

- 24-hour Telephone Number: (937) 847-3200
- Use for urgent or emergency needs for technical support, service and/or replacement parts
- Routine Technical Inquiries: techsupport@motoman.com
- Allow up to 36 hours for response

MOTOMAN-GP110,GP110B INSTRUCTIONS

TYPE:**YR-1-06VX110-A00****(MOTOMAN-GP110 STANDARD SPECIFICATION)****YR-1-07VXB110-A00****(MOTOMAN-GP110B STANDARD SPECIFICATION)**

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

MOTOMAN INSTRUCTIONS

MOTOMAN-GP110,GP110B INSTRUCTIONS**YRC1000 INSTRUCTIONS****YRC1000 OPERATOR'S MANUAL (GENERAL) (SUBJECT SPECIFIC)****YRC1000 MAINTENANCE MANUAL****YRC1000 ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)**

Have the following information available when contacting the YASKAWA Representative:

- System
- Primary Application
- Software Version (*Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version}*)
- Warranty ID (*Located on Robot Controller*)
- Robot Serial Number (*Located on Manipulator data plate*)
- Robot Sales Order Number (*Located on Robot controller data plate*)



DANGER

- This instruction manual is intended to explain mainly on the mechanical part of this manipulator for the application to the actual operation and for proper maintenance and inspection. It describes on safety and handling, details on specifications, necessary items on maintenance and inspection, to explain operating instructions and maintenance procedures. Be sure to read and understand this instruction manual thoroughly before installing and operating the manipulator. Any matter not described in this manual must be regarded as “prohibited” or “improper”.
- General information related to safety are described in “Chapter 1. Safety” of the YRC1000 INSTRUCTIONS. To ensure correct and safe operation, carefully read “Chapter 1. Safety” of the YRC1000 INSTRUCTIONS.



CAUTION

- In some drawings in this manual, protective covers or shields are removed to show details. Make sure that all the covers or shields are installed in place 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 is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids the product warranty.

NOTICE

- 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. Be sure to tell the representative the manual number listed on the front cover.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of your manipulator.

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



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.



WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.



CAUTION

Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

NOTICE

NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident in some situations.



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

**DANGER**

- Do not remove the motor, and do not release the brake.

Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the manipulator's arm.

**WARNING**

- 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.



DANGER

- Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.
 - Press the emergency stop buttons on the front door of the YRC1000, on the programming pendant, on the external control device, etc.
 - Disconnect the safety plug of the safety fence. (when in play mode or in remote mode)

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

Fig. : Emergency Stop Button



- Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

Fig. : Release of Emergency Stop



- Observe the following precautions when performing a teaching operation within the manipulator's operating range:
 - Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
 - View the manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Always keep in mind emergency response measures against the manipulator's unexpected movement toward a person.
 - Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

- Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
 - Turning ON the YRC1000 power
 - Moving the manipulator by using the programming pendant
 - Running the system in check mode
 - Performing automatic operations

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop buttons are located on the front panel of the YRC1000 and on the upper right of the programming pendant.

- Read and understand the Explanation of the Warning Labels before operating the manipulator.



WARNING

- Perform the following inspection procedures prior to conducting manipulator teaching. If there is any problem, immediately take necessary steps to solve it, such as maintenance and repair.
 - Check for a problem in manipulator movement.
 - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the YRC1000 cabinet after use.

If the programming pendant is left unattended on the manipulator, on a fixture, or on the floor, etc., the Enable Switch may be activated due to surface irregularities of where it is left, and the servo power may be turned ON. In addition, if operation of the manipulator starts, the manipulator or the tool may hit the programming pendant left unattended, which may result in personal injury and/or equipment damage.

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 supply cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
YRC1000 controller	YRC1000
YRC1000 programming pendant	Programming pendant
Cable between the manipulator and the controller	Manipulator cable

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.

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.

Note: Taking the maintenance-relevant trainings offered by your YASKAWA representative is indispensable for replacing the L-axis of the balancer-equipped manipulator.

Fig. : Warning Label Locations (YR-1-06VX110-A00)

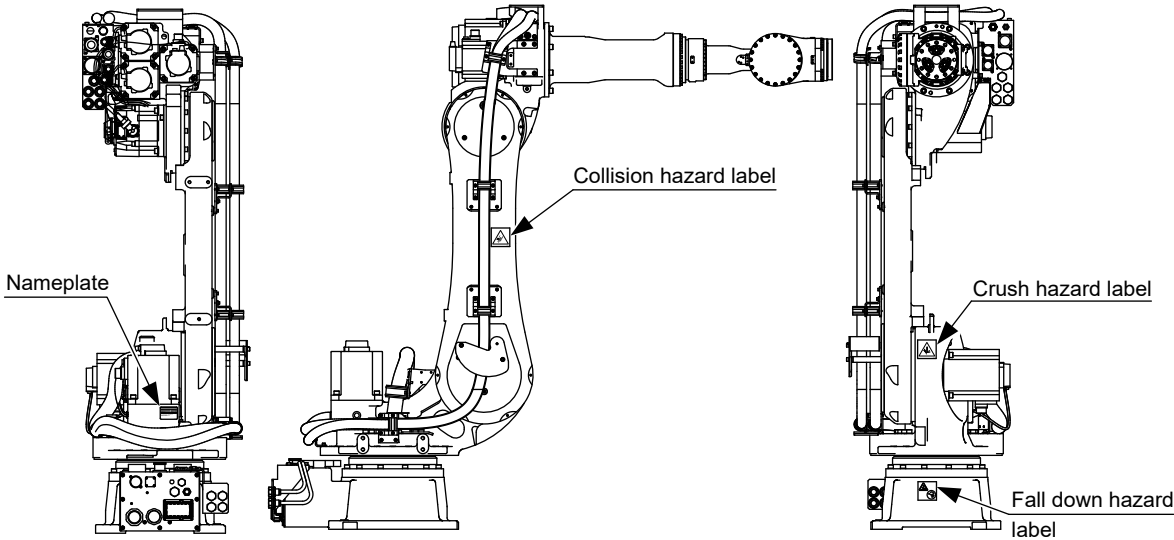
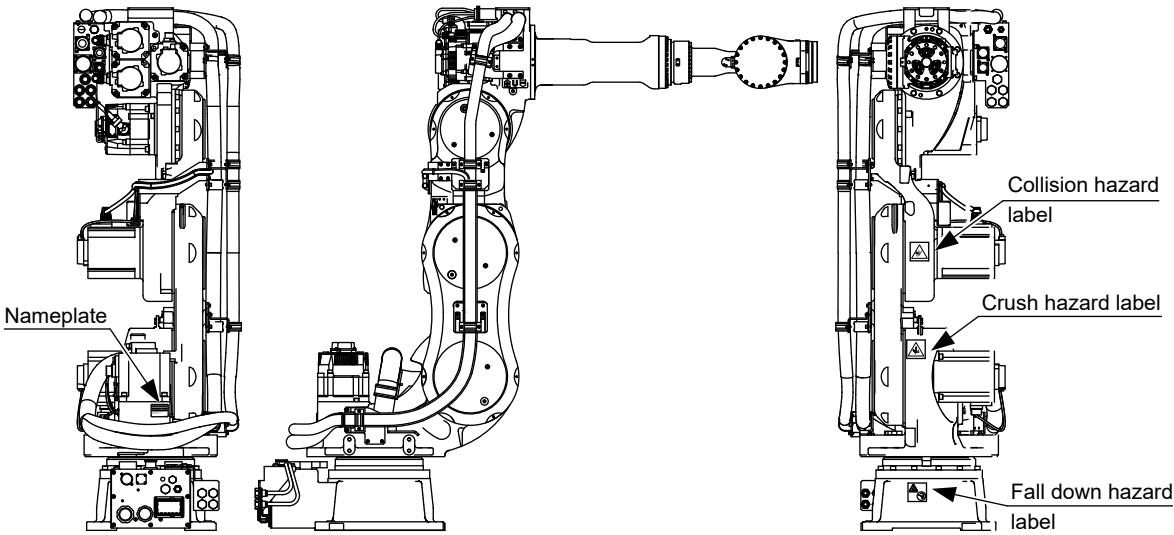


Fig. : Warning Label Locations (YR-1-07VXB110-A00)



Nameplate

TYPE	
DATE	PAYLOAD
	kg
SERIAL NO.	MASS
	kg
YASKAWA ELECTRIC CORPORATION	
2-1 Kurosakishiroishi, Yahatanishi-ku,	
Kitakyushu 806-0004 Japan	
MADE IN JAPAN	
NJ4030	

Fall down hazard label**Description**

Make sure to secure the manipulator base by using the bolts of the specified sizes and by tightening the bolts with the specified tightening torques. If the power is turned ON and the manipulator is operated without securing the manipulator properly, the manipulator may fall down, which may result in personal injury and/or equipment damage.

Collision hazard label**Description**

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an emergency stop button whenever there is a problem. Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:

- Turning ON the YRC1000 power
- Moving the manipulator by using the programming pendant
- Running the system in check mode
- Performing automatic operations

Crush hazard label**Description**

Keep clear of moving parts when performing a teaching operation within the manipulator's operating range. Failure to observe this instruction may result in personal injury.

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1 Product Confirmation



CAUTION

- Confirm that the manipulator and the YRC1000 have the same order number. Pay special attention when installing two or more manipulators.

Failure to observe this instruction may cause improper movement of the manipulator, which may result in personal injury and/or equipment damage.

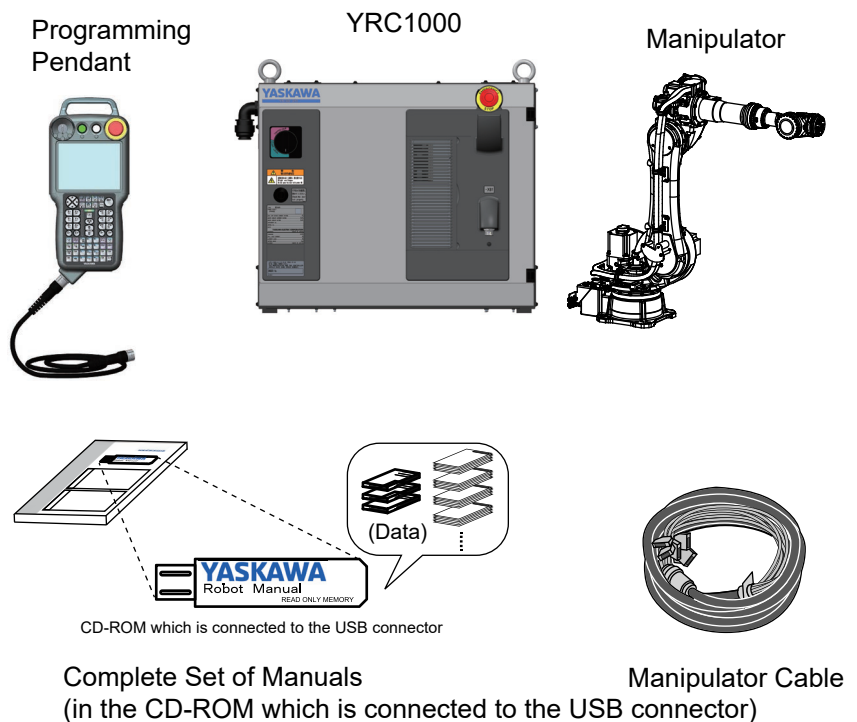
1.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

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

- Manipulator (accessories included)
- YRC1000 (spare parts included)
- Programming pendant
- Manipulator cable (between the YRC1000 and the Manipulator)
- Manual

Fig. 1-1: Five Items for Standard Delivery



1 Product Confirmation
1.1 Contents Confirmation

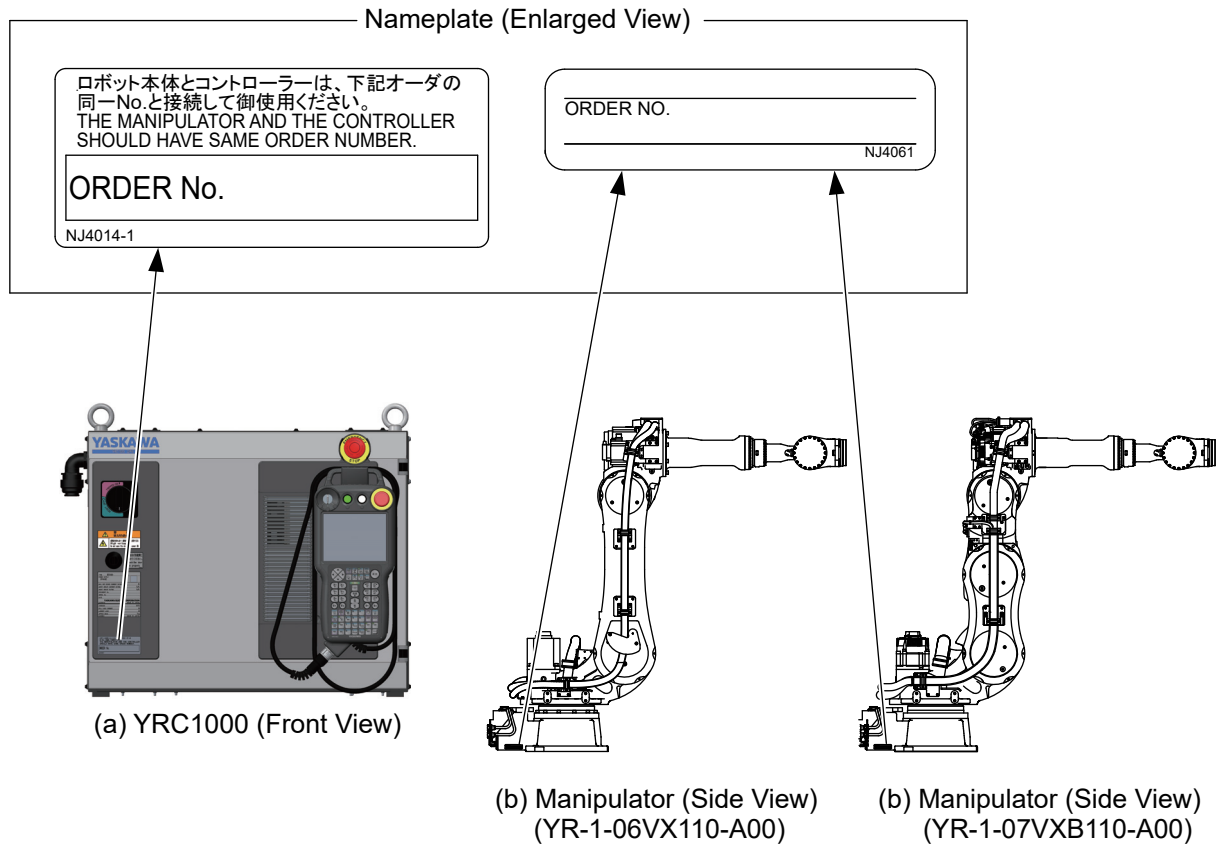
Accessories of Manipulator	Pcs	Remarks
Hexagon socket head cap screw M20 (length: 70 mm)	8	For mounting the manipulator
Spring washer M20 *stainless*	8	
Washer M20 *stainless*	8	
Grease zerk A-PT1/4	1	For grease replenishment of S-axis
Grease zerk A-PT1/8	5	For grease replenishment of L-, U-, R-, B-, T-axes, and gears (YR-1-06VX110-A00)
Grease zerk A-PT1/8	6	For grease replenishment of L-, E-, U-, R-, B-, T-axes, and gears (YR-1-07VXB110-A00)

- 1 Product Confirmation
- 1.2 Order Number Confirmation

1.2 Order Number Confirmation

Confirm the order number of the manipulator corresponds to the YRC1000. The order number is located on a nameplate as shown below.

Fig. 1-2: Location of Order Number Labels



2 Transport



WARNING

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

Failure to observe this instruction may result in personal injury and/or equipment damage.

NOTICE

- Avoid excessive vibration or shock while transporting or moving the manipulator.

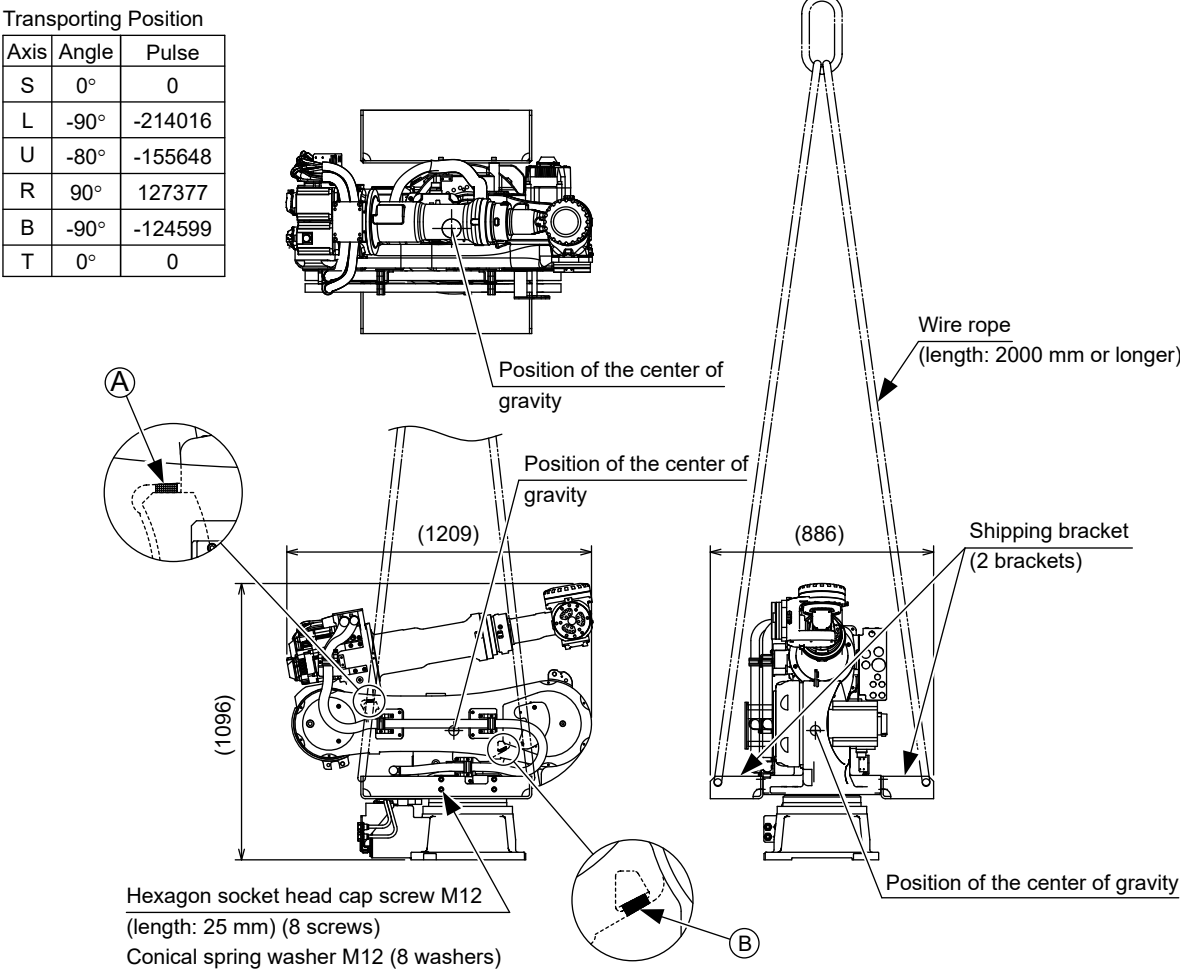
Failure to observe this instruction may adversely affect the performance of the manipulator because it consists of precision components.

