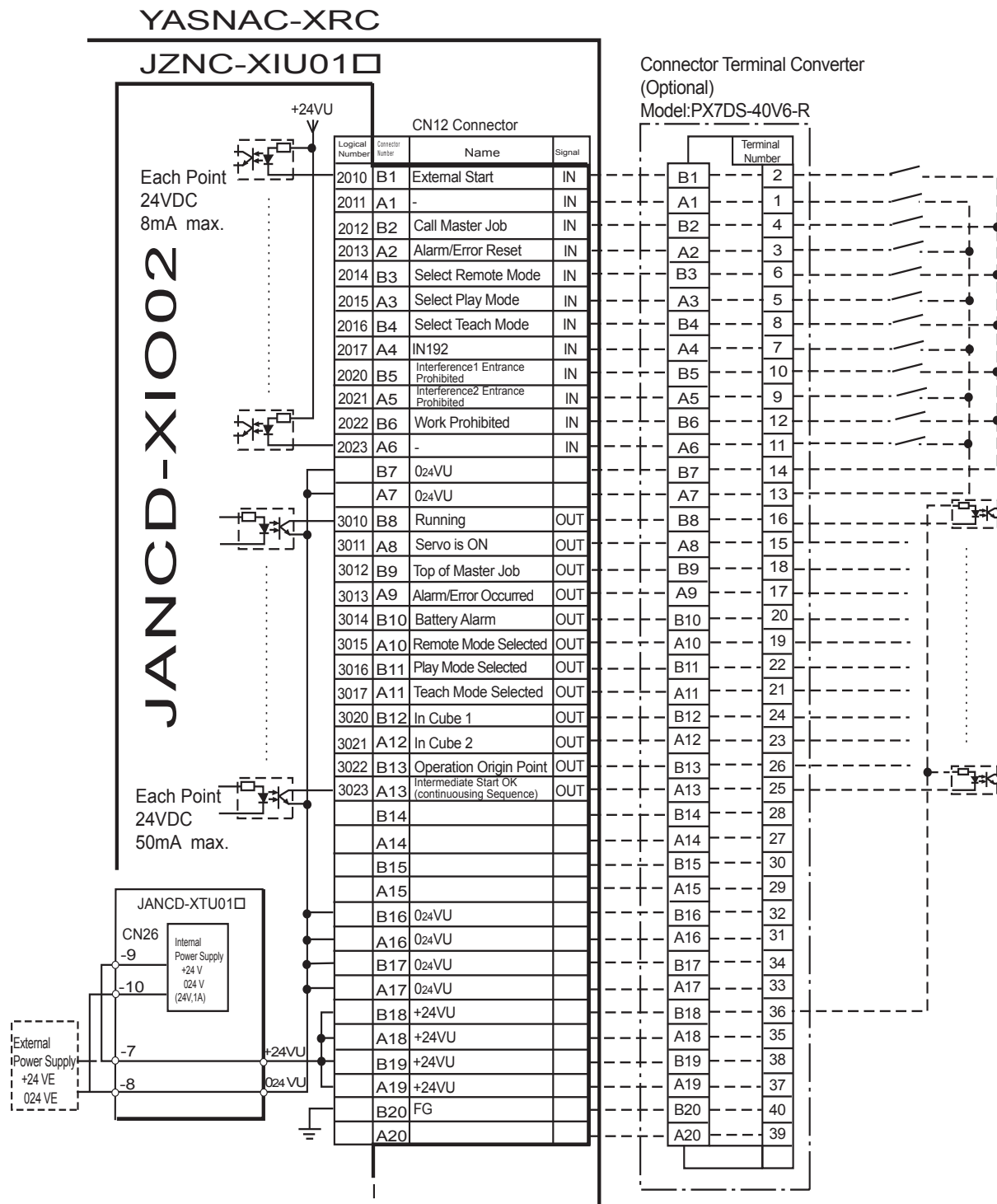
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*1 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	TOP OF MASTER JOB 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	INTERMEDIATE START OK 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	ALARM/ERROR OCCURRED 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	HAND VALVE 1-4 These outputs are controlled by the HAND handling specific instructions. Hand valves 1 to 4 correspond to HAND 1 to 4.
3014	BATTERY ALARM 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.		
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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.		
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.		

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

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

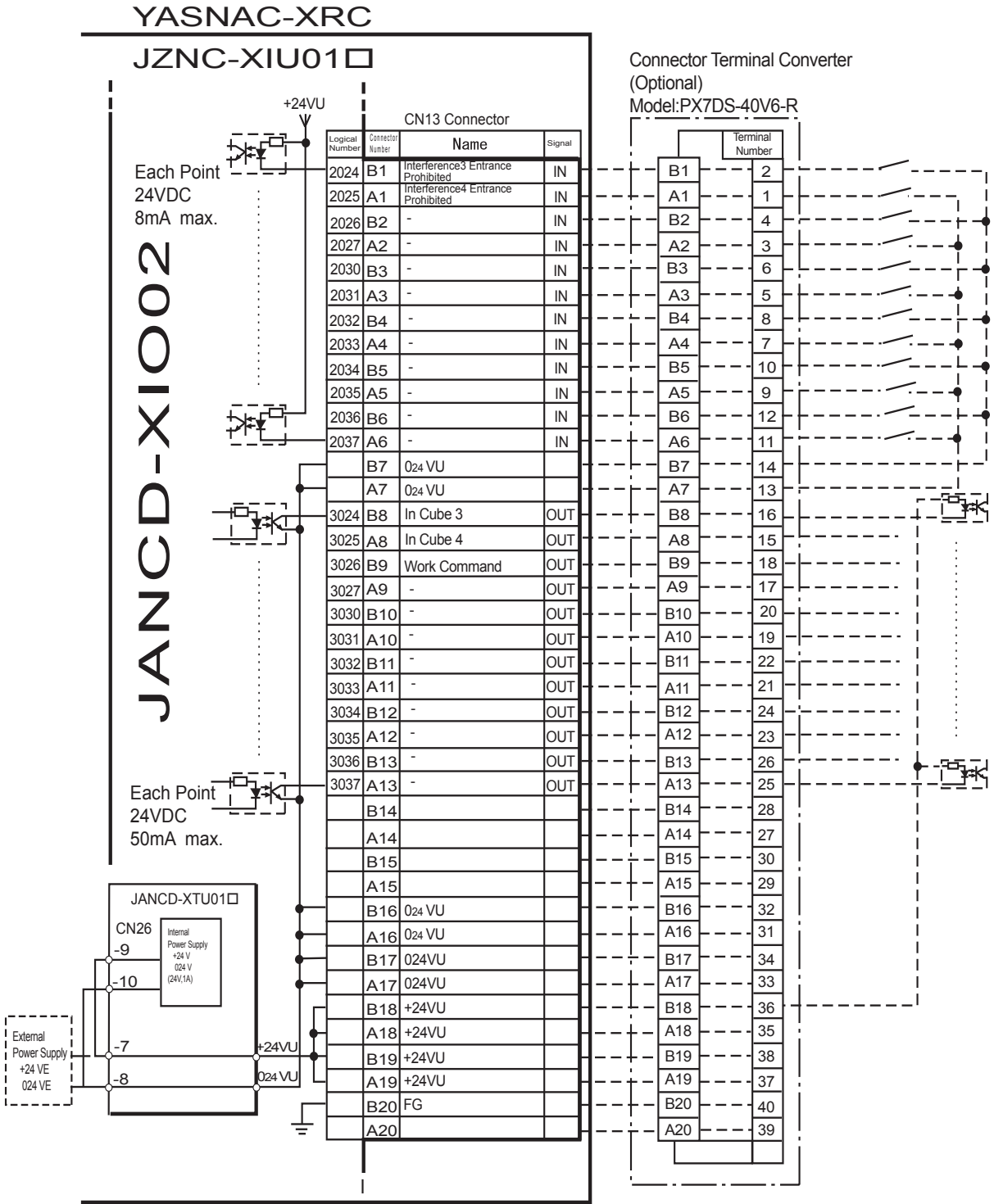
7.7 General I/O Signal Assignment

7.7.3 General Application



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

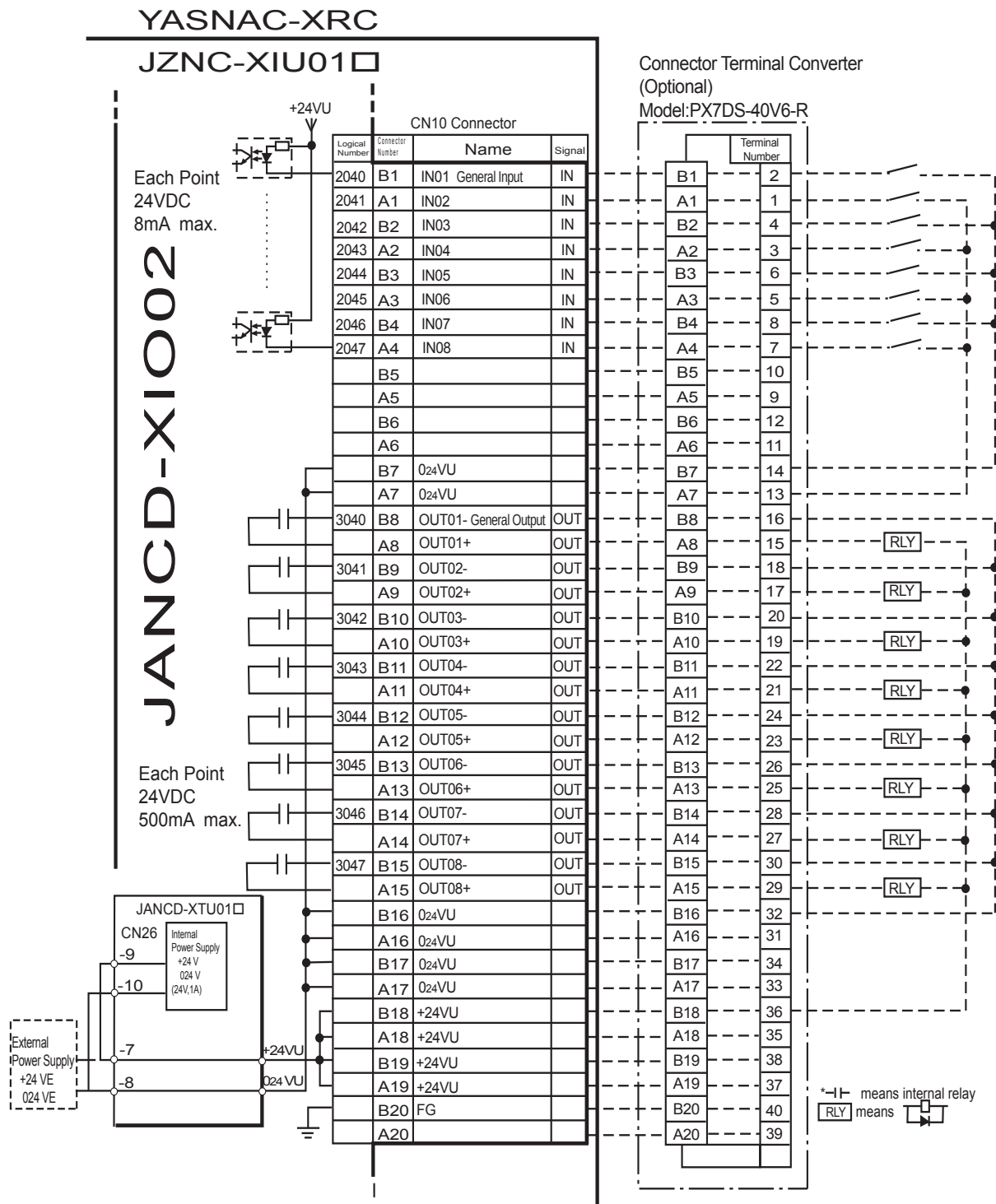
JANCD-XIO02 (CN12 Connector) I/O Allocation and Connection Diagram (For General Application)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

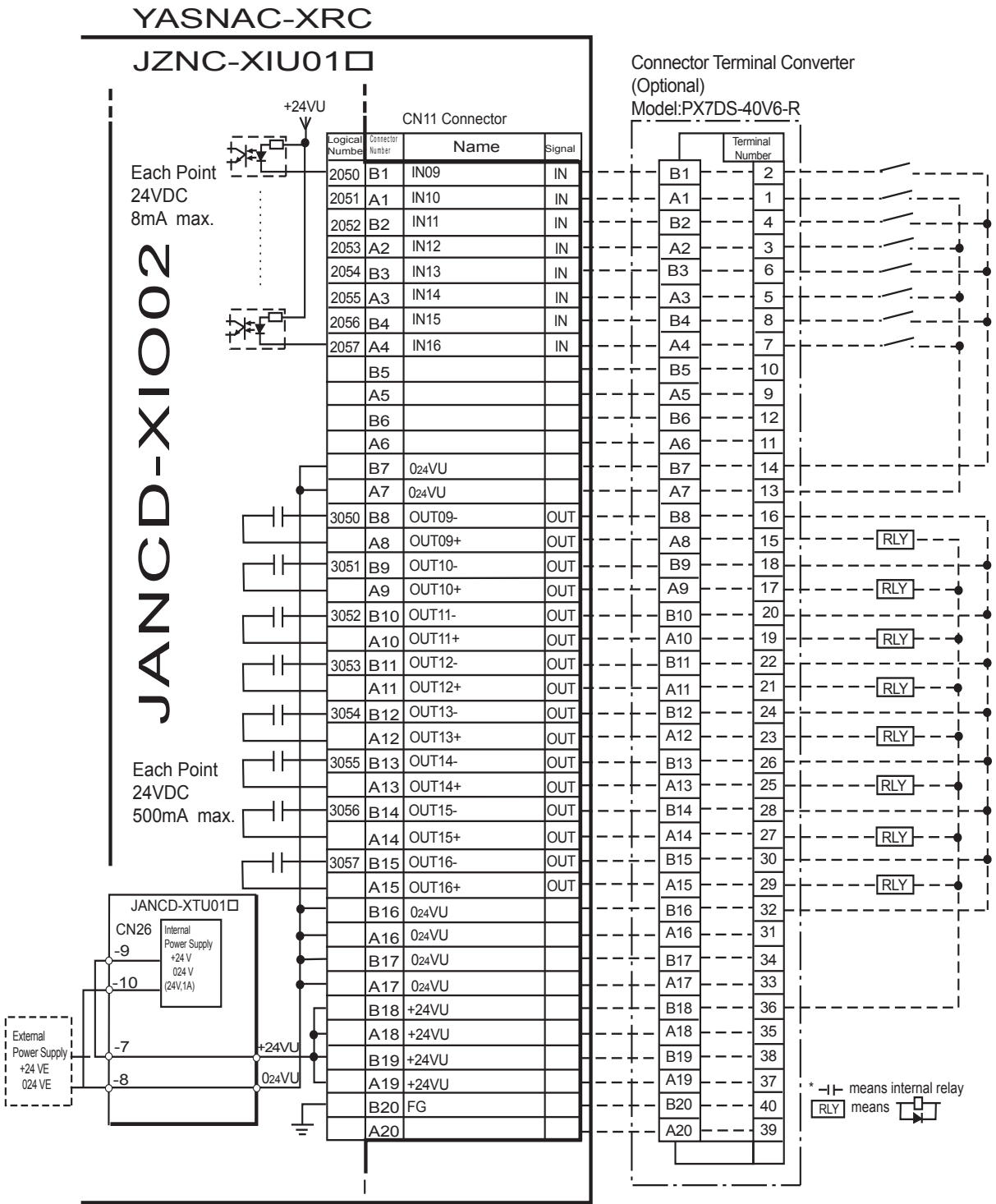
JANCD-XIO02 (CN13 Connector) I/O Allocation and Connection Diagram (For General Application)

7.7 General I/O Signal Assignment



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when an external power supply is used.

JANCD-XIO02 (CN10 Connector) I/O Allocation and Connection Diagram (For General Application)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

JANCD-XIO02 (CN11 Connector) I/O Allocation and Connection Diagram (For General Application)

7.7 General I/O Signal Assignment

Specific Input List XIU01□ (General application)

Logical Number	Input Name / Function	Logical Number	Input 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.	2022	WORK PROHIBITED (Tool ON Prohibited) Even if TOOLON instruction is executed, XRC doesn't output to external while this signal is ON.
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.	2024	INTERFERENCE 3 ENTRANCE PROHIBITED 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.
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.	2025	INTERFERENCE 4 ENTRANCE PROHIBITED 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.
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** Refer to " 3.7 Interference Area ".

Specific Output List XIU01□ (General application)

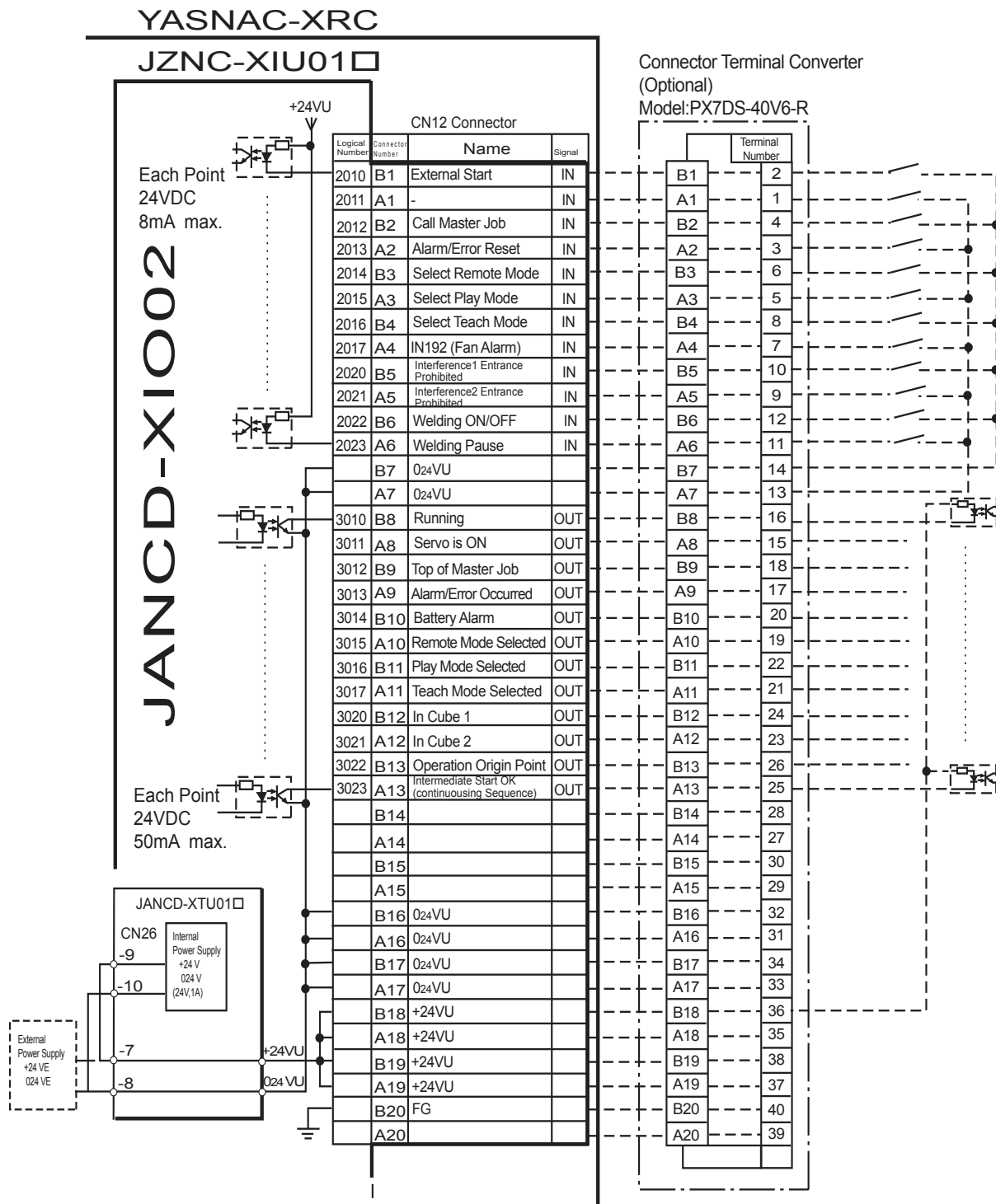
Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING This signal signifies that the job is running. (Signifies that the job is running, system status is waiting reserved start, or test run is running.) This signal status is the same status as [START] in the playback panel.	3021	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.
3011	SERVO IS ON 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	OPERATION ORIGIN POINT (IN CUBE 24)*¹ 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	TOP OF MASTER JOB 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	INTERMEDIATE START OK 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	ALARM/ERROR OCCURRED 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	IN CUBE 3 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.
3014	BATTERY ALARM 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	IN CUBE 4 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.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WORK COMMAND 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.
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.		

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

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

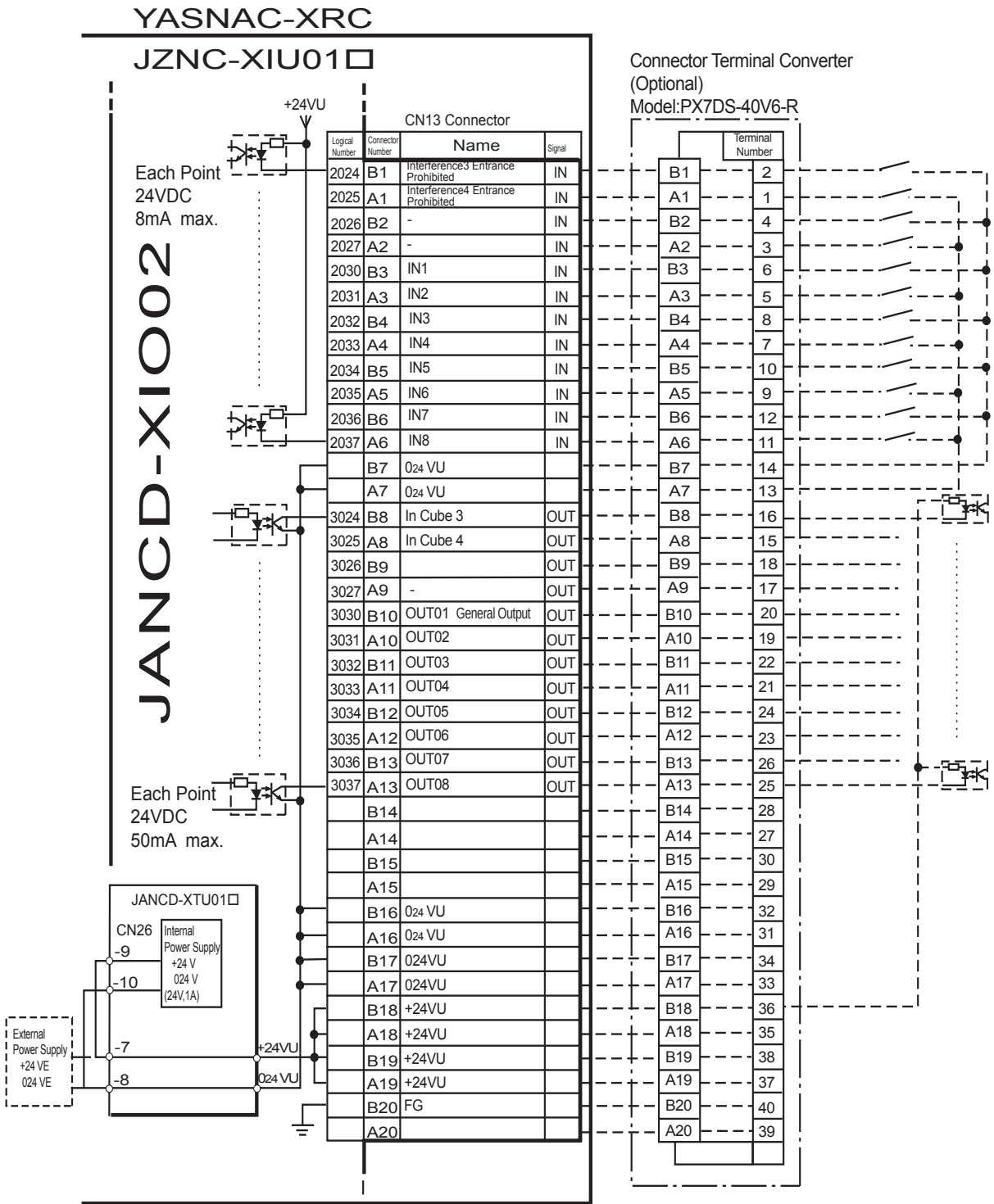
7.7 General I/O Signal Assignment

7.7.4 Spot Welding



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

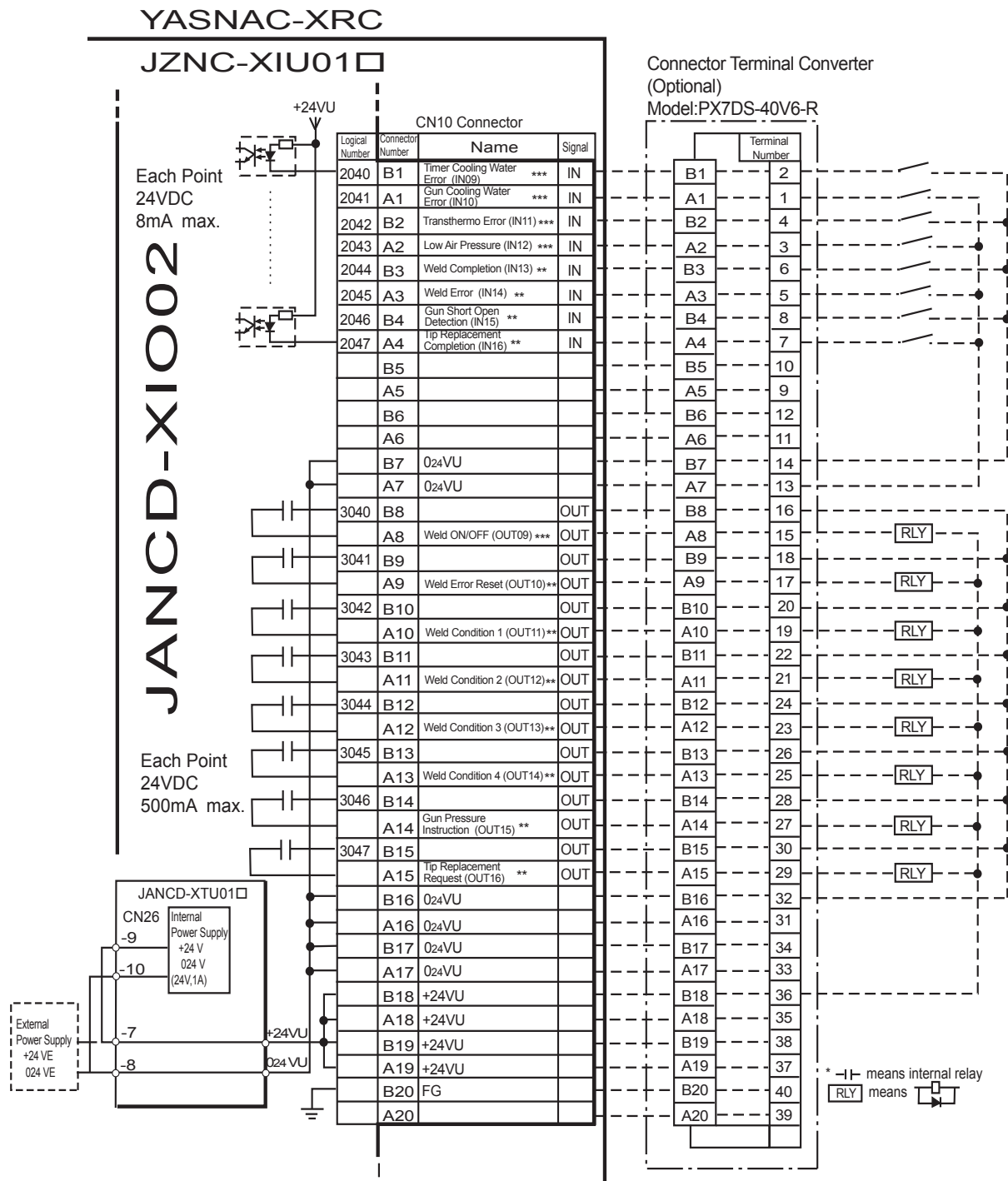
JANCD-XIO02 (CN12 Connector) I/O Allocation and Connection Diagram (For Spot Welding)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