2.1 Transport Method

2.1.1 Using a Crane

As a rule, the manipulator must be lifted by a crane with four wire ropes when removing the manipulator from the package and moving it. Be sure to fix the manipulator with the cushioning materials for transport, and lift it in the posture as shown in fig. 2-1(a) “Transporting Position (factory setting) (YR-1-06VX110-A00)”, and fig. 2-1(b) “Transporting Position (factory setting) (YR-1-07VXB110-A00)”. The length of the wire rope must be 2000 mm or longer.

Fig. 2-1(a): Transporting Position (factory setting) (YR-1-06VX110-A00)

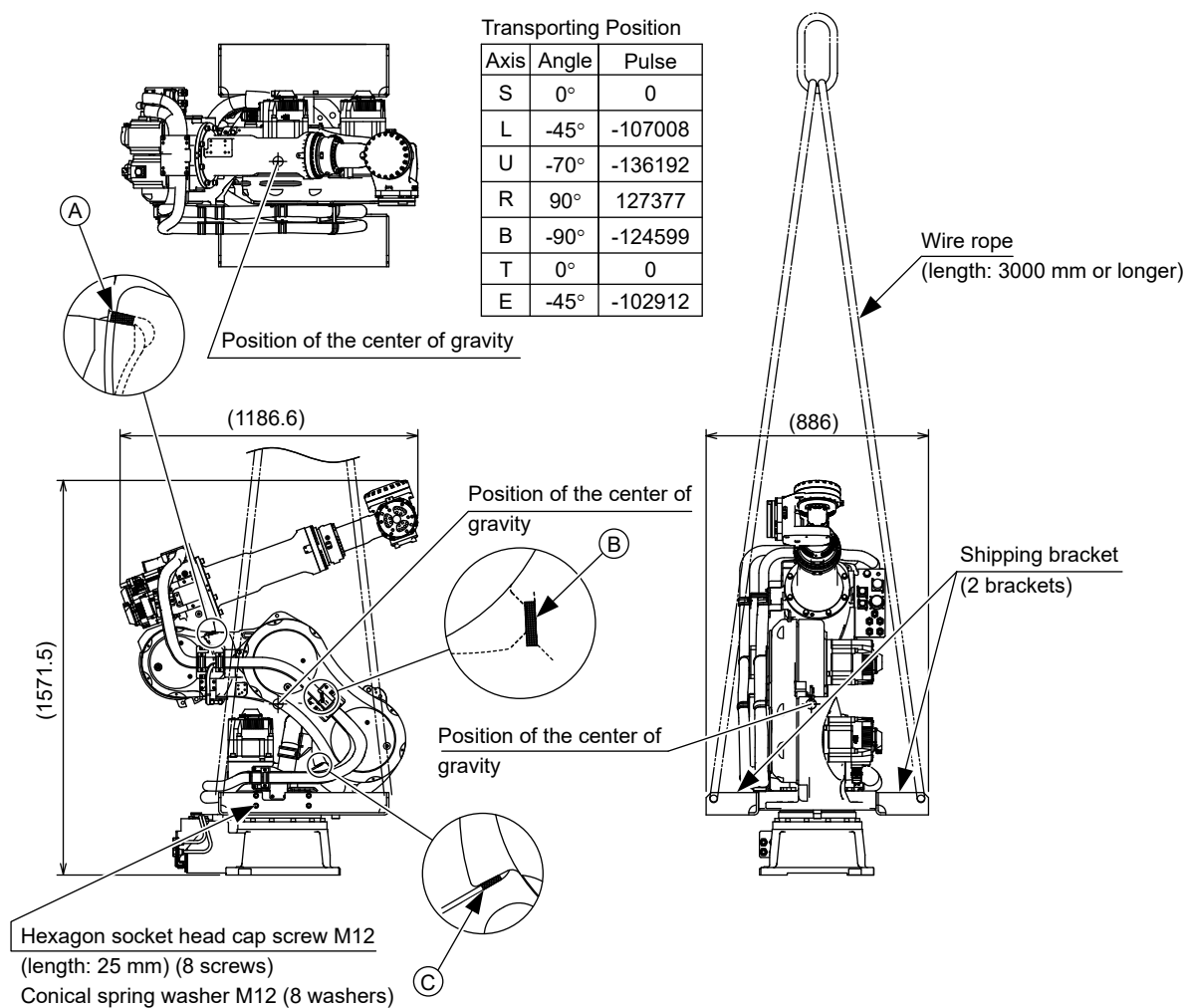


- A rubber cushion is respectively wedged at the sections A and B.

2 Transport

2.1 Transport Method

Fig. 2-1(b): Transporting Position (factory setting) (YR-1-07VXB110-A00)



- A rubber cushion is wedged at the section A, B, and C.



When lifting the manipulator, be careful not to damage the motor, connector, cable, etc.

2 Transport

2.1 Transport Method

2.1.2 Using a Forklift

When using a forklift, attach shipping brackets to the manipulator in the posture as shown in *fig. 2-2(a) "Using a Forklift (YR-1-06VX110-A00)"* or *fig. 2-2(b) "Using a Forklift (YR-1-07VXB110-A00)"*. Put a pallet under the manipulator, and secure the manipulator by using bolts or screws. Insert claws of the forklift into the pallet, and transport the manipulator together with the pallet.

The pallet must be strong enough to support the manipulator.

Transport the manipulator slowly with due caution in order to avoid overturning or slippage.

Fig. 2-2(a): Using a Forklift (YR-1-06VX110-A00)

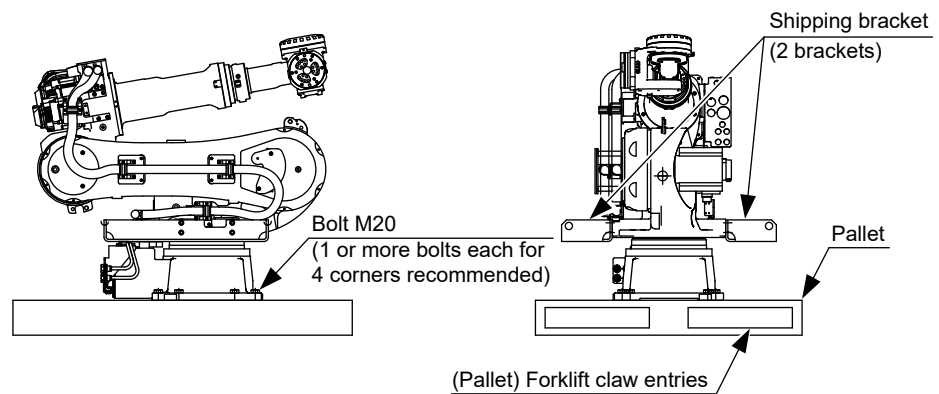
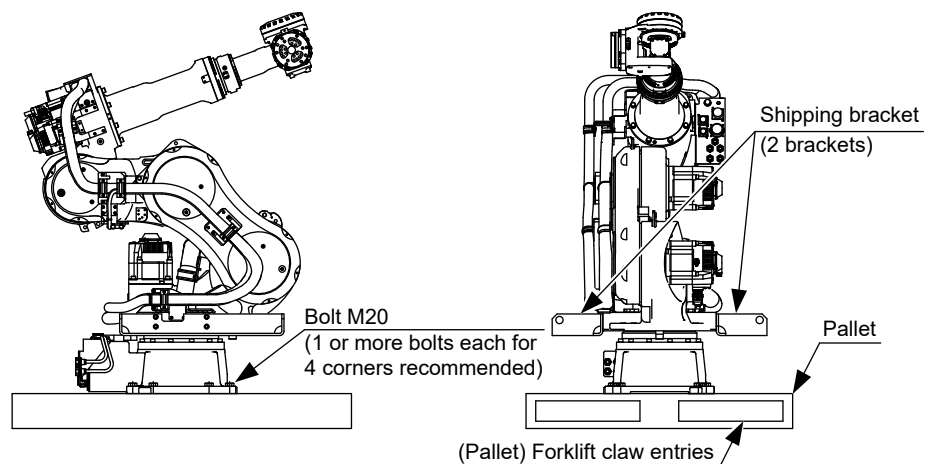


Fig. 2-2(b): Using a Forklift (YR-1-07VXB110-A00)



The approximate weight of the manipulator is shown below.

- YR-1-06VX110-A00: 690 kg (including the shipping bolts/screws and brackets)
- YR-1-07VXB110-A00: 820 kg (including the shipping bolts/screws and brackets)

NOTE

Use a wire rope strong enough to withstand the weight.

- When transporting, be sure to install the shipping brackets.
- Avoid applying external force on the arm or motor unit when transporting by a crane, forklift, or other equipment. Failure to observe this instruction may result in injury.

2 Transport

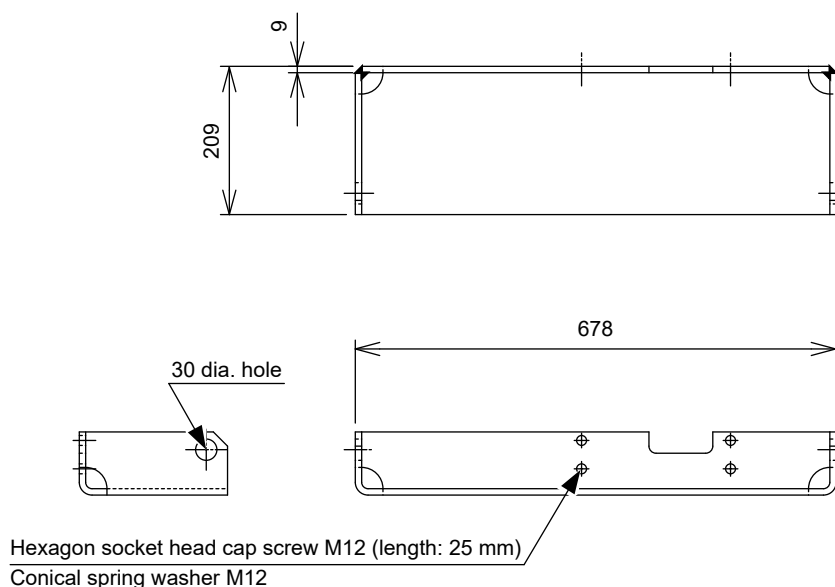
2.2 Shipping Bracket

2.2 Shipping Bracket

To protect the manipulator's machinery from external forces during transportation, shipping brackets are installed.

(Refer to fig. 2-3 "Shipping Bracket".)

Fig. 2-3: Shipping Bracket



- The shipping brackets are painted yellow.
- The shipping brackets are fixed with the hexagon socket head cap screw M12 (length: 25 mm) (four screws) (two places) and the conical spring washer M12 (four washers) (two places).

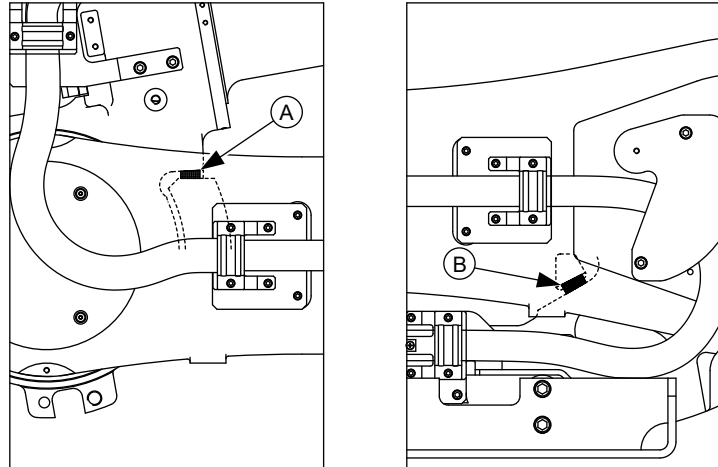


Before turning ON the power, check to be sure that the shipping bolts/screws and brackets are removed. The shipping bolts/screws and brackets then must be stored for future use, in the event that the manipulator must be moved again.

2.3 Cushioning Material for Transport

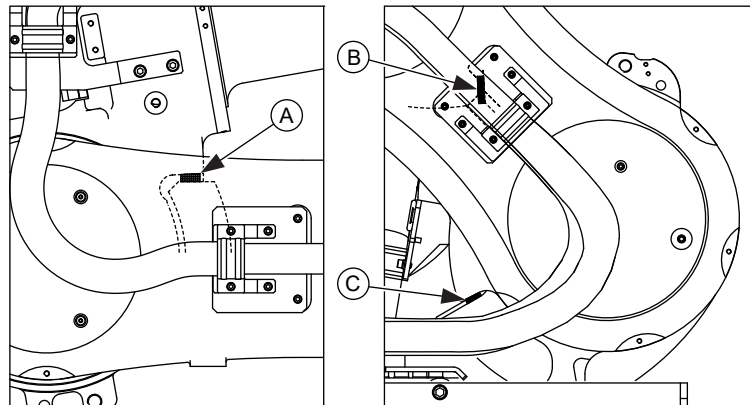
To protect the manipulator's machinery from external forces during transportation, the cushioning materials for transport are installed in the sections A and B. (Refer to fig. 2-4(a) "Cushioning Materials for Transport (YR-1-06VX110-A00)" and fig. 2-4(b) "Cushioning Materials for Transport (YR-1-07VXB110-A00)".)

Fig. 2-4(a): Cushioning Materials for Transport (YR-1-06VX110-A00)



- A rubber cushion is respectively wedged at the sections A and B.

Fig. 2-4(b): Cushioning Materials for Transport (YR-1-07VXB110-A00)



- A rubber cushion is wedged at the section A, B, and C.



Before turning ON the power, check to be sure that the cushioning materials for transport are removed.

In the event that the manipulator must be moved again, to avoid its main body from being damaged, the cushioning materials such as rubber plate, etc. must be used.

3 Installation



DANGER

- Install the safety fence.

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



WARNING

- Do not perform the welding operation for a pedestal or etc. when the power cable is being connected.

Failure to observe this instruction may result in damage to an electric device due to the current of welding.

- Install the manipulator in a location where the tool or the workpiece held by its fully extended arm will not reach the wall, the safety fence, or the YRC1000, etc.

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

- Make sure to firmly anchor the manipulator before turning ON the power and operating the manipulator.

Failure to observe this instruction may cause overturning of the manipulator, which may result in personal injury and/or equipment damage.

- Do not install or operate a damaged manipulator or a manipulator any of whose components is missing.

Failure to observe this instruction may cause improper movement, etc. of the manipulator, which may result in personal injury and/or equipment damage.

NOTICE

- After completing the installation of the manipulator, make sure to remove the shipping bolts/screws and brackets before turning ON the power.

Failure to observe this instruction may result in damage to the main drive unit.

3 Installation

3.1 Installation of the Safety Fence

3.1 Installation of the Safety Fence

To ensure safety, be sure to install safety fence. It prevents unforeseen accidents with personnel and damage to equipment. Refer to the following quoted clause for your information and guidance.

Responsibility for Safeguarding (ISO10218)

The user of a manipulator or robot system should ensure that safety fences are provided and used in accordance with Sections 6, 7, and 8 of this standard. The means and degree of safeguarding, including any redundancies, should 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 Base

The manipulator should be firmly mounted on a baseplate or foundation strong enough to support the manipulator and withstand reaction forces during acceleration and deceleration.

Construct a solid foundation with the appropriate thickness to withstand maximum reaction forces of the manipulator referring to *table 3-1 "Manipulator Reaction Force and Torque (YR-1-06VX110-A00)"*, and *table 3-2 "Manipulator Reaction Force and Torque (YR-1-07VXB110-A00)"*.

A baseplate flatness must be kept at 0.5 mm or less: insufficient flatness of installation surface may deform the manipulator shape and affect its functional abilities. Mount the manipulator base as instructed in *chapter 3.2.1 "Mounting Example"*.

Table 3-1: Manipulator Reaction Force and Torque (YR-1-06VX110-A00)

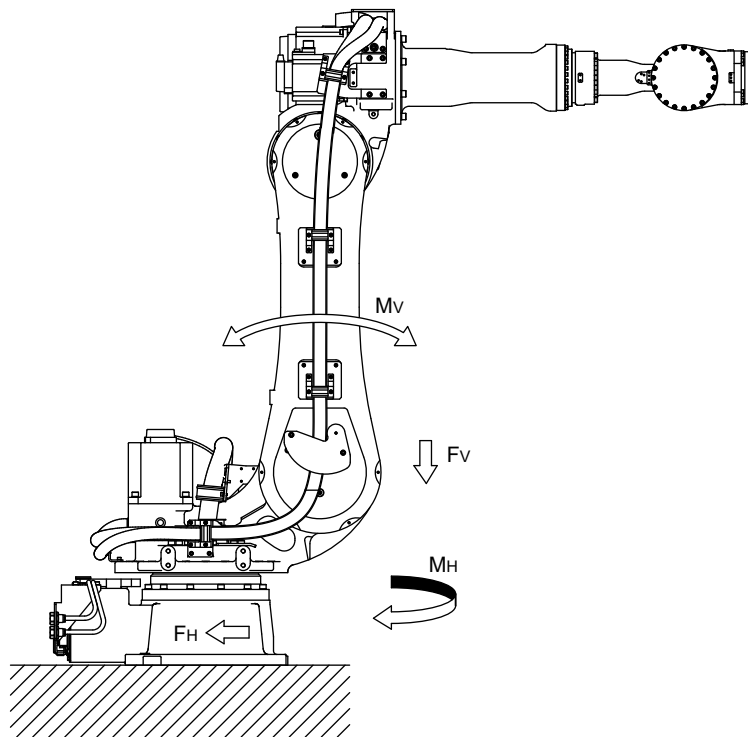
	Horizontal rotation		Vertical rotation	
	Reaction force F_H	Torque M_H	Reaction force F_V	Torque M_V
Emergency stop	23544 N (2400 kgf)	24525 N•m (2500 kgf•m)	29430 N (3000 kgf)	49000 N•m (5000 kgf•m)
Acceleration/ deceleration	7358 N (750 kgf)	7358 N•m (750 kgf•m)	9810 N (1000 kgf)	18394 N•m (1875 kgf•m)

Table 3-2: Manipulator Reaction Force and Torque (YR-1-07VXB110-A00)

	Horizontal rotation		Vertical rotation	
	Reaction force F_H	Torque M_H	Reaction force F_V	Torque M_V
Emergency stop	23544 N (2400 kgf)	23897 N•m (2436 kgf•m)	35316 N (3600 kgf)	49050 N•m (5000 kgf•m)
Acceleration/ deceleration	7358 N (750 kgf)	7171 N•m (731 kgf•m)	14715 N (1500 kgf)	18394 N•m (1875 kgf•m)