JANCD-XIO02 (CN13 Connector) I/O Allocation and Connection Diagram (For Spot Welding)

7.7 General I/O Signal Assignment

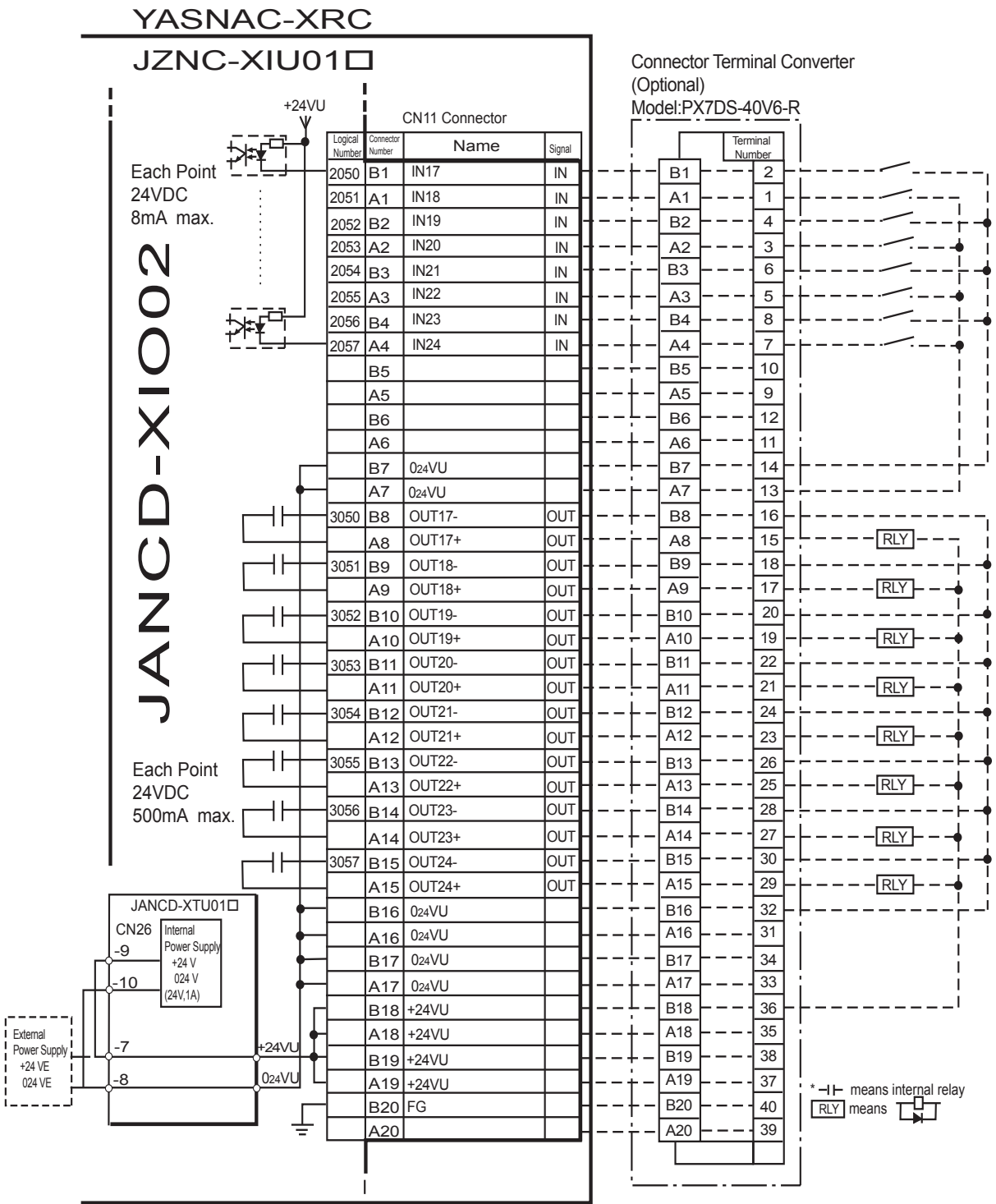


* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when an external power supply is used.

** This assignment can be changed at the I/O assignment display. Refer to Specific Input List XIU01 and Specific Output List XIU01 for detail.

*** This assignment can be changed at the PSEDU input display. Refer to Specific Input List XIU01 and Specific Output List XIU01 for detail.

JANCD-XIO02 (CN10 Connector) I/O Allocation and Connection Diagram (For Spot Welding)



* Remove Jumper-pin between CN26-9 and -7, CN26-10 and -8 when a external power supply is used.

JANCD-XIO02 (CN11 Connector) I/O Allocation and Connection Diagram (For Spot Welding)

7.7 General I/O Signal Assignment

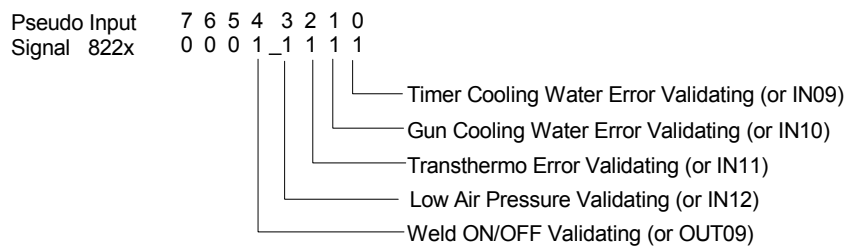
Specific Input List XIU01□ (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input 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.	2022	WELDING ON/OFF (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 executed when this signal is input (ON).
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).	2023	WELDING PAUSE (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.
2013	ALARM/ERROR RESET After an alarm or error has occurred and the cause been corrected, this signal resets the alarm or error.	2024	INTERFERENCE 3 ENTRANCE PROHIBITED 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.
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.	2025	INTERFERENCE 4 ENTRANCE PROHIBITED 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.
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 ^{*4}	TIMER COOLING WATER ERROR 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.
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.	2041 ^{*4}	GUN COOLING WATER ERROR 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.
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.	2042 ^{*4}	TRANSTHERMO ERROR 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.
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.	2043 ^{*4}	LOW AIR PRESSURE When air pressure is reduced and this input is turned ON, an alarm occurs. The servo power supply remains ON.

Specific Input List XIU01□ (Spot Welding)

Logical Number	Input Name / Function	Logical Number	Input Name / Function
2044 *3	WELD COMPLETION 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 DETECTION 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** Refer to " 3.7 Interference Area ".
- *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 the general I/O signal described in parentheses.

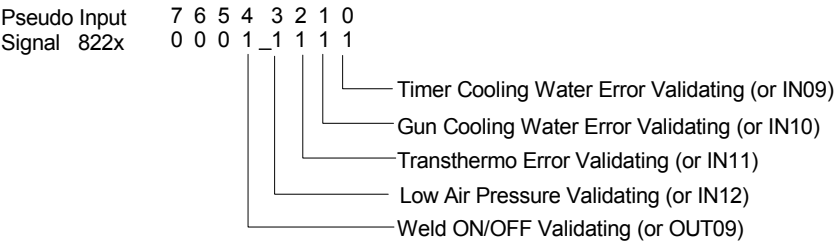


7.7 General I/O Signal Assignment

Specific Output List XIU01□ (Spot Welding)

Logical Number	Output Name / Function	Logical Number	Output Name / Function
3010	RUNNING 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	INTERMEDIATE START OK 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	SERVO IS ON 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	IN CUBE 3 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	TOP OF MASTER JOB 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	IN CUBE 4 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	ALARM/ERROR OCCURRED 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	WELD ON/OFF Outputs a signal input from the interlock panel etc. considering the robot status.
3014	BATTERY ALARM 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	WELD ERROR RESET This signal commands the reset error status of the welder. This is operated with the programming pendant operation.
3015 to 3017	REMOTE/PLAY/TEACH MODE SELECTED 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	WELD CONDITION (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).
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)*1 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 the general I/O signal described in parentheses.

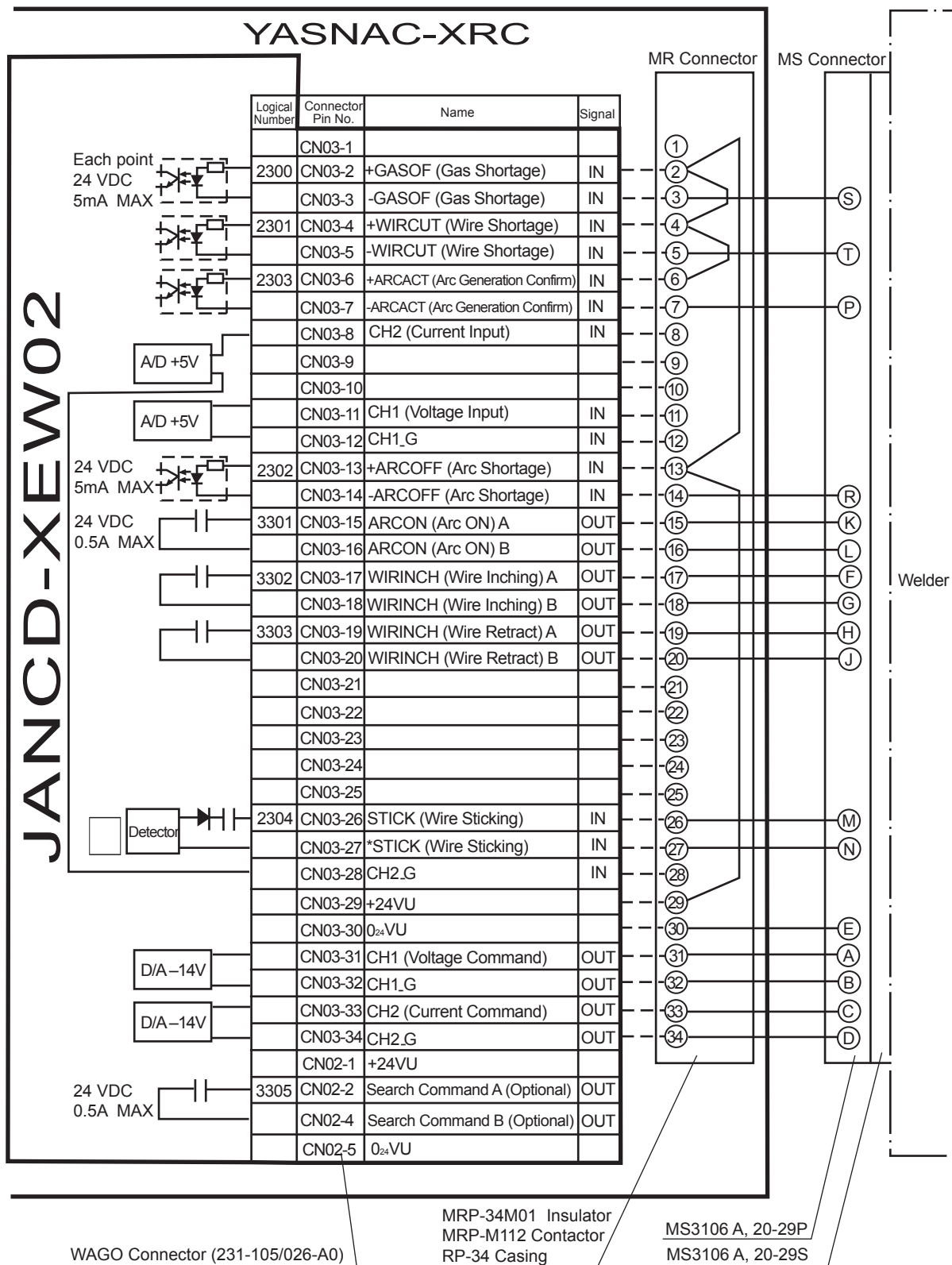


7.7 General I/O Signal Assignment

7.7.5 JANCD-XEW02 Circuit Board (Standard)

■ For Arc Welding

JANCD-XEW02 circuit board is provided with 2 points of analog output, 2 points of analog input, and the welder status signal I/O.



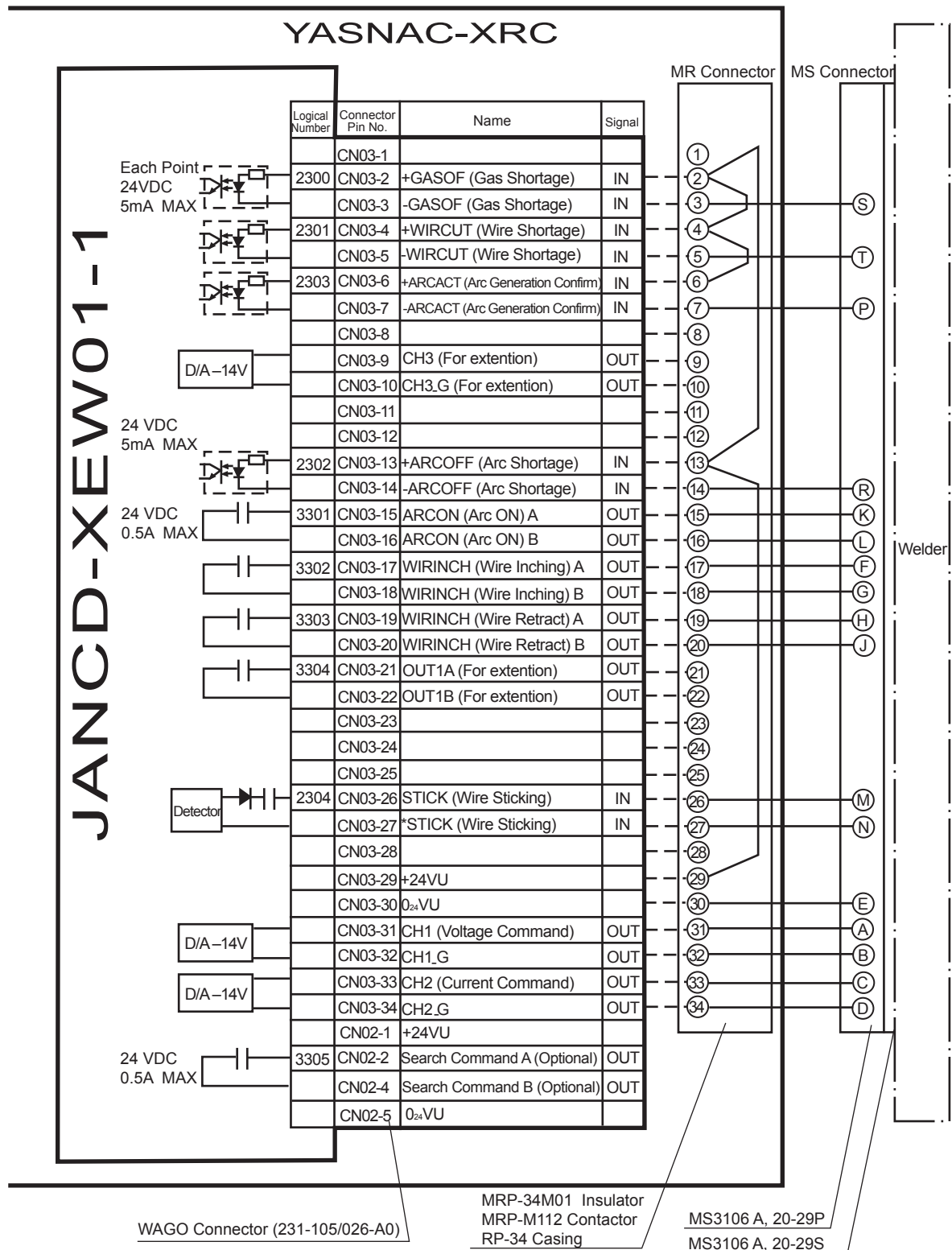
7.7.6 JANCD-XEW01 Circuit Board (Option)

■ 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



Maintenance

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.

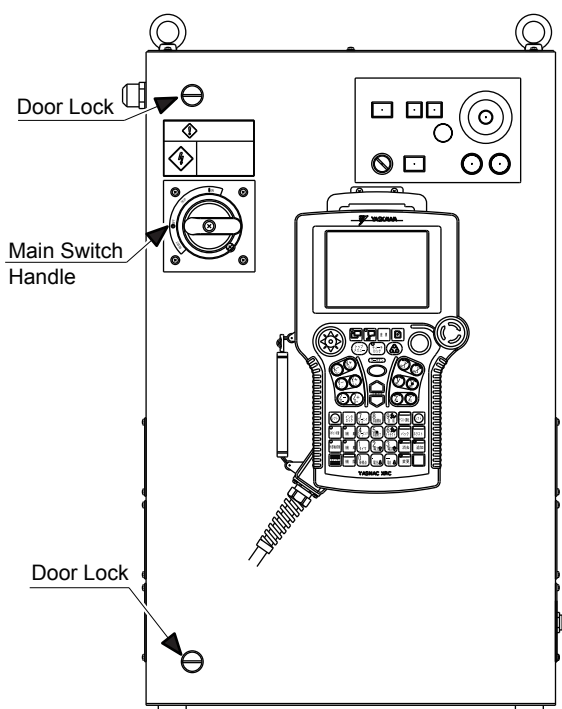
Carry out the following inspections.

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.

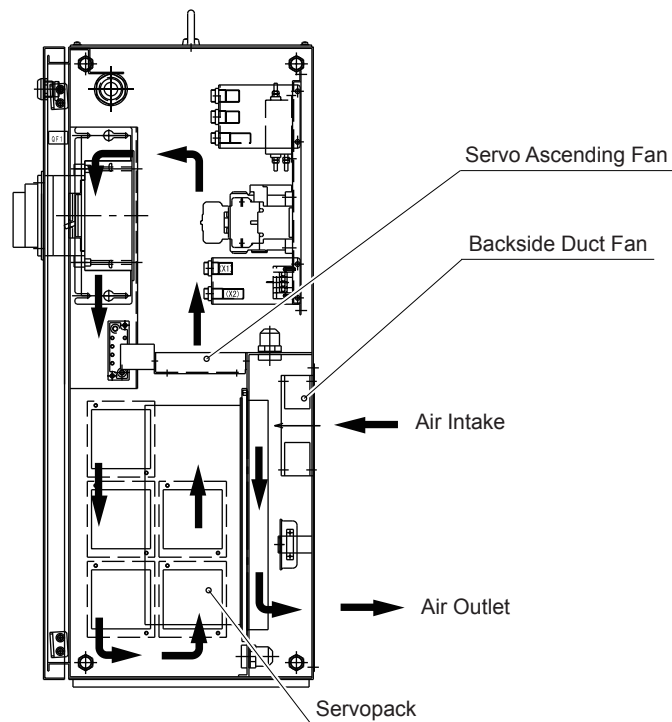
The servo ascending fan and backside duct fan normally operate while the power is turned ON. Check if the fans are operating correctly by visual inspection and by feeling air moving into the air inlet and from the outlet.



When the message "Cooling fan in control box stopped" is displayed, it may be caused by the error occurrence at the cooling fan (JZNC-XZU02) on the CPU rack.

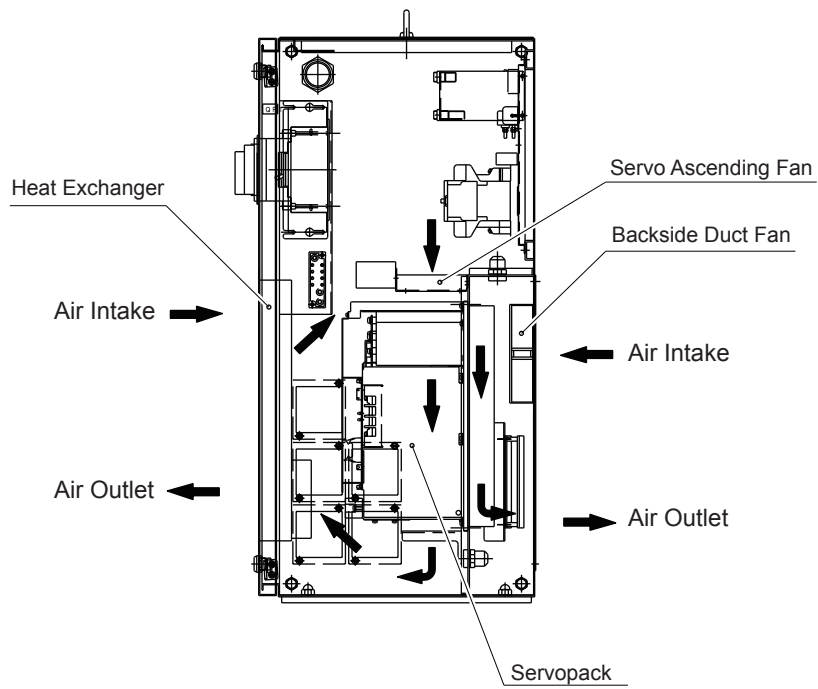
In the case an error occurred in the cooling fan like this, the alarm 4119 with the message "FAN ERROR (IN CONTROL BOX)" will appear in 72 hours and the playback operation (execution of the JOB) will no longer be performed.

When the message "Cooling fan in control box stopped" is displayed, carry out an inspection and the replacement of the cooling fan on the CPU rack as soon as possible.

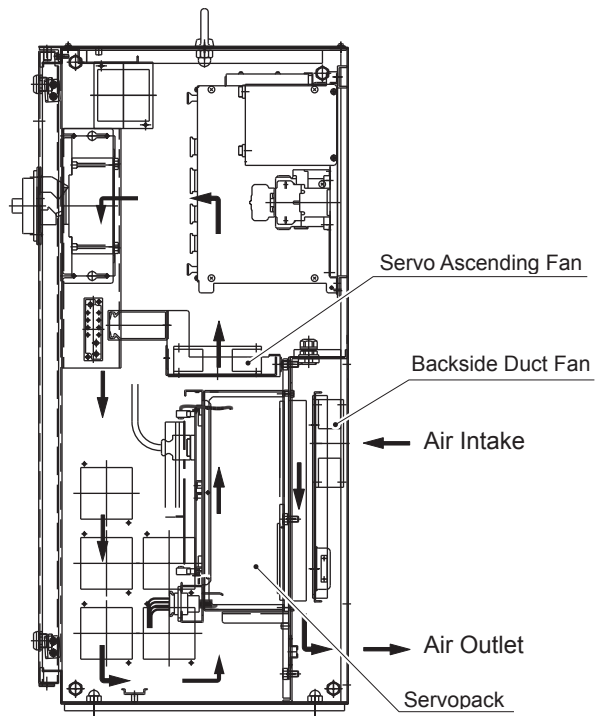


Cooling Fan Construction (Small- or medium-capacity XRC, in A- or B-type panels)

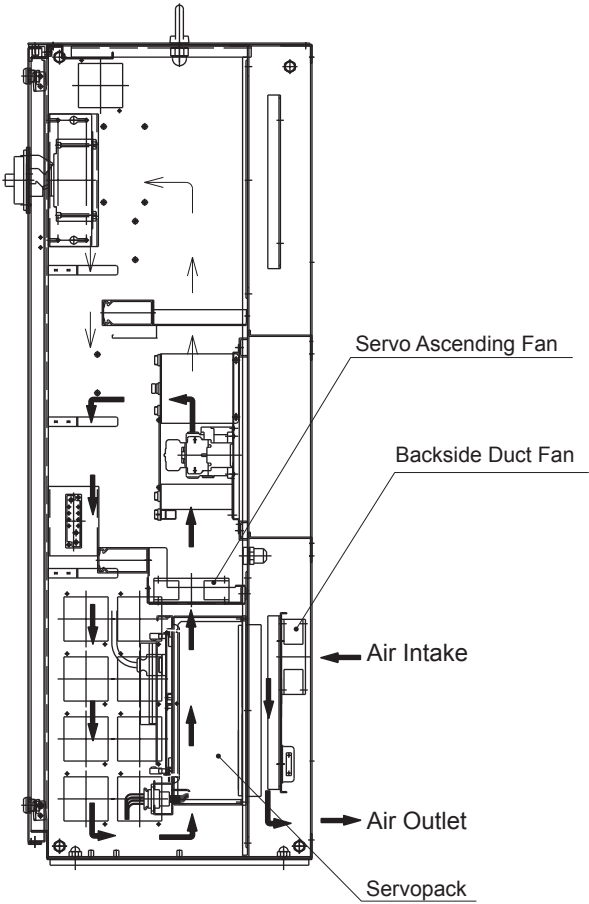
8.3 Cooling Fan Inspections



Cooling Fan Construction (Large capacity XRC in A and B type panel)



Cooling Fan Construction (New A type panel)



Cooling Fan Construction (New B type panel)

8.4 Emergency Stop Button Inspections

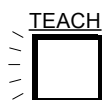
8.4 Emergency Stop Button Inspections

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.

8.5 Deadman Switch Inspections

The programing 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.

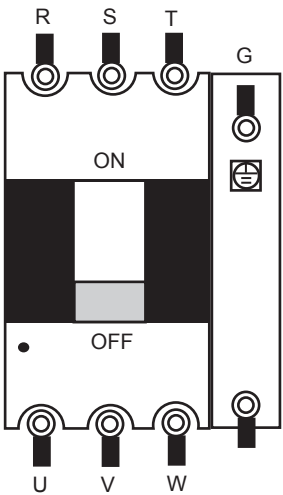
A battery alarm indicates when a battery has expired and must be replaced. The programming pendant display and the message "Memory battery weak" appears at the bottom of the display.