3 Installation
3.2 Mounting Procedures for Manipulator Base

Fig. 3-1: Manipulator Reaction Force and Torque



3 Installation

3.2 Mounting Procedures for Manipulator Base

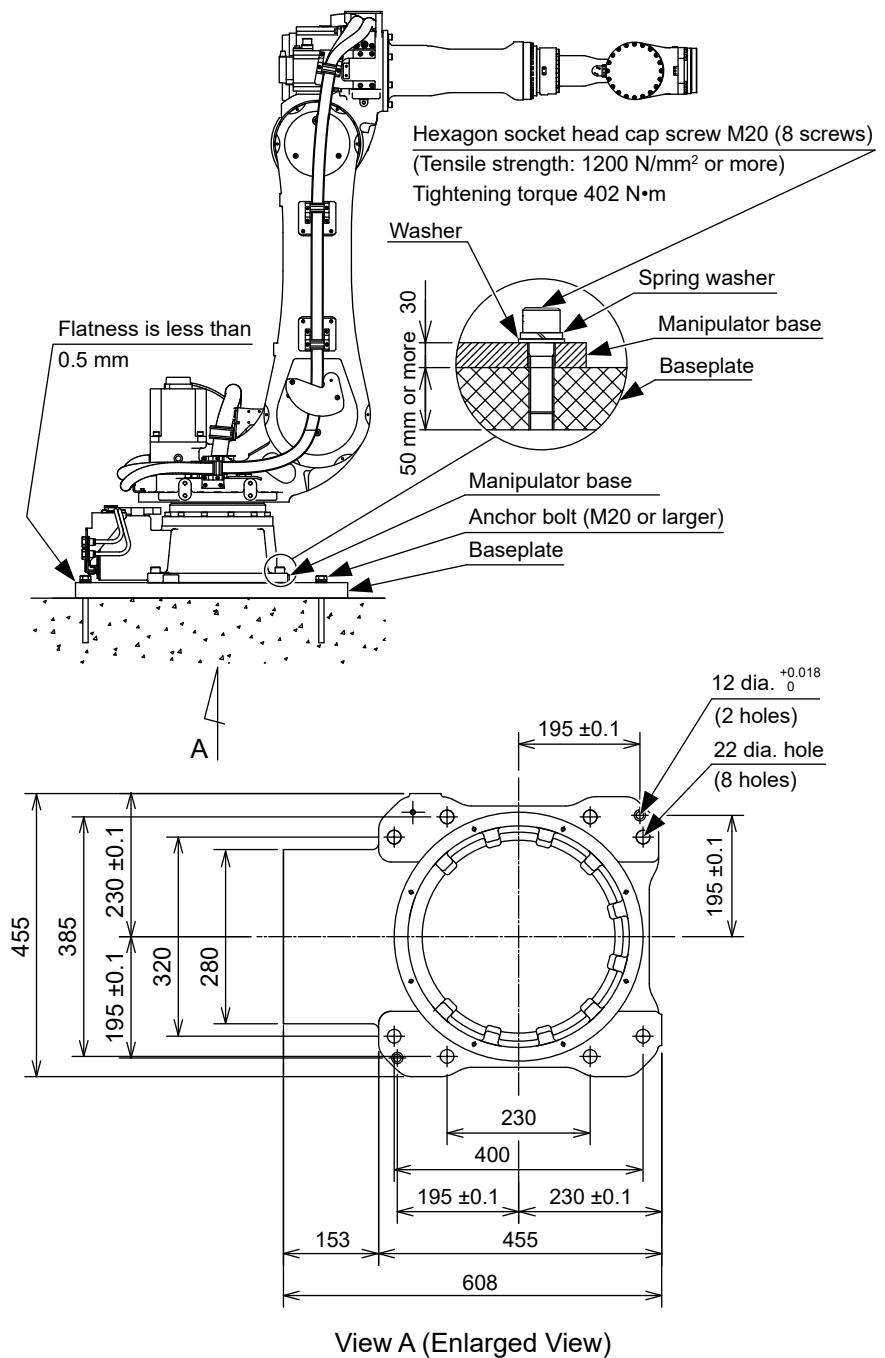
3.2.1 Mounting Example

For the first process, anchor the baseplate firmly to the ground. The baseplate should be rugged and durable to prevent shifting of the manipulator or the mounting fixture. It is recommended to prepare a baseplate of 50 mm or more in thickness, and anchor bolts of M20 or larger size.

The manipulator base is tapped for eight mounting holes; securely fix the manipulator base to the baseplate with eight hexagon socket head cap screw M20 (Tensile strength: 1200 N/mm² or more) (70 mm long is recommended) by using a tightening torque 402 N·m.

Next, fix the manipulator base to the baseplate. Tighten the hexagon socket head cap screw and anchor bolts firmly so that they will not work loose during the operation. Refer to fig. 3-2 "Mounting the Manipulator on Baseplate".

Fig. 3-2: Mounting the Manipulator on Baseplate



3	Installation
3.3	Mounting Method

3.3 Mounting Method

This manipulator is mounted on the floor only.

A wall-mounted way, a tilt-mounted way, and a ceiling-mounted way are not available.

3 Installation
3.4 Location

3.4 Location

When installing a manipulator, it is necessary to satisfy the following environmental conditions:

Table 3-3: Ambient Conditions

Item	Type	YR-1-06VX110-A00 YR-1-07VXB110-A00
Ambient temperature during operation		0°C - +45°C
Humidity		20%RH - 80%RH (no-condensing)
Vibration		4.9 m/s ² (0.5G) or less
Altitude		1000 m or less
Flatness for installation		0.5 mm or less
Others		Free from dirt, dust, oil soot, or water
		Free from explosive and corrosive gas or liquid
		Free from excessive electrical noise (plasma)
		Free from strong magnetic field



When the operation is started after the manipulator has been out of operation and left in the low temperature (almost 0°C) for a long period, the alarm may occur since the friction torque of the drive unit is large.
If the alarm occurs, perform the break-in for few minutes.

- 3 Installation
- 3.5 Notes on Dust-Proof/Water-Proof Specifications

3.5 Notes on Dust-Proof/Water-Proof Specifications

This manipulator conforms to:

- IP67 for the wrist part
- IP54 for the main part of the manipulator

NOTE

< Definition of IP (protection class) >

- Definition of IP67

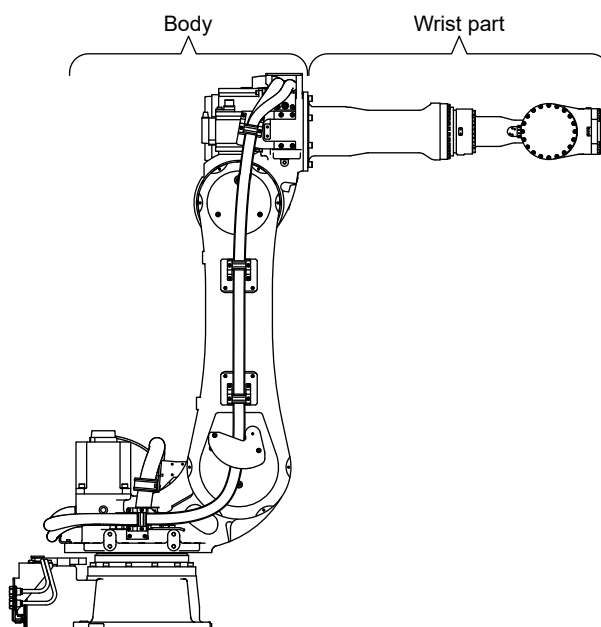
IP6□: Protection from the entry of dust.

IP □7: Protection from immersion in water with being submerged for a specified duration and pressure.

- Definition of IP54

IP5□: Protection from a certain amount of dust which is harmful enough to affect the normal operation of equipment.

IP □4: Protection from sprays and splashing of water in all directions.



Note: The illustration above shows a typical model.

The following precautions must be observed:

- Do not use the following liquids, because the rubber parts of the manipulator (gasket, oil seal, O-ring, etc.) may be deteriorated or corroded:
 - Organic solvent
 - Chlorine-based cutting fluid
 - Amine-based cleaning fluid
 - Corrosive substances such as acids, alkalis, or liquids/solutions causing rust
 - Other liquids/solutions to which nitrile-butadiene rubber (NBR) is not resistant
- After removing a gasket for parts replacement or maintenance/inspection, make sure to replace the gasket with a new one.
- Do not use cutting fluid or cleaning fluid which contains unknown chemical substances.

4 Wiring



WARNING

- Ground resistance must be 100 Ω or less.

Failure to observe this warning may result in fire and/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.)

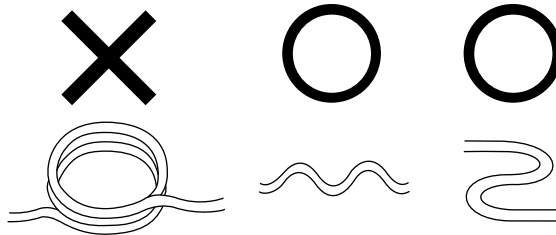
Failure to observe this warning may result in electric shock and/or personal injury.

- Wiring must be performed by authorized or certified personnel.

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

- When laying the cables from the manipulator to the YRC1000, DO NOT cover the cable with heat insulating material and avoid multiple cabling.

Failure to observe this caution may result in burn caused by cable heat emission failure.



4 Wiring

4.1 Grounding

4.1 Grounding

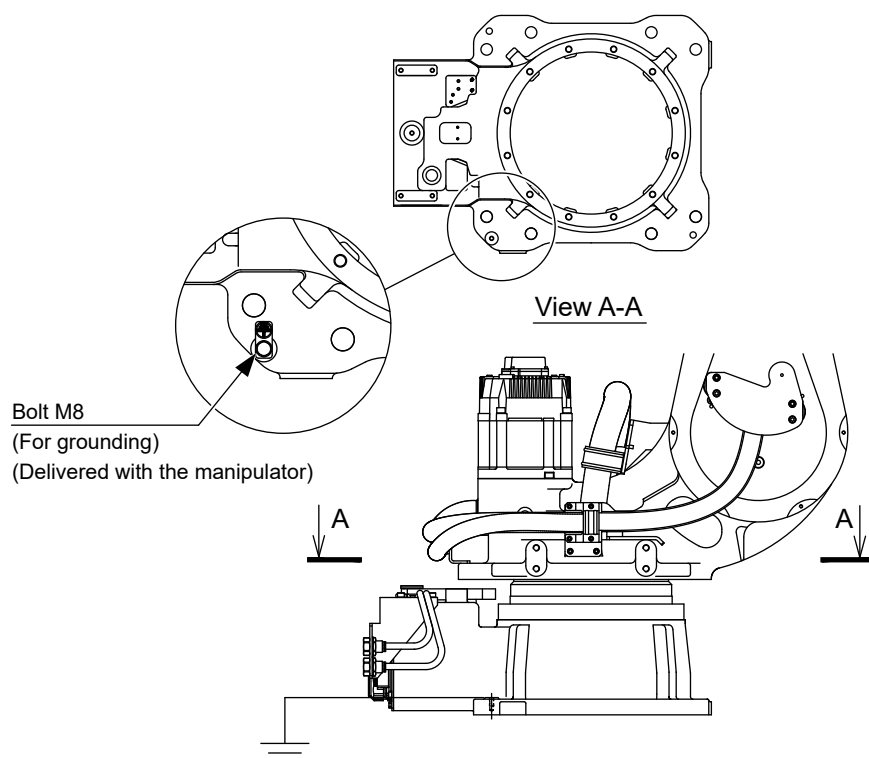
Follow electrical installation standards and wiring regulations for grounding. A ground wire of 5.5 mm² or more is recommended.

Refer to *fig. 4-1 "Grounding Method"* to connect the ground line directly to the manipulator.

NOTE

- Never use this wire sharing 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 electrical installation standards.

Fig. 4-1: Grounding Method



4.2 Cable Connection

Connect the both edge of the manipulator cable to the manipulator base connectors and to the YRC1000. Before connecting the cable to the manipulator, verify the numbers on the connector as shown in *fig. 4-3 "Manipulator Cables"*.

For the connecting position, refer to *fig. 4-4 "Manipulator Cable Connection (Manipulator Side)"* and *fig. 4-5 "Manipulator Cable Connection (YRC1000 Side)"*.

Refer to *table 4-1 "Specifications of Manipulator Cable"* and *fig. 4-6 "Overhead View of Manipulator Cable Connection (Manipulator Side)"* for the outside diameter and the minimum bending radius (for fixed part and moving part) of the manipulator cable and the details of the manipulator cable connection on the manipulator side.



CAUTION

- When connecting and disconnecting the manipulator cable, hold the manipulator cable by the connector part.

The manipulator cable may break if this work is performed by holding the cable part.

■ Procedures for Inserting the Connector

1. Confirm the connector lever of the manipulator cable is at the initial position. Insert the cable straight into the connector on the back side of the YRC1000. Insert the manipulator cable to a fixed depth then the lever rotates about 30 degree forward automatically.
2. Push the lever with hand and turn it (about 30 degree) until the lock is clicked.

■ Procedures for Removing the Connector

1. Release the lock by pushing the unlock part of the lever to unlock. Turn the lever about 60 degree to return to the initial position.
2. Pull out the connector straight.

4 Wiring

4.2 Cable Connection

Fig. 4-2: Connection of Manipulator Cable

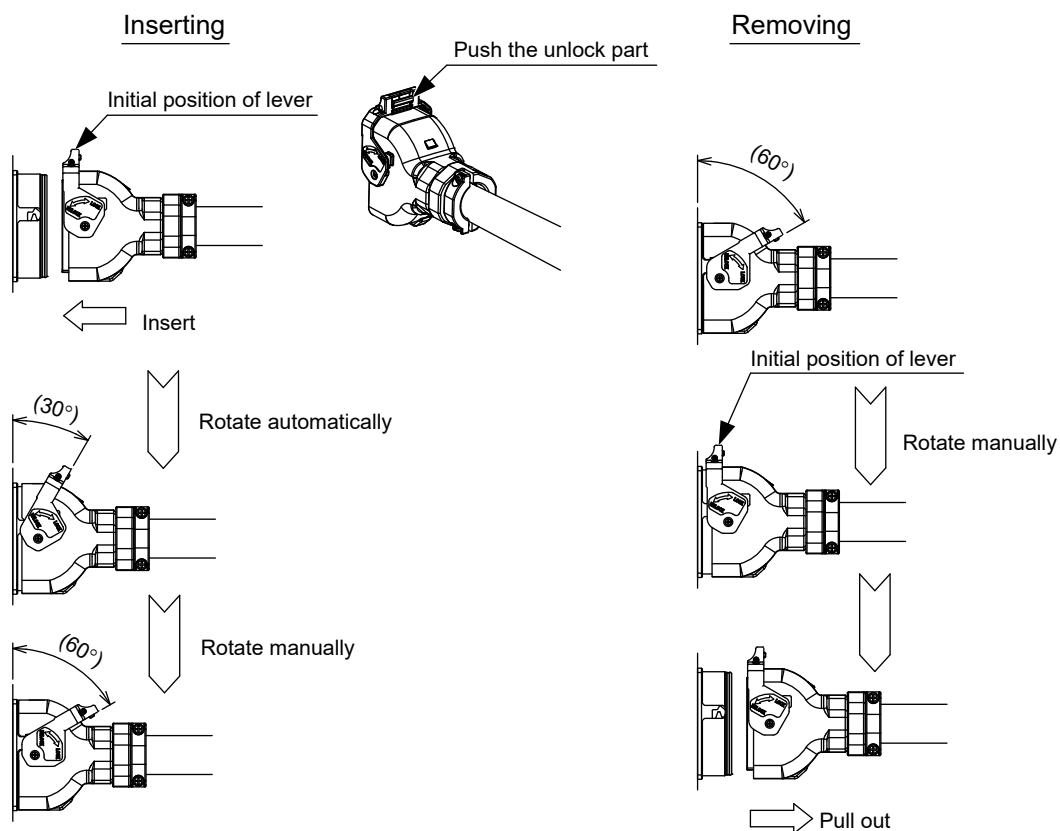
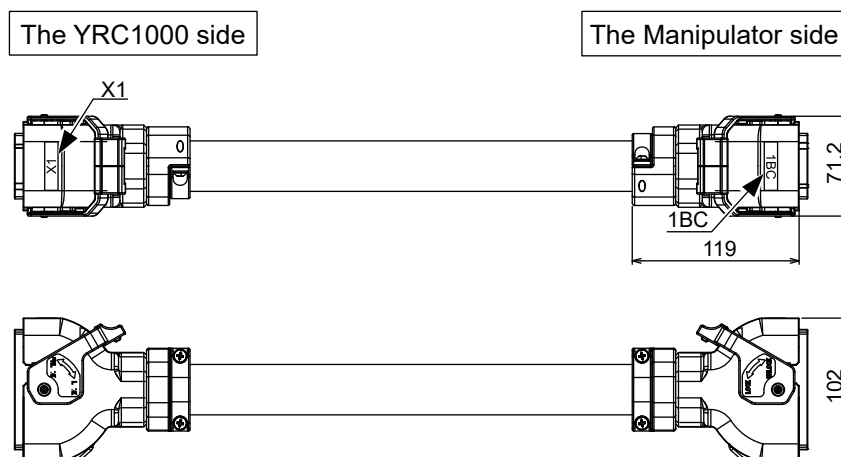


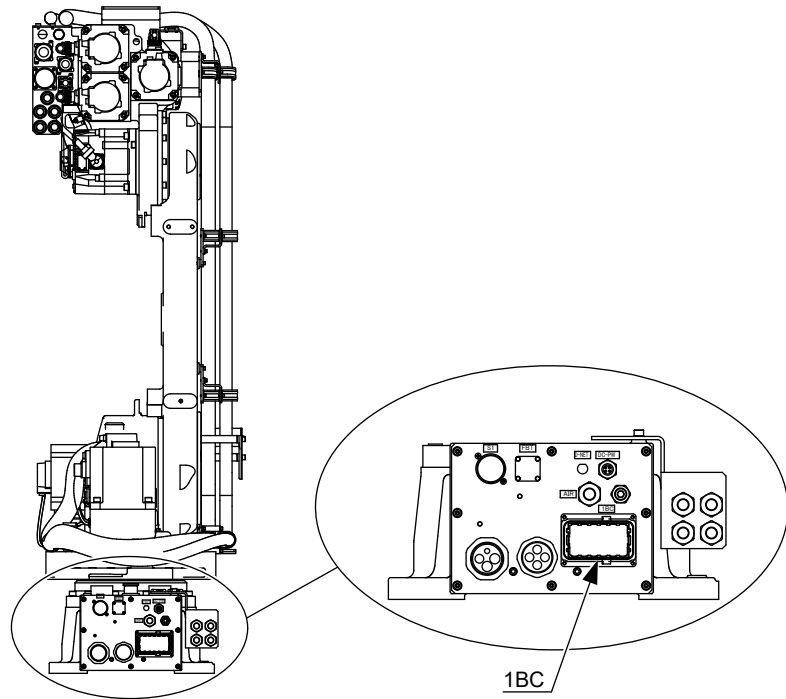
Fig. 4-3: Manipulator Cables



4 Wiring

4.2 Cable Connection

Fig. 4-4: Manipulator Cable Connection (Manipulator Side)



4 Wiring

4.2 Cable Connection

Fig. 4-5: Manipulator Cable Connection (YRC1000 Side)

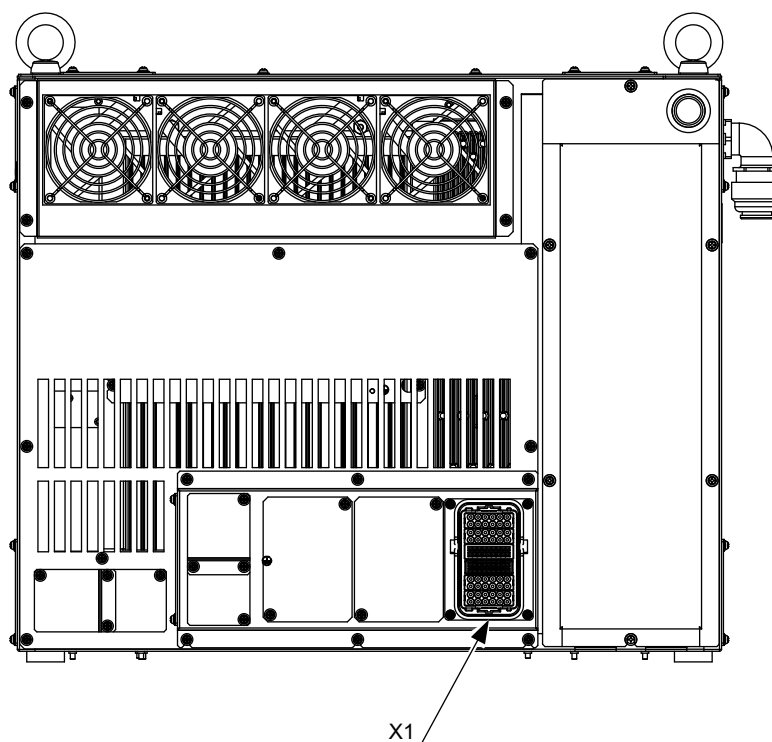
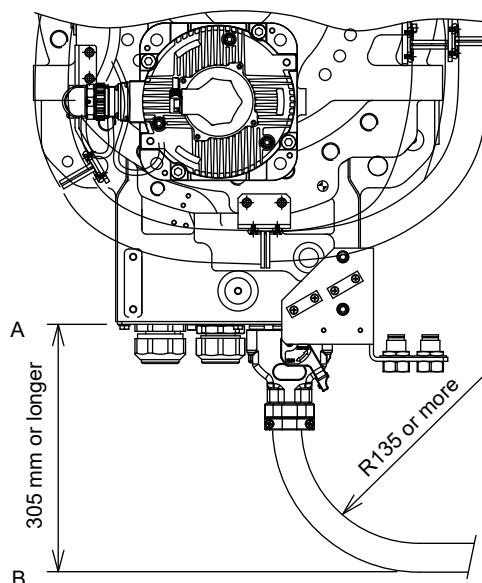