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, T and R	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



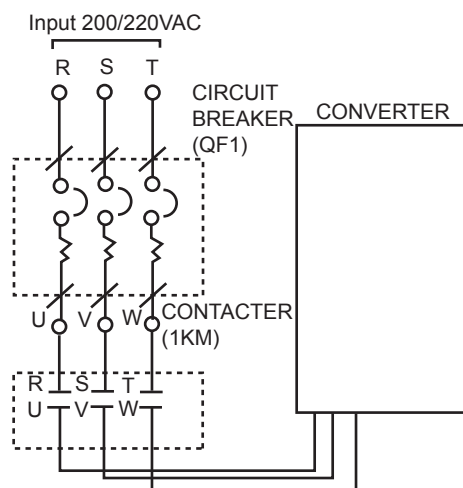
Circuit Breaker (QF1)

8.8 Open Phase Check

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).



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 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.

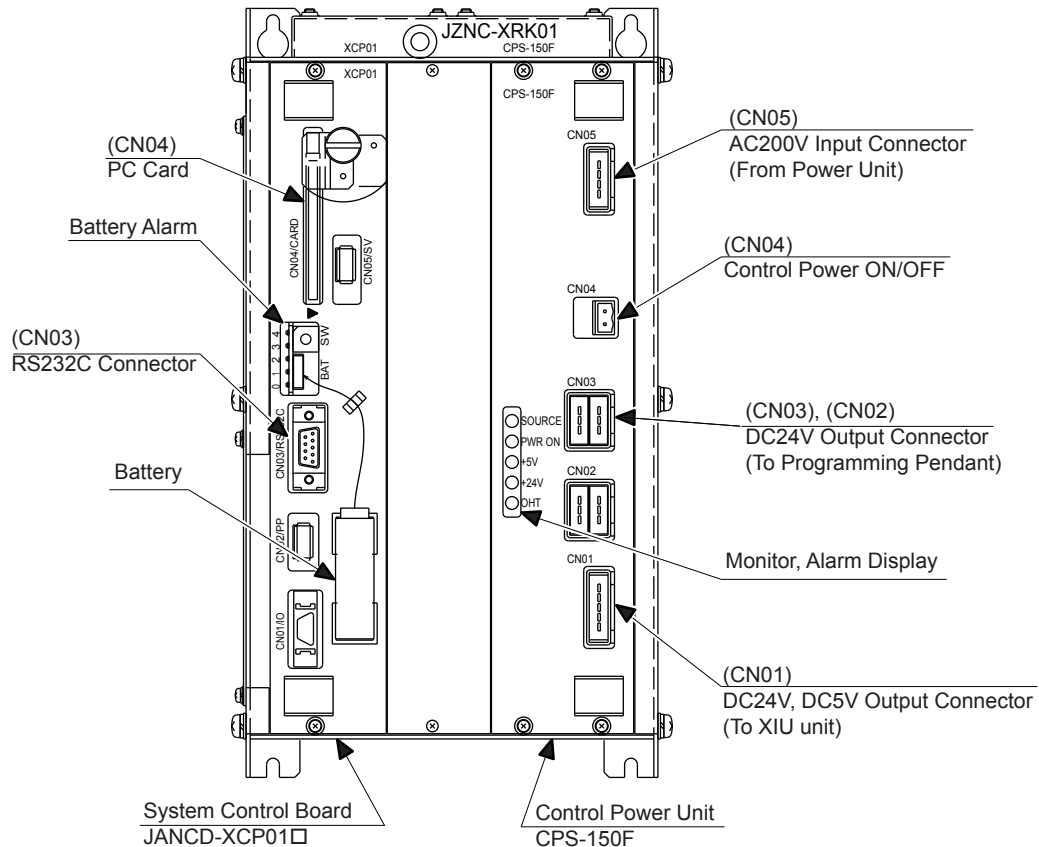
- After maintenance is completed, carefully check that no tools are left inside the YASNAC XRC and that the doors are securely closed.

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

9.1 Replacing XRC Parts

9.1.1 Replacing Parts of the CPU Rack

CPU rack (JZNC-XRK01□-□) is comprised of the control power supply unit, the rack for the various circuit boards and system control boards.



CPU Rack Configuration (JZNC-XRK01□-□)

■ 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.



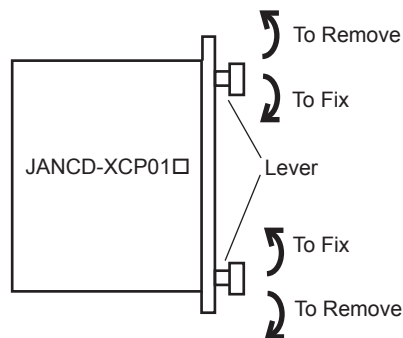
Although the CMOS memory is backed up by super capacitor, the battery must be replaced as soon as the battery alarm occurs. The job data and other data may be lost if the battery is left for more than 40 hours.

■ 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 (CMOS memory) for the user programs, which is backed up by the battery. Incorrect operations can cause this stored file data to be lost.

For more information about the replacement procedure of the JANCD-XCP01□ circuit board, refer to “YASNAC XRC INSTRUCTIONS for CPU Circuit Board Replacement Procedure.” If you have not received a copy of this instruction manual, contact your Yaskawa representative.

9.1 Replacing XRC Parts

■ 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

 **WARNING**

- After turning OFF the power supply, wait at least 5 minutes before replacing a servopack. Do not touch any terminals during this period.

Failure to observe this warning may result in electric shock.

There are two kinds of Servopacks depending on capacity.

Type		Manipulator
Integrated Type	Small capacity	SV3X, SV035X, UP6, SK16X, UP20
Separated Type	Medium capacity	SK16MX, SK45X, UP50, UP20M, SP70X
	Large capacity	UP130, UP130R, UP165, UP200, UP130T, SK300X, SR200X, UP200R, SK506X, UP165-100, UP165R, UP130RL, SP100X, ES165, ES200, ES165R, ES200R

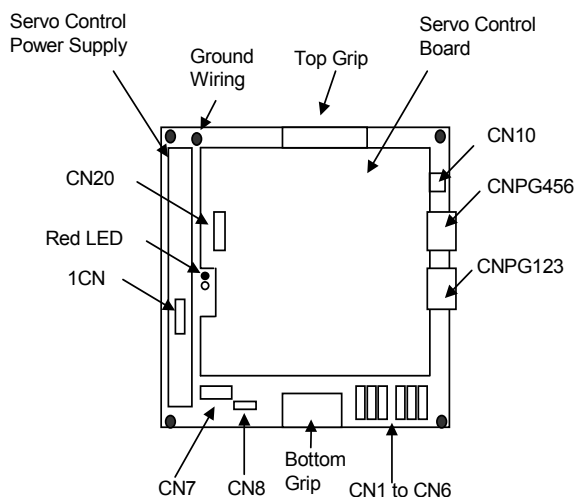
 **NOTE**

- Before replacing a servopack, confirm the version number of the JASP-WRCA01□ board and be sure to backup the data. (Refer to YASNAC XRC INSTRUCTION For CPU Circuit Board Replacement Procedure.)
- After having replaced the servopack, load the backup data to the JASP-WRCA01□ board.

9.1 Replacing XRC Parts

Replacement Procedure (Integrated Type Small Capacity)

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 (CNPG123, CNPG456)
 - 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 Integrated Type (Small Capacity) Servopack

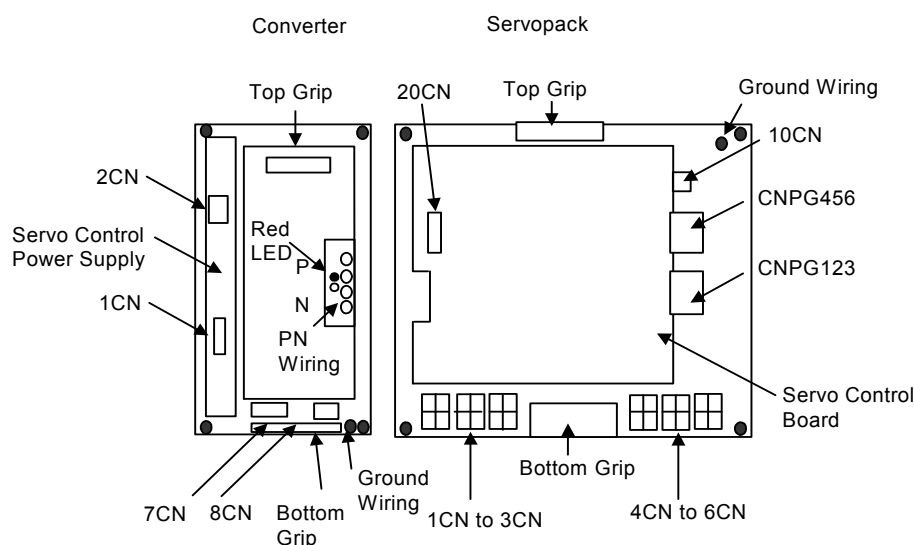
Replacement Procedure (Separated Type Medium Capacity)

• 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.
 - ①Main circuit power supply connector (CN7)
 - ②Regenerative resistor connector (CN8)
 - ③Servo control power supply connectors (1CN and 2CN)
 - ④PN 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 Servopack

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.
 - ①PG cable connectors (CNPG123, CNPG456)
 - ②Communication cable connector (CN10)
 - ③Power ON signal cable connector (CN20)
 - ④Motor cable connectors (CN1 to CN6)
 - ⑤Ground wire
4. Remove the four screws in the four corners of the servopack.
5. With the top and bottom grips, pull out the servopack.
6. Install the new servopack and reconnect the connectors in the reverse order of that listed above.



Configuration of Separated Type (Medium Capacity) Servopack

9.1 Replacing XRC Parts

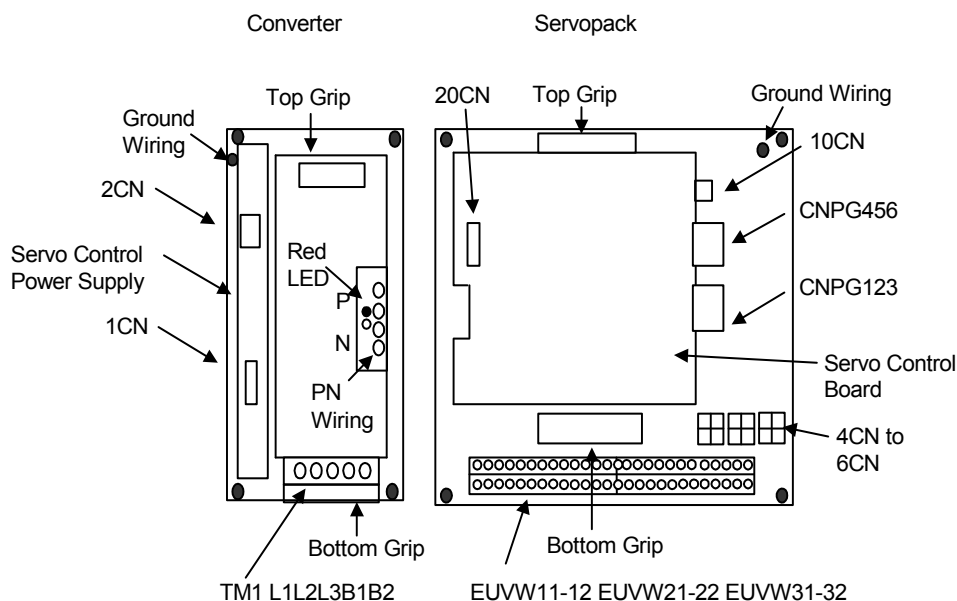
Replacement Procedure (Separated Type Large Capacity)

• 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 Servopack

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 (CNPG123, CNPG456)
 - ② Communication cable connector (CN10)
 - ③ Power ON signal cable connector (CN20)
 - ④ Motor cable terminal (EUVW), motor cable connectors (CN4 to CN6)
 - ⑤ Ground wire
4. Remove the four screws in the four corners of the servopack.
5. With the top and bottom grips, pull out the servopack.
6. Install the new servopack and reconnect the connectors in the reverse order of that listed above.



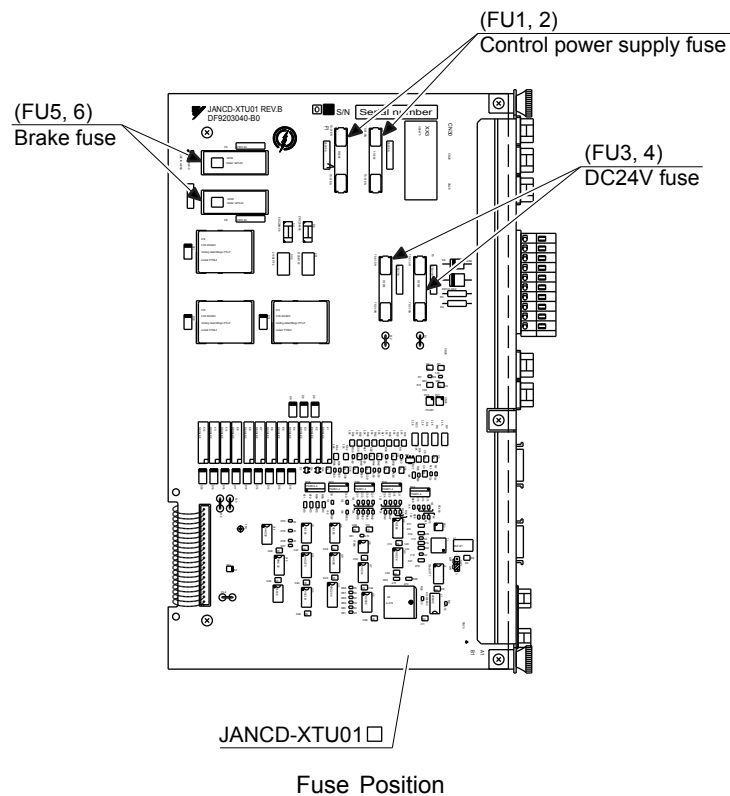
Configuration of Separated Type Servopack for Large Size Robot

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: 0313005 (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 (refer to " 10.3 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).



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

9.2 YASNAC XRC Parts List

YASNAC XRC Parts List

No.	Name	Model	Comment
1	Servopack	*1	6 Axis type
2	CPU rack	JZNC-XRK01□-□	
	Backboard	JANCD-XBB01	
	System control circuit board	JANCD-XCP01□	
	High speed serial interface circuit board	JANCD-XIF03 or JANCD-XIF04	
	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	A and B type panel
		4715□S-22T-B□0-B00	New A and new B type panel
7	Backside duct fan	4715□S-22T-B□0-B00	Small capacity
		5915PS-22T-B30-B00	Medium and large capacity
8	Heat exchanger	YD5-1042A	Only large capacity A and B type panel
9	Contactor circuit board fuse	0313005	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, refer to " Table Servopack List (Small Capacity) ", " Table Servopack List (Medium Capacity) ", and " Table Servopack List (Medium Capacity) ".

***2** The type of the power supply unit depends on the robot model. For detail, refer to " 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-RCP01□□□	JUSP-RCP01□□□	JUSP-RCP01□□□

Component		SV035X	UP20
		Type	Type
Servopack		CACR-SV035AAA	CACR-UP20AAA
Converter		JUSP-ACP05JAA	JUSP-ACP05JAA
Amplifier	S	JUSP-WS04AA	JUSP-WS10AA
	L	JUSP-WS04AA	JUSP-WS20AAY22
	U	JUSP-WS04AA	JUSP-WS10AAY17
	R	-	JUSP-WS02AA
	B	JUSP-WS01AA	JUSP-WS02AA
	T	JUSP-WS01AA	JUSP-WS02AA
Servo control circuit board		JASP-WRCA01□	JASP-WRCA01□
Control power supply		JUSP-RCP01□□□	JUSP-RCP01□□□

9.2 YASNAC XRC Parts List

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-RCP01□□□	JUSP-RCP01□□□	JUSP-RCP01□□□

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-WRCA01□
Converter		JUSP-ACP25JAAY11	JUSP-ACP25JAA
Control power supply		JUSP-RCP01□□□	JUSP-RCP01□□□

Servopack List (Large Capacity)

Component		UP200, UP130R, UP165-100, UP130T, SK506X, ES200	UP130, UP165, ES165	UP130RL, UP165R, UP200R, ES165R, ES200R
		Type	Type	Type
Servopack		CACR-UP130AABY18	CACR-UP130AAB	CACR-UP130AABY21
Amplifier	S	JUSP-WS60AAY18	JUSP-WS60AA	JUSP-WS60AAY18
	L	JUSP-WS60AAY18	JUSP-WS60AA	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□	JASP-WRCA01□
Converter		JUSP-ACP35JAA	JUSP-ACP35JAA	JUSP-ACP35JAA
Control power supply		JUSP-RCP01□□□	JUSP-RCP01□□□	JUSP-RCP01□□□

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-RCP01□□□	JUSP-RCP01□□□

9.2 YASNAC XRC Parts List

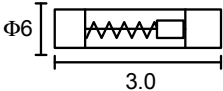
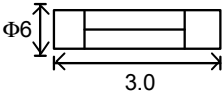
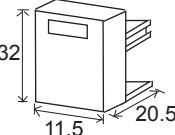
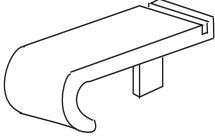
Power Supply Unit List

Type	Robot Type
JZNC-XPW03□ or JZRCCR-XPU03□	SV3X, SV035X, UP6, SK16X, UP20
JZRCCR-XPU02□	SK16MX, SK45X, SP70X, UP50, UP20M
JZRCCR-XPU02□ or JZRCCR-XPU01□	UP130, UP165, UP165-100, UP200, UP130T,ES165,ES200
JZRCCR-XPU01□	SK300X, SP100X, SK506X, SR200X, UP130R, UP165R, UUP200R, UP130RL,ES165R,ES200R

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	0313005 (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	Manufacturer	Qty	Qty per unit	Remark
1	A	Battery	ER6VC3N 3.6V	Toshiba Battery	1	1	
2	A	Rack Fan	JZNC-XZU02	Yaskawa	2	1	
3	A	Backside Duct Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SV3AAA	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRRCR-XPU03□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for SV035X

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	1	
3	A	Backside Duct Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00 4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SV035AAA	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU03□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

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	1	
3	A	Backside Duct Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-UP6AAC	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCCR-XPU03□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

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	1	
3	A	Backside Duct Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	2	2	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SK16AAC	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU03□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

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	1	
3	A	Backside Duct Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	2	2	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP05JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	B	Circuit Protection Board for Brake Area	JARCR-XFL01	Yaskawa	1	1	
19	C	Servopack	CACR-UP20AAA	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCR-XPU03□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	3	3	A type panel
					4	4	B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SK16MAAB	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU02□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP25JAAY11	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	B	Circuit Protection Board for Brake Area	JARCR-XFL01	Yaskawa	1	1	
19	C	Servopack	CACR-UP20MAAB	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCR-XPU02□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

9.4 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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A type, new A type, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	3	3	A type panel
					4	4	B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SK45AAB	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU02□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	
4	A	Servopack Ascending Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP25JAAY11	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-UP50AAB	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRRCR-XPU02□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	3	3	A type panel
					4	4	B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP25JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SK70AAB	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU02□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for UP130, UP165, ES165

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Heat Exchanger Fan	4710PS-22T-B30	Minebea	2	2	A and B type panel
6	A	Control Power Fuse	0313005	Little 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	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
11	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
13	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
14	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
15	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
16	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
17	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
18	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
19	C	Servopack	CACR-UP130AAB	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCCR-XPU02□or JZRCCR-XPU01□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP200, UP165-100, UP130T, ES200

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Heat Exchanger Fan	4710PS-22T-B30	Minebea	2	2	A and B type panel
6	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
10	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
11	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
13	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
14	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
15	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
16	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
17	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
18	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
19	C	Servopack	CACR-UP130AABY18	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCR-XPU02□ or JZRCR-XPU01□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for UP130R, SK506X

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Heat Exchanger Fan	4710PS-22T-B30	Minebea	2	2	A and B type panel
6	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
10	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
11	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
13	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
14	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
15	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
16	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
17	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
18	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
19	C	Servopack	CACR-UP130AABY18	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCR-XPU01□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

Recommended Spare Parts of XRC for UP130RL, UP165R, UP200R, ES165R, ES200R

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	New A and new B type panel
4	A	Servopack Ascending Fan	4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-UP130AABY21	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU01□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

Recommended Spare Parts of XRC for SK300X, SR200X

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Heat Exchanger Fan	4710PS-22T-B30	Minebea	2	2	A and B type panel
6	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
10	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
11	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
12	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
13	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
14	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
15	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
16	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
17	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
18	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
19	C	Servopack	CACR-SK300AAB	Yaskawa	1	1	
20	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
21	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
22	C	Power Unit	JZRCR-XPU01□	Yaskawa	1	1	
23	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.23 "Programming Pendant" is ordered.

9.4 Recommended Spare Parts

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	1	
3	A	Backside Duct Fan	5915PC-22T-B30-B00	Minebea	2	2	A, new A, and new B type panel
					3	3	B type panel
4	A	Servopack Ascending Fan	3610PS-22T-B30-B00	Minebea	4	4	A and B type panel
			4715PS-22T-B30-B00 or 4715MS-22T-B50-B00	Minebea	3	3	New A and new B type panel
5	A	Control Power Fuse	0313005	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	LY-2-DC24V	OMRON	3	3	
9	B	Converter	JUSP-ACP35JAA	Yaskawa	1	1	
10	B	Control Power Unit	JUSP-RCP01□□□	SANRITZ	1	1	For Servo
11	B	Servopack Control Board	JASP-WRCA01□	Yaskawa	1	1	
12	B	Control Power Unit	CPS-150F	Fuji Electric Hi-Tech	1	1	For CPU Unit
13	B	System Control Board	JANCD-XCP01□	Yaskawa	1	1	
14	B	Communication Board	JANCD-XIF03 or JANCD-XIF04	Yaskawa	1	1	
15	B	Specific I/O Board	JANCD-XIO01□	Yaskawa	1	1	
16	B	General I/O Board	JANCD-XIO02	Yaskawa	1	1	
17	B	Power On Board	JANCD-XTU01□	Yaskawa	1	1	
18	C	Servopack	CACR-SP100AAB	Yaskawa	1	1	
19	C	CPU Unit	JZNC-XRK01□-1	Yaskawa	1	1	
20	C	I/O Power On Unit	JZNC-XIU01□	Yaskawa	1	1	
21	C	Power Unit	JZRCR-XPU01□	Yaskawa	1	1	
22	C	Programming Pendant	JZNC-XPP02□	Yaskawa	1	1	With Cable 8m

*Specify application (Arc, General, Spot, Handling) of key sheet when No.22 "Programming Pendant" is ordered.

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.

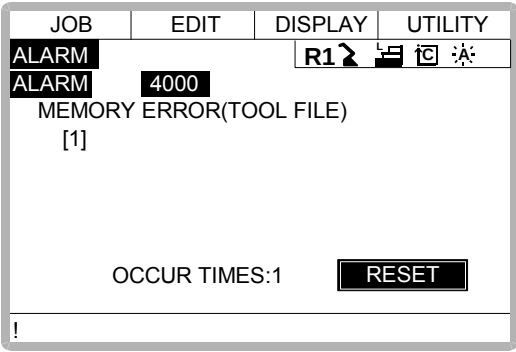
Alarm Code classification.

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]^{*1}

Explanation

^{*1} 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^{*1}

Explanation

^{*1} 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

10.2 Alarm Display

- 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 1 to 3 [S **L** U R B T]

With base axis: Robots 1 to 3 [**1** 2 3]

With station axis: Stations 1 to 6 [1 **2** 3]

- 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]	• Insertion of the circuit board was not completed • Defective circuit board 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) (Note) XCP02 circuit board (#□-■) □:Slot NO. ■:0 →XCP02 circuit board (main) 1 →Sub-board1 (connector CNSL side) 2 →Sub-board2 (connector CNET side)	• Check whether the circuit board is correctly inserted. • Replace the circuit board.
0020	CPU COMMUNICATION ERROR [Decimal Data]	• Insertion of the circuit board was not completed • Defective circuit board 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) (Note) XCP02 circuit board (# □-■) □ :Slot NO. ■ :0 →XCP02 circuit board (main) 1 →Sub-board1 (connector CNSL side) 2 →Sub-board2 (connector CNET side)	• Check whether the circuit board is correctly inserted. • Replace the circuit board.

10.3 Alarm Message List

Alarm Message List

Alarm Number	Message	Cause	Remedy
0021	COMMUNICATION ERROR(SERVO) [Decimal Data]	Electric power is not supplied to the control power unit. - The connection of communication cable for servopack was not completed. - The connection of communication cable for servopack was not cut. - The connection of terminal connector was not completed. - The terminal connector was unusual. - The WRCA01 circuit board was out of order. (The terminal connector was equipped 1 for a system). - Failure of the power supply (JUSP-RCP01AAA) for the WRCA01 circuit board. 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) (Note) WRCA01 circuit board (# □) The setting value of rotary switch on the WRCA01 circuit board is (□ -1).	- Check FU1 and FU2 in the XIU01B or check F1, F2 in the XSU01 or check F3, F4 in the XSU02 - Check the connection of communication cable for servopack. (XCP01•CN05 - WRCA(#*)•CN10 cable, WRCA•CN10(#*) - WRCA CN10(#*) cable) - Replace the communication connector for servopack. - Check the connection of the terminal connector (WRCA•CN10(#*)). - Replace the terminal connector. - Replace the circuit board. - Check whether the fuse for the circuit board power supply is cut out or not. - Replace the circuit board power supply.
0030	ROM ERROR [Decimal Data]	An error was found by sum check of system program. 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) (Note) XCP02 circuit board (#□ -■) □ :Slot NO. ■ :0 → XCP02 circuit board (main) 1 → Sub-board1(connector CNSL side) 2 → Sub-board2(connector CNET side) 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) (Note) WRCA01 circuit board (# □) The setting value of rotary switch on the WRCA01 circuit board is (□ -1).	- Replace the circuit board. - When the XCP01 circuit board is replaced, consult YASKAWA representative.

Alarm Message List

Alarm Number	Message	Cause	Remedy
0040	MEMORY ERROR (CPU BOARD RAM) [Decimal Data]	Memory (RAM) error 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) (Note) XCP02 circuit board (#□ - ■) □ :Slot NO. ■ :0 → XCP02 circuit board (main) 1 → Sub-board1 (connector CNSL side) 2 → Sub-board2 (connector CNET side) 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) (Note) WRCA01 circuit board (# □) The setting value of rotary switch on the WRCA01 circuit board is (□ -1)	• Replace the circuit board. • When the XCP01 circuit board is replaced, consult a YASKAWA representative.
0050	MEMORY ERROR(PCI-BUS COMMON RAM) [Decimal Data]	A error occurred in PCI bus shared RAM of the CPU rack or shared RAM between circuit boards. 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) (Note) XCP02 circuit board (# □ -■) □ :Slot NO. ■ :0 → XCP02 circuit board (main) 1 → Sub-board1 (connector CNSL side) 2 → Sub-board2 (connector CNET side)	• Insert the circuit board securely in the CPU rack or in the connector on the board. • 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]	- An error occurred in communication of I/O module. - Defective I/O module Data stands for the error 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) (Note) WRCA01 circuit board (#□) The setting value of rotary switch on the WRCA circuit board is (□ -1)	- Check the connection of the communication cable for I/O module. (XCP01•CN01 - XIU01•CN03 cable, WRCA01(#*)•CN20 - XIU01•CN21 cable) - Replace the communication connector for I/O module.
0100	COMMUNICATION ERROR (WRCA#1) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #1.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.
0101	COMMUNICATION ERROR (WRCA#2) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #2.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.

Alarm Message List

Alarm Number	Message	Cause	Remedy
0102	COMMUNICATION ERROR (WRCA#3) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #3.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.
0103	COMMUNICATION ERROR (WRCA#4) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #4.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.
0104	COMMUNICATION ERROR (WRCA#5) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #5.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.
0105	COMMUNICATION ERROR (WRCA#6) [Decimal Data]	An error occurred in the communications sequence between the XCP01 circuit board and Servopack #6.	- Check the connection of the communications cable for the servopack. (XCP01 or CN05 to WRCA (#*) or CN10 cable, WRCA (#*) or CN10 to WRCA or CN10 (#*) cable) - Replace the communications cable for the servopack. - Check the connection of the terminal connector (WRCA (#*) and CN10). - Replace the terminal connector. - Replace the circuit board.
0200	MEMORY ERROR (PARAMETER FILE) [Decimal Data]	The parameter file 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 parameter	- Initialize the parameter file damaged on maintenance mode. - Load the saved parameter file in the external memory unit.
0210	MEMORY ERROR (SYSTEM CONFIG-DATA)	The system configuration data information on setting system initialization was damaged.	Needs investigation. Consult a YASKAWA representative.
0220	MEMORY ERROR (JOB MNG DATA)	The job control data was damaged.	- Initialize the job on maintenance mode The whole job data is deleted. - Load the job saved on the external memory unit.

10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0230	MEMORY ERROR (LADDER PRG FILE)	The concurrent I/O ladder program was damaged.	- Initialize the ladder program on maintenance mode. - Load the ladder program saved on the external memory unit.
0240	MEMORY ERROR (MEMORY ERROR (DeviceNet Allocation File) [Decimal Data]	The devicenet assignment file is damaged. Data stands for the file No.	- Reset the devicenet assignment on the maintenance mode. - Load the devicenet assignment file saved on the external memory unit, then turn the power supply off once, and turn it on again.
0300	VERIFY ERROR (SYSTEM CONFIG-DATA) [Decimal Data]	The system parameter was modified illegally.	Needs investigation. Consult a YASKAWA representative.
0310	VERIFY ERROR (CMOS MEMORY SIZE)	CMOS memory capacity on system setting was different than the current one.	Check the connection status of CMOS memory circuit board (XMM01) for expansion.
0320	VERIFY ERROR (I/O MODULE) [Decimal Data]	- The status of the I/O module on initializing system or modifying was different than the current. - The communication mode (16/17 bytes) does not coincide with the XIO01 due to replacement of the I/O module. 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) (Note) WRCA01 circuit board (# □) The setting value of rotary switch on the WRCA01 circuit board is (□ -1)	- Check the I/O module is same as when it was initialized or modified. - Modify the I/O module on maintenance mode. - Verify the communication mode (16/17 bytes) of the new I/O module.
0330	VERIFY ERROR (APPLICATION SETTING)	The application on system setting was different than AP parameter.	Change the AP parameter to the correct value.
0340	VERIFY ERROR (SENSOR FUNCTION)	- The sensor function on system initializing was different than the function of the sensor circuit board mounted now. - The sensor setting on system setting was different than SE parameter.	- Set the function of the sensor circuit board on maintenance mode again. - Change SE parameter for the correct value.

Alarm Message List

Alarm Number	Message	Cause	Remedy
0350	VERIFY ERROR (DeviceNet Allocation File) [No indication data]	1: The master station on the first page of the set file does not exist. 2: MAC-ID which is on the first page of the set file is different from the one which is on the station. 3: The data which is over the range exists on the first page of the set files. 10: There is no master station on the second page of the set file. 11: MAC-ID which is on the second page of the set file is different from the one which is on the station. 12: The data which is over the range exists on the second page of the set file.	Set the devicenet allocation in the maintenance mode.
0400	PARAMETER TRANSMISSION ERROR [Decimal Data]	- The connection of communication cable for servopack was not completed. - The connection of communication cable for servopack was not cut. - The connection of terminal connector is not completed. - The terminal connector is unusual. - The circuit board was out of order. (The terminal connector is equipped 1 for a system). 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) (Note) WRCA01 circuit board (#□) The setting value of rotary switch on the WRCA01 circuit board is (□ -1)	- Check the connection of communication cable for servopack. (XCP01•CN05 - WRCA(#*)•CN10 cable, WRCA•CN10(#*) - WRCA•CN10(#*) cable) - Replace the communication connector for servopack. - Check the connection of the terminal connector (WRCA•CN10(#*)). - Replace the terminal connector. - Replace the circuit board.

10.3 Alarm Message List

Alarm Message List

Alarm Number	Message	Cause	Remedy
0410	MODE CHANGE ERROR [Decimal Data]	An error occurred in process of change to normal operation mode. 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) (Note) XCP02 circuit board (# □ - ■) □ :Slot NO. ■ :0 → XCP02 circuit board (main) 1 → Sub-board1(connector CNSL side) 2 → Sub-board2(connector CNET side) 50:WRCA01 board (#1) 51:WRCA01 board (#2) 52:WRCA01 board (#3) 53:WRCA01 board (#4) 54:WRCA01 board (#5) 55:WRCA01 board (#6) (Note) WRCA01 circuit board (# □) The setting value of rotary switch on WRCA01 circuit board is (□ -1)	<Data :10-21> • Insert the circuit board in the CPU rack fast. • Replace the circuit board. <Data :50-55> • Check the connection of communication cable for servopack. (XCP01•CN05 - WRCA(•)•CN10 cable, WRCA•CN10(•) - WRCA•CN10(•) cable) • Replace the communication connector for servopack. • Check the connection of the terminal connector (WRCA•CN10(•)). • Replace the terminal connector. • Replace the circuit board.
0420	DeviceNet ALLOCATION FILE TRANSMISSION ERROR [Decimal Data]	1: An error occurs when the first setting file is sent. 2: An error occurred when the second setting file is sent.	• Set the devicenet assignment.
0500	SEGMENT PROC NOT READY	An error occurred in communication between XCP01 circuit board and WRCA01 circuit board.	• Turn the power OFF then back ON. • If the error occurs again, contact your YASKAWA representative.
0510	SOFTWARE VERSION UNMATCH [Decimal Data]	The software version of the XCP01 circuit board does not agree with that of the WRCA circuit board.	• Contact your Yaskawa representative.
0900	WATCHDOG TIMER ERROR (XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0901	WATCHDOG TIMER ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or the circuit board failure.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board • If the error occurs again, contact your YASKAWA representative.
0902	WATCHDOG TIMER ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.

Alarm Message List

Alarm Number	Message	Cause	Remedy
0910	CPU ERROR(XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0911	CPU ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0912	CPU ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0920	BUS ERROR (XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0921	BUS ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0922	BUS ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board • If the error occurs again, contact your YASKAWA representative.
0930	CPU HANG UP ERROR (XCP01) [Decimal Data]	An insertion error of the XCP01 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0931	CPU HANG UP ERROR (XCP02#1) [Decimal Data]	An insertion error of the XCP02#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0932	CPU HANG UP ERROR (XCP02#2) [Decimal Data]	An insertion error of the XCP02#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0940	WATCHDOG TIMER ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board • If the error occurs again, contact your YASKAWA representative.
0941	WATCHDOG TIMER ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA01#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.

10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
0942	WATCHDOG TIMER ERROR (WRCA#3) [Decimal Data]	An insert error of the WRCA01#3 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0943	WATCHDOG TIMER ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0944	WATCHDOG TIMER ERROR (WRCA#5) [Decimal Data]	An insertion error of the WRCA01#5 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0945	WATCHDOG TIMER ERROR (WRCA#6) [Decimal Data]	An insertion error of the WRCA01#6 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0950	CPU ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0951	CPU ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA0#21 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0952	CPU ERROR (WRCA#3) [Decimal Data]	An insertion error of the WRCA01#3 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0953	CPU ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0954	CPU ERROR (WRCA#5) [Decimal Data]	An insertion error of the WRCA01#5 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0955	CPU ERROR (WRCA#6) [Decimal Data]	An insertion error of the WRCA01#6 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0960	CPU HANG UP ERROR (WRCA#1) [Decimal Data]	An insertion error of the WRCA01#1 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.

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0961	CPU HANG UP ERROR (WRCA#2) [Decimal Data]	An insertion error of the WRCA01#2 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0962	CPU HANG UP ERROR (WRCA#3) [Decimal Data]	An insertion error of the WRCA01#3 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0963	CPU HANG UP ERROR (WRCA#4) [Decimal Data]	An insertion error of the WRCA01#4 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0964	CPU HANG UP ERROR (WRCA#5) [Decimal Data]	An insertion error of the WRCA01#5 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
0965	CPU HANG UP ERROR (WRCA#6) [Decimal Data]	An insertion error of the WRCA01#6 circuit board or defective circuit board.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
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.	• Insert the circuit board in the CPU rack or the connector on the circuit board fast. • Replace the circuit board. • If the error occurs again, contact your YASKAWA representative.
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 parameter	• Initialize the parameter file damaged on maintenance mode. • Load the saved parameter from the floppy disk and restore.
1031	MEMORY ERROR (MOTION1) [Decimal Data]	The saved each file on CMOS memory used by motion instruction was damaged.	• Initialize the file damaged on maintenance mode. • Load the saved file from the floppy disk and restore.

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Alarm Number	Message	Cause	Remedy
1032	MEMORY ERROR (MOTION2) [Decimal Data]	- The saved each file on XCP01 circuit board memory used by motion instruction was damaged. - An insertion error of the XCP01 circuit board or the circuit board failure.	- Turn the power OFF then back ON. - Insert the XCP01 circuit board in CPU rack fast. - Replace the XCP01 circuit board. - If the error occurs again, contact your YASKAWA representative.
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.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1051	SETUP INITIALIZE ERROR (MOTION) [Decimal Data]	The error occurred in the setup process of motion instruction when the main power was turned ON.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1100	SYSTEM ERROR C: □ B: □ C: □ [Decimal Data]	The alarm of unknown origin was detected by noise and control error.	Needs investigation. Consult a YASKAWA representative.
1101	SYSTEM ERROR (SYSTEM1) [Decimal Data]	The error occurred in the control check of system.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1102	SYSTEM ERROR (SYSTEM2) [Decimal Data]	The error occurred in the control check of system.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1103	SYSTEM ERROR (EVENT) [Decimal Data]	The error occurred in the event data check of system.	If the error occurs again, contact your YASKAWA representative.
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	- Check the connector, cable for transmission path of I/O signal(XCP01/I/O contactor unit, I/O module) - Reset the I/O module on maintenance mode. - Replace the XCP01, I/O contactor unit, I/O module.
1105	SYSTEM ERROR (SERVO) [Decimal Data]	The error occurred in control check of the WACA01/WRCF01 circuit board.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1106	SYSTEM ERROR (SPEED MONITOR) [Decimal Data]	The error occurred in control check of the XFC01 circuit board.	- Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
1109	SYSTEM ERROR (CONVEYER) [Decimal Data]	The error occurs in control check.	- Turn the power off then back on. - If the error occurs again, contact your YASKAWA representative.
1110	SYSTEM ERROR (CONTROLNET) [Decimal Data]	The error occurs in control check.	- Turn the power off then back on. - If the error occurs again, contact your YASKAWA representative.
1200	HIGH TEMPERATURE (IN CNTL BOX)	The temperature in the controller raised abnormally.	Check whether interior fan of controller is working or not.

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Alarm Number	Message	Cause	Remedy
1201	OVERRUN LIMIT SWITCH RELEASED	Overrun recovery switch was operated on playback.	• Don't operate the overrun recovery switch on playback. • It is thought that the overrun recovery switch is failed. Consult YASKAWA representative.
1202	FAULT [Decimal Data]	CPU motion impossibility caused by 0 division etc. Data stands for the factor of alarm. 1:Calculation 2:Floating point	• Turn the power OFF then back ON. • If the error occurs again, contact your YASKAWA representative.
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	• Turn the power OFF then back ON. • Check the connection cable of the I/O contactor unit. • If the error occurs again, contact your Yaskawa representative.
1204	COMMUNICATION ERROR (I/O Module) [Binary Data]	An error occurred in the communications of the I/O module. 0000_0000_0000_0010: ST#1 0000_0000_0000_0100: ST#2 0000_0000_0000_1000: ST#3 : 1000_0000_0000_0000: ST#15	• Check the connector and cable for the I/O signal transmission (XCP01-I/O power ON unit, and I/O module) • Set the I/O module to maintenance mode again. • Take countermeasures against noise. • Replace the XCP01 circuit board, the I/O-power ON unit, and/or the I/O module.
1206	SPEED ERROR (XCP01) Robot/Station [Axis Data]	The motor speed displayed in the axis data exceeds the maximum motor speed. • Incorrect wiring of motor U,V,W lines • Incorrect motor type • The motor was rotated by an external force. • Motor (encoder) fault	• Check the connection of the motor. • Check the robot motion for when the alarm occurs and if any external force is being applied to the motor. • Check if the U, V, and W lines of the motor are connected correctly. If not, reconnect them. • Check if the alarm occurs at a teaching speed lower than the speed when the alarm occurred. Depending on the teaching posture, the R, B, or T axis may move at a higher speed during linear interpolation. If so, reconsider the teaching. <When the alarm occurs in the robot axis> Check if the motor type specified in the instruction manual is used. If not, use the specified type of motor. <When the alarm occurs in the external axis> Check if the motor type set in the system configuration is the same as that is actually connected. If the setting in the system configuration is correct, replace the motor with one set in the system configuration. If not, correct the setting in the system configuration.

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Alarm Number	Message	Cause	Remedy
1300	SERVO CPU SYNCHRONIZING ERROR	The communication between the XCP01 circuit board and the WRCA01 circuit board was abnormal. • The cable between the XCP01 circuit board and WRCA01 circuit board was defective. • The connection of the terminal connector was incomplete. • Defective XCP01 circuit board • Defective WRCA01 circuit board	• Check the connection of communication cable for servopack. (XCP01•CN05 - WRCA(•)•CN10 cable, WRCA•CN10(•) - WRCA•CN10(•) cable) • Replace the communication cable for servopack. • Check the connection of the terminal connector (WRCA• CN10(•)). • Replace the terminal connector. • Replace the XCP01 circuit board, WRCA01 circuit board.
1301	COMMUNICATION ERROR (SERVO) [Decimal Data]	The communication between the XCP01 circuit board and the WRCA01 circuit board was abnormal. • The cable between the XCP01 circuit board and WRCA01 circuit board was defective. • The connection of the terminal connector was incomplete. • Defective XCP01 circuit board • Defective WRCA01 circuit board	• Check the connection of communication cable for servopack. (XCP01•CN05 - WRCA(•)•CN10 cable, WRCA•CN10(•) - WRCA•CN10(•) cable) • Replace the communication cable for servopack. • Check the connection of the terminal connector (WRCA• CN10(•)). • Replace the terminal connector. • Replace the XCP01 circuit board, WRCA01 circuit board. • If the error occurs again, contact your YASKAWA representative.
1302	COMMUNICATION ERROR (SERVO I/O) [Decimal Data]	The communication between WRCA01 circuit board and the I/O Power-ON unit (for I/O, robot, external axis) was abnormal.	• Check the connection for communication cable between the WRCA01 circuit board and I/O Power-ON unit. (WRCA01(•)•CN20 - XIU01•CN21 cable) • Replace the WRCA01 circuit board. • Replace the I/O Power-ON unit. • Check the settings of the shorting pins (SW1 and SW2) of the I/O Power-ON unit. • If the error occurs again, contact your YASKAWA representative.
1303	ARITHMETIC ERROR (SERVO) [Decimal Data]	The error occurred on check of interior control for the WRCA circuit board.	Needs investigation. Consult a YASKAWA representative.
1304	EX-AXIS BOARD NOT INSTALLED	• The system included the external axis, but the external axis circuit board (WRCF01 board) was not installed. • The system did not include the external axis, but the system with external axis was set. • Defective WRCF01 circuit board • Defective WRCA01 circuit board	<The system with external axis> • Check the installation of the external axis circuit board(WRCF01 board). • If the WRCF01 circuit board is installed, replace it. <The system without external axis> • Check the system is not included external axis. • Execute the system configuration again on system without external axis.

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1305	POWER ON UNIT NOT INSTALLED [Bit Pattern]	• The contactor unit was set on system configuration, but the I/O Power-ON unit was not installed. • The system was not installed I/O Power-ON unit, but the system was set as though a I/O Power-ON unit installed. • Defective I/O Power-ON unit • Defective WRCA circuit board	<The system with external axis> • Check the installation of the external axis circuit board(WRCF01 board). • If the WRCF01 circuit board is installed, replace it. <The system without external axis> • Check the system is not included external axis. • Execute the system configuration again on system without external axis.
1306	AMPLIFIER TYPE MISMATCH Robot/Station [Axis Data]	• The type of amplifier displayed by axis data was different than the type set by system configuration. • The type of amplifier was not correct. • The type of amplifier was different than the type set by system configuration. • Defective amplifier • Defective WRCA01 circuit board	• Check the type of servopack displayed by axis data. <Error in robot axis> Check the type of servopack is same as described one on manual. If the type is not correct, replace it with correct servopack. <Error in external axis> 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. • If the error occurs again, replace WRCA01 circuit board.
1307	ENCORDER TYPE MISMATCH Robot/Station [Axis Data]	The type of encoder displayed by axis data was different than the type set by system configuration. • The type of encoder was not correct. • The system configuration setting of encoder was not correct. • Defective encoder • Defective WRCA circuit board (Note) The encoder is accessories of motor, check the type of motor to check the type of encoder	• Check the type of motor displayed by axis data. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 circuit board.

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Alarm Number	Message	Cause	Remedy
1308	OVER SPEED Robot/Station [Axis Data]	The motor speed displayed by axis data exceeded allowable max speed. • The wiring of UVW wire of motor was not correct. • The type of motor was not correct. • The motor was moved by external power. • Defective WRCA01, WRCF01 circuit board • Defective motor (encoder)	• Check the connection of motor. • Check the robot motion on alarm and check whether external power is operated or not. • Check the connection of UVW wire of motor again. If the error is found, alter the connection. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRC01 and/or WRCF01 circuit board.
1309	OVERLOAD (CONTINUE) Robot/Station [Axis Data]	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. • The wrong wiring, the breaking of the UVW wire for the motor • The type of motor was not correct. • The motor was moved by external power. • It interfered with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause. • Check the connection of UVW wire of motor again. And check the breaking of the wire. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for axis where the error occurred.

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Alarm Number	Message	Cause	Remedy
1310	OVERLOAD (MOMENT) Robot/Station [Axis Data]	The motor torque displayed by axis data exceeded rated torque for a long time. It may have burned the motor. • The wrong wiring, the breaking of the wire UVW wire for the motor • The type of motor was not correct. • The motor was moved by external power. • It interfered with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective (encoder)	• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause. • Check the connection of UVW wire of motor again. And check the breaking of the wire. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for axis where the error occurred.
1311	AMPLIFIER OVER-LOAD (CONTINUE) Robot/Station [Axis Data]	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. • The wrong wiring, the breaking of the UVW wire for the motor • The type of motor was not correct. • The motor was moved by external power. • It interfered with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause. • Check the connection of UVW wire of motor again. And check the breaking of the wire. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for axis where the error occurred.

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1312	AMPLIFIER OVER-LOAD (MOMENT) Robot/Station [Axis Data]	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. • The wrong wiring, the breaking of the UVW wire for the motor • The type of motor was not correct. • The motor was moved by external power. • It interfered with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause. • Check the connection of UVW wire of motor again. And check the breaking of the wire. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for axis where the error occurred.
1313	MOTOR ERROR Robot/Station [Axis Data]	The motor was driven recklessly. This error occurred when the motor moved in reverse for the forward instruction. • Incorrect wiring of the UVW wire for the motor • The type of motor was not correct. • Defective WRCA01, WRCF01 circuit board	• Check the connection of UVW wire of motor again. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board.

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Alarm Number	Message	Cause	Remedy
1314	SERVO TRACKING ERROR Robot/Station [Axis Data]	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 • The wrong wiring, the breaking of the wire of UVW wire for the motor • The type of motor was not correct. • The motor was moved by external power. • It interfered with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check whether the robot interferes with the outside equipment. If the robot interferes, remove the cause. • Check the connection of UVW wire of motor again. And check the breaking of the wire. • 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. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for axis where the error occurred.
1315	POSITION ERROR Robot/Station [Axis Data]	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.) • Noise of outside equipment • Defective WRCA01, WRCF01 circuit board • Down of the power supply voltage for the encoder • Defective motor (encoder)	• Check whether there is a equipment generating loud noise. • Check the ground of controller is correct. • When the error occurred at external axis, set the ferrite core on the encoder cable for noise measure. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the motor for axis occurred the error.
1316	BROKEN PG LINE Robot/Station [Axis Data]	The break of the signal wire from encoder (But, this alarm may accompany the position error alarm, the alarm related to the encoder.) • Noise of outside equipment • Defective WRCA01, WRCF01 circuit board • Decrease of the power supply voltage for the encoder • Defective motor (encoder)	• Check the conduction of cable from the WRCA01, WRCF circuit board to the motor (encoder). • Check whether there is equipment generating loud noise. • Check the grounding of controller is correct. • If the error occurs again, replace WRCA01 and/or WRCF01 circuit board. • Replace the motor for the axis where the error occurred.
1317	SPEED WATCHER BOARD ERROR	The error occurred in the speed detective circuit board. • Defective speed detective circuit board • Defective WRCA circuit board	• Turn the power OFF then back ON. • If the error occurs again, replace the speed detective circuit board and WRCA01 circuit board.

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1318	OVERVOLTAGE (CONVERTER) [Bit Pattern]	The power supply voltage of direct current supplied to the amplifier of servopack exceeded 420V. • The primary power supply voltage was too high.(220V,+10%) • It was too much load. • Defective converter • Defective WRCA01 circuit board	• Check the primary power supply (220V, +10%). • 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. • If the error occurs again, replace the WRCA01 circuit board and the converter.
1319	GROUND FAULT Robot/Station [Axis Data]	One of U,V,W wires of the motor displayed on axis data was grounded at least. • Defective the motor • Ground fault of the motor, lead wire • Defective WRCA01, WRCF01 circuit board • Defective amplifier	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 that the servopack is damaged when the servo turn-ON and OFF is repeated during ground fault status. • Check the connection of the U,V,W,E wires of motor again. • 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. • 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. • If the error is not caused by the lead wire, it is thought to be a defective motor. • If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for the axis where the error occurred.
1320	OPEN PHASE (CONVERTER) [Bit Pattern]	Any of the three-phase current for primary side power supply of servopack was open-phase. • The wrong wiring of the primary side power supply connection. • The decrease of the primary side power supply voltage(170V or less) • Defective WRCA01, WRCF01 circuit board • Defective converter	• Check the connection of the primary side wiring R,S,T wires of servopack. • Check that the power supply voltage is more than 170V. • If the error occurs again, replace the WRCA01,WRCF01 circuit board. • Replace the converter for the axis where the error occurred.

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1321	OVERCURRENT (AMP) Robot/Station [Axis Data]	One of the U,V,W wires of the motor displayed on the axis data was grounded at least. • Defective motor • Ground fault of the motor, lead wire • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Overheating of amplifier	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 repeated during ground fault status. • Check the connection of the U,V,W,E wires of motor again. • 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. • 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. • If the error is not caused by the lead wire, it is thought to be a defective motor. • If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the servopack, motor for the axis where the error occurred.
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. • The load installed on robot was too heavy. • The primary side power supply voltage was too high.(242V or more) • Defective converter • Defective WRCA01, WRCF01 circuit board	• 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. • Check the primary power supply(220V, +10%). • If the error occurs again, replace the WRCA01, WRCF01 circuit board. • Replace the converter for the axis where the error occurred.
1323	INPUT POWER OVER VOLTAGE (CONV) [Bit Pattern]	The primary side power supply voltage of servopack was too high.(more than 242V)	• Check the primary power supply(220V, +10%). • If the error occurs again, replace the WRCA01 circuit board. • Replace the converter of the concerned axis.
1324	TEMPERATURE ERROR (CONVERTER) [Bit Pattern]	The temperature of servopack (converter) was too high.	• Check whether the ambient temperature is too high or not. • Check the primary power supply(220V, +10%). • If the error occurs again, replace the WRCA01 circuit board. • Replace the converter for the axis where the error occurred.

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Alarm Number	Message	Cause	Remedy
1325	COMMUNICATION ERROR (ENCODER) Robot/Station [Axis Data]	The communication error between the encoder and the WRCA01 circuit board. • The wrong wiring of the encoder wire • The type of motor was not correct. • Defective WRCA01 circuit board • Defective encoder	• Check the connection of the encoder displayed on axis data. • Check whether there is equipment generating big noise around or not. • Check the ground of controller is correct. <Error in robot axis> Check the type of motor is same as described one on manual. If the type is not correct, replace it with correct motor. <Error in external axis> 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. • If the error occurs again, replace the WRCA01 circuit board.
1326	DEFECTIVE ENCODER ABSOLUTE DATA Robot/Station [Axis Data]	The error occurred in the position detect circuit board of encoder.	• Turn the power OFF then back ON. • If the error occurs again, replace the motor (encoder) for the axis where the error occurred.
1327	ENCODER OVER SPEED Robot/Station [Axis Data]	• 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. • 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. • In case this alarm occurred in a stop state, it is thought that the encoder caused the error.	• Check the timing of turning ON the control power supply. • If the error occurs when the control power supply is turned in a stopped state, replace the motor (encoder) displayed on axis data.
1328	DEFECTIVE SERIAL ENCODER Robot/Station [Axis Data]	The internal parameter of the serial encoder 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.
1331	CURRENT FEEDBACK ERROR (U PHASE) Robot/Station [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, servopack for the axis where the error occurred.