Table 4-1: Specifications of Manipulator Cable

	Outside diameter (mm)	Minimum bending radius (mm)		Distance between A and B (mm)
		Fixed part	Moving part	
GP110	36	135	320 ¹⁾	305
GP110B	36.7	135	320	305

1 The high flexible cable with a 250-mm bending radius is also available as an option.

Fig. 4-6: Overhead View of Manipulator Cable Connection (Manipulator Side)



5 Basic Specifications
5.1 Basic Specifications

5 Basic Specifications

5.1 Basic Specifications

Table 5-1: Basic Specifications (YR-1-06VX110-A00)

Item		Type	YR-1-06VX110-A00	
Flange for cabling ¹⁾			Not-equipped	Equipped
Structure			Vertically articulated	
Degree of freedom			6	
Payload	Wrist part		110 kg	100 kg
	U-arm		10 kg	
Repeatability ²⁾			0.03 mm	
Range of Motion	S-Axis (turning)		-180° - +180°	
	L-Axis (lower arm)		-90° - +155°	
	U-Axis (upper arm)		-80° - +90°	
	R-Axis (wrist roll)		-360° - +360°	-205° - +205°
	B-Axis (wrist pitch/yaw)		-125° - +125°	-120° - +120°
	T-Axis (wrist twist)		-360° - +360°	-205° - +205°
Maximum Speed ³⁾	S-Axis		2.45 rad/s, 140°/s	
	L-Axis		1.92 rad/s, 110°/s	
	U-Axis		2.27 rad/s, 130°/s	
	R-Axis		3.05 rad/s, 175°/s	
	B-Axis		3.05 rad/s, 175°/s	
	T-Axis		4.44 rad/s, 255°/s	
Allowable Moment ⁴⁾	R-Axis		721 N•m (73.5 kgf•m)	696 N•m (71 kgf•m)
	B-Axis		721 N•m (73.5 kgf•m)	696 N•m (71 kgf•m)
	T-Axis		294 N•m (30 kgf•m)	
Allowable Inertia ⁴⁾ (GD ² /4)	R-Axis		60 kg•m ²	58 kg•m ²
	B-Axis		60 kg•m ²	58 kg•m ²
	T-Axis		33.7 kg•m ²	33 kg•m ²
Approx. Mass			660 kg	
Protective enclosure			Body: IP54	Wrist part: IP67
Mounting method			Floor-mounted	
Power requirement ⁵⁾			5.0 kVA	
Applicable controller: YRC1000 ⁶⁾			ERAR-1000-06VX280-□ *□: Depends on the specification.	
Equivalent continuous A-weighted sound pressure level ⁷⁾			72 dB or less	

1 For the manipulator with the YASKAWA standard external cable, the flange for cabling (for details, refer to fig. 5-2(a) "Dimensions and P-Point Maximum Envelope (YR-1-06VX110-A00)") is mounted on the edge of the wrist.

2 Repeatability conforms to ISO 9283.

3 The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.

4 Refer to chapter 6.1 "Allowable Wrist Load" for details on the allowable moment and the allowable inertia.

5 The power requirement value is obtained using YASKAWA's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

6 The last digit of the type number differs depending on the specification. Refer to "YRC1000 INSTRUCTIONS (RE-CTO-A221)" and YRC1000 supplementary instructions for details.

7 The equivalent continuous A-weighted sound pressure level is measured in accordance with ISO 11201 (EN 31201).

<Measurement conditions>

1. The maximum load and speed are used for measurement.

2. Measurement position

-Measurement height: 1.2 m to 1.5 m above the floor

-Distance from the target object to the measuring instrument: 400 mm from P-point maximum envelope

5 Basic Specifications
5.1 Basic Specifications

Table 5-2: Basic Specifications (YR-1-07VXB110-A00)

Item		Type	YR-1-07VXB110-A00	
Flange for cabling ¹⁾			not-equipped	Equipped
Structure			Vertically articulated	
Degree of freedom			7	
Payload	Wrist part		110 kg	100 kg
	U-arm		10 kg	
Repeatability ²⁾			0.04 mm	
Range of Motion	S-Axis (turning)		-180° - +180°	
	L-Axis (lower arm)		-45° - +155°	
	E-Axis (elbow)		-45° - +120°	
	U-Axis (upper arm)		-70° - +90°	
	R-Axis (wrist roll)		-360° - +360°	-205° - +205°
	B-Axis (wrist pitch/yaw)		-125° - +125°	-120° - +120°
	T-Axis (wrist twist)		-360° - +360°	-205° - +205°
Maximum Speed ³⁾	S-Axis		2.45 rad/s, 140°/s	
	L-Axis		1.92 rad/s, 110°/s	
	E-Axis (elbow)		1.92 rad/s, 110°/s	
	U-Axis		2.27 rad/s, 130°/s	
	R-Axis		3.05 rad/s, 175°/s	
	B-Axis		3.05 rad/s, 175°/s	
	T-Axis		4.44 rad/s, 255°/s	
Allowable Moment ⁴⁾	R-Axis		721 N•m (73.5 kgf•m)	696 N•m (71 kgf•m)
	B-Axis		721 N•m (73.5 kgf•m)	696 N•m (71 kgf•m)
	T-Axis		294 N•m (30 kgf•m)	
Allowable Inertia ⁴⁾ (GD ² /4)	R-Axis		60 kg•m ²	58 kg•m ²
	B-Axis		60 kg•m ²	58 kg•m ²
	T-Axis		33.7 kg•m ²	33 kg•m ²
Approx. Mass			790 kg	
Protective enclosure			Body: IP54	Wrist part: IP67
Mounting method			Floor-mounted	
Power requirement ⁵⁾			5.0 kVA	
Applicable controller: YRC1000 ⁶⁾			ERAR-1000-07VXB110-□ *□: Depends on the specification.	
Equivalent continuous A-weighted sound pressure level ⁷⁾			70 dB or less	

1 For the manipulator with the YASKAWA standard external cable, the flange for cabling (for details, refer to fig. 5-2(b) "Dimensions and P-Point Maximum Envelope (YR-1-07VXB110-A00)") is mounted on the edge of the wrist.

2 Repeatability conforms to ISO 9283.

3 The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.

4 Refer to chapter 6.1 "Allowable Wrist Load" for details on the allowable moment and the allowable inertia.

5 The power requirement value is obtained using YASKAWA's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

6 The last digit of the type number differs depending on the specification. Refer to "YRC1000 INSTRUCTIONS (RE-CTO-A221)" and YRC1000 supplementary instructions for details.

7 The equivalent continuous A-weighted sound pressure level is measured in accordance with ISO 11201 (EN 31201).

<Measurement conditions>

1. The maximum load and speed are used for measurement.

2. Measurement position

-Measurement height: 1.2 m to 1.5 m above the floor

-Distance from the target object to the measuring instrument: 400 mm from P-point maximum envelope

5 Basic Specifications
 5.2 Part Names and Working Axes

5.2 Part Names and Working Axes

Fig. 5-1(a): Part Names and Working Axes (YR-1-06VX110-A00)

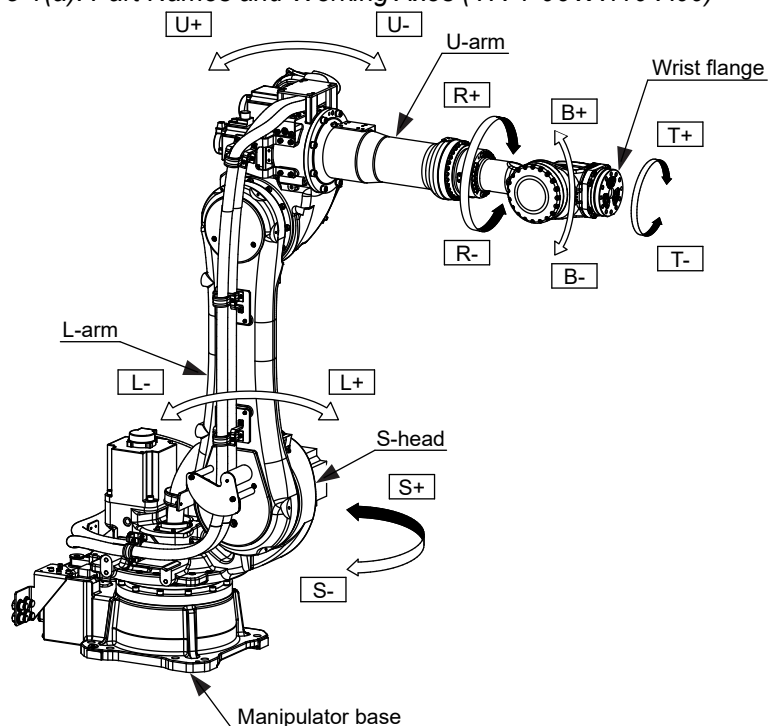
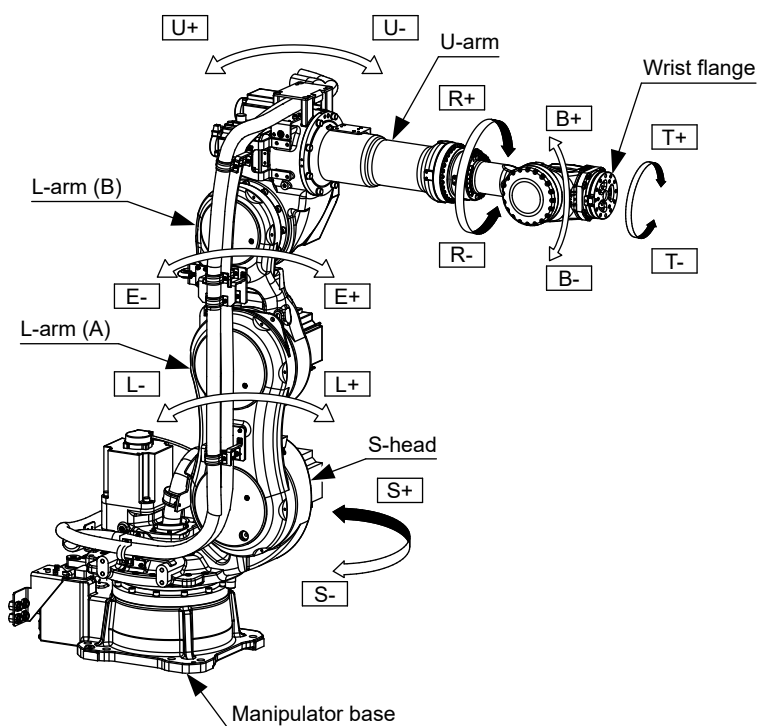
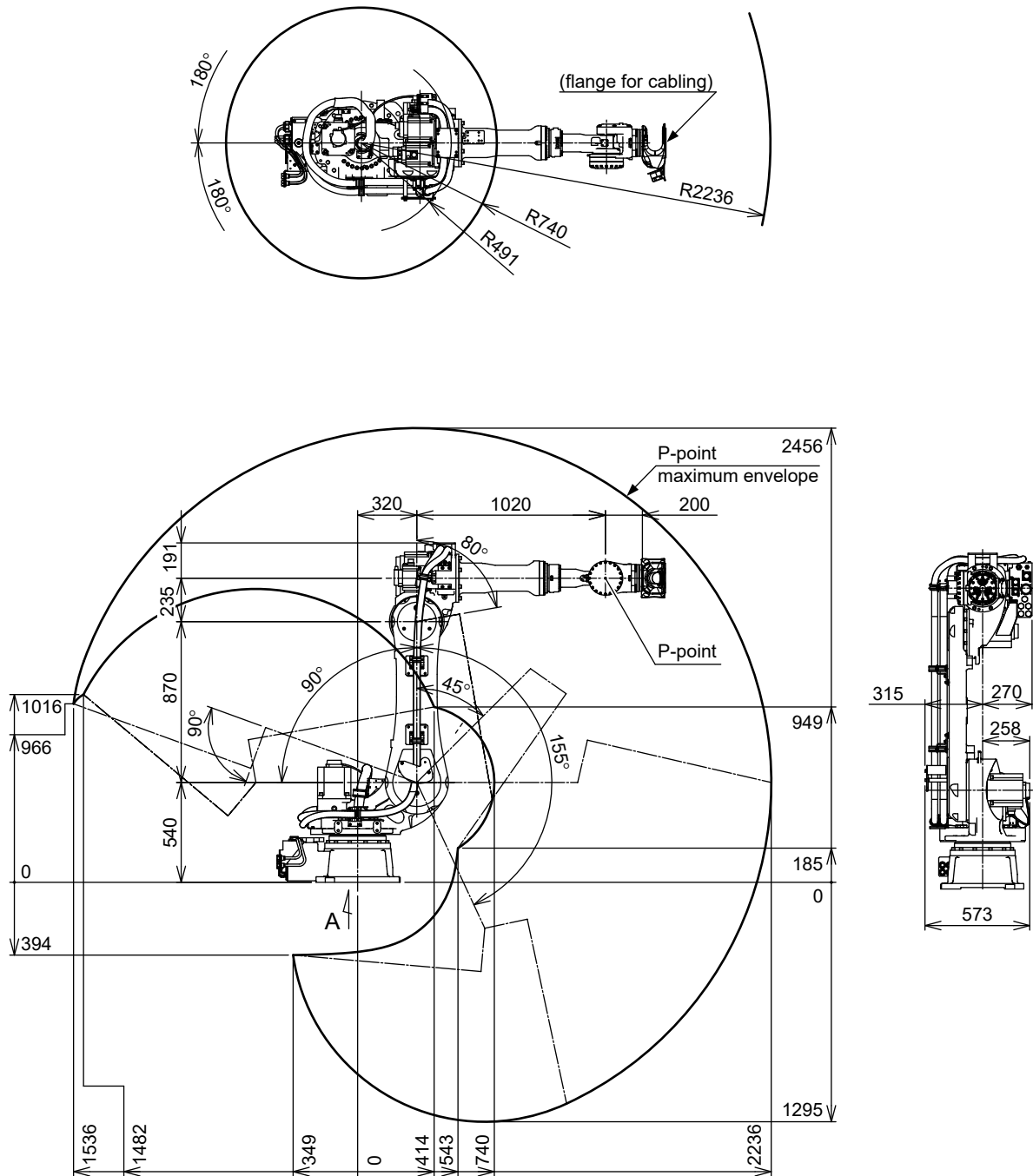


Fig. 5-1(b): Part Names and Working Axes (YR-1-07VXB110-A00)



5.3 Dimensions and P-Point Maximum Envelope

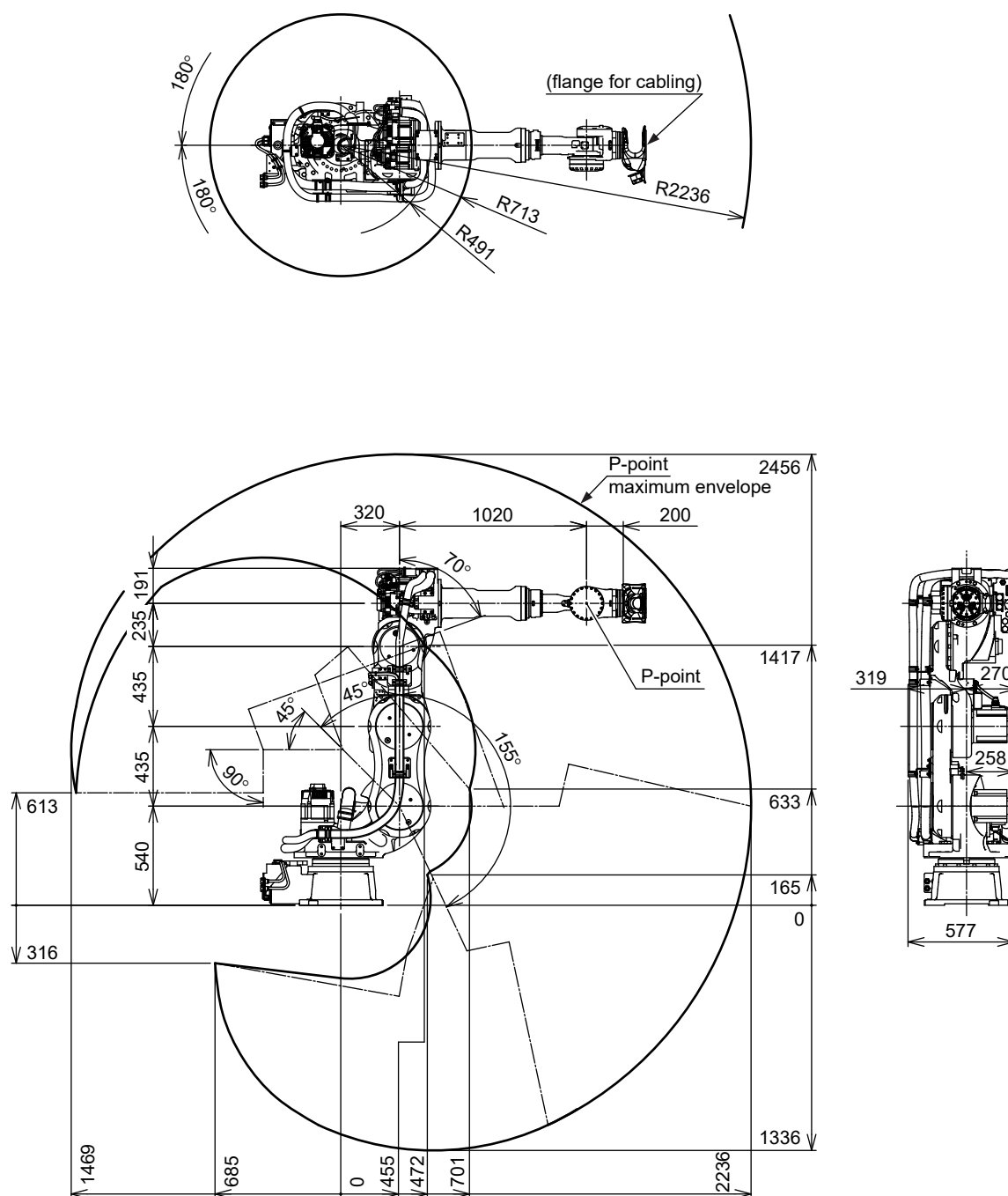
Fig. 5-2(a): Dimensions and P-Point Maximum Envelope (YR-1-06VX110-A00)