Alarm Message List

Alarm Number	Message	Cause	Remedy
1332	CURRENT FEED-BACK ERROR (V PHASE) Robot/Station [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, servopack for axis the error occurred.
1333	Collision Detection (play mode)	The servo deflection of the axis displayed in the axis data becomes excessive, the robot is shifted from instructed motion position of tracks more than tolerance. The wiring of the UVW wire of the motor is not correct or cut. • The type of the motor used is different. • The motor is moved by the external force. • It interferes with an outside equipment • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check the robot arm is interfered with the external devices or the robot body. If the robot interferes, remove the causes. • Check the connection of the UVW wire of the motor, and check the breaking of the wire. • The robot might be worked with heavy load. Review the robot operation and set the teaching speed lower. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier or the motor of the error axis. • If the error occurs again, contact your YASKAWA representative.
1334	Resurrection Overload	It is too much energy of the resurrection at the motor deceleration for the resurrection circuit of the servopack to control. • The load installed on robot is too heavy. • The primary power supply voltage is too high. (more than 242 V) • Defective converter • Defective WRCA01, WRCF01 circuit board	• Check the load again. Reduce the teaching speed of four steps by about 30% before and behind the alarm generation step. If the alarm does not reoccur, alter the load. • Check the primary power supply (220V+10%) • If the error occurs again, replace the WRCA01, WRCF01 circuit board. • Replace the converter for the axis where the error occurred.
1335	ENCODER NOT RESET Robot/Station [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.

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Alarm Number	Message	Cause	Remedy
1339	SPEED MONITOR LEVEL ERR (XFC01)	The error occurred in the speed monitoring level signal. • Disconnected cable between the I/O conductor unit and the XFC01 circuit board • Disconnected cable between the I/O conductor 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 your YASKAWA representative.
1340	BROKEN SPEED 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 SPEED 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 your YASKAWA representative.
1342	OVER SPEED (XFC01) Robot/Station [Axis Data]	The motor speed displayed in the axis data exceeded the allowable maximum motor speed. • Improper wiring of motor lines U, V and W. • Wrong type of motor was used. • Motor was moved by an external force. • Defective XFC01 circuit board • Defective motor (encoder)	• Check the motor wiring. • Check the robot movement when the alarm occurred to make sure that no external force has been applied. • Check the wiring of motor lines U, V and W. • 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. • <Error in robot axis> 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. • <Error in external axis> 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. • If the error occurs again, replace the XFC01 circuit board.
1343	COMMUNICATION ERROR (XFC01) Robot/Station [Axis Data]	The communication error occurred between the WRCA01 and the XFC01 circuit board. • Faulty connection between the WRCA01 board and the XFC01 circuit board. • Defective WRCA01 board • Defective XFC01 circuit board	• Check the connection of the WRCA01 board and the XFC01 circuit board. • Replace the WRCA01 board and the XFC01 circuit board. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
1344	COMMUNICATION ERR (ENCODER) (XFC01) Robot/Station [Axis Data]	The communication error occurred between the encoder and the XFC01 circuit board. • Improper wiring of encoder cables • Noise from external devices • Incorrect motor type • Defective XFC01 circuit board • Defective encoder	• Check the encoder connection displayed in the axis data. • Check that there is no device generating excessive noise. • Check that the grounding of the control panel is correct. <Error in robot axis> 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. <Error in external axis> 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. • If the error occurs again, replace the XFC01 circuit board.
1345	SAFETY CIRCUIT SIGNAL UNMATCH	There is an improper signal in the double check for the receive data from the power-on unit.	• Check the wiring. • Replace the power-on unit circuit board.
1346	LINEAR SERVO FLOAT TRACKING ERROR [XYZ]	The servo deflection of the axis displayed in the axis data becomes excessive, the robot is shifted from instructed motion position of tracks more than tolerance. The wiring of the UVW wire of the motor is not correct or cut. • The type of the motor used is different. • The motor is moved by the external force. • It interferes with an outside equipment • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check the robot arm is interfered with the external devices or the robot body. If the robot interferes, remove the causes. • Check the connection of the UVW wire of the motor, and check the breaking of the wire. • The robot might be worked with heavy load. Review the robot operation and set the teaching speed lower. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier or the motor of the error axis. • If the error occurs again, contact your YASKAWA representative.
1347	CONVERTER OVERLOAD	Total loads of the all motors connected with the converter exceed the rated value for a long time.	There is a possibility to be operated at overload. Ensure the operation of the robot, then reduce the teaching speed and check whether the error occurs again.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1348	POSITION ERROR (Serial Encoder) Robot/Station	The bit error is detected in the serial encoder.	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA0 and/or WRCF01 circuit board.
1349	POWER LOST DETECTION (WRCA01)	Power lost is detected	• Verify the state of primary power supply. • Verify the CPS power supply. If the error occurs again, contact your Yaskawa representative.
1350	POWR ON UNIT TYPE UNMATCH	The type of the power-on circuit board is improper.(ex. The standard TU is used though the safety specification is set.)	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
1351	SPEED MONITORING BOARD SPECIFICATION	The speed monitoring circuit board is installed though the speed monitoring circuit board is invalidly specified in the S1D parameter.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
1352	SERIAL ENCODER CORRECTION MISSING	The correction mistake is detected by the bit deviation correction check.	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.
1353	SPEED MONITORING BOARD WATCHDOG ERROR	• Defective XFC01 circuit board	• Replace the I/O power-on unit and the XFC01 circuit board. • If the error occurs again, contact your YASKAWA representative.
1354	COMMAND TIMEOUT (XFC01)	The command execution time of the speed monitoring circuit board exceeds allowable time.	• Replace the I/O power-on unit and the XFC01 circuit board. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
1355	SERIAL ENCODER MULTI TURNING RANGE ERROR	The internal parameter of the serial encoder is abnormal. It is thought to be an error of the encoder.	• Turn off the power supply then back on. • If the error occurs again, replace the motor(encoder) for the axis where the error occurred. • If the error occurs again, contact your YASKAWA representative.
1356	INVALID AXIS SPECIFICATION ERROR	A group axis is required of processing though the group is specified to invalidity at the group cutting-off function.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
1400	CONVEYER ENCODER ERROR [123]	The encoder is abnormal. Sub Code 1-6 : The conveyor No. that the abnormal encoder is set.	Replace the encoder or the encoder cable.
1401	ENCODER OPERATION MODE CHANGE DISABLE [123]	The encoder mode "Encoder / Virtual encoder" was switched by the general input while performing conveyor synchronized function.	Do not switch "Encoder / Virtual encoder" with the general signal while performing the conveyor synchronized function.
1402	CONVEYER QUE OVER FLOW [123]	The error occurs when the signal of conveyor home position L.S. is input and all of the six conveyor cues are used. • There are 6 or more work which are passed by the conveyor synchronization LS. • The conveyor home position LS is operating incorrectly. <There is no function for the moment.>	• Check the workplace interval that there are 6 or less of workplaces which passed by the conveyor synchronization L.S. • Check whether there are any chattering etc. when the workplace interval is correct. (The conveyor home position L.S may work incorrectly.)
1403	CONVEYER QUE NO DATA [123]	The CVQUW command is executed though all conveyor cue has not been used. Or, the clear signal for the conveyor que is input. <There is no function for the moment.>	Check the timing of the CVQUE command execution or the timing of input signal for the conveyor cue clear.
1410	CONTROLNET MODULE ERROR	The error occurs in the CONTROLNET communication module connected to the XCP03 circuit board.	Replace the XCP03 circuit board.
1411	CONTROLNET SETTING ERROR	The data for the CONTROLNET communication is abnormal. 1: Setting address is abnormal. 2: Output signal allocation is abnormal.	Set up the CONTROLNET communication correctly.
1412	CONTROLNET PROCESS ERROR	The error occurs in the system of the sensor part of the CONTROLNET function.	• Turn off the power supply then back on. • If error occurs again, contact your YASKAWA representative.
1500	SGDB PARAMETER ERROR	The contents of the parameter writing value for the SGDx is illegal.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
1501	SGDB COMMAND ERROR	The sending data is different from the receiving data when the mechatro link command is received.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
1502	SGDB PARAMETER VERIFICATION ERROR	The writing data is different from the reading data at the mechatro link parameter.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
1503	COMMUNICAION ERROR(Encoder) (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:00)	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.
1504	CONSTANTDE-STRUCTION (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:02)	Replace the SGDB.
1505	POSITION ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:80)	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.
1506	ENCODER ABSO ERROR(SGDB)	An error occurs in the position detect circuit board of the encoder. * This error occurs during the low speed operations such as the welding operation and the teaching because the alarm check is conducted only when the encoder drives at 200 rpm or less. This alarm does not occur at high speed motion.	• Turn off the power supply then back on. • If the error occurs again, replace the motor(encoder) for the axis where the error occurred. * There is a possibility of the mis-detection by the dust adhesion, etc. on the LED, the lens, and the slit of the detector due to the encoder internal abnormality.
1507	PARAMETER WRITING ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:94)	Replace the SGDB.
1508	COMMAND ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:95)	Replace the SGDB.

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Alarm Number	Message	Cause	Remedy
1509	COMMUNICATION ERROR WARNING (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:96)	Replace the SGDB.
1510	GATE ARRAY 1 ERROR(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:B1)	Replace the SGDB.
1511	GATE ARRAY 2 ERROR(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:B2)	Replace the SGDB.
1512	ENCODER PHASE MISDETECTION (SGDB)	An error occurs in the position detect circuit board of the encoder. * This error occurs during the low speed operations such as the welding operation and the teaching because the alarm check is conducted only when the encoder drives at 200 rpm or less. This alarm does not occur at high speed motion.	• Turn off the power supply then back on. • If the error occurs again, replace the motor(encoder) for the axis where the error occurred. * There is a possibility of the mis-detection by the dust adhesion, etc. on the LED, the lens, and the slit of the detector due to the encoder internal abnormality.
1513	PG LINE CUT-A/B PHASE(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:C3)	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.
1514	PG LINE CUT-C PHASE(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:C4)	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.

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Alarm Number	Message	Cause	Remedy
1515	SYNCHRONIZING ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:E5)	Replace the SGDB.
1516	COMMUNICATION ERROR(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:E6)	Replace the SGDB.
1517	OVER CURRENT (SGDB)	One of the U,V, W wires of the motor displayed on the axis data is grounded at least. • Defective motor • Ground fault of the motor, lead wire • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Overheating of the amplifier	This alarm is reset by turning off the control power supply. But do not turn on the servo power supply before checking the motor grounding. There is a possibility the servopack is damaged when the servo turn-on and off is repeated during ground fault status. • Check the connection of the U, V, W and E wire of the motor. • 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 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. • If the error is not caused by the lead wire, it is thought to be a defective motor. Replace the motor. • If an error is not found by the above check, turn off the power supply and leave them for a while. (self-cooling). If the error is not found after that, the overheat may be a cause. Review the load and the ambient temperature. • If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier and the motor of the error axis.

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Alarm Number	Message	Cause	Remedy
1518	GROUND FAULT (SGDB)	One of U,V and W wires of the motor displayed on axis data is grounded at least. • Defective motor • Ground fault of the motor and lead wire • Defective WRCA01, WRCF01 circuit board • Defective amplifier	This alarm is reset by turning off the control power supply. But do not turn on the servo power supply before checking the motor grounding. There is a possibility the servopack is damaged when the servo turn-on and off is repeated during ground fault status. • Check the connection of the U, V, W and E wire of the motor. • 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 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. • If the error is not caused by the lead wire, it is thought to be a defective motor. Replace the motor. • If the error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier and the motor of the error axis.
1519	RESURRECTION ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:30)	Replace the SGDB.
1520	OVERVOLTAGE (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:40)	Replace the SGDB.
1521	SPEED ERROR(SGDB)	The motor speed displayed in the axis data exceeds allowable max speed. • The wiring of UVW wire of the motor is not correct. • The type of the motor is not correct. • The motor is moved by the external force. • Defective WRCA01, WRCF01 circuit board • Defective motor (encoder)	• Check the connection wire of the motor. • Check the operation of the robot when the alarm is occurred, and confirm whether the external force adds. • Check the connection of the UVW wire of the motor. If it is wrong, correct it up. • Drop the teaching speed when the alarm is occurred. Moreover, R, B, and T axes operate at a fast speed according to the teaching pose at the linear motion type occasionally. In this case, review teaching. <Generated axis is a robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Generated axis is external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
1522	OVERLOAD (CONTINUE)(SGDB)	• The motor torque displayed in the axis data exceeds rated torque for a long time. It may have burned the motor. • The wiring of the UVW wire of the motor is not correct or cut. • The type of the motor used is different. • The motor is moved by the external force. • It interferes with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check the robot arm is interfered with the external devices or the robot body. If the robot interferes, remove the causes. • Check the connection of the UVW wire of the motor, and check the breaking of the wire. • The robot might be worked with heavy load. Review the robot operation and set the teaching speed lower. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier or the motor of the error axis. • If the error occurs again, contact your YASKAWA representative.
1523	OVERLOAD (MOMENT) (SGDB)	The motor torque several times rated torque is generated for a long time at the axis displayed in the axis data. • The wiring of the UVW wire of the motor is not correct or cut. • The type of the motor used is different. • The motor is moved by the external force. • It interferes with an outside equipment. • Defective WRCA01, WRCF01 circuit board • Defective amplifier • Defective motor (encoder)	• Check the robot arm is interfered with the external devices or the robot body. If the robot interferes, remove the causes. • Check the connection of the UVW wire of the motor, and check the breaking of the wire. • The robot might be worked with heavy load. Review the robot operation and set the teaching speed lower. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier or the motor of the error axis. • If the error occurs again, contact your YASKAWA representative.
1524	TEMPERATURE ERROR(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:7A)	Replace the SGDB.

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Alarm Number	Message	Cause	Remedy
1525	ENCODER BACKUP ERROR (SGDB)	- The position data inside the encoder is missing because that the back-up power supply voltage has decreased to 2.6 V or less. - The above error always occurs when purchased motor is used at first time. (The alarm occurs when the control power supply has just been turned on, and it does not occur in operating.)	- Reset the alarm then perform the homeposition calibration again of the alarm axis - Check the voltage of battery in the encoder.(2.8 V or more) - Replace the battery. - If the error occurs again, replace the encoder. - Do not turn the power supply off while the backup capacitor is charging. (For a few minutes)
1526	ENCODER INTERNAL DATA ERROR(SGDB)	The internal parameter of the serial encoder is abnormal. It is thought to be an error of the encoder.	- Turn off the power supply then back on. - If the error occurs again, replace the motor(encoder) for the axis where the error occurred. - If the error occurs again, contact your YASKAWA representative.
1527	ENCODER SPEED ERROR (SGDB)	- The control power supply is turned on when the encoder is driving at 400 rpm or more. The control power supply should not be turned on when the motor is rotating. - The axis without the brakes such as the R, B and T axis of the SK6 falls freely when the servo power supply is turned off by the emergency stop etc. - If the power supply is turned on above statuses, the alarm occurs. - If the alarm occurs in the robot geostationary state, it is thought that the encoder caused the error. (This alarm occurs when the control power supply starts turning on and this does not occur during the operation.)	- Check the timing of the turning on the control power supply. - If the error occurs when the control power supply is turned on at the robot geostationary state, replace the motor (encoder) for the axis data where is the error occurred. - If the error occurs during the operation, contact your YASKAWA representative.
1528	CURRENT FEED BACK U PHASE ERROR(SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:B3)	Replace the SGDB.
1529	CURRENT FEED BACK V PHASE (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:B4)	Replace the SGDB.
1530	WATCHDOG DETECTOR ERROR (SGDB)	The alarm code from the SGDx at the mechatro link communication. (CODE:B5)	Replace the SGDB.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
1531	MOTOR ERROR (SGDB)	The motor is out of control. This alarm occurs when the motor is operated reversing to the instruction of the correct turning direction. • Mis-wiring of the U,V,W, lines of the motor. • Improper type of the motor • External force • Defective WRCA01,WRCF01 circuit boards	• Check the connection of the U,V,W lines of the motor. <Generated axis is a robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Generated axis is external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • If the error occurs again, contact your YASKAWA representative.
1532	SERVO TRACKING ERROR(SGDB)	The servo deviation displayed in the axis data is excessive and the specified active position and path is deviated over the tolerance. • Mis-wiring and disconnection of the U,V,W, lines of the motor • Improper type of the motor • External force • Interfering with external devices • Defective WRCA01,CWRCF01 • Defective amplifier • Defective motor (Encoder)	• Check whether the robot interferes with the external device or with robot body. • Remove the cause if interference. • Check the connection of the U,V,W lines of the motor, and check the disconnection as well. • The robot may run with overload. Review the state of robot working, then reduce the teaching speed and so on. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board. • Replace the amplifier or the motor of the error axis. • If the error occurs again, contact your YASKAWA representative.
1533	OPEN PHASE (SGDB)	The alarm code from SGDx at the mechatro link communication. (CODE:F1)	• Review the primary connecting wires of the R,S, and T lines of the servopack. • Ensure the power supply voltage is 170V or more. • If the error occurs again, replace the WRCA01 and WRCF01 circuit boards. • Replace the SGDB of the error axis.
1534	SGDB WATCHDOG ERROR	Received watch dog data is abnormal.	Replace the SGDB.
1535	SGDB COMMAND TIMEOUT	The execution time of the command exceeds the permissible time.	Replace the SGDB.
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.

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Alarm Number	Message	Cause	Remedy
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.
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 (COM-ARC 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.

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Alarm Number	Message	Cause	Remedy
4015	MEMORY ERROR(Welding start condition guide file)	The welding start condition guide file of the CMOS memory is damaged.	- Initialize the welding start condition guide file in the maintenance mode. - Load the welding start condition guide file in the external memory unit and restore.
4016	MEMORY ERROR(Welding end condition guide file)	The welding end condition guide file of the CMOS memory is damaged.	- Initialize the welding end condition guide file in the maintenance mode. - Load the welding end condition guide 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.
4019	MEMORY ERROR (Cutting condition file) [Decimal Data]	The cutting condition file of the CMOS memory is damaged. Data stands for the file number.	- Initialize the cutting condition file in the maintenance mode. - Load the saved cutting condition 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.
4022	MEMORY ERROR (PAINT SPECIAL FILE) [Decimal Data]	The paint color condition file in the CMOS memory was damaged. The the data stands for the file number.	Initialize the paint color condition file in the maintenance mode. Load the saved file in the external memory unit and restore.
4023	MEMORY ERROR (PAINTING COND FILE) [Decimal Data]	The painting condition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the painting condition file in the maintenance mode. Load the saved condition file in the external memory unit and restore.
4024	MEMORY ERROR (Wrist weaving amplitude characteristic file)	The wrist weaving amplitude characteristic file of the CMOS memory is damaged.	- Initialize the wrist weaving amplitude characteristic file in the maintenance mode. - Load the saved wrist weaving amplitude characteristic file in the external memory unit and restore.
4025	MEMORY ERROR (INTERRUPT JOB FILE)	The interrupt jog file in the CMOS memory was damaged. The data stands for the file number.	Initialize the interrupt jog file in the maintenance mode.
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.

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Alarm Number	Message	Cause	Remedy
4030	MEMORY ERROR (Press characteristic file) [Decimal Data]	The press characteristic file of the CMOS memory is damaged. Data stands for the file number.	- Initialize the press characteristic file in the maintenance mode. - Load the saved press characteristic condition file in the external memory unit and restore.
4031	MEMORY ERROR (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.
4033	MEMORY ERROR (GUN PRESSURE FILE) [Decimal Data]	The gun pressure file of CMOS memory was damaged. The data stands for the file No.	Initialize the 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 form cut 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 ALLOCTE 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.

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Alarm Number	Message	Cause	Remedy
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 maintenance mode. Load the saved vision calibration in the external memory unit and restore.
4044	MEMORY ERROR (WELDING PULSE COND FILE) [Decimal Data]	The welding pulse condition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the welding pulse condition file in maintenance mode. Load the saved condition file in the external memory unit and restore.
4045	MEMORY ERROR (WELDING PULSE SELECTION FILE) [Decimal Data]	The welding pulse selection file in the CMOS memory was damaged. The data stands for the file number.	Initialize the welding pulse selection file in maintenance mode. Load the saved selection file in the external memory unit and restore.
4046	MEMORY ERROR (CONVEYOR CALIBRATION) [Decimal Data]	The conveyor calibration in the CMOS memory was damaged. The data stands for the file number.	Initialize the conveyor calibration in maintenance mode. Load the saved calibration in the external memory unit and restore.
4047	MEMORY ERROR (MACRO DEFINITION FILE) [Decimal Data]	The macro definition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the macro definition file in maintenance mode. Load the saved definition file in the external memory unit and restore.
4048	MEMORY ERROR (SERVO S-GUN FILE)	The sealer gun condition file in the CMOS memory was damaged.	Initialize the sealer gun condition file in the maintenance mode. Load the saved condition file in the external memory unit and restore.
4049	MEMORY ERROR (PASTE QUAN COMPENSATION FILE) [Decimal Data]	The seal amount correction condition file in the CMOS memory was damaged.	Initialize the seal amount correction condition file in maintenance mode. Load the saved condition file in the external memory unit and restore.
4050	MEMORY ERROR (AXIS I/O ALLOCATION FILE)	The axis motion I/O allocation file in the CMOS memory was damaged.	Initialize the axis motion I/O allocation file in maintenance mode. Load the saved I/O allocation file in the external memory unit and restore.
4051	MEMORY ERROR (GUN COND AUX FILE) [Decimal Data]	The gun condition auxiliary file in the CMOS memory was damaged. The data stands for the file number.	Initialize the gun condition auxiliary file in maintenance mode. Load the saved file in the external memory unit and restore.
4052	MEMORY ERROR (TOOL INTERFERENCE FILE) [Decimal Data]	The tool interference file in the CMOS memory was damaged. The data stands for the file number.	Initialize the tool interference file in maintenance mode. Load the saved file in the external memory unit and restore.
4053	MEMORY ERROR (PAINTING SYSTEM CONFIGURATION) [Decimal Data]	The painting system setting file in the CMOS memory was damaged. The data stands for the file number.	Initialize the painting system setting file in maintenance mode. Load the saved setting file in the external memory unit and restore.
4054	MEMORY ERROR (PAINTING SPECIAL) [Decimal Data]	The painting device condition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the painting device condition file in maintenance mode. Load the saved file in the external memory unit and restore.
4055	MEMORY ERROR (CCV-PAINT TABLE) [Decimal Data]	The painting CCV file in the CMOS memory was damaged. The data stands for the file number.	Initialize the painting CCV file in maintenance mode. Load the saved file in the external memory unit and restore.

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Alarm Number	Message	Cause	Remedy
4056	MEMORY ERROR (PLUG VOLUME FILE) [Decimal Data]	The painting filling file in the CMOS memory was damaged. The data stands for the file number.	Initialize the painting filling file in maintenance mode. Load the saved file in the external memory unit and restore.
4057	MEMORY ERROR (EVB GUN SPECIAL FILE) [Decimal Data]	The EVB gun file in the CMOS memory was damaged. The data stands for the file number.	Initialize the EVB gun file in maintenance mode. Load the saved file in the external memory unit and restore.
4058	MEMORY ERROR (EVB TURBINE SPECIAL FILE) [Decimal Data]	The EVB turbine file in the CMOS memory was damaged. The data stands for the file number.	Initialize the EVB turbine file in maintenance mode. Load the saved file in the external memory unit and restore.
4059	MEMORY ERROR (EVB PAINT SPECIAL FILE) [Decimal Data]	The EVB paint file in the CMOS memory was damaged. The data stands for the file number.	Initialize the EVB paint file in maintenance mode. Load the saved file in the external memory unit and restore.
4060	MEMORY ERROR (CLEARANCE FILE) [Decimal Data]	The clearance file in the CMOS memory was damaged. The data stands for the file number.	Initialize the clearance file in maintenance mode. Load the saved file in the external memory unit and restore.
4061	MEMORY ERROR (GAGING SENSOR FILE) [Decimal Data]	The gaging sensor file in the CMOS memory was damaged. The data stands for the file number.	Initialize the gaging sensor file in maintenance mode. Load the saved file in the external memory unit and restore.
4062	MEMORY ERROR (LINEAR SCALE FILE) [Decimal Data]	The linear scale condition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the linear scale condition file in maintenance mode. Load the saved file in the external memory unit and restore.
4063	MEMORY ERROR (CONVEYOR COND SUPP.) [Decimal Data]	The conveyor condition auxiliary file in the CMOS memory was damaged. The data stands for the file number.	Initialize the conveyor condition auxiliary file in maintenance mode. Load the saved auxiliary file in the external memory unit and restore.
4064	MEMORY ERROR (WEAVING SYNCHRONIZING WELD FILE) [Decimal Data]	The weaving synchronizing welding condition file in the CMOS memory was damaged. The data stands for the file number.	Initialize the weaving synchronizing welding condition file in maintenance mode. Load the saved condition file 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.
4102	SYSTEM DATA HAS BEEN CHANGED [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.

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Alarm Number	Message	Cause	Remedy
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. 7: SYNC synchronized task designation omit error The start sub-task omits the synchronized task designation between SUB3 and SUB5. 8: SYNC synchronized task designation error The same task is designated in SYNC.	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. 7:Check the PSTART command again. 8:Check the PSTART command again.
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 (ABSO 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.

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Alarm Number	Message	Cause	Remedy
4109	DC 24V POWER SUPPLY FAILURE	The external 24V power supply was not output.	• Check whether fuse for I/O contactor unit is cut or not. • Check the external 24V power supply. • Check the connection of communication cable for I/O module. (XCP01•CN01-XIU01•CN03 cable) • If the error occurs again, contact your YASKAWA representative.
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 time out 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 time out (timer A) 2:Reception time out (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 HARDWARE ERROR [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 time out (timer A) 5:Transmission time out (timer B)	Correct the error according to the data of the alarm factor after resetting the alarm.
4115	TRANSMISSION SYSTEM BLOCK [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.
4116	TRANSMISSION SYSTEM ERROR [Decimal Data]	An error occurs in the internal processing of the transmission system.	An investigation is required. Contact your Yaskawa representative.

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Alarm Number	Message	Cause	Remedy
4117	SERVO POWER INPUT SIGNAL ERROR	It is thought that the CPU rack, circuit board was abnormal.	• Check whether the setting is the same as the system or not (robot and external axis) • If the error occurs again, contact your YASKAWA representative.
4118	RESURRECTION RESISTANCE COOLING FAN ERROR	The cycle of the cooling fan for the resurrection resistance has decreased.	Move the manipulator to a safe position in the teaching mode after resetting the alarm. Replace the cooling fan for the resurrection resistance. Contact your YASKAWA representative.
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.
4121	COOLING FAN 1 ERROR [Binary Data]	The number of revolutions of cooling fan 1 connected to the I/O Power-ON 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 I/O Power-ON 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 I/O Power-ON 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.

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Alarm Number	Message	Cause	Remedy
4124	VISION INSTRUCTION EXECUTION ERROR [Decimal Data]	1: There is a wrong number in the designated file. 2: There is a wrong setting number in the designated file. 3: The calibration is unable to be executed. 4: The communication port for the vision system are unable to be initialized. 5: The time-out occurs when the data is sent. 6: The time-out occurs when the data is received. 7: There is a mistake at the data which is received from the vision system. 8: It is unable to convert from the pixel coordinates value to the robot coordinates value. 9: A position variable (P variable) was unable to be read or written.	1: Set the correct file number. 2: Set the correct setting value. 3: • Set the robot coordinates value and the pixel coordinates value for the calibration in the user variable. • Set the user variable number in calibration file correctly. 4: Set the parameter for the communication port correctly. 5: • Set the cable between the vision system and the XRC correctly. • Set up the vision system to communicate. 6: • Set the cable between the vision system and the XRC correctly. • Set up the vision system to communicate. • Set the cable between vision system and the XRC correctly. 7: • Set the cable between the vision system and the XRC correctly. • Set up the vision system to communicate. • Set up the vision system to be detectable. 8: • Set up the vision system to detect the correct position. • Use proper calibration file. 9: Do not use the designated positional variable at the same time by other jobs.
4125	WELDING PULSE CONDITION TRANSMISSION ERROR [Decimal Data]	The error occurs when the instruction is executed in the welding pulse condition transmission function. 1: File access abnormality. 2: File setting data abnormality. 4: Port initialization abnormality. 5: Data sending time-out. 6: Data receiving time-out. 7: Received data abnormality.	1: Check set file number. 2: Check setting value of the file. 4: Check setting value of the RS parameter. 5,6,7: Check setting value of the RS parameter.
4126	AUTOMATIC PMT EXECUTION ERROR [Decimal Data]	The error occurs when the automatic PMT function is executed. 1: System abnormality. 2: P panel editing prohibition 3: Conversion object job editing prohibition 4: Saved job editing prohibition 5: Job area memory lack. 6: None conversion object job 7: Position area memory lack	1: Contact your YASKAWA representative. 2: Check the editing prohibition key of the P panel. 3,4: Check the job headers. 5,7: Delete unnecessary jobs. 6: Check the name of the PMT conversion object job.
4127	U-AXIS TIMING BELT BLOWN	An error was detected in the drive belt of the U-axis.	Perform an overrun release, move the robot to the posture for replacement, and replace the belt.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
4128	ARC MONITOR ERROR [Decimal data]	1: One ARCMONON instruction is started while another is being carried out. 10: The settings for the XEW02 analog input board have not been made. 11: A time-over error occurs while sampling.	1: Do not carry out an ARCMONON instruction while another is being carried out. After an ARCMONON instruction, be sure to issue an ARCMONOF instruction to end the arc monitoring function. 10: Make the settings for the XEW02 analog input board. 11: Shorten the monitoring distance.
4200	SYSTEM ERROR (FILE DATA) [Decimal Data]	When accessing to the file data was executed, the error occurred. (File edition, Operation of external memory unit)	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
4201	SYSTEM ERROR (JOB) [Decimal Data]	When accessing to the job was executed, the error occurred. (During robot is being playback and operation)	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
4202	SYSTEM ERROR (JOB) [Decimal Data]	When accessing to the job was executed, the error occurred. (Job edition, Operation of external memory unit)	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
4203	SYSTEM ERROR (POSITION DATA) [Bit Pattern]	When accessing to the position data was executed, the error occurred. (During playback and operation)	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
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)	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
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	SYSTEM ERROR (MOTION) [Decimal Data]	The system error occurred in MOTION.	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
4208	SYSTEM ERROR (ARITH) [Decimal Data]	The system error occurred in ARITH.	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.
4209	OFFLINE SYSTEM ERROR (ARITH) [Decimal Data]	The system error occurred in ARITH offline.	- Reset the alarm and repeat the operation. - Turn the power OFF then back ON. - If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
4210	SYSTEM ERROR	-1: Unused local variable -2: Local variable area lack -3: None empty handle value -4: LVMT semaphore error -5: Invalid specification handle (LVMD.flag=0) -6: Handle value abnormality -7: Failure of the DMM_free -8: Failure of the DMM_new -9: LVMT unconstruction (it has not be initialized.)	- Reset the alarm then try again. - Turn the power supply off once then back on. - If the error occurs again, contact your YASKAWA representative.
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.)	- Check the safe circuit signal wiring of the cables connected to the I/O contactor unit. - Replace the I/O contactor unit.
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.) The data stands for the following error signals: 1: IORDY 2: ON_EN 3: OVSPD 4: SVMMAIN 5: EXOT 6: SVMX 7: KMMB 8: KMMA	- Check the safe circuit signal wiring of the cables connected to the I/O contactor unit. - Replace the I/O contactor unit.
4224	MEMORY PLAY FILE ERROR	Return value (negative value) from the memory play file manager -1: File system bug -2: Control information default (allocation address information) -3: Control information default (save control information) -4: Undefined file No. -5: Used file No. -6: Verification at writing to the CMOS -7: Unused memory play file -8: Memory play file destruction -9: Sampling data area full -10: Sampling data destruction -11: Parameter error -12: Sampling data end or head -13: File system uninitialization -14: MEMOP_sample_seek() illegal offset	- Reset the alarm then try again. - Turn the power supply off once then back on. - If the error occurs again, contact your YASKAWA representative.
4300	VERIFY ERROR (SERVO PARAMETER) [Decimal Data]	A mistake was found in the parameter related to servo control.	Needs investigation. Consult a YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
4301	CONTACTOR ERROR [Bit Pattern]	- The contactor of the Power Supply Unit was not turned ON at servo ON. - While turning servo ON, the signal from the contactor was intercepted. - The contactor signal was not intercepted at servo OFF (at emergency stop). - While turning servo OFF (at emergency stop), the contactor signal was turned ON. Reasons are as follows: - Defective Power Supply Unit - Defective WRCA01 circuit board	- Turn servo ON again after resetting the alarm. - If the error occurs again, replace the Power Supply Unit, WRCA01 circuit board.
4302	BRAKE CIRCUIT ERROR [Bit Pattern]	- The brake relay signal unit was not turned ON at servo ON. - While turning servo ON, the brake relay signal was intercepted. - The brake relay signal was not intercepted at servo OFF (at emergency stop). - While turning servo OFF (at emergency stop), the brake relay signal was turned ON. Reasons are as follows: - Defective I/O Power-ON unit - Defective WRCA01 circuit board	- Reset the alarm and turn servo ON again. - If the error occurs again, replace the I/O Power-ON unit, WRCA01 circuit board.
4303	CONVERTER READY SIGNAL ERROR [Bit Pattern]	- There was no response (servo ready signal) of charge completion from convertor at servo ON. - While turning servo ON, the servo ready signal was intercepted. - The servo ready signal was not intercepted at servo OFF (at emergency stop). - While turning servo OFF (at emergency stop), the servo ready signal was turned ON. Reasons are as follows: - Primary side power supply voltage was too low. - Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON. - Defective WRCA01, WRCF01 circuit board - Defective converter	- Reset the alarm and turn servo ON again. - Check the primary power supply voltage (220V+10%). - If the error occurs again, replace the WRCA01 circuit board, the converter.
4304	CONVERTER INPUT POWER ERROR [Bit Pattern]	- There was no response (ready 1 signal) of primary power supply input from convertor at servo ON. - While turning servo ON, the ready 1 signal was intercepted. - The ready 1 signal was not intercepted at servo OFF (at emergency stop). - While turning servo OFF (at emergency stop), the ready 1 signal was turned ON. Reasons are as follows: - Mistaken wiring of connection for primary side power supply. - The drop of primary side power supply (less than 170V). - Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON. - Defective WRCA01, WRCF01 circuit board - Defective converter	- Check the connection for primary side wiring R,S,T, wire. - Check that the power supply voltage is more than 170V. - If the error occurs again, replace the WRCA01 circuit board, WRCF01 circuit board, the converter.

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Alarm Number	Message	Cause	Remedy
4305	CONVERTER CIRCUIT CHARGE ERROR [Bit Pattern]	• There was no response (ready 2 signal) of charge completed from convertor at servo ON. • While turning servo ON, the ready 2 signal was intercepted. • The ready 2 signal was not intercepted at servo OFF (at emergency stop). • While turning servo OFF (at emergency stop), the ready 2 signal was turned ON. Reasons are as follows: • Mistaken wiring of connection for primary side power supply. • The drop of primary side power supply (less than 170V). • Because the power supply cable of primary side was too fine or its cable was too long, the voltage drop occurred at servo ON. • Defective WRCA01, WRCF01 circuit board • Defective converter • Defective amplifier (There is a possibility that power circuit was short-circuited internally.)	• Check that primary power supply is more than 170V. • Replace the servopack. • If the error occurs again, replace the WRCA01 circuit board, WRCF01 circuit board, the converter.
4306	AMPLIFIER READY SIGNAL ERROR [Bit Pattern]	• There was no response (amp ready signal) of energizing completed from amplifier at servo ON. • While turning servo ON, the amp ready signal was intercepted. • The amp ready signal was not intercepted at servo OFF (at emergency stop). • While turning servo OFF (at emergency stop), the amp ready signal was turned ON. Reasons are as follows: • Defective WRCA01, WRCF01 circuit board • Defective converter • Defective amplifier (There is a possibility that power circuit was short-circuited internally.)	• Reset the alarm and turn servo ON again. • If the error occurs again, replace the WRCA01 circuit board, servopack, the converter.
4307	SERVO ON DEFECTIVE SPEED Robot/Station [Axis Data]	• While encoder was rotating, the servo power supply was turned ON. Impossible to turn ON control power supply in the rotation • 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.	Check the timing of turning ON servo power supply again.
4308	VOLTAGE DROP (CONVERTER) [Bit Pattern]	• Direct current power supply voltage supplied to amplifier for servopack has become less than 143V. Reason is follows: • Primary power supply voltage was too low. • There was open phase. • Defective converter • Defective WRCA01 circuit board	• Check the connection for primary side wiring R,S,T, wire. • Check that power supply voltage is more than 170V. • If the error occurs again, replace the WRCA01, WRCF01 circuit board, the converter.

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Alarm Number	Message	Cause	Remedy
4309	DEFECTIVE ENCODER INTERNAL DATA Robot/Station [Axis Data]	The internal parameter error for serial encoder. It is thought the encoder was abnormal.	• 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. • If the error occurs again, consult with a YASKAWA representative.
4310	ENCODER OVER-HEAT Robot/Station [Axis Data]	The encoder has overheated to 100 degrees.	• Check that the ambient temperature is not too high. • Check the load again. • Check the primary power supply voltage (220V+10%). • If the error occurs again, replace the WRCA01 circuit board, the encoder.
4311	ENCODER BACK-UP ERROR Robot/Station [Axis Data]	• Because backup power supply voltage for encoder decreased (less than 2.6V), position data of the encoder disappeared. • Whenever a new motor was used, this error occurred.	• Reset the alarm. Adjust the home position again. • Check the battery voltage for encoder. (more than 2.8V) • Replace the battery. • If the error occurs again, replace the encoder. • Because it is charged the backup condenser, don't turn OFF power supply for a few minutes.
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.)	• Check the battery voltage for encoder. (more than 2.8V) • Replace the battery.
4313	SERIAL ENCODER OVER HEAT Robot/Station [Axis Data]	The encoder has overheated to 100 degrees.	• Check that the ambient temperature is not too high. • Check the load again. • Check the primary power supply voltage (220V+10%). • If the error occurs again, replace the WRCA01 circuit board, the encoder.
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.)	• Check the battery voltage for encoder. (more than 2.8V) • Replace the battery.
4315	COLLISION DETECT Robot/Station [Axis Data]	• A collision from interference between robot and peripheral device etc. was detected. • The collision was mis-detected by the normal movement of the robot, because the detection level was small.	• Remove the object after resetting the alarm or move the robot to the safety position. • 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. • 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.
4316	PRESSURE DATA LIMIT	The value of pressure in the "GUN PRESSURE" file or the "PRESSURE" file exceeds the maximum pressure in the "GUN CONDITION" file.	Change the value of pressure in the "GUN PRESSURE" file or the "PRESSURE" file below the maximum pressure.

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Alarm Number	Message	Cause	Remedy
4317	PRE-LOAD ERROR	The motor does not operate in the pre-load process.	Adjust the gun opening.
4318	SERIAL ENCODER CORRECTION LIMITATION OVER	DLTPG exceeds the tolerance.	• Check the connection of the encoder displayed on the axis data. • Check whether there is the equipment of device generating big noise around. • Check the ground of the controller is correct. <Error in robot axis> Check the type of the motor is same as described one on the manual. If the type is not correct, replace it with correct motor. <Error in external axis> • Check the type of the motor set in the system configuration is same as actual installed one. If set data in the system configuration is correct, replace installed motor with correct one. If set data in the system configuration is not correct, set the correct system configuration. • If error occurs again, replace the WRCA01 and/or WRCF01 circuit board.
4345	LINK SERVO FLOAT CANNOT EXUCUTE	The link servo float execution is demanded to the linear servo float execution axis.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4346	LINK SERVO FLOAT LIMITATION TORQUE RANGE ERROR	The control torque specified in the link servo float condition file exceeds the limited range specified by the CMOS parameter.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4347	LINEAR SERVO FLOAT LIMITATION TORQUE RANGE [XYZ]	The control torque specified the linear servo float condition file exceeds the limited range specified by the CMOS parameter.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4348	LINEAR SERVO FLOAT COORDINATES TYPE UNMATCH	A linear servo float indicates other coordinates type of the linear servo float.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4349	LINEAR SERVO FLOAT TOOL POSE CONTROL SPECIFICATION ERROR	Tool pose control specification indicates as no existence though the tool pose control specification exists.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4350	LINEAR SERVO FLOATCANNOT EXUCUTE [XYZ]	The linear servo float execution is demanded to the link servo float execution axis.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
4400	NOT READY (ARITH) [Decimal Data]	The operation process of motion control does not end in regulated time.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.
4401	SEQUENCE TASK CONTR ERROR [Decimal Data]	The error has occurred in job exec state-part.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
4402	UNDEFINED COMMAND(ARITH)	The instruction not defined was demanded of the path operation process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4404	ARITHMETIC ERROR [Decimal Data]	The control error occurred in the path operation process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4405	SELECT ERROR (PARAMETER) [Decimal Data]	The control error occurred in the path operation process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4406	GROUP AXIS CONTROL ERROR [Decimal Data]	When operating cooperative control, the control error occurred in the path operation process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
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 (SPLINE)	Among three taught points, there was the same point of two points or more.	Reset the alarm. Teach the different 3 points again.
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 ERROR (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 interpolation 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 interpolation 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 a 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 a 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.

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Alarm Number	Message	Cause	Remedy
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.
4423	MECHANICAL INTERFERENCE (MAX.) Robot/Station [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again.
4424	SPECIAL MECHANICAL INTRF (MIN.) Robot/Station [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again
4425	SPECIAL MECHANICAL INTRF (MAX.) Robot/Station [Axis Data]	An abnormal (reverse) axis interfered mutually.	Reset the alarm. Release the interference and teach again.
4426	PULSE MECHANICAL 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.
4427	PULSE MECHANICAL 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.
4428	SEGMENT CONTROL ERROR [Decimal Data]	The error occurred in data and the timing of the processing part where the operation part was controlled.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.
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.	• Reset the alarm and repeat the operation • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
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.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4431	JHM ERROR [Decimal Data]	The data was abnormal in the job control process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4432	INSTRUCTION INTERPRETER ERROR [Decimal Data]	The error occurred in the job interpretation exec statement part.	- Reset the alarm. Select job and repeat the operation. - If the error occurs again, operate by the following procedure: ① Delete the command that caused the alarm and register again and start execution. ② Delete the job that cause the alarm and register again and start execution. - If the error occurs again, contact your YASKAWA representative.
4433	UNDEFINED GLOBAL VARIABLE [Decimal Data]	The global variable range was undefined.	Needs investigation at YASKAWA. Consult a YASKAWA representative.
4434	VAR-SCOREBOARD CONTROL ERROR [Decimal Data]	The error occurred in variable scoreboard control.	- Reset the alarm. Select job and repeat the operation. - If the error occurs again, operate by the following procedure: ① Delete the command that caused the alarm and register again and start execution. ② Delete the job that cause the alarm and register again and start execution. - If the error occurs again, contact your YASKAWA representative.
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

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Alarm Number	Message	Cause	Remedy
4442	LOCAL-VARIABLE CONTROL ERROR [Decimal Data]	When job was executed, the error occurred in control process of local variable.	- Reset the alarm. Select job and repeat the operation. - If the error occurs again, operate by following procedure: - Delete the command that caused the alarm and register again and start execution. - Delete the job that caused the alarm and register again and start execution.
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.	- Reset the alarm. Select the job again and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4444	UNSUCCESSFUL FINE POSITIONING [Binary Data]	- When executing PL=0 or interrupting external servo, the servo deflection was not put within time. - Excessive external force - The servopack, the motor were abnormal.	- Reset the alarm. In case an external force is affecting the robot, move the robot to remove the external force and repeat the operation. - In case the phenomenon occurs again without any external force, try to insert the XCP01 circuit board again. - If the error occurs again, contact your YASKAWA representative.
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.	- Reset the alarm. Select the job and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
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]	When executing the weaving motion control, the control error occurred in the path operation process. Data stands for the alarm factor. 4:Weaving speed instruction was moving time instruction, moving time was less than 0. 5:Weaving speed instruction was frequency instruction, frequency was less than 0. 6:Weaving stopping time was negative 7:Vertical direction distance at or horizontal direction distance was 0 in triangular wave, L type weaving. 9:Distance between P point and control point was less than 0 in the wrist weaving Except above:Control error	4:Set 0.1 seconds or more in the moving time of weaving file. 5:Set 0.1 hertz or more in the frequency of weaving file. 6:Set a positive value in the stopping time of weaving file. 7:Set 1mm or more in the vertical direction, horizontal direction distance of weaving file. - If the error occurs again, contact your YASKAWA representative.
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.	- Reset the alarm. Select the job and repeat the operation. - If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
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.
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.	• Reset the alarm and repeat the operation. • If the error occurs again, operate the following procedure: ① Delete the command that caused the alarm and register again. ② Delete the job that caused the alarm and register again.
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.

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Alarm Number	Message	Cause	Remedy
4464	OVER BCD RANGE	- 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. - 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.	- Reset the data in the permitted range. - Check the designated data (BCD/binary) and parity check.
4465	OVER BINARY RANGE (PARITY CHECK)	An attempt was made to output a value exceeding 127(decimal) while the parity check was designated.	- Reset the data in the permitted range. - Review the parity check.
4466	OFFLINE UNDEFINED COMMAND(ARITH) [Decimal Data]	Undefined instruction was required for software for OFF-line path arithmetic of the XCP01 circuit board.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4467	USER COORDINATES GENERATION STEP SHORTAGE	An error occurred at user coordinate creation by a job. The number of steps was lacking for a job for user coordinate creation.	Be sure that the number of steps will be three or more.
4468	ROBOT CALIBRATION DATA ERROR [Decimal Data]	The error occurred in the process of making robot calibration data.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4469	ROBOT CALIBRATION FRAME ERROR [Decimal Data]	The error occurred in frame conversion process of robot calibration data	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4470	ROBOT CALIBRATION STEP SHORTAGE	An error occurred at calibration data creation between manipulators. The number of steps was lacking for a job for calibration data creation between manipulators.	Correct the number of steps for a job.
4471	CALIBRATION DATA ERROR [Decimal Data]	The error occurred in the process of making calibration data.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4472	TOOL CALIBRATION DATA ERROR [Decimal Data]	The error occurred in the process of making calibration data.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4473	ARITHMETIC ALARM RESET ERROR [Decimal Data]	System data didn't correspond with reset process after the alarm occurred in arithmetic section.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4474	WRONG CONTROL GROUP AXIS [Bit Pattern]	An instruction such as a job call (CALL) or job jump (JUMP) was used for a call or jump to a job in a group outside the currently used job control group.	Include the call source job control group in the control group used by the current call destination job.
4475	CANNOT EXECUTE JOB(NO ROBOT) [Decimal Data]	When executing ARCON, WVON instruction, the robot was not in the prescribed job control group.	Add a robot to the job control group.

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Alarm Number	Message	Cause	Remedy
4476	CANNOT EDIT (EDIT LOCK JOB) [Decimal Data]	An attempt was made to overwrite an edit-locked job.	Cancel the edit lock.
4477	SELECT ERROR (APPLICATION) [Decimal Data]	When executing operation instruction, the selection parameter (parameter specified for maker) for first application and application parameter (AP) was not adjusted.	Needs investigation. Consult a YASKAWA representative.
4480	SELECT ERROR (SENSOR) [Decimal Data]	When executing sensor instruction, the selection parameter (parameter specified for maker) for first sensor application and sensor parameter (SE) is not adjusted.	Needs investigation. Consult a YASKAWA representative.
4484	WRONG PORT NO. (ANALOG OUTPUT) [Decimal Data]	Parameter(AxP010) showed the head of analog port used for arc, sealing was incorrect.	Change the parameter to a normal value.
4485	WRONG SELECTION (SENSOR) [Decimal Data]	When executing sensor instruction, robot designation (system parameter) uses sensor application and robot designation (system parameter) uses application was not corresponded.	Needs investigation. Consult a YASKAWA representative.
4486	PATH OVER [Decimal Data]	The path went outside the designated pass-over monitoring area.	• Correct the cause of the pass-over. • Set the pass-over radius inside the permitted range.
4487	WRONG MECH PARAMETER FILE [Decimal Data]	Path arithmetic process section control error.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.
4488	INCOMPLETE PT FRAME [Decimal Data]	Path arithmetic process section control error.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.
4489	DEFECTIVE TAUGHT POINT (CUTTING) [Decimal Data]	Impossible to execute cutting motion. Data stands for the alarm factor. 1: CW axis CUT pulse error C, W axis position on cutting start is not zero(0) pulse. 2: Cutting (edge) radius 0 Cutting (edge) radius is zero(0).	1: Set C, W axis position of cutting start position zero(0). 2: Set the radius zero(0) or more.
4490	DEFECTIVE TAUGHT POINT (ENDLESS) [Decimal Data]	Impossible to execute endless motion. Data stands for the alarm factor 1: Interpolation motion impropriety of endless function. Linear motion impropriety. This error occurred as follows. When operating playback panel and programming pendant, though continuous rotation was completed, MRESET instruction was not executed but linear interpolation was executed. 4: Instruction position of step has permitted pulse over cursor for endless axis exceeded 2,147,483,647 pulse.	1: In case this alarm occurs when operating programming pendant, reset the alarm and execute the MRESET operation. In case this alarm occurs when operating playback, set the MRESET instruction before executing the MOV L, MOV C instruction. 4: Check the teaching position again. Set C, W axis position of cutting start position zero(0).
4491	CORRECTIONAL DIRECTION ERROR [Decimal Data]	When correcting a motion, the error occurred in the process of making a correction in the direction for path arithmetic. 4: Reference points were the same.	• Teach reference points again. • If the error occurs again, contact your YASKAWA representative.

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Alarm Number	Message	Cause	Remedy
4492	POSITION CORRECTION ERROR [Decimal Data]	When correcting a motion, the error occurred in making process of making a correction in the volume for path arithmetic.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4493	OVER TOOL FILE NO. [Decimal Data]	The error occurred in the tool file control process.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4494	DEFECTIVE TAUGHT POINT(WEAV) [Decimal Data]	1:Weaving start point and end point were the same. - In case there was no instruction of stop weaving, the position of weaving start point and end point was the same point or the position of weaving start point and reference point is the same point. - In case there is instruction to stop weaving, the position of the weaving start point and reference point is the same point.	Check the position of the start point, end point and reference point. Teach again.
4495	UNDEFINED ROBOT CALIBRATION [Bit pattern]	Robot calibration was incomplete when a coordinated move instruction was executed.	Conduct robot calibration.
4496	PARAMETER ERROR [Decimal Data]	Parameter settings caused division by zero.	Needs investigation. Consult a YASKAWA representative.
4497	DEFECTIVE TAUGHT POINT(CALIB) [Decimal Data]	There was a problem with the taught points.	Teach the points again.
4498	CANNOT EXECUTE JOB(NO GRP AXIS) [Decimal Data]	An illegal instruction was executed in a job with no control group.	Register the instruction in a job with control axis.
4499	UNDEFINED POSITION VARIABLE [Bit Pattern]	Undefined position data was used.	Define the position data.
4500	UNDEFINED USER FRAME [Decimal Data]	Undefined user coordinates were used.	Define the user coordinates.
4501	OUT OF RANGE(PARALLEL PROCESS) [Decimal Data]	The error occurred in task control process of independent control function.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4502	SL BOARD ON-LINE ERROR	When turning ON power supply, detected in the XCP01 circuit board that the XCP02 didn't normally work.	- Insert the XCP02 circuit board again. - If the error occurs again, contact your YASKAWA representative.
4503	CONTROL GROUP JOB EXECUTION IMPOSSIBILITY	The error occurs in the process of the job control.	Contact your YASKAWA representative.
4504	MEASURE INST EXECUTE ERROR [Decimal Data]	When executing the measure instruction, the error occurred. Data stands for the alarm factor. 2:MEASON instruction 3:MEASOF instruction	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.

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4505	UNDEFINED POSITION FOR ARC ON [Decimal Data]	Retry was possible with ARC RETRY execution only if a step existed before the ARCON instruction.	Register a step in front of the ARCON instruction.
4506	UNDEFINED POS FOR RESTART RETURN [Decimal Data]	No restart-return step existed in the job when a restart was attempted.(Eg.,a retry request was received during 1-step execution of CALL destination job.)	Reset the alarm and correct the job.
4507	REFP POS ERROR (SEARCH MOTION)	The distance between the search start point and aimed point was too short to determine the search direction.	Reset the alarm and increase the distance between the search start point and aimed point.
4508	PECIFIED ERROR (COORDINATE) [Decimal Data]	Position confirmation was not possible because the position variable (P) designates coordinates as tool coordinates, master tool coordinates. Data stands for the alarm factor. 0:No coordinates 1:Designation error for master tool coordinates system 2:Designation error for tool coordinates system	Reset the alarm and change the coordinates.
4509	MFRAME ERROR [Decimal Data]	Impossible to create user coordinates 8:No position file registered.	Register the position file (variable).
4510	CANNOT EXECUTE INSTRUCTION (SQRT) [Decimal Data]	The attempt was made to calculate the root of a negative number (Second argument is a negative.)	Correct the job.
4511	OUT OF RANGE (DROP-VALUE) [Control Group]	When turning ON servo, the difference in robot position pulse at servo ON and the previous servo OFF exceeded the permitted range. (Permitted pulse is normally 100pulse.)	Reset the alarm and repeat the operation.
4512	TWO STEPS SAME LINE(3 STEPS)	The three points for creating the user cocoanuts or three or more taught points for robot calibration lie on the same line.	Teach again such that the three points do not lie on the straight line.
4513	EXCESSIVE SEGMENT (SAFETY 1): LOW Robot/Station [Axis Data]	The specified speed exceeded the safe speed.	After resetting the alarm, reduce the speed of the step where the alarm occurred (move instruction) or change the robot posture.
4514	EXCESSIVE SEGMENT (SAFETY 1): HIGH Robot/Station [Axis Data]	The specified speed exceeded the safe speed.	After resetting the alarm, reduce the speed of the step where the alarm occurred (move instruction) or change the robot posture.
4515	EXCESSIVE SEGMENT (SAFETY 2): LOW Robot/Station [Axis Data]	The specified speed exceeded the safe speed.	After resetting the alarm, reduce the speed of the step where the alarm occurred (move instruction) or change the robot posture.
4516	EXCESSIVE SEGMENT (SAFETY 2): HIGH Robot/Station [Axis Data]	The specified speed exceeded the safe speed.	After resetting the alarm, reduce the speed of the step where the alarm occurred (move instruction) or change the robot posture.