5 Basic Specifications

5.3 Dimensions and P-Point Maximum Envelope

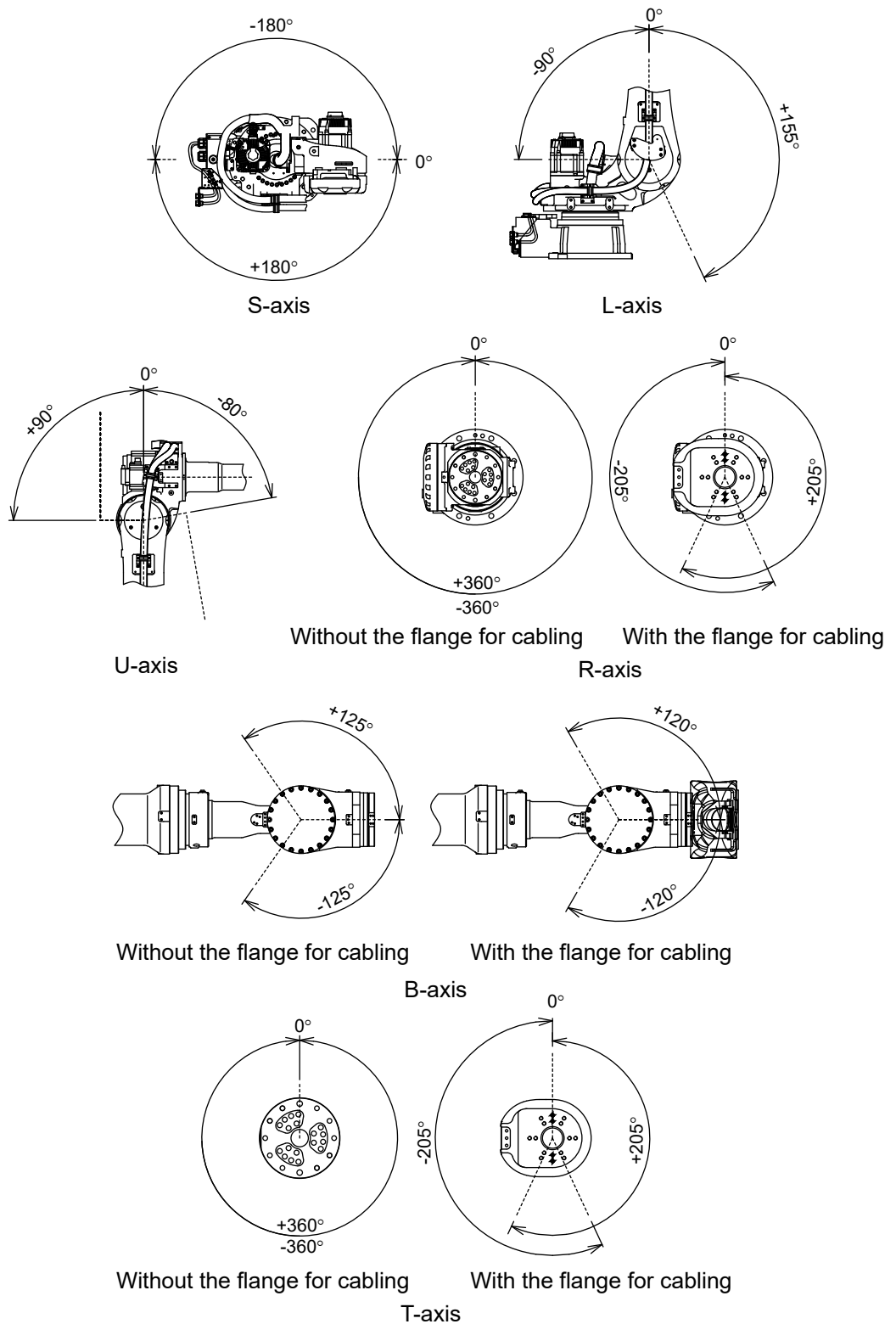
Fig. 5-2(b): Dimensions and P-Point Maximum Envelope (YR-1-07VXB110-A00)



5 Basic Specifications

5.3 Dimensions and P-Point Maximum Envelope

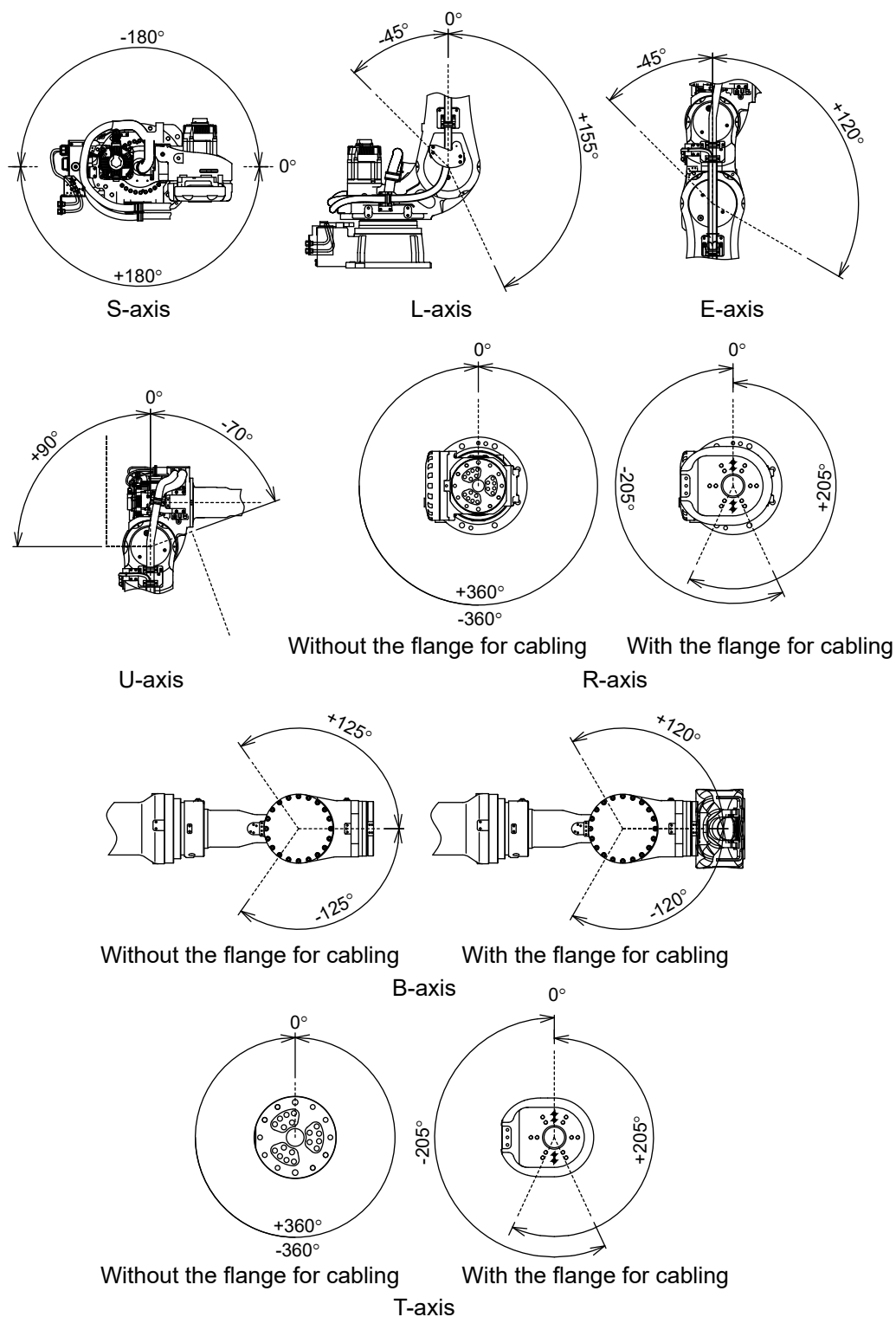
Fig. 5-3(a): Home Position and Operating Range of Each Axis (YR-1-06VX110-A00)



5 Basic Specifications

5.3 Dimensions and P-Point Maximum Envelope

Fig. 5-3(b): Home Position and Operating Range of Each Axis (YR-1-07VXB110-A00)



5 Basic Specifications

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes**5.4.1 General Information**

- The stopping distance is an angle traveled by the manipulator from the moment when the stop signal is activated until the manipulator comes to a complete standstill.
- The stopping time is the time elapsed from the moment that the stop signal is activated until the manipulator comes to a complete standstill.
- The data that are given for the main axes S, L and U (or E) are the maximum displacement.
- Superposed axes motions may result in longer stopping distance.
- Stopping distance and stopping time are measured in accordance with ISO 10218-1, Annex B.
- Stop categories: According to IEC60204-1
 - Stop category 0
 - Stop category 1
- The values specified for Stop category 0 are the reference values that are determined by tests and simulations. The actual stopping distance and stopping time may differ.

5.4.2 Definition of Use

Load: Rated load weight and load on an arm

Speed: Operating speed of the manipulator

Extension: Distance between the rotation center and the P-point of each axis

5.4.3 Stopping Distance and Time for Stop Category 0: S-, L- and U- (or E-) Axes

Measurement Conditions

- Load: Maximum load
- Speed: Maximum speed
- Posture: Maximum inertia generation posture

Table 5-3: YR-1-06VX110-A00

Axis	Stopping distance (deg)	Stopping time (sec)
S-axis	26.5	0.538
L-axis	18.9	0.490
U-axis	25.9	0.433

Table 5-4: YR-1-07VXB110-A00

Axis	Stopping distance (deg)	Stopping time (sec)
S-axis	31.3	0.608
L-axis	26.2	0.562
E-axis	21.6	0.397

5 Basic Specifications

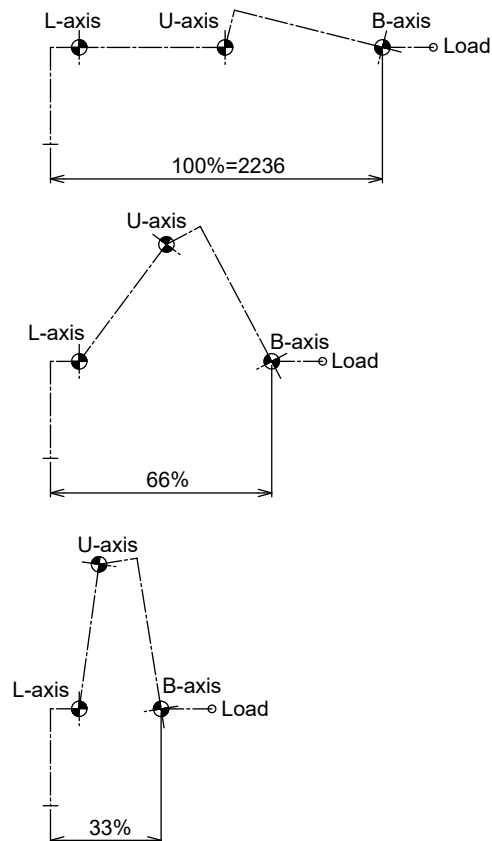
5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4.4 Stop Category 1: Stopping Distance and Time for Stop Category 1: S-, L- and U- (or E-) Axes

5.4.4.1 Extension

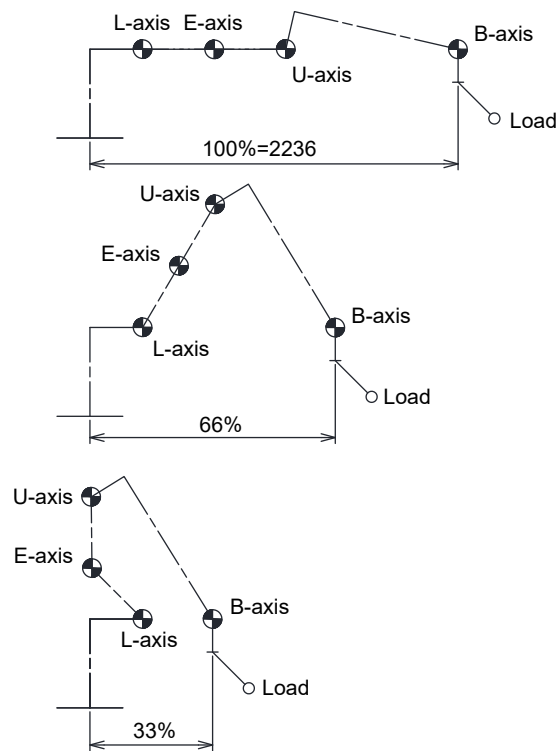
Refer to fig. 5-4(a) "S-Axis Extension (YR-1-06VX110-A00)", fig. 5-4(b) "S-Axis Extension (YR-1-07VXB110-A00)", fig. 5-5(a) "L-Axis Extension (YR-1-06VX110-A00)", fig. 5-5(b) "L-Axis Extension (YR-1-07VXB110-A00)", fig. 5-6 "U-Axis Extension (YR-1-06VX110-A00)", fig. 5-7 "E-Axis Extension (YR-1-07VXB110-A00)" for each axis arm extension.

Fig. 5-4(a): S-Axis Extension (YR-1-06VX110-A00)



5 Basic Specifications

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

Fig. 5-4(b): S-Axis Extension (YR-1-07VXB110-A00)

5 Basic Specifications
 5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

Fig. 5-5(a): L-Axis Extension (YR-1-06VX110-A00)

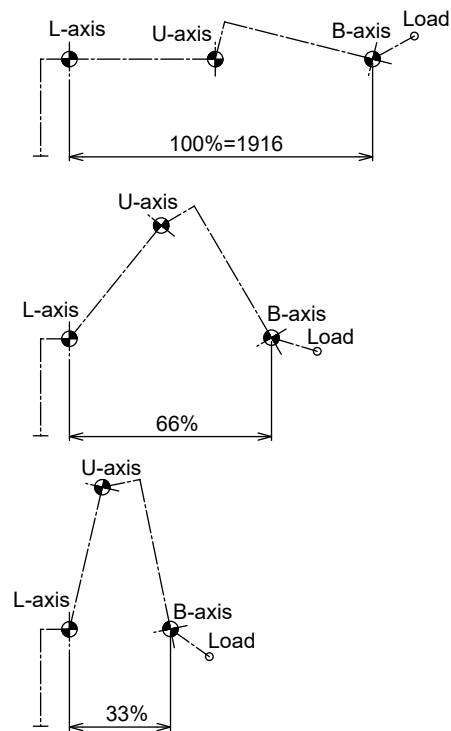
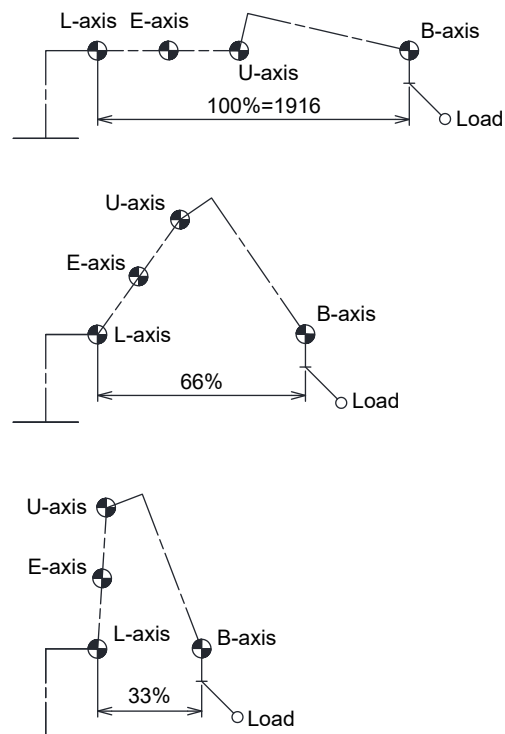
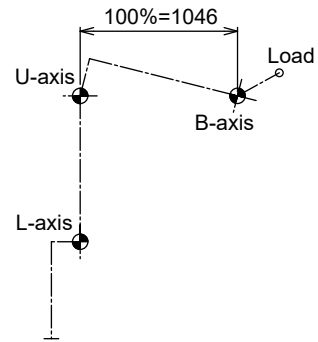
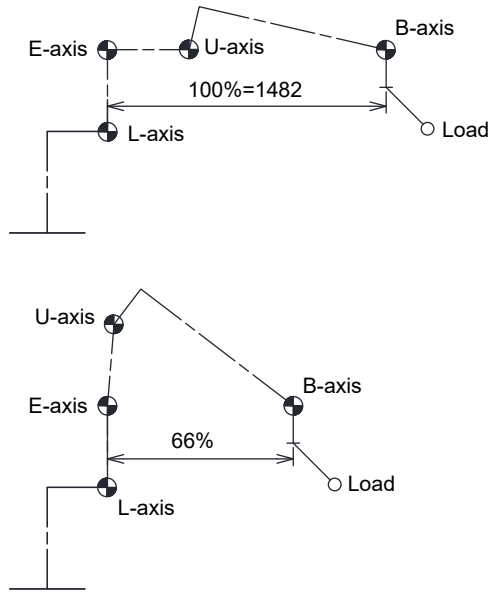


Fig. 5-5(b): L-Axis Extension (YR-1-07VXB110-A00)



5 Basic Specifications

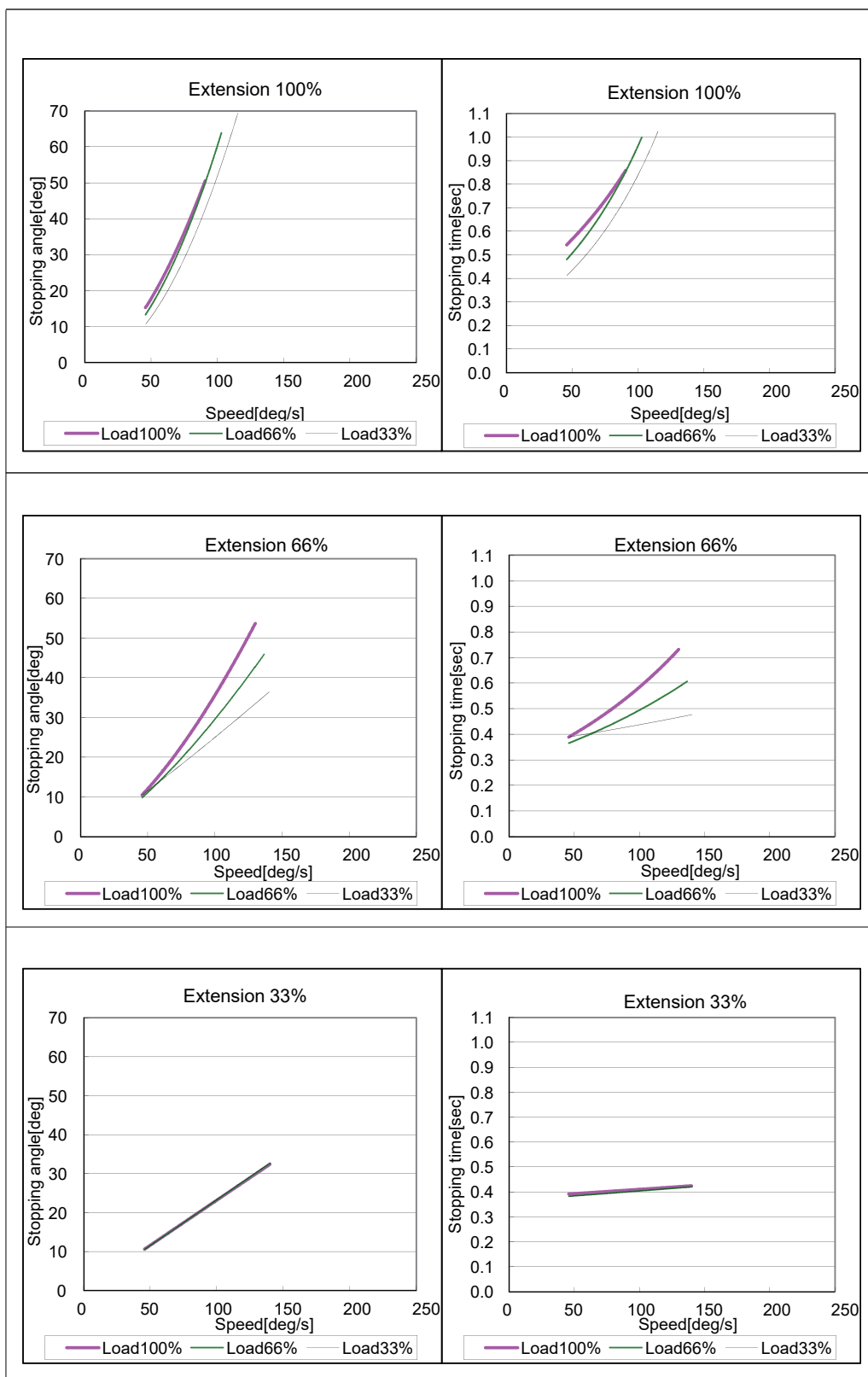
5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

Fig. 5-6: U-Axis Extension (YR-1-06VX110-A00)*Fig. 5-7: E-Axis Extension (YR-1-07VXB110-A00)*

5 Basic Specifications

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4.4.2 Stopping Distance and Time for Stop Category 1: S-axis (YR-1-06VX110-A00)



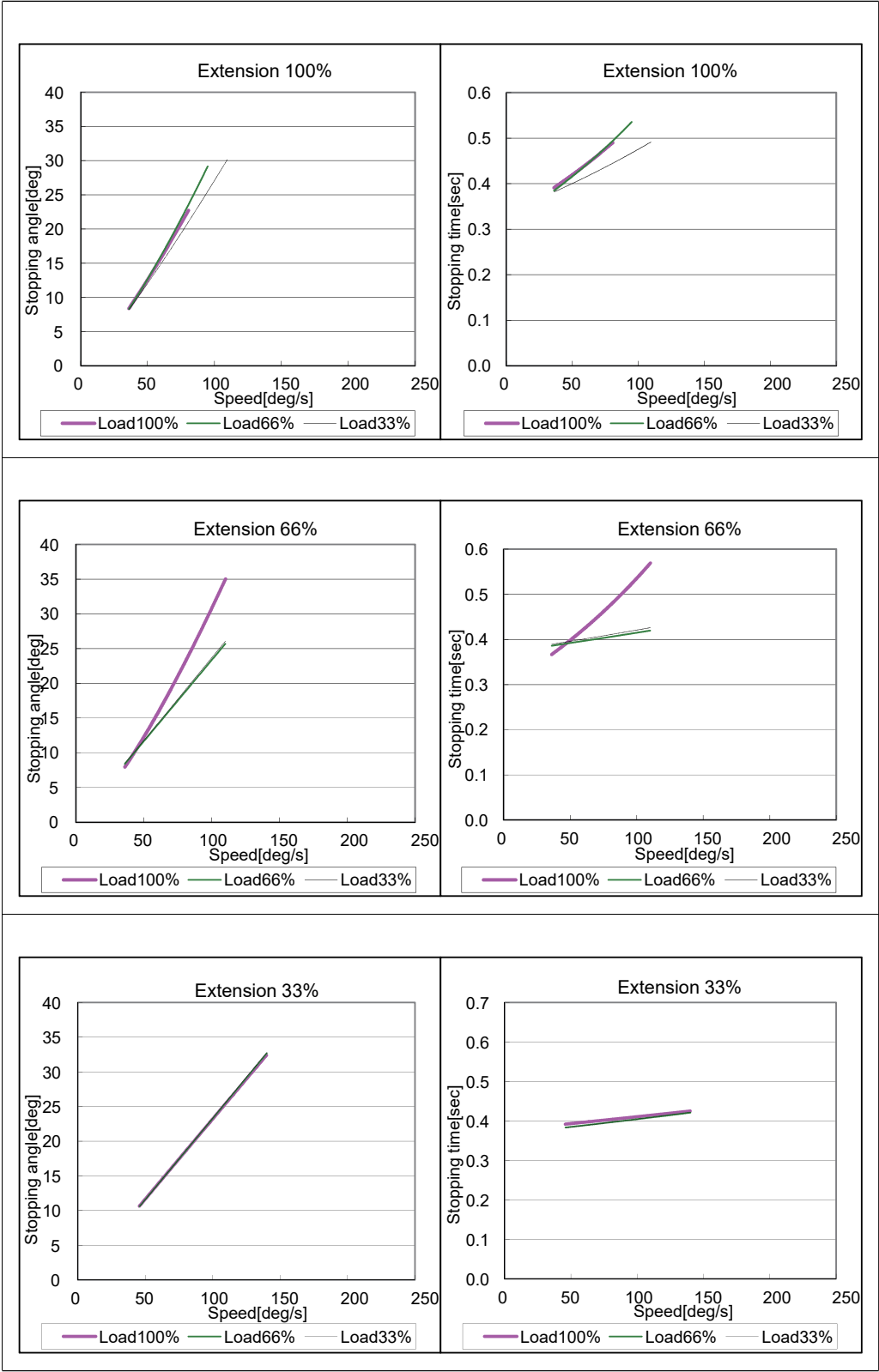
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Basic Specifications

5.4

Stopping Distance and Time for S-, L-, and U- (or E-) Axes

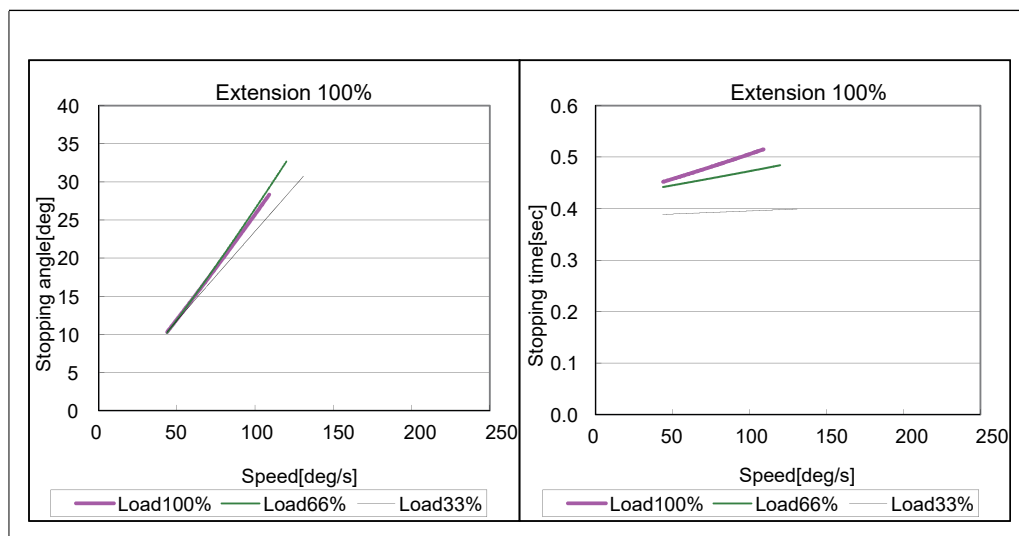
5.4.4.3 Stopping Distance and Time for Stop Category 1: L-axis (YR-1-06VX110-A00)



5 Basic Specifications

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4.4.4 Stopping Distance and Time for Stop Category 1: U-axis (YR-1-06VX110-A00)



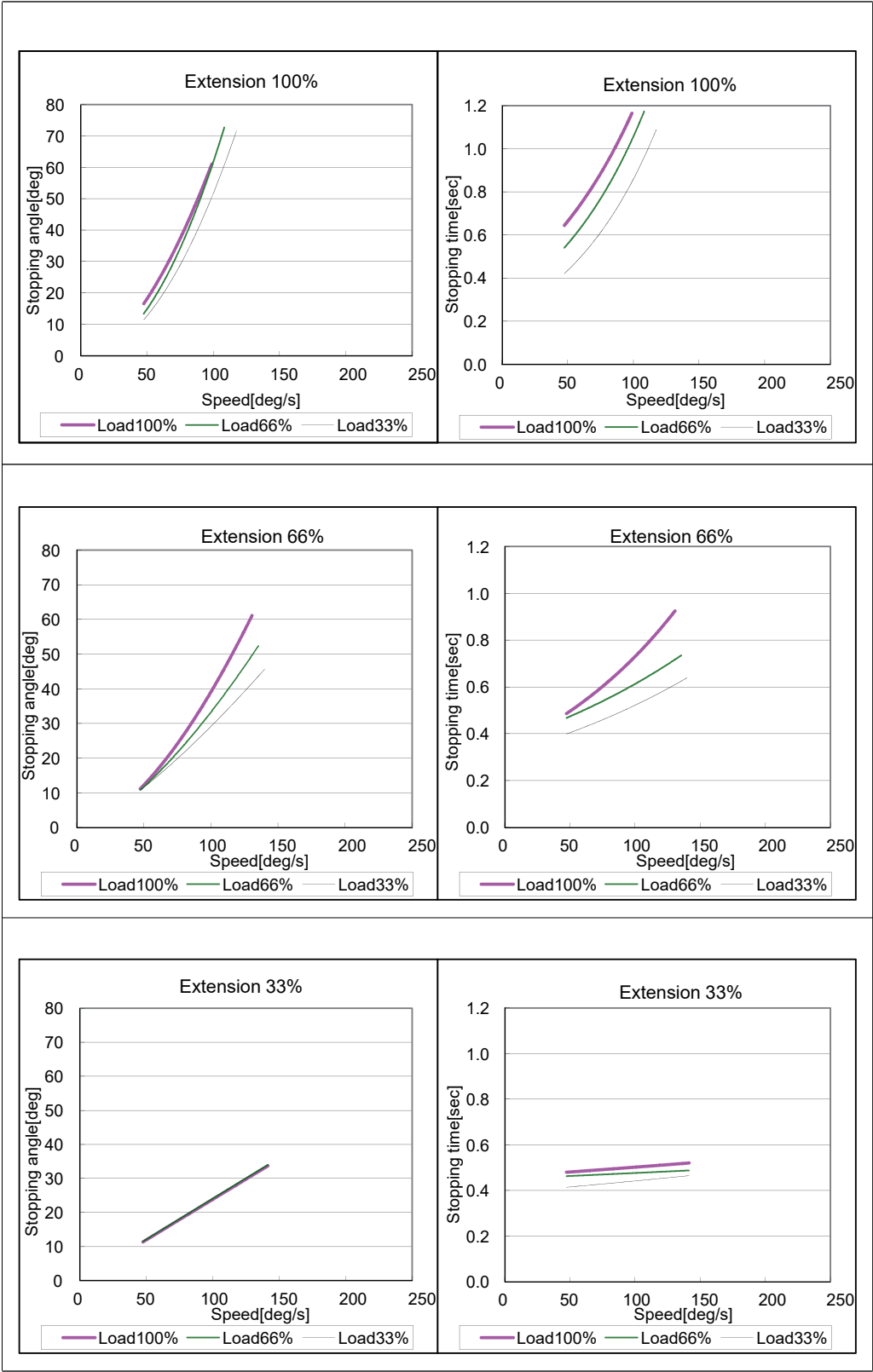
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Basic Specifications

5.4

Stopping Distance and Time for S-, L-, and U- (or E-) Axes

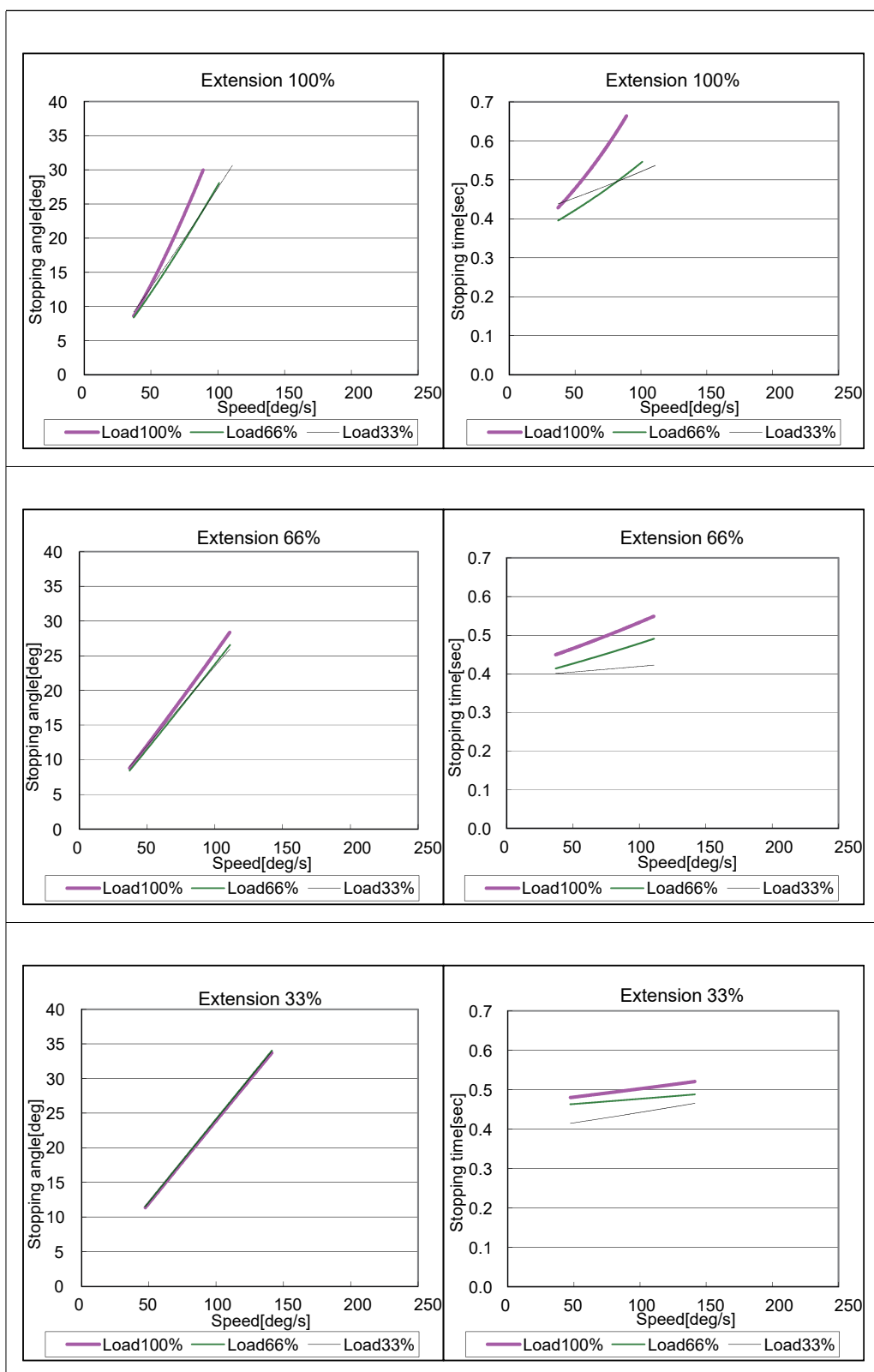
5.4.4.5 Stopping Distance and Time for Stop Category 1: S-axis (YR-1-07VXB110-A00)



5 Basic Specifications

5.4 Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4.4.6 Stopping Distance and Time for Stop Category 1: L-axis (YR-1-07VXB110-A00)



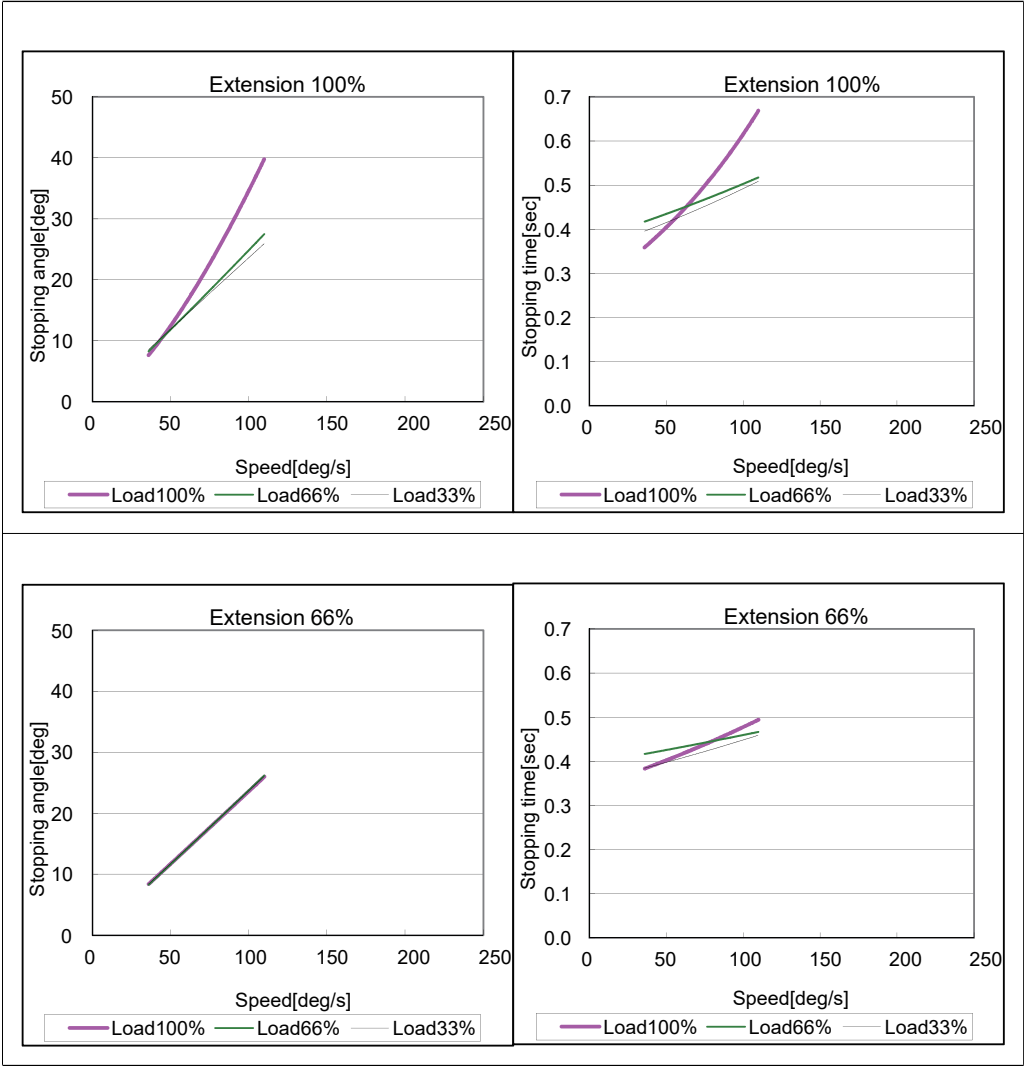
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Basic Specifications

5.4

Stopping Distance and Time for S-, L-, and U- (or E-) Axes

5.4.4.7 Stopping Distance and Time for Stop Category 1: E-axis (YR-1-07VXB110-A00)



5 Basic Specifications
 5.5 Alterable Operating Range

5.5 Alterable Operating Range

The operating range of the S-axis can be altered in accordance with the operating conditions as shown in *table 5-5 “S-Axis Operating Range”*. If alteration is necessary, contact your YASKAWA representative in advance.

Table 5-5: S-Axis Operating Range

Item	Specifications
S-axis operating range	- 180° - + 180° (standard) - 165° - + 165° - 150° - + 150° - 135° - + 135° - 120° - + 120° - 105° - + 105° - 90° - + 90° - 75° - + 75° - 60° - + 60° - 45° - + 45° - 30° - + 30° - 15° - + 15°

5.5.1 Components for Altering Operating Range

Arrange the components listed in *fig. 5-8 “Components of the S-Axis Stopper and Stopper Mounting Position”*, when modifying the angle of S-axis.

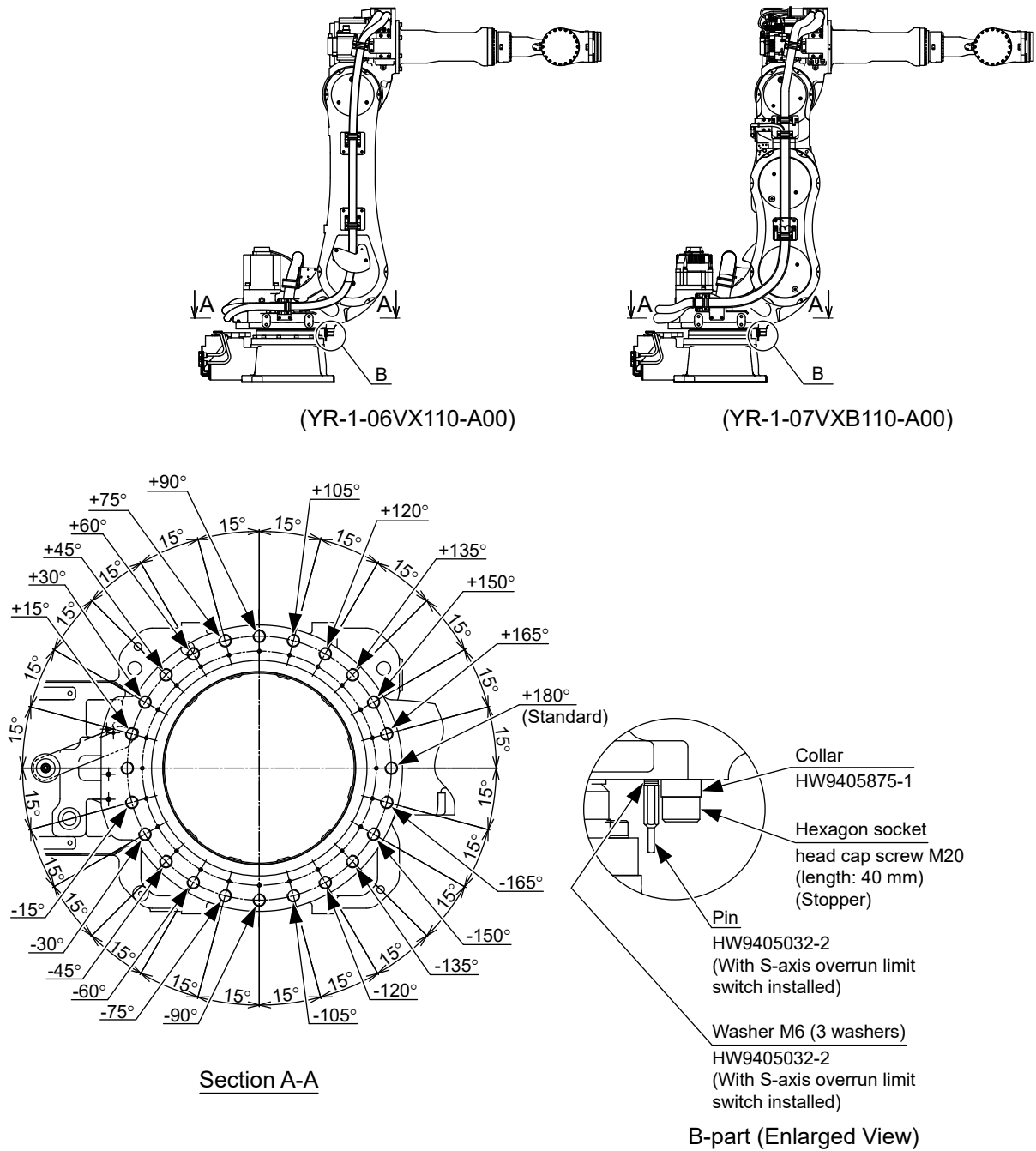
- Hexagon socket head cap screw
 M20 *FA coat* (length: 40 mm) (2 screw (stopper))
 (Tensile strength: 1200 N/mm² or more)
- Collar (drawing No. HW9405875-2) (2 pcs)
- Pin (drawing No. HW9405032-2) (2 pin)
- Washer M6 (6 washers)

* Pin and washers only when S-axis overrun limit switch has been added.

5 Basic Specifications

5.5 Alterable Operating Range

Fig. 5-8: Components of the S-Axis Stopper and Stopper Mounting Position



5 Basic Specifications

5.5 Alterable Operating Range

5.5.2 Notes on the Mechanical Stopper Installation

As shown in *fig. 5-8 "Components of the S-Axis Stopper and Stopper Mounting Position"*, mount the S-axis mechanical stopper to the S-head by inserting the collar (HW9405875-2) onto the hexagon socket head cap screw M20 *FA coat* (length: 40 mm) (Tensile strength: 1200 N/mm² or more) and tightening the screw with the tightening torque 167 N·m.

If the operating range is $\pm 180^\circ$, the mechanical stopper is mounted as shown in B of *fig. 5-8*. The S-axis mechanical stopper can be set at a pitch of 15° , however, mount the S-axis mechanical stopper using the combinations in *table 5-6 "The Settable Angle for S-Axis Stopper"* so that the stopper and lever do not interfere with each other.

When the S-axis overrun limit switch has been added, mount the pin (HW9405032-2) and the washer M6 at a position with the same angle.



1. Apply the specified components when mounting the S-Axis mechanical stopper.
2. Turn OFF the electric power supply before mounting.

5.5.3 Adjustment to the Pulse Limitation of S-Axis

For altering the range of motion of S-Axis, refer to chapter 6.13 "Softlimit Setting Function" in "YRC1000 GENERAL OPERATOR'S MANUAL (RE-CSO-A051)". With programming pendant, input the numeric value as shown in the following table to modify the parameter.

Degree	0°	$\pm 15^\circ$	$\pm 30^\circ$	$\pm 45^\circ$	$\pm 60^\circ$
Pulse	0	± 21203	± 42406	± 63609	± 84812

Degree	$\pm 75^\circ$	$\pm 90^\circ$	$\pm 105^\circ$	$\pm 120^\circ$	$\pm 135^\circ$
Pulse	± 106015	± 127217	± 148420	± 169623	± 190826

Degree	$\pm 150^\circ$	$\pm 165^\circ$	$\pm 180^\circ$
Pulse	± 212029	± 233232	± 254434



Adjust both of the pulse limitation and the angle of S-Axis mechanical stopper as modifying the range of motion for machinery.

5

Basic Specifications

5.5

Alterable Operating Range

Table 5-6: The Settable Angle for S-Axis Stopper

The Angle of S-Axis Stopper for + Direction	
	-180°
	-165°
	-150°
	-135°
	-120°
	-105°
	-90°
	-75°
	-60°
	-45°
	-30°
	-15°
	0°
	15°
	30°
	45°
	60°
	75°
	90°
	105°
	120°
	135°
	150°
	165°
	180°
The Angle of S-Axis Stopper for - Direction	
-180°	
-165°	
-150°	
-135°	
-120°	
-105°	
-90°	
-75°	
-60°	
-45°	
-30°	
-15°	
0°	
15°	
30°	
45°	
60°	
75°	
90°	
105°	
120°	
135°	
150°	
165°	
180°	

6	Allowable Load for Wrist Axis and Wrist Flange
6.1	Allowable Wrist Load

6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load

The allowable payload of the wrist axis including the mass of the grip is shown below.

: a maximum of 110 kg (without a flange for cabling)

: a maximum of 100 kg (with a flange for cabling)

The conditions listed in *table 6-1 "Allowable Wrist Load"* must be satisfied due to limits of moments and the moment of inertia.

The values in *table 6-1* must not be exceeded even if the load is not applied as mass but applied as force.

Table 6-1: Allowable Wrist Load

Axis	Without flange for cabling		With flange for cabling	
	Allowable moment N·m (kgf·m) ¹⁾	Allowable inertia (GD ² /4) kg·m ²	Allowable moment N·m (kgf·m) ¹⁾	Allowable inertia (GD ² /4) kg·m ²
R-Axis	721 (73.5)	60	696 (71)	58
B-Axis	721 (73.5)	60	696 (71)	58
T-Axis	294 (30)	33.7	294 (30)	33

1 (): Gravitational unit

When the volume of the load is relatively small, refer to the moment arm rating (L_B , L_T) shown in *fig. 6-1(a) "Moment Arm Rating Without Flange for Cabling"* and *fig. 6-1(b) "Moment Arm Rating With Flange for Cabling"*. Each value of the allowable inertia above is calculated assuming that the moment load is at the maximum. When only the inertia load is applied, when the moment load is small while the inertia load is large, or when the load is not applied as mass but applied as force, etc., contact your YASKAWA representative in advance.

When a tool is installed, the tool information and the load information must be set. For the setting, refer to chapter 8.3 "Tool Data Setting" and chapter 8.4 "ARM Control" in "YRC1000 INSTRUCTIONS (RE-CTO-A221)".

6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load

Fig. 6-1(a): Moment Arm Rating Without Flange for Cabling

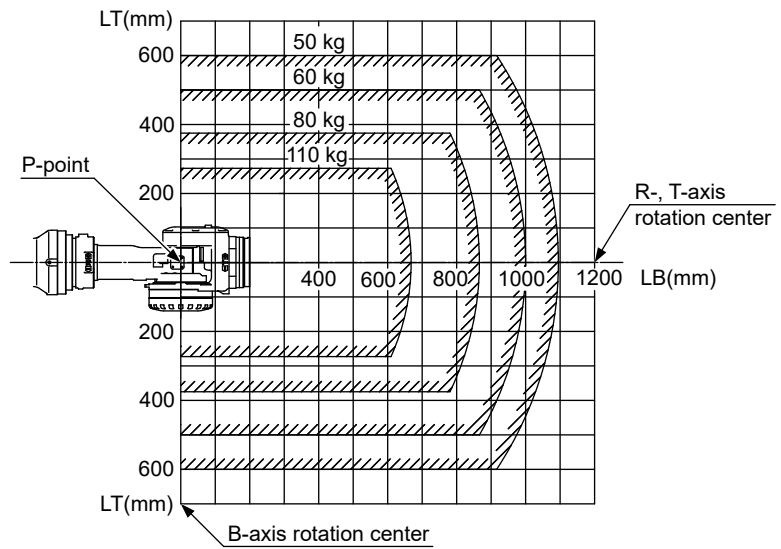
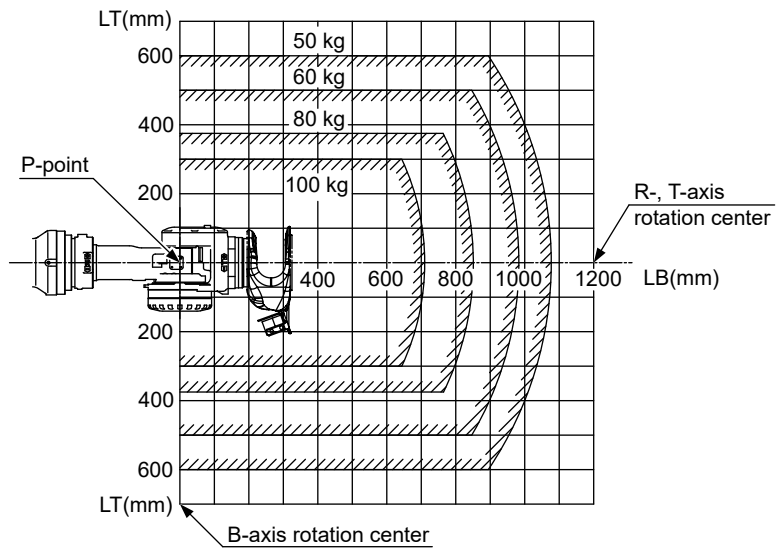


Fig. 6-1(b): Moment Arm Rating With Flange for Cabling



6 Allowable Load for Wrist Axis and Wrist Flange

6.2 Wrist Flange

6.2 Wrist Flange

The wrist flange dimensions are shown in *fig. 6-2(a) "Wrist Flange Without Flange for Cabling"* and *fig. 6-2(b) "Wrist Flange With Flange for Cabling"*.

It is recommended that the attachment be mounted inside the fitting in order to identify the alignment marks. Fitting depth should be 5 mm or less.

Fig. 6-2(a): Wrist Flange Without Flange for Cabling

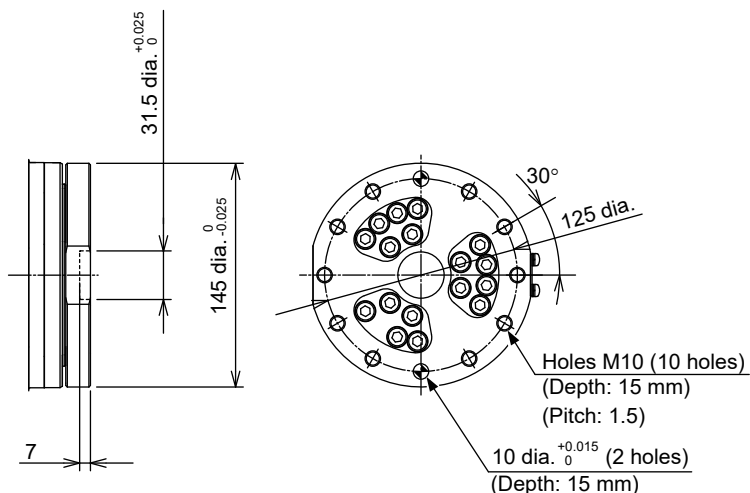
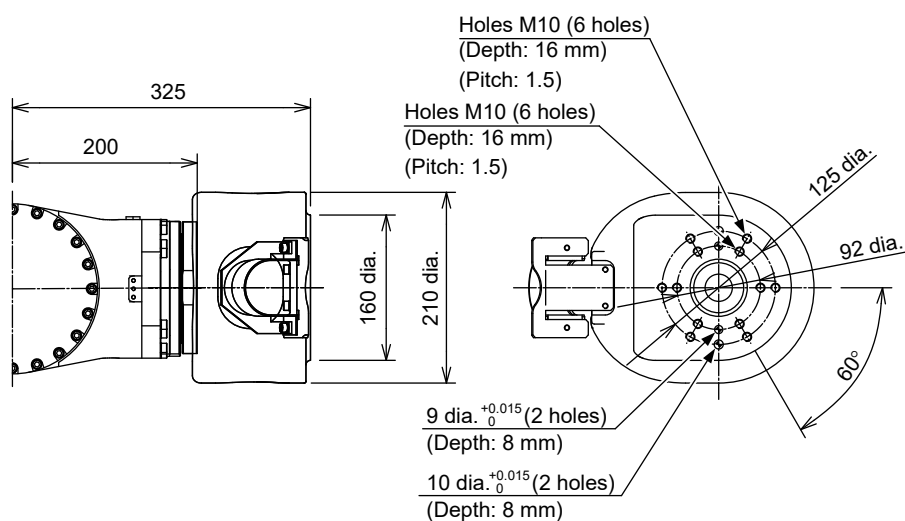


Fig. 6-2(b): Wrist Flange With Flange for Cabling



Wash off anti-corrosive paint (yellow) on the wrist flange surface with thinner before mounting the tools.

7 System Application



CAUTION

- Do not make any additional holes or tapped holes on the manipulator's body.

Failure to observe this instruction may adversely affect the safety and/or performance of the manipulator.

- YASKAWA provides no guarantee against damages, malfunctions, failures, etc. caused by using any means other than the tapped holes shown in the following figure. The tightening bolts used for the mechanical parts of the manipulator must be used only to secure the mechanical parts. Do not additionally secure or attach any other things by using these tightening bolts.
- When mounting a peripheral device to the robot, ensure that the device and cables to be mounted to the robot do not interfere with the internal wiring harnesses.

There is a risk of inhibiting the movement of an internal wiring harness and causing a failure, such as premature cable breakage.

7.1 Peripheral Equipment Mounts

The peripheral equipment mounts are provided as shown in *fig. 7-1 "Installation Position"* for easier installation of the user's system applications. The following conditions should be observed to attach or install peripheral equipment.

7.1.1 Allowable Load

The allowable load on the peripheral equipment mount of the U-arm is up to 10 kg. The amount of increase for the upper arm moment should be 49 N·m or less when loading the allowable load.

When a load is applied on the U-arm, the load setting must be performed. For setting procedures, refer to "Chap. 8.4. ARM Control" in "YRC1000 INSTRUCTIONS (RE-CTO-A221)".

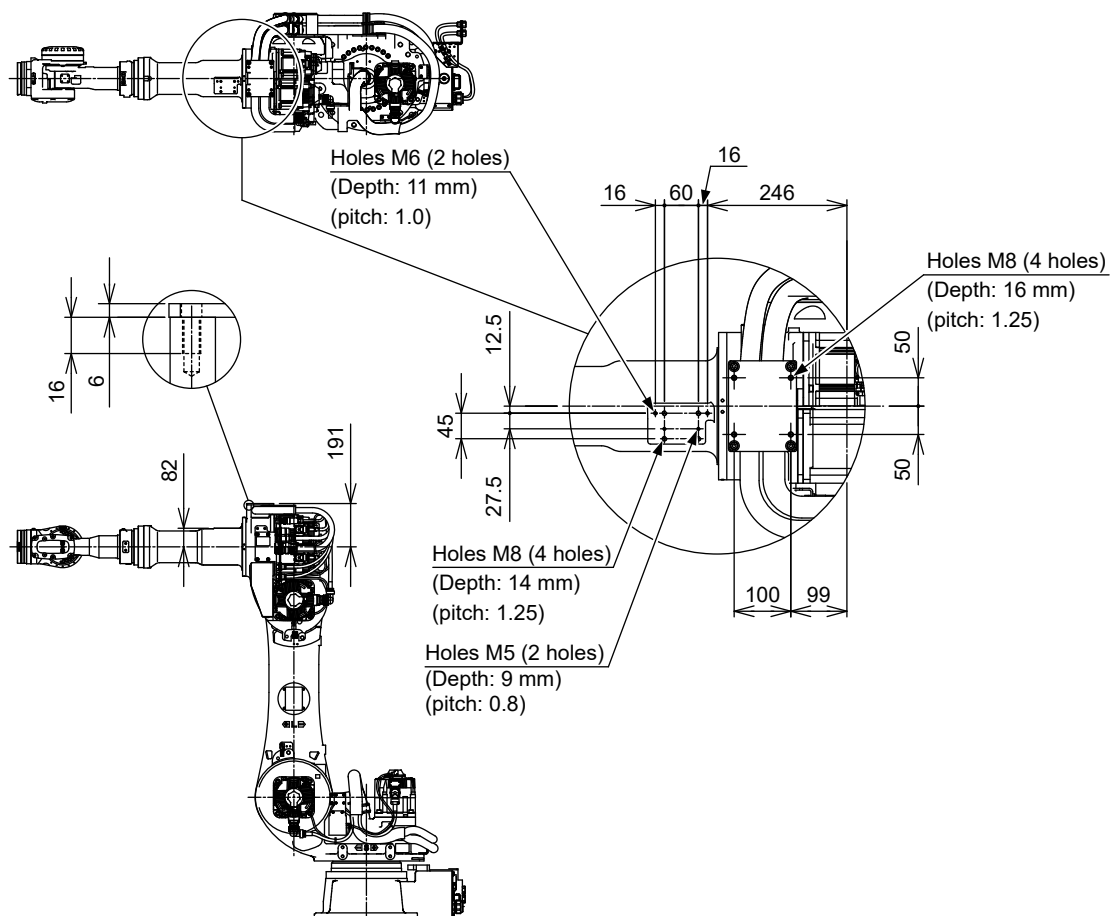
7 System Application

7.1 Peripheral Equipment Mounts

7.1.2 Installation Position

There is a limitation on where to install the peripheral equipment as shown in fig. 7-1 "Installation Position".

Fig. 7-1: Installation Position



7 System Application
 7.2 Internal User I/O Wiring Harness and Air Lines for User's System Applications

7.2 Internal User I/O Wiring Harness and Air Lines for User's System Applications

Internal user I/O wiring harness, encoder or power cables for external axis, cables for large current power, D-NET cables, and air lines and fieldbus tube are incorporated in the manipulator for the drive of peripheral devices mounted on the U-arm as shown in *fig. 7-2 "Connectors for Internal User I/O Wiring Harness and Air Line"* and *fig. 7-3 "Details of the Connector Pin Numbers"*.

When using cables other than a cable for large current power, make sure that the cables do not interfere with the manipulator or its equipment.

Refer to *table 7-1 "Conditions for Use"* for information on the conditions of use for each cable and line.

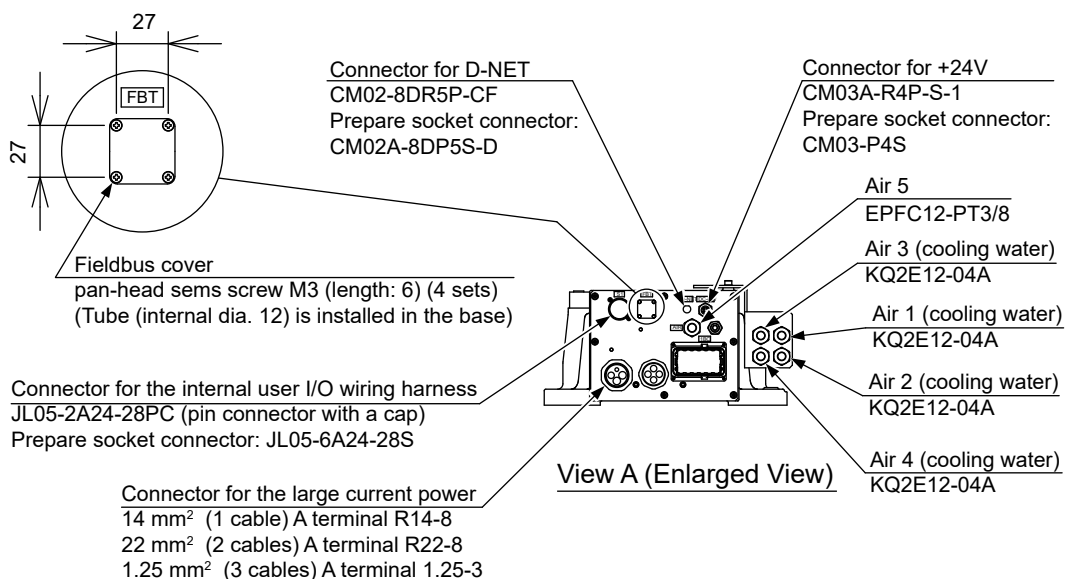
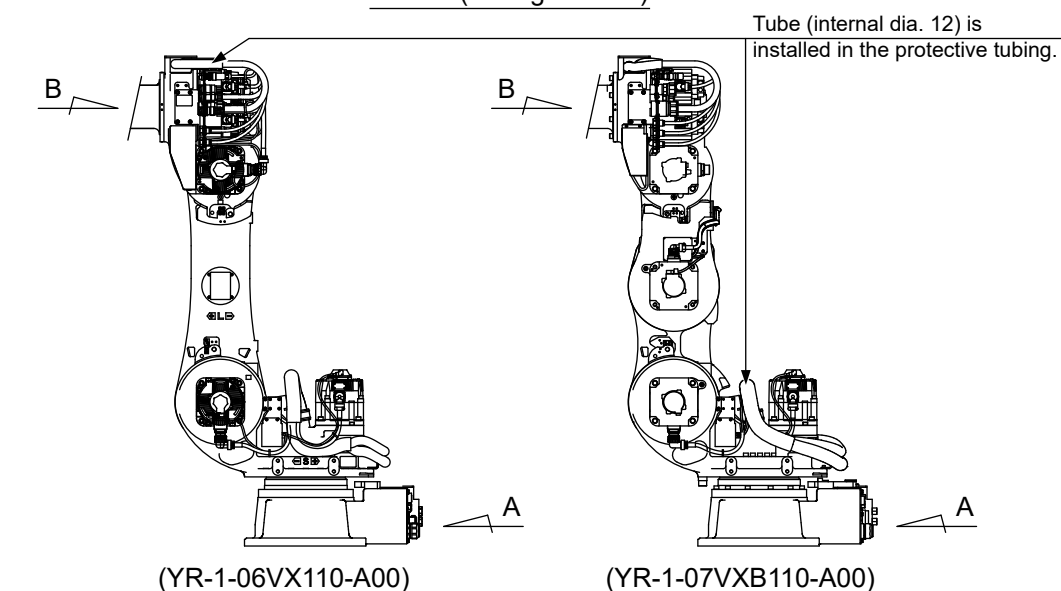
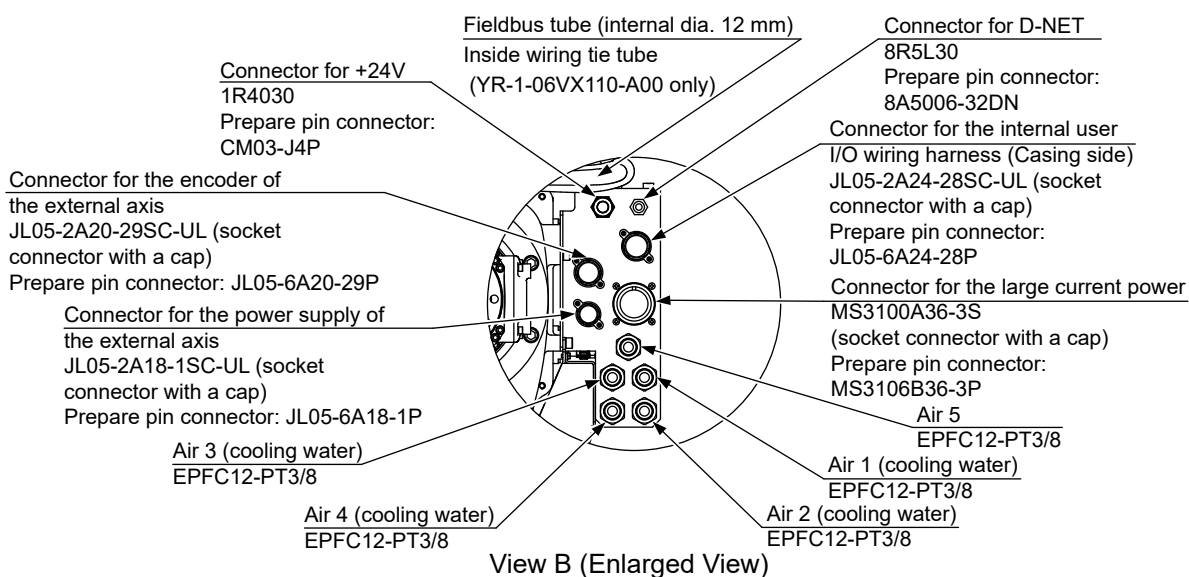
Table 7-1: Conditions for Use

Item	Specification	Conditions
Internal user I/O wiring harness	0.5 mm ² × 12 wires 0.75 mm ² × 11wires	0.5 mm ² : 7.5A or less per wire 0.75 mm ² : 10.0A or less per wire The total current value must be 42.0A or less.
Encoder cable for external axis	0.2 mm ² × 6 cables 1 shielded cable	0.2 mm ² : 3.0A or less per wire The total current value must be 12.9A or less.
Power cable for external axis	2 mm ² × 4 cables 0.75 mm ² × 2 cables	2 mm ² : 13.0A or less per wire 0.75 mm ² : 10.0A or less per wire The total current value must be 55.7A or less.
Cable for large current power	22 mm ² × 2 cables 14 mm ² × 1 cable (A ground cable) 1.25 mm ² × 3 cables	22 mm ² : 77.6A or less per wire 14 mm ² : 54.4A or less per wire 1.25 mm ² : 9.3A or less per wire
Cable for D-NET(DS1)	0.3 mm ² × 2 cables 0.2 mm ² × 2 cables 1 drain wire	0.3 mm ² : 3.0A or less per wire 0.2 mm ² : 3.0A or less per wire
Cable for +24V	1.25 mm ² × 4 cables	8.0A or less per wire
Air (cooling water) line maximum allowable working pressure	Inside dia. 8.5 mm × 5 lines	490 kPa (5 kgf/cm ²) or less
Fieldbus tube	Inside dia. 12 mm × 1 line	-

7 System Application

7.2 Internal User I/O Wiring Harness and Air Lines for User's System Applications

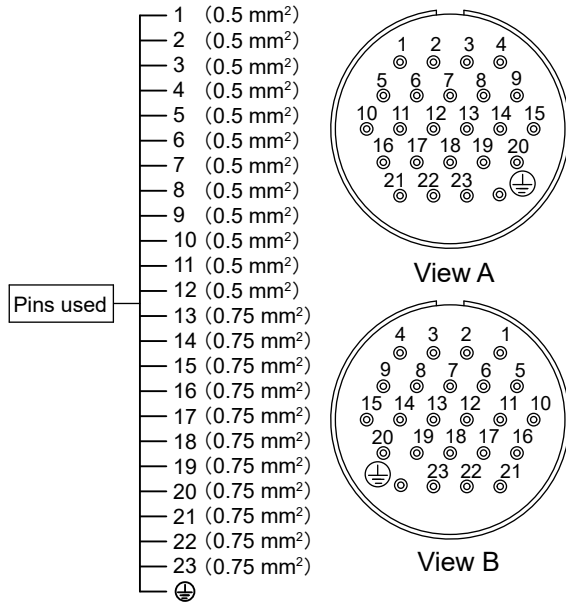
Fig. 7-2: Connectors for Internal User I/O Wiring Harness and Air Line



7 System Application

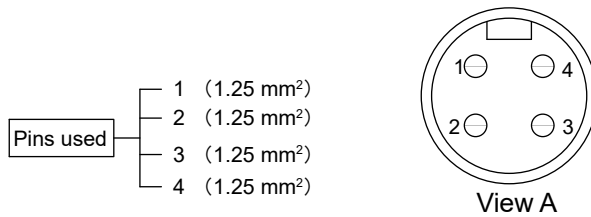
7.2 Internal User I/O Wiring Harness and Air Lines for User's System Applications

Fig. 7-3: Details of the Connector Pin Numbers



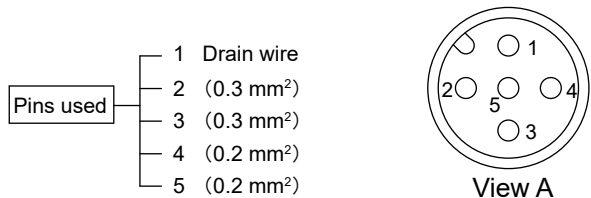
Internal user I/O wiring harness: 12×0.5 mm²
: 11×0.75 mm²

Details of the connector for internal user I/O wiring harness pin numbers



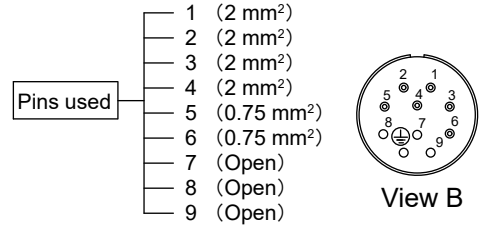
+24 V cable: 4×1.25 mm²

Connector for +24V



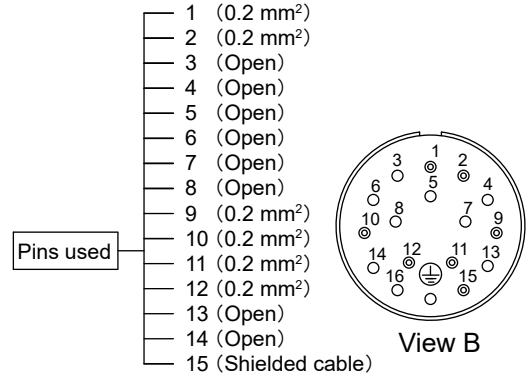
D-NET cable: 2×0.3 mm²
: 2×0.2 mm²

Connector for D-NET



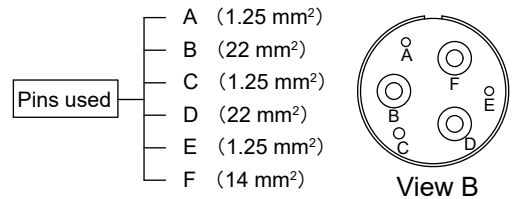
Power cable for the external axis: 4×2 mm²
: 2×0.75 mm²

Details of the connector for the power of the external axis



Encoder cable for the external axis: 6×0.2 mm²

Details of the connector for the encoder of the external axis



Cable for the large current power: 1×14 mm²
: 2×22 mm²
: 3×1.25 mm²

Details of the connector for the large current power

- 7 System Application
 7.3 Mating Connector for Internal User I/O Wiring Harness (Optional)

7.3 Mating Connector for Internal User I/O Wiring Harness (Optional)

The mating connector for internal user I/O wiring harness is optional.

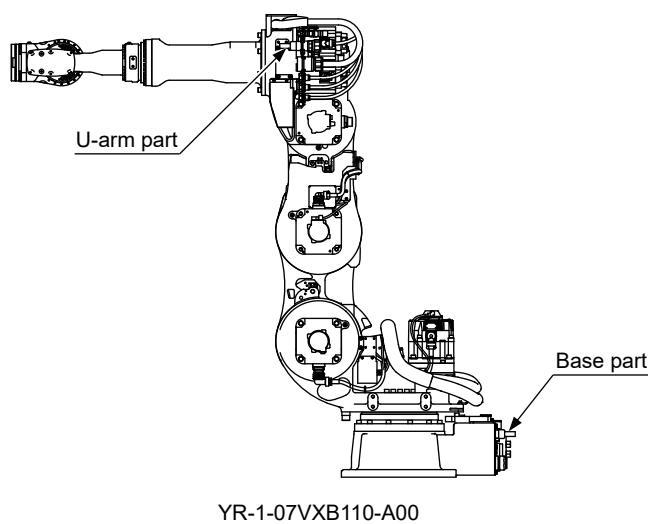
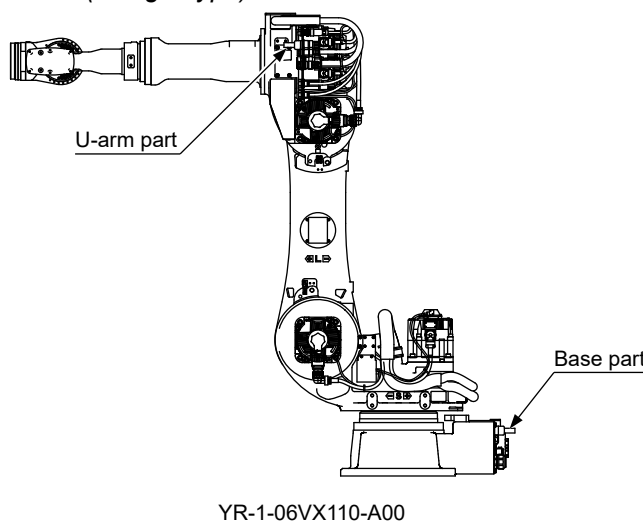
		Manipulator's base part	U-arm part
Straight type	Plug	JL05-6A24-28S-R or the equivalent	JL05-6A24-28P-R or the equivalent
	End bell	CE01-24BS-DS	CE01-24BS-DS
	Cable clamp	CE3057-16A-2- D	CE3057-16A-2-D

■ Straight Type

The manipulator with the connector installed is shown in *fig. 7-4* "Manipulator With the Mating Connector for Internal User I/O Wiring Harness (straight type)".

When operating, be careful not to let the connector and/or cable touch the other equipment.

Fig. 7-4: Manipulator With the Mating Connector for Internal User I/O Wiring Harness (straight type)



7.4 How to Wire Fieldbus Cable inside Manipulator

To add a fieldbus cable to the outside of the manipulator, it is necessary to consider the manipulator's motion (especially the S-axis motion). If not, this can result in complicated cable wiring.

Inside this manipulator is a built-in tube for laying a fieldbus cable and guidewire to run through the tube. Use the guidewire in this tube to pass the fieldbus cable inside the manipulator.

Follow the following specific steps:

1. Turn OFF the power supply for the controller.
2. Loosen the fixing bolt for the connector base shown in *fig. 7-5 "How to Wire Fieldbus Cable inside Manipulator"* and remove the connector base.
3. Pull out the tube from the inside of the manipulator.
4. Remove the vinyl tape on the end of the tube and connect the fieldbus cable to the guidewire in the tube.
5. Pull out the tube from part ③ shown in *fig. 7-5 "How to Wire Fieldbus Cable inside Manipulator"*.
6. Remove the vinyl tape on the end of the tube and pull the guidewire in the tube to thread the fieldbus cable through the tube.
7. Remove the cover located at part ① and pass the fieldbus cable through part ②.
8. Tighten the fixing bolt for the connector base to install the connector base.

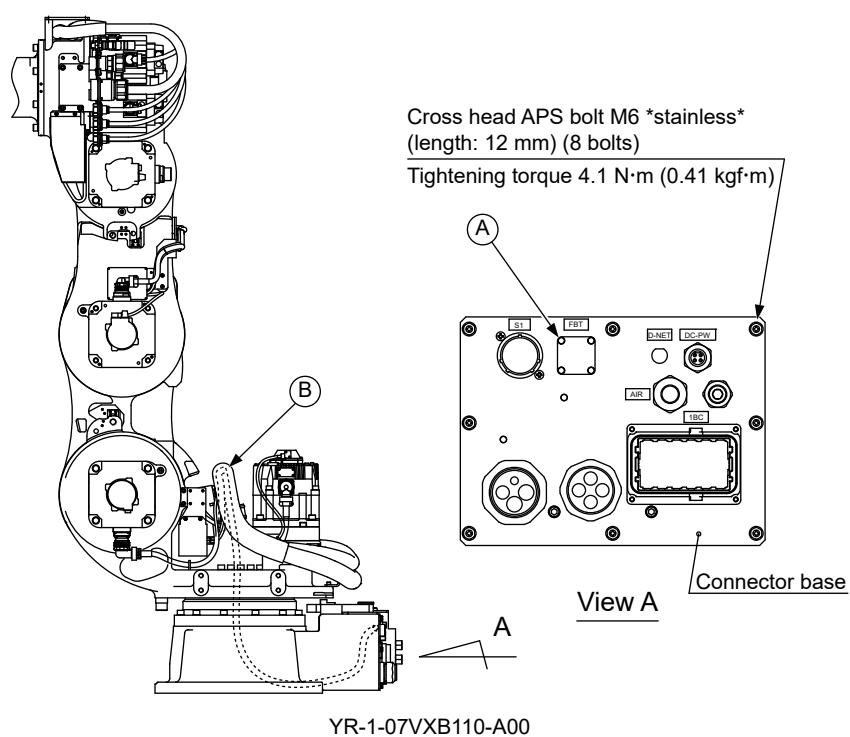