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Alarm Number	Message	Cause	Remedy
4517	SEARCH MONITOR SET ERROR (SERVO) [Decimal Data]	The error occurred in the interface with servo on feedback latch mode.	Check the system version of the XCP01, WRCA circuit board.
4518	SEARCH MON RELEASE ERROR (SERVO) [Decimal Data]	The error occurred in the interface with servo on feedback latch mode.	Check the system version of the XCP01, WRCA circuit board.
4519	SPHERE INTRF ERR(ROBOT) [Decimal Data]	Robot calibration was not executed.	Execute robot calibration.
4520	AXIS BLOCKING [Control Group]	Operation was instructed to group axis out of axis blocking on play mode.	- Reset the alarm and repeat the operation. - In case operating robot after reset the alarm, turn ON the general input signal set in the parameter.
4521	WRONG JOB TYPE [Bit Pattern]	0000_0001:Robot job was started from concurrent job by CALL or JUMP instruction. 0000_0001:Concurrent job was started from robot job by CALL or JUMP instruction.	Check the starting job.
4522	TAG DATA CHANGE PROCESS ERROR [Decimal Data]	The error occurred when welding conditions were changed in a job or file.	Correct the job.
4524	CANNOT EXECUTE INST (CONCUR JOB)	A concurrent job contained an instruction (MOV etc.) which couldn't be executed in a concurrent job.	Correct the job.
4525	SPECIFIED JOB EXECUTION IMPOSSIBILITY	The error occurs in the job control processing part.	Contact your YASKAWA representative.
4526	SYNTAX ERROR IN EQUATION INST [Decimal Data]	Internal data of equation installation was abnormal.	Needs investigation. Consult a YASKAWA representative.
4527	UNDEFINED PORT NO. (AOUT) [Decimal Data]	Designation of port No. for job was abnormal.	Needs investigation. Consult a YASKAWA representative.
4528	SYNTAX ERROR [Decimal Data]	Internal data was abnormal in instruction. (System function unmatched)	Needs investigation. Consult a YASKAWA representative.
4529	TWIN COORDINATED ERROR [Decimal Data]	1: The job started by SYNC was a job without any robot axes (job with station axes only, or concurrent job, etc.). 2: The job started by SYNC was a job with robot axes only.	Set the R□+S□ job to the job that is started by SYNC.

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Alarm Number	Message	Cause	Remedy
4530	CONVEYER SYNCHRONIZING ERROR	Data stands for the alarm factor. 1: The base axis in the conveyer characteristic file is specified to the value excepted for 0, 1, and 2. 2: The job which follow up the robot axis does not have the robot axis. 3: The job which follow up the base axis does not have the base axis. 4: CV selection <-> CVF# number unmatched 5: No conveyer starting point data at pre-reading 6: Conveyer position latch error at pre-reading 7: No synchronization starting signal input 8: Conveyer position reset prohibited 9: Conveyer correction amount read error	- Reset the alarm then try again. - If the error occurs again, contact your YASKAWA representative.
4531	CONVEYER CHARACTERISTIC FILE UNSET	"Use state" of the conveyer characteristic file set up by the job is not specified to "1:Use".	Set "Use state" to "1:Use" at the conveyer characteristic file set by the job.
4532	CONVEYER SPEED DOWN	The conveyer speed drops into under "Conveyer Lowest Speed" in the conveyer characteristic file when "Mode When Conveyer Decreases" of the conveyer characteristic file is selected as "1:Mode When the Alarm Occurs".	Check the speed specified at "Conveyer Lowest Speed" of the conveyer characteristic file.
4533	CONVEYER SYNCHRONIZATION CALCULATION ERROR	Data stands for the alarm factor. 1: Conveyer synchronization control group specification error 2: Conveyer synchronization user coordinate specification error 3: Conveyer synchronization cooperation slave error	- Reset the alarm then try again. - If the error occurs again, contact your YASKAWA representative.
4534	TORQUE INTERFERENCE	During operation at the designated speed, there is axis that the robot axis or motor load torque exceeded the permitted torque.	- Check if the tool weight information is correctly set in the tool file. - Reset the alarm. Reduce the step (for moving instruction) speed that caused the alarm or change pose of robot.
4535	PSEND ERROR	Data stands for the alarm factor. 1: PRECV is instructed to its own task. 2: Mail data type unmatched 3: Mail box number error	Check the destination.
4536	PRECV ERROR	Data stands for the alarm factor. 1: PRECV is likely to be instructed by itself to its task. 2: Unmatched mail data type 3: Mail box number error	Check the destination.
4537	OFFLINE MAIL BOX PROCESSING ERROR	Data stands for the alarm factor. 1: Mail box number error The error of the mail box number from the SYSCON CPU 2: Undefined mail box operation command The error of the mail box number from the SYSCON CPU 3: OFF_MB_IFS pointer improper MOTION CPU internal data error	- Reset the alarm then try again. - If the error occurs again, contact your YASKAWA representative.

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4538	ROBOT AXIS TRACKING IMPOSIBILITY	• SYMOVJ is executed for following up the robot. • SYMOVJ is only able to use for the base axis follow-up.	Check the job.
4539	CORNER R CONTROL ERROR	• Unable to use the corner R during the cooperative operation • No reference point • Permissible angle over • Circular path inscribed by the specified radius cannot be generated. 1: Corner R cooperated control slave specification error 2: Corner R pass refinement reference point error 3: Corner R pass angle error 4: Corner R operating radius data error 5: Corner R operating group specification error 6: Corner R master side command error 7: Corner R operation prohibition during the weaving function execution 8: Corner R operation prohibition during the conveyer synchronization function execution 17: Corner R operation prohibition during the conveyer synchronization execution	• Do not use the corner R in the coordinated motion. • Teach it again. • Adjust the set value of the corner R operation specification.
4540	JOB QUEUE EMPTY ERROR	[QUE] was called by CALL instruction and JUMP instruction when all job queue was not used.	Set data in the job queue and call [QUE].
4541	UNDEFINED PAINT CHARACTERISTIC FILE	"SET" in the painting characteristic file specified by the job has not been "Completed".	Select "Completed" at "SET" at the painting characteristic file specified by the job.
4542	MRESET ERROR	The MRESET instruction is executed though the endless axis is not specified. Data stands for the alarm factor. 1: Endless axis specification error.	• Reset the alarm then try again. • If the error occurs again, contact your YASKAWA representative.
4543	STACK LESS THAN 0 (JOB CALL) [Decimal Data]	The error occurred in internal data when returning job.	• Reset the alarm and repeat the operation. • If the error occurs again, contact your YASKAWA representative.
4544	MULTI LAYER JOB ATTRIBUTE UNMATCH	Incorrect job attribute (reverse attribute) The cause is as following: • The sampling reverse job specified by the MLTSMPL instruction is not the reverse attribute. • First layer job specified by the MLTSMPL instruction or sampling forward job is reverse attribute. • The attribute of the sampling job specified by the MLTSCAL is different from the attribute of the Nth job. (MLTSMPL, MLTSCAL)	• Check the attribute of the job specified by the MLTSMPL. • Check the sampling reverse job is generated. • Correct the attribute of the job specified by the MLTSCAL.
4545	MULTI LAYER JOB CONTROL GROUP UNMATCH	The control group between the specified jobs are not same. (MLTSMPL, MLTSCAL)	Select the job which matches with the control group.

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4546	MULTI LAYER JOB STEP NUMBER UNMATCH	The number of total steps is not equal between specified jobs. (MLTSMPL,MLTSCAL)	Match the number of the steps between jobs.
4547	MULTI LAYER JOB REFERENCE POINT NUMBER UNMATCH	Unmatch number of the reference point between specified jobs (MLTSMPL, MLTSCAL)	Match the number of the reference point between the jobs.
4548	MULTI LAYER JOB POSITION DATA COORDINATES UNMATCH	The sample job and the jobs after the second layer are pulse type. (MLTSMPL, MLTSCAL)	Create the sample job and the jobs after the second layer according to the instruction of "Multi Layer Function".
4549	MULTI LAYER TEACHING TOOL UNMATCH	The tool file of the move instruction corresponded between specified jobs is unmatched.(MLTSMPL, MLTSCAL)	Match the tool file of the move instruction corresponded between jobs.
4550	MULTI LAYER WELDING SECTION UNREGISTERED	The welding section as follow are not registered at the specified job. (SENSON COMARC - SENSO COMARC, SENSON SCOMARC - SENSO SCOMARC, ARCON - ARCOF) (MLTSMPL,MLTSCAL)	Register the welding section on the each job.
4551	MULTI LAYER WELDING SECTION MOVE INSTRUCTION NUMBER UNMATCH	The number of the move instruction in the welding section between specified jobs is unmatched. (MLTSMPL, MLTSCAL)	Match the number of the move instruction in the welding section between jobs.
4552	MULTI LAYER EXECUTION ERROR	Data stands for the alarm factor. 1: Multi layer sampling cue underflow The internal cue for sampling is underflow at the MLTSMPL instruction execution. (MLTSMPL) 2: Multi-layer sampling cue overflow The internal cue for sampling is overflow at the MLTSMPL instruction execution. (MLTSMPL) 3: Multi layer sampling cue fatal error The job name of the internal cue for sampling is not registered at the MLTSMPL instruction execution. (MLTSMPL) 4: Multi layer sampling cue / job name unset 5: Multi layer scaling calculation error (approach point) 6: Multi layer scaling calculation error (sensing start point) 7: Multi layer scaling calculation error (sensing start reference point) 8: Multi layer scaling calculation error (sensing execution point) 9: Multi layer scaling calculation error (sensing end point) 10: MLTWSET file pointer Illegality 11: Scaling shift calculation answer point number over	• Reset alarm then try again. • If the error occurs again, contact your YASKAWA representative.
4553	MLTSMPL INSTRUCTION DUPLICATION EXECUTION IMPOSSIBLE	The MLTSMPL instruction is executed again while the MLTSMPL is executed. (MLTSMPL)	Check the contents of the job. Check if the MLTSMPL instruction is executed doubly by the problems such as the JUMP instruction makes the flow change, and so on.

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Alarm Number	Message	Cause	Remedy
4554	UNDEFINED MULTI LAYER CONDITION FILE	The setting of the multi-layer condition file is not completely. (MLTSSET, MLTWSET)	Set the multi-layer condition file completely.
4555	UNDEFINED MULTI LAYER CONDITION FILE	The multi-layer condition file which is no used is specified. (MLTSSET, MLTWSET)	Check the specified multi-layer condition file.
4556	MULTI LAYER WELDING SECTION NUMBER UNMATCH	The number of the welding section as follow is not equal in the specified job. (SENSON COMARC - SENSO COMARC, SENSON SCOMARC - SENSO SCOMARC, ARCON - ARCOF) (MLTSMPL, MLTSCAL)	Equate the number of the welding section between jobs.
4557	MULTI LAYER WELDING START INSTRUCTION DUPLICATION EXECUTION IMPOSSIBILITY	There are SENSON instruction and ARCON instruction between the welding sections at the specified job. (MLTSMPL, MLTSCAL)	Register it with pairs as SENSON COMARC and SENSO COMARC, SENSON SCOMARC and SENSO SCOMARC, ARCON and ARCOF. Do not register SENSON and ARCON in instructions in that sections. (MLTSMPL, MLTSCAL)
4558	MULTI LAYER WELDING SECTION NUMBER OVER	The number of the welding section exceeds 10. (MLTSMPL, MLTSCAL)	Adjust the number of the welding sections in the job to 1-10.
4559	MULTI LAYER MOVE INSTRUCTION UNMATCH	The type of the move instruction which corresponds between the jobs is not equal. (MLTSCAL)	Equate type of the move instruction which corresponds between the jobs.
4560	SCALING SHIFT SAME POINT ERROR (MOVL3 POINTS)	Same three points of the MOVL instruction are registered in the scaling shift section. (MLTSCAL)	Same point must be two or less.
4561	SCALING SHIFT SAME POINT ERROR (REFP)	The REFP instruction is registered with the same point in the scaling shift section. (MLTSCAL)	Re-teach the same points of the REFP.
4562	SCALING SHIFT SAME POINT ERROR (Start point/End point)	The start point and the end point in the scaling shift sections are registered at the same point. (MLTSCAL)	Teach the start point and the end point at the different point.
4563	SCALING SHIFT ERROR	Data stands for the alarm factor. 1: Scaling shift internal processing error 1 2: Scaling shift internal processing error 2 3: Scaling shift calculation processing error (MLTSCAL)	- Reset the alarm then try again. - If the error occurs again, contact your YASKAWA representative.
4564	INTERNAL STATUS ERR (SEARCH HALT) [Decimal Data]	When execution of start point detecting function (SRCH), search function for general sensor (ASRCH), force detecting function (TSRCH) was completed, the process error occurred.	- Reset the alarm and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4565	SOFTWARE UNMATCH [Decimal Data]	Operating function didn't correspond to system.	Need the investigation. Consult YASKAWA representative.

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4566	USER COORDINATES GENERATION ERROR	1: The teaching points are incorrect. 2: The teaching points for user coordinate turning are incorrect. 3: The robot axis is not specified for the control group of the job to prepare the user coordinates. 5: Position data error Software operation error occurred 6: Setting error of the slave group for user coordinate conversion	2: Among three taught points in the teaching position. Teach the three points again so that they do not lie in the straight line. Except 2: (1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4567	CANNOT MONITOR DISTANCE	The attempt was made to execute MOVJ, MOVS when operating ARC retry, restart.	Set not to operate ARC retry, restart or, change the instruction (interpolation) to MOVJ, MOVJ.
4568	UNDEFINED PRESS CHARACTERISTIC FILE	"Unused" is specified in the press characteristic file used in the job.	Set "Used State" in the press characteristic file.
4569	PRESS RESOLUTION DATA UNSET	The resolution of the press characteristic file specified by the job is not set.	Please set the resolution of the press characteristic file.
4570	SERVO FLOAT MODE SETTING ERROR	The float mode can not be specified at the FLOATON instruction execution.	- Check the proper ROM version for the WRCA circuit board. - It is necessary to replace the SL circuit board and investigate the problem by YASKAWA if the error occurs again. Contact your YASKAWA representative.
4571	SERVO FLOAT MODE RELEASE ERROR	The float mode can not be canceled at the FLOATOF instruction execution time.	- Check the proper ROM version for the WRCA circuit board. - It is necessary to replace the SL circuit board and investigate the problem by YASKAWA if the error occurs again. Contact your YASKAWA representative.
4572	UNDEFINED MOTOR GUN CONTROL GRP	There was no group setting controlled as motor gun.	Configured again on customer maintenance mode, set the motor gun axis correctly.
4574	SPOT WELD COMPLETE TIME LIMIT	Welding completed signal from timer conductor or welding error signal doesn't enter even if waiting set time.	- Correct the factor, no turning ON power supply of timer conductor etc., and repeat the operation. - In case that it takes time to response from the timer, lengthen set time.
4575	ERROR IN WELD START TIMING SET	When there was no set of second pressure at servogun, welding timing was set [After first pressure].	Set the second pressure or, change the start timing.
4576	ERR IN SERVO GUN CONT MODE	The error occurred in control process of servogun.	Needs investigation. Consult a YASKAWA representative.
4577	ERR IN SERVO GUN MODE RLSE	The error occurred in control process of servogun.	Needs investigation. Consult a YASKAWA representative.
4578	SPOT WELD ERROR [Decimal Data]	The error occurred in timer conductor of system designated by data.	Reset the timer conductor that caused the welding error and repeat the operation.

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Alarm Number	Message	Cause	Remedy
4579	ANTICIPATION CONTROL ERROR	The error occurs at the processing of the participation function. The alarm may occur when the work instructions are registered consecutively.	Register the move instruction between work instructions. PAINTON PAINTON PAINTOF → MOVL PAINTOF MOVL
4580	ANTICIPATION DISTANCE SHORTAGE	There is no return step at the re-painting function after the emergency stop. The error occurs at restart after the emergency stop is performed during the movement to the top step of the job called in the painting section.	- Reset the alarm then try again - Refer to the Painting System Additional Function Manual for details.
4581	DEFECTIVE ANTICIPATION FILE [Decimal Data]	A setting in the anticipation output file is set to an improper value. The setting of the OT output or OG output is “-” 1: OT output No. failure 2: OG output No. failure	After resetting the alarm, set to the proper value.
4583	CANNOT EXECUTE GUN TYPE	Set gun was set by operation mode of control impossible.	Change to the mode applied to the gun.
4584	STRWAIT TIME LIMIT	Confirmation signal designated by stroke switch confirmation instruction doesn't enter even if waiting set time.	- Correct the factor, defective LS etc., and repeat the operation. - If the error occurs again, contact your YASKAWA representative.
4585	SERVO PG ON ERROR	Encoder's power is not on when the control power supply is turned ON.	Check the cable connection of the motor gun's encoder.
4587	MOTOR GUN CHANGE ERROR	The error occurred when the gun was changed. The number shown indicates the cause of the alarm. 1: GUNCHG was issued in a system configuration in which the gun change function cannot be used. 2: GUNCHG PICK was issued while the servo of the motor gun's motor was on. 3: GUNCHG PICK was issued when the ATC was unchecked. 4: GUNCHG PLACE was issued when the ATC was unchecked. 5: The encoder's power could not be turned ON when GONCHG PLACE was issued. 6: The encoder's power could not be turned OFF when GUNCHG PLACE was issued. 7: The serial number of the motor gun does not correspond to the gun number specified in GUNCHG.	1: Reconnect the motor gun on the station axis in maintenance mode. 2: Execute GUNCHG PICK when the servo of the motor gun's motor is OFF. 3: Execute GUNCHG PICK when the ATC is chucked. 4: Execute GUNCHG PLACE when the ATC is chucked. 5: Check the cable connection of the motor gun's encoder. 6: Check the cable connection of the motor gun's encoder. 7: Check the gun number in the gun condition data file for GUNCHG. And, check the gun's serial number.
4588	COMPENSATION DIRECTION UNSETTING	When correction direction of fix side chip for gun condition data file was except 1, 2, [Contact Teaching], [Abrasion Correction] etc. was intended to used.	Set the correction direction of fix side chip to apply the gun.
4589	ABRASION BASIS POS UNSETTING [Decimal Data]	When using abrasion correction function at servogun, various standard position was not registered. 1: Standard position A 2: Standard position B 3: Standard position C	Register a required standard position.

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Alarm Number	Message	Cause	Remedy
4591	SERVO PART SPEED CONTROL MODE SETTING ERROR	The error occurs in control check.	(1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4592	SERVO PART SPEED CONTROL MODE RELEASE ERROR	The error occurs in control check.	(1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4593	SERVO HAND CONTROL MODE SETTING ERROR	The error occurs in control check.	(1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4594	SERVO HAND CONTROL MODE RELEASE ERROR	The error occurs in control check.	(1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4595	FORM CUTTING MOTION IMPOSSIBILITY	1: Radius data set defect 2: Horizontal data set defect 3: Vertical data set defect 4: Corner radius data set defect 5: Overlap data set defect 6: Speed data set defect 7: Cooperative control slave specified 8: From cutting operation minimum radius not specified 9: Form cutting operation maximum radius not specified 10: FORMAPR unexecution. (The FORMAPR is not performed at the previous step though the starting point is specified to "Starting Point" or "Automatic".)	1: Check the value of the radius. 2: Check the value of the horizontal. 3: Check the value of the vertical. 4: Check the radius value of the corner. 5: Check the value of the overlap amount. 6: Check the value of the cutting speed. 7: Execute FORMCUT instruction at the independent job. 8: Check the set value of the minimum radius. 9: Check the set value of the maximum radius. 10: -Execute the FORMAPR instruction. -Do not register any move instruction between the FORMAPR and FROMCUT instructions. -To execute the FORMCUT instruction by pressing PLAYBACK, TEST RUN, or INTERLOCK and FWD at the same time after a FWD or BACK operation, be sure to execute the FWD or BACK operation several steps before the FORMCUT instruction. All the instructions between the instruction carried out by pressing the FWD or BACK and the FORMCUT instruction must be executed by pressing PLAYBACK, TEST RUN, or INTERLOCK and FWD at the same time.
4596	FORMCUT ERROR	An attempt was made to reexecute the FORMCUT instruction after interrupting it.	Re-execute the move instruction executed before the FORMCUT instruction, and then execute the FORMCUT instruction again.

Alarm Message List

Alarm Number	Message	Cause	Remedy
4597	OFFLINE POSITION DATA CONVERSION ERROR	1: Error of the original position data tag for the off-line position data conversion 2: Error of the original position data user coordinates number for the off-line position data conversion 3: Defect of the position data for the reference for the off-line position data conversion 4: Error of the original position data order and the inversion for the off-line position data conversion 5: Defect of the pulse increment for the offline position data conversion 6: Conversion failure after the pulse increment for the off-line position data conversion 7: Defect of the XYZ incremental value for the off-line position data conversion 8: Conversion failure after the XYZ increment for the off-line position data conversion 9: Conversion error by the conversion information for the off-line position data conversion 10: Defect of the angle incremental value for the off-line position data conversion 11: Conversion failure after the angle increment for the off-line position data conversion 12: Reverse shift data creation failure of the 3D shift for the off-line position data conversion 13: Reverse shift data addition failure of the 3D shift for the off-line position data conversion 14: Reverse shift data creation failure of the shift data for the off-line position data conversion 15: Reverse shift data addition failure of the shift data for the off-line position data conversion 16: Addition failure of the 3D shift data for the off-line position data conversion 17: Addition failure of the shift data for the offline position conversion	4: The variable position may be out of the robot motion range. Check if the variable position is within the robot motion range. Except 4: (1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status. (operating procedure).
4598	PAINTOUT ERROR	1: The parameter setting for the universal input group number is incorrect.	Check the settings for the AxP011.
4599	SERVO COMMAND ERROR	An attempt was made to issue the command while the servo control processing has not completed.	(1)Reset the alarm, and then try again. (2)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4601	UNDEFINED GUN COND FILE [Decimal Data]	Gun condition data file was not set.	Set the gun condition data file completely.
4603	WIRE STICKING [Decimal Data]	The sticking was detected by the welder. 1 : Welder 1 2 : Welder 2 3 : Welder 3 4 : Welder 4	Determine the sticking factor of the welder.

10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4604	DESIGNATED AXIS HOME POSITION CORRECTION DATA NON-EXISTING	The home position correction data is not registered.	Registration for the home position correction data.
4605	SETTOOL ERROR	The different value between a present tool constant and the setting value exceeds a permissible range (parameter setting value). 1: Maximum deviation permissible range over.	• Check whether the setting value is correct. • Check whether the parameter setting is correct.
4606	GLOBAL VARIABLE AREA OVERFLOW	The value of the number setting parameter of the global variable (user variable) is defective. User variable setting condition The maximum rows are 4:(below 999) The maximum memory are below 2816 byte. $S1D190*4*1+S1D191*4*2+S1D192*4*4+S1D193*4*4 \leq 2816$ S1D190(B variable) 1block: 4 numbers S1D191(I variable) 1block: 4 numbers S1D192(D variable) 1block: 4 numbers S1D193(R variable) 1block: 4 numbers Position variable setting condition<X3.76> Maximum numbers are 4992. S1D187(P variable) 1 block: 64 numbers Setting value 0-78 S1D188(B variable) 1 block: 64 numbers Setting value 0-78 S1D189(EX variable) 1 block: 64 numbers Setting value 0-78 * It is necessary initialize the job when the position variable number is expanded. Standard CMOS is able to correspond the P variable with the maximum numbers of 4992 at the one robot system. However, the number of the P variable is limited within the ranges of the number of teaching step at the system of the base or station.	Reset the global variable (user variable) number and the position variable setting parameter.
4607	MACRO COMMAND EXECUTION ERROR	1: Macro execution job unset 2: Macro interruption job unset 3: Unstartable job from the specified macro command (attribute) 4: Macro execution cancel error1 5: Macro execution cancel error2	(1)Check the following settings. • Check the settings for execution macro job.
4608	JOB ARGUMENT GET ERROR	1: Job argument unset 2: No specific argument numbers 3: Argument data type unmatched	(1)Check the following settings. • Check the settings for jobs.
4609	MEMORY PLAY FILE	1: Memory play has already executed. (task itself) 2: Memory play is in use at the other task 3: Re-record of the record completion file 4: Replay of the record incompleteness file 5: Memory play file control group is different from the execution job control group.	(1)Check the following settings. • Check the setting of the used memory play file number. • Check the control group setting of the used memory play file.

Alarm Message List

Alarm Number	Message	Cause	Remedy
4610	MEMORY PLAY SAMPLING ERROR	1: Memory play sampling data reading failure 2: Memory play sampling data writing failure 3: Memory play sampling data seeking failure 4: Memory play mode setting error at the memory play sampling 5: Memory play sampling data control group error 6: Ki/Ni in the sampling section of the memory play sampling data is lower than 0. 7: Undetection at the memory play sampling data back play mode.	(1)Reset the alarm, and then try again. (2)Check the following settings. • Check the settings for the memory play mode. • Check the number of the memory play file for use. (3)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4611	OPTON INSTRUCTION EXECUTION NUMBER OVER	It exceeds the limitation numbers of the execution.	(1)Check the following settings. • Check the settings for the OPTON instruction. OPTON instruction can use only the function to five simultaneously.
4612	TSYNC ERROR [Decimal Data]	The number of synchronizations in the TSYNC command disagree. The data indicates the number of synchronization that were first executed.	Check the number of synchronizations in the TSYNC command again.
4613	SERVO SEALING GUN CONTROL ERROR	1: The set up of the "Sealing Gun Characteristic File" is not completed. 2: Sealing guns does not exist at the job which executes the sealing gun control. 3: Robot does not exist at the job which executes the sealing gun control. 4:The specification of the control method for the servo sealing control is not correct. (PRM1 of the OPTON instruction must be specified to 1 or 2.) 5: The specification value of the needle position is not correct. (PRM2 must be specified to 0-100 when PRM=1 in the OPTON instruction.) 6: The specification value of the painting width is not correct. (PRM2 must be specified to 0-30 when PRM1=2 in the OPTON instruction.)	(1)Check the following settings. • Check the settings for the function designation parameter. • Check the settings for the control-group of the job. • Set either "1" or "2" for PRM1 control method designation of the OPTON instruction. • If "1" is set for PRM1 of the OPTON instruction, set the PRM2 needle position designation to a value between 0 and 100. • If "2" is set for PRM1 of the OPTON instruction, set PRM2 sealing width designation to a value between 0 and 30.
4614	SEALING GUN CHARACTERISTIC FILE UNSET	Sealing gun characteristic file unset	Complete the sealing gun characteristic file.
4615	I/O AXIS OPERATING	An attempt was made to command a job whose control group was in I/O axis motion.	Check the following settings. • Does not the I/O axis motion executed for the control group that executing the job? • Does not the job executed for the control group that operating by the I/O axis motion? The control group where the I/O axis is operating cannot execute the job. Moreover, the I/O axis motion cannot perform for the control group where the job is executing.

10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4616	AXIS SHIFT ERROR	An internal control error occurred when shifting the axis. 1: The file could not be switched because of incorrect start point designation. 2: The control group with which the axis shifting is performed disagrees with the control group set for the axis shifting function in the calibration file. 3: The calibration file number for axis shifting function is out of the applicable range.	(1)Reset the alarm, and then try again. (2)Check the following settings. • Correct the settings for the OPTON instruction tag so that value of the file number specification is 1 to 32. (3)If the alarm occurs again, save the CMOS.BIN in maintenance mode, and then contact your Yaskawa representative about occurrence status (operating procedure).
4617	SU AXIS MOTION DISABLED (LR AXIS POSITION ERROR) [Decimal Data]	With L- and R-axes in the present positions, the S- and U-axes cannot be moved.	Add a teaching position or change the teaching position before the move command where the error occurred so that the L- and R-axes move to the home position.
4618	SHIFT INSTRUCTION EXECUTION ERROR	1: At the tool shift in Eulerian angles ± 90 degrees, the shift value is specified besides Y axis.	(1)Check the following settings. • Check if the shift value is setting for Y-axis only.
4619	JOB REGISTRATION ON TABLE UNSET	An error occurred in job registration table. The job registration table is not set. Sub Code: Designated registration number	(1)Check the following settings. • Check the settings for the job registration table.
4620	ARM(TOOL) INTERFERENCE	Parts and tool of manipulators were about to interfere with each other. Sub Code: Group(Interferening)&Axis(Interfering)&Group(Interfered)&Axis(Interfered)	(1)Check the following settings. • Change the teaching so that the manipulators specified by sub code will not interfere with each other. • Check if the tool model (Tool interference file) of the manipulator specified by sub code is correctly set. • Check if calibration between the manipulators are correctly set.
4623	GETPOS COMMAND ERROR [Decimal Data]	1: Cannot get the step of the local position variable. Ex.) MOVJ LP000 VJ=25.00 2: Cannot get the step of the arrangement variable. Ex.) MOVJ P[0] VJ=25.00 3: This step does not exist.	Check the GETPOS command again.
4809	ENCODER BATTERY ERROR(SGDB)	• The voltage of the encoder backup battery decreased to 2.8V or less. • Leaving above situation makes the abnormal backup, and the home position data disappears. (This alarm only occurs when the control power supply is started to turn on, and this does not occur in operating)	• Check the battery voltage of the encoder. (2.8V or more) • Replace the battery.
4811	MAIN POWER SUPPLY CIRCUIT ERROR(SGDB)	Alarm code (Code:B6) from SGDx at the mechatro link communication	Replace the SGDB.
4816	SGDB MAIN POWER SUPPLY READY ERROR	• The main power supply signal is not turned on in the servo ON sequence. • The main power supply signal is not on during the servo on. • The main power supply signal is not on in the servo OFF sequence. • The main power supply signal is not off during the servo OFF. (emergency stop).	Replace the SGDB.

Alarm Message List

Alarm Number	Message	Cause	Remedy
4817	SGDB BASE BLOCK SIGNAL ERROR	• The base block signal is not released in the servo ON sequence. • The base block signal is not released during the servo ON. • The base block signal is released in the servo OFF sequence. • The base block signal is released during the servo OFF. (emergency stop)	Replace the SGDB.
4818	SGDB EXECUTION IMPOSSIBILITY	Processing which cannot be used in the mechatro link mode is specified for execution. (X3.90)	Replace the SGDB.
4901	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 1	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4902	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 2	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4903	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 3	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4904	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 4	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4905	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 5	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4906	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 7	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.

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Alarm Message List			
Alarm Number	Message	Cause	Remedy
4907	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 7	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4908	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 8	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4909	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 9	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4910	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 10	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4911	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 11	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4912	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 12	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4913	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 13	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4914	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 14	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.

Alarm Message List

Alarm Number	Message	Cause	Remedy
4915	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 15	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4916	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 16	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4917	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 17	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4918	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 18	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4919	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 19	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4920	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 20	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4921	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 21	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4922	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 22	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.

10.3 Alarm Message List

Alarm Message List			
Alarm Number	Message	Cause	Remedy
4923	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 23	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
4924	CUBE/ AXIS INTERFERENCE	Cube/Axis interference 24	(1)Check the following settings. • Perform the teaching again to correct positions for manipulators so that the step where the alarm occurred is out of interference area. • Change the settings for interference area.
5000	IP ADDRESS SETTING ERROR	The setting of the I P address of the local station or server is (0,0,0,0) or (255,255,255,255).	Ensure the setting value and change to an appropriate numerical value in the system configuration.
5001	SUBNET MASK SETTING ERROR	The setting of the sub net mask is (0,0,0,0) or (255,255,255,255).	Ensure the setting value and change to an appropriate numerical value in the system configuration.
5002	GATEWAY SETTING ERROR	The setting of the IP address of the gateway does not exist in the same local station and the same network.	Ensure the setting value and change to the correct gateway IP address in the network specified by the sub-net mask in the system configuration.
5003	ETHERNET PROCESSING ERROR	XIF02 circuit board initialization error.	• Turn on the control power again. • If the error occurs again, contact your YASKAWA representative.
5010	ANALOG INPUT ERROR(XCP02)	The value of the analogue input on the XCP02 circuit board can not be readable correctly. Data stands for the channel where an input error has occurred.	• Check the cable. • Replace the XCP02 circuit board.
5011	TRANSMISSION ERROR(XCP02)	An error occurs in the serial transmission of the XCP02 circuit board. Data stands for the defective contents. d0: Receiving FIFO error d1: Framing error d2: Parity error d3: Overrun error d4: Check sum error d5: NAK receiving error d6: Sending time over d7: Receiving time over	• Check the receiving and sending communication parameter. • Check the communication cable.
5012	SYSTEM ERROR(COMARC)	An error occurs in the system on the sensor part of the COMARC function. Data stands for the contents of the errors.	• Reset the alarm then try again. • If the error occurs again, contact your YASKAWA representative.
5013	COMARC PROCESSING ERROR	An error occurs in the system on the sensor part of the COMARC function. Data stands for the contents of the errors.	• Reset the alarm then try again. • If the error occurs again, contact your YASKAWA representative.
5020	SENSOR PARAMETER ERROR	The value of the sensor (SE) is abnormal.	Review the sensor (SE) parameter.

Alarm Message List

Alarm Number	Message	Cause	Remedy
5021	CONVEYER CHARACTERISTIC FILE ERROR	Data of the conveyer characteristic file is abnormal. Data stands for the conveyer characteristic number.	Correct the data of the conveyer characteristic file.
5022	CONVEYER POSITION LIMIT OVER	The position of the corrected conveyer exceeds the limited value of $\pm 21\text{m}$. Data stands for the conveyer characteristic number.	Review the synchronization motion section. This alarm does not require the update of the conveyer position, therefore re-synchronization motion after the alarm reset is not necessary. Perform at the conveyer position where the alarm occurs.
5023	CONVEYER COUNTER LIMIT OVER	The counter pulse of the conveyer position is overflowed. Data stands for the conveyer characteristic number.	Review the conveyer resolution or the section of synchronization. This alarm does not require the update of the conveyer position, therefore re-synchronization motion after the alarm reset is not necessary. Perform at the conveyer position where the alarm occurs.
5030	SYSTEM ERROR (General Sensor)	An error occurs in the system of the sensor part of the general sensor function. Data stands for the alarm factor.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
5031	GENERAL SENSOR PROCESSING ERROR	An error occurs in the system of the sensor part of the general sensor function. Data stands for the alarm factor.	• Turn the power off then back on. • If the error occurs again, contact your YASKAWA representative.
5040	CONTROLNET COMMUNICATION ERROR	Communication error occurs.	Check the function and the connection of the network devices such as the cables.

10.4 I/O Alarm Message List

10.4 I/O Alarm Message List

■ Arc Welding Application

	Alarm No.	Registration No.	I/O Alarm Message
System Section			
	9000	00	
	9010	01	MISSING ARC GENERATION CONFIRM
	9020	02	ARC SHORTAGE
	9030	03	
	9040	04	GAS SHORTAGE (RESTART)
	9050	05	WIRE SHORTAGE (RESTART)
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

■ Handling Application

	Alarm No.	Registration No.	I/O Alarm Message
System Section			
	9000	00	AIR PRESSURE LOWERED
	9010	01	
	9020	02	
	9030	03	
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

10.4 I/O Alarm Message List

■ Spot Welding Application

	Alarm No.	Registration No.	I/O Alarm Message
System Section	9000	00	ERR OF WELD TIMER COOLING WATER
	9010	01	ERROR OF GUN COOLING WATER
	9020	02	ERROR IN TRANSTHERMO OF GUN
	9030	03	AIR PRESSURE LOWERED
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

■ General Application

	Alarm No.	Registration No.	I/O Alarm Message
System Section			
	9000	00	
	9010	01	
	9020	02	
	9030	03	
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

11 Error

11.1 Error Message List

Error warns the operator not to advance to the next operation caused by a wrong operation and the access method when programming pendant operation or an external equipment (computer, PLC, etc.) accesses.

When an error occurs, release it after the confirmation of the content of the error.

To release the error perform following the operation.

- Press [CANCEL] on programming pendant.
- Input alarm/error reset signal (specific input).



An error is different than an alarm because it does not stop the robot even if it occurred while the robot was operated (during playback).

11.1.1 System and General Operation

Error NO.	Data	Message	Contents
10	-	Turn OFF servo power and perform corrective action	It cannot be operated on servo power supply.
20	-	Depress TEACH	Out of specified mode operation
30	-	Illegal setting for number of variables	Parameter setting error
31	-	Illegal setting for number of variables name	
40	-	Undefined robot position variables	Position type variable cannot be used
50	-	Depress MODIFY	
60	-	Undefined points (ORG, XX, XY)	Not registered user coordinates basic 3 points (ORG, XX, XY)
70	-	Program and current tool different	The tool number registered with teaching position data didn't match the tool number.selected at the programing pendant.
80	-	Same position in the 3 points	
90	-	Set robot exactly to taught position	
100	-	On overrun recovery status	
110	-	Turn ON servo power	
120	-	Set to PLAY mode	
130	-	No start using external signal	
140	-	No start using P.BOX	
150	-	TEACH-LOCK mode	
170	-	Servo OFF signal ON	
180	-	TEACH mode select signal ON	
190	-	Set variable number	
200	-	Defined group axis	
210	-	Undefined coordinated robots	
211	-	Cannot register between stations	
212		Cannot register group combination	
220	-	Taught by other robot	
230	-	While releasing soft limit	

11.1 Error Message List

Error NO.	Data	Message	Contents
240	-	Undefined robot	
250	-	Defined condition No.	
260	-	Undefined file	
270	-	Undefined gun condition file	
280	-	Lack of number of I/O points	
290	-	Cannot set same No.	
300	-	Undefined user frame	
310	-	Cannot register Master JOB	
320	-	Cannot operate CHECK-RUN	
330	-	Cannot operate MACHINE LOCK	
340	-	Cannot operate Master JOB	
350	-	Cannot initialize	
360	-	Teach point not specified	
370	-	No SYNCHRO operation	
380	-	Position not checked	Second home position was not checked
390	-	Can specify servo OFF by safety relay	
400	-	Wrong specification of measure interval	Wrong specification of measure interval for TRT function.
410	-	Time could not be measured	Time could not be measured
420	-	Incorrect number of taught points	Taught points for tool calibration were incorrect.
430	-	Register start reserved JOB	
440	-	Clear data to teach at the tool because other tool is set	
450	-	Wrong JOB for measuring	
460	-	Excess time for measuring	
470	-	Calibration at another file	
480	-	Calibration at another robot combination	
490	-	Cannot calibrate at this combination	
500	-	Undefined robot calibration data	
510	-	Undefined axis	

Error NO.	Data	Message	Contents
520	-	Cannot select two coordinated combination	
530	-	Start reservation mode	
540	-	Not start reservation mode	
550	-	Start reserved JOB change prohibit is set	
560	-	Cannot teach position while soft limit released	
570	-	Turn ON all contactor's servo power	
580	-	Connect group axis to one contactor	
590	-	Register group axis combination	[SYNCHRO] key for coordinated job which was not registered as group was pressed.
600	-	Out of setting data range	
610	-	Cannot use the user coordinate	
620	-	Select JOB (robot)	
630	-	Not completed to load original tool file	
640	-	Not specified tool file	
650	-	Incorrect measured data	
660	-	Wrong data type of position variable	
670	-	Enter path number	
680	-	Defined data	
	XXX		File No.
690	-	Illegal path number	
700	-	Wrong CMOS memory board type	
710	-	Enter path number	
720	-	Defined file name	
730	-	Undefined Name Position file	
740	-	This name cannot be defined	
750	-	Undefined Name Position	
760	-	Error in start condition set	
770	-	During robot operation	
780	-	Quit operation by mini operation pendant	

11.1 Error Message List

Error NO.	Data	Message	Contents
790	-	FWD/BWD don't work in the handle operation	
800	-	The gun of designation is not connected	
810	-	Servo power supply is limited	
820	-	Modification range over	
830	-	Cannot move while modifying speed	
840	-	Unregistered key	
850	-	Cannot register instruction	
860	-	Please release key registration mode	
870	-	This key cannot be allocated	
880	-	Same relay cannot be set	
890	-	This key has already been registered. Cannot register them once	
900	-	Relay No. not set	
910	-	Cannot be registered because job control group not same	
920	-	Cannot modify this setting	
930	-	Undefined conveyor calibration data	
940	-	Forced pressure signal ON	
950	-	Negative correction distance	
960	-	I/O axis mode requesting	Start the job after completing JOG motion.
970	-	ERRSVCPU signal error	Servo ON request during WRCA circuit board alarm. Turn the power OFF then back ON. If the error occurs again, turn the power OFF and disconnect the WRCA01 circuit board, XIU (XCO) unit, and XST (XSU) unit. Or disconnect the cables that are connected to those units. If the problem is not resolved, replace those circuit boards, units, and cables.
980	-	TIMER DATA TRANSMISSION ERROR	Error in timer setting. Correct the timer setting.

11.1.2 Editing

Error No.	Data	Message	Contents
1010	-	EDIT LOCK mode	
1020	-	Enter correct value	
1030	-	Unauthorized ID No.	
1040	-	-	
1050	-	Enter correct date	
1060	-	Enter correct clock	
1070	-	Enter a number in 8 figures	
1080	-	Negative value can't be set	

11.1.3 Job Defined Data

Error No.	Data	Error Message	Error Contents
2010	-	Incorrect character	
2020	-	Name not entered	
2030	-	Undefined JOB name	
2040	-	Defined JOB name	
2050	-	Address not found	
2060	-	Select master	
2070	-	Set robot exactly to taught position	
2080	-	Press INSERT or MODIFY	
2090	-	Only modifying move instruction possible	
2100	-	JOB cannot be edited.	
2110	-	Over soft limit	
2120	-	Cannot insert/alter/delete with servo OFF	
2130	-	Only modifying move instruction possible	
2150	-	Inserting is not possible from this point	
2160	-	Cannot modify or delete this position	

11.1 Error Message List

Error No.	Data	Error Message	Error Contents
2170	-	Press INSERT to record same step as previous step	
2180	-	Cannot insert data	
2190	-	Cannot delete data	
2200	-	Cannot modify data	
2210	-	Illegal data setting	
2220	-	Display edit instruction	
2230	-	Illegal instruction equation	
2240	-	Excessive instruction equation	
2250	-	Unmatched number of parentheses in equation	
2260	-	Wrong group axis selection	
2270	-	Cannot insert any more instruction in JOB	
2280	*	JOB memory is full	
	1		Lack of position file memories
	2		Lack of JOB registering memories
	3		Lack of instruction file memories
	4		Lack of memory pool
	5		Lack of pass condition file for multi-layer
2290	-	Undefined master JOB	
2291	*	Undefined SUB Master JOB	
	1		Sub-master 1
	2		Sub-master 2
	3		Sub-master 3
	4		Sub-master 4
	5		Sub-master 5
2292	-	Undefined MASTER START JOB	

Error No.	Data	Error Message	Error Contents
2293	*	Undefined SUB START JOB	
	1		Sub-master 1
	2		Sub-master 2
	3		Sub-master 3
	4		Sub-master 4
	5		Sub-master 5
2300	-	Cannot teach JOB without group-axis specification	
2310	*	Same label exists	
	XXX		Line No.
2320	-	Cannot create coordinated JOB	
2330	-	Cannot edit coordinated instruction	Calibration not complete
2340	-	Pasted data not found	
2350	-	Editing data not found	
2360	-	Cannot create editing area	
2370	-	Cannot cut/copy NOP and END instructions	
2380	-	Wiring JOB selection	
2390	-	Wrong group axis selection	
2400	-	Cannot move in cut & paste editing	
2410	-	When variable is used for speed setting, perform a line-edit	
2420	-	When variable is used for teach setting, perform a line-edit	
2430	-	Reverse data not found	
2440	-	Move C-and W-axis to basic position	Laser cutting
2450	-	Relative JOB not permitted	
2460	-	Specified JOB is already converted	
2470	-	Wrong JOB type	
2480	-	Wrong JOB coordinates setting	
2490	-	Execute NEXT/BACK operation once	
2500	-	Cannot convert the JOB	

11.1 Error Message List

Error No.	Data	Error Message	Error Contents
2510	-	Cannot correct position in the JOB	
2520	-	Enter JOB name	
2530	-	Illegal step number	
2540	-	Enter step number	
2550	-	Duplicated step number	
2551	-	Duplicated line number	
2560	-	Cannot correct steps of position variables and REFP	
2570	-	The step does not contain speed	
2580	-	The step dose not contain PL/CONT	
2590	-	Soft limit range over	
2600	-	Cannot teach position in concurrent JOB	
2610	-	Wrong JOB kind	
2620	-	Cannot correct play speed in the JOB	
2630	-	Conveyor position not reset	
2640	-	Incorrect JOB name	
2650	-	Defined JOB name	
2660	-	Register MOVL inst. after circular block	
2670	-	Undefined target JOB	
2680	-	Wrong designation of welding section	
2690	-	Defined same kind JOB	
2700	-	Press position not reset	
2710	-	Relative job can't be shifted with pulse type	
2720	-	Cannot correct position variables	
2730	-	Cannot use robot macro JOB	
2740	-	Cannot use concurrent macro JOB	
2750	-	Cannot use JOB with group-axis specification	
2760	-	Cannot insert/modify/delete for group axis detachment	

Error No.	Data	Error Message	Error Contents
2761	-	Axis is separated. Cannot add, modify, or delete.	
2770	-	Cannot reverse data of SVSPOTMOV instruction	
2780	-	Arithmetic error	

11.1 Error Message List

11.1.1.4 External Memory Equipment

Error No.	Data	Message	Contents
3010	-	Floppy disk drive cable not connected	
3020	-	Floppy disk not inserted into floppy disk drive	
3030	-	Floppy disk protection is ON	
3040	-	File not saved on floppy disk	
3050	-	File saved on floppy disk	
3060	-	Out of memory on floppy disk	
3070	-	Number of files on floppy disk is full	
3080	-	I/O error on floppy disk	
3090	*	Transmission error with floppy disk drive	
	1		Framing error
	2		Overflow error
	3		Parity error
	4		Data code error
	5		Data read error
	6		Data write error
	7		Data time out
	8		Serial I/O error
	9		Error other than described above
3100	-	Total checksum error	
3110	-	Syntax error	
3120	*	HEX code error	
	1		Specification error of data record
	2		Specification error of FEO record
	3		Record type error
	4		Total check error of record
3130	-	Verify error	
3140	-	Wrong pseudo instruction	

Error No.	Data	Message	Contents
3150	*	Concurrent I/O record error	
	1		Format error
	2		Ladder program is too long
	3		Exceed the range of the data
	4		Specification error of channel No.
	5		Specification error of relay No.
	6		Timer value error
	7		Specification error of timer No.
3160	-	Cannot load illegal system data	
3170	*	Condition file data error	
	1		Format error
	2		Specified file No. is omitted
	3		Specified tool No. is omitted
	4		User file is not registered
3180	-	Concurrent I/O data transmission error	

11.1 Error Message List

Error No.	Data	Message	Contents
3190	*	Error in JOB data record	
	1		The number of position data (NPOS) record wrong for the format
	2		Record on the user coordinate No. is wrong for the format
	3		Tool record is wrong for the format
	4		Record on the position data section is wrong for the format
	5		Robot type of XYZ data (RCONF) record is wrong for the format
	6		Date record is wrong for the format
	7		Comment record is wrong for the format
	8		JOB attribute data (ATTR) record is wrong for the format
	9		Control group (GROUP) record is wrong for the format
	10		Local variable (LVAR) record is wrong for the format
	11		JOB argument (JARGS) record is wrong for the format
	12		Teaching coordinates for relative JOB (FRAME) record is wrong for the format
	13		Position data coordinates do not match relative job coordinates
	14		Correct the format of the job file.
3200	-	NOP or END instruction not found	
3210	-	Position No. storage area not found	
3220	*	Syntax error in instruction data	
	2		Interior control error
	3		Undefined instruction/tag
	4		Instruction/tag shortage
	5		Disuse instruction/tag
	6		Sub instruction
	7		Non instruction

Error No.	Data	Message	Contents
3220	8		Invalid instruction
	9		Invalid tag
	10		Invalid character
	11		Undefined intermediate code
	12		Intermediate code shortage
	13		Syntax stack overflow
	14		Syntax stack underflow
	15		Array type tag uncompleted Tag [ARRAY]
	16		Element type tag uncompleted Tag [ELEMENT]
	17		Macro JOB unregistered
	18		Input format error
	19		Date size over
	20		MIN value over
	21		MAX value over
	22		Operation expression error
	23		JOB call argument setting error
	24		Macro JOB call argument setting error
	25		Position vector setting error
	26		System error
	27		Soft key designate error
	28		Numerical input buffer overflow
	29		Real type data precision error
	30		Element format error
	35		[BOOL TYPE] data error
	36		[CHAR] data error
	37		[BYTETYPE] [BINARY] / HEXA- DECIMAL BYTE TYPE] data error
	38		[INTEGER TYPE] [DECIMAL EORD TYPE] data error

11.1 Error Message List

Error No.	Data	Message	Contents
3220	39		[BINARY/HEXADECIMAL WORD TYPE] data error
	40		[DOUBLE PRECISION TYPE] [DECIMAL DWORD TYPE] data error
	41		[BINARY/HEXADECIMAL WORD TYPE] data error
	42		[REAL TYPE] data error
	43		[LADDER SPECIAL TYPE] data error
	44		JCL text
	45		Invalid text
	46		[LABEL NAME] data error
	47		[JOB NAME] data error
	48		[STRING] data error
	49		[COMMENT] data error
	58		Invalid instruction/tag detection
3230	-	Syntax not matched	
3240	-	Undefined application	
3250	-	Cannot load this file	
3260	-	Excess input data	
3270	-	Cannot verify this file	
3280	-	Wrong welding condition (STANDARD/ ENHANCED)	
3290	-	Serial port not defined	
3300	-	Serial port being used	
3310	-	Protocol being used	
3320	-	Wrong GUN type	
3330	-	Undefined multilayer data	
3340	-	Illegal number of multilayer data	
3350	-	Not enough memory	
3360	-	Invalid directory	
3370	-	Incorrect directory name	

Error No.	Data	Message	Contents
3380	-	Drive not ready	
3390	-	File not found	
3400	-	File already exists on the media	
3410	-	Out of memory on the media	
3420	-	Max number of files has been reached	
3430	-	I/O error on the drive	
3440	-	Wrong media type	
3450	-	Cannot load macro JOB at current security mode	Load in management mode.
3460	*	Cannot backup to PC card	
	1		Insufficient PC card memory.
	2		Not accessible to PC card.
3470	-	Database not found	
3480	-	Database access error	
3490	-	Same database exists	
3500	-	Check PC card insertion	
3510	-	Cannot delete folder. Check attribute and inside file	
3520	-	Same folder exists	
3530	-	Cannot load at current security mode	Raise the security level.

11.1 Error Message List

11.1.1.5 Concurrent I/O

Error No.	Data	Message	Contents
4010	*	Illegal relay No.	
	XXX		Line No.
4020	*	Illegal block No.	
	XXX		Line No.
4030	*	Illegal instruction	
	XXX		Line No.
4040	*	Relay/register No. duplicated in OUT/ GOUT or arithmetic instruction	Plural output are instructed to the relay or register
	XXX		Line No.
4050	*	The relay is not used	
	XXX		Line No.
4060	*	Excess STR [-NOT] instructions	
	XXX		Line No.
4070	*	Excess AND [OR] STR instructions	
	XXX		Line No.
4080	*	Syntax error in CNT instructions	
	XXX		Line No.
4090	*	Enter STR [-NOT] at head of block	Need STR [-NOT]
	XXX		Line No.
4100	*	Relay No. duplicated in TMR and CNT	Timer and counter are used twice
	XXX		Line No.
4110	-	Excessive ladder scan-time	Ladder scan time is too long
4120	-	Concurrent I/O memory is full	Exceeds memory capacity
4130	-	END instruction not found	END instruction not found
4140	-	Wrong ladder program	Position and number of PART instruction are wrong
4150	*	Wrong use of GSTR, GOUT commands	GSTR and GOUT is not used together
	XXX		Line No.
4160	-	Cannot edit system section	

Error No.	Data	Message	Contents
4170	-	Cannot modify/delete	
4180	-	Press INSERT/MODIFY/DELETE keys	
4190	-	Ladder program not found	
4200	-	Cannot specify system variables (\$)	
4210	-	Cannot edit line	
4220	-	Excess TMR/CNT or arithmetic instructions	More than 100 TMR, CNT or arithmetic instruction used
4230	-	Syntax error in TMR/CNT instructions	

11.1.6 Maintenance Mode

Error No.	Data	Message	Contents
8010	-	Too many axes	
8020	-	Too many I/O points	
8030	-	Too many boards (XFB01B (MASTER))	
8031	-	Too many boards(MSC01B)	
8040	-	Memory error (ControlNet) output condition	
8041	-	Memory error (UNIWIRED CONNECT DAT)	Initialize the UNIWIRED setting file in the maintenance mode.
8050	-	Robot model is not registered	
8060	-	Cannot get UNIWIRED connection data	Connection data cannot be obtained due to communication error. Verify the network connection.

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UP6 MANIPULATOR SYSTEM MANUAL

FOR XRC2001 CONTROLLER

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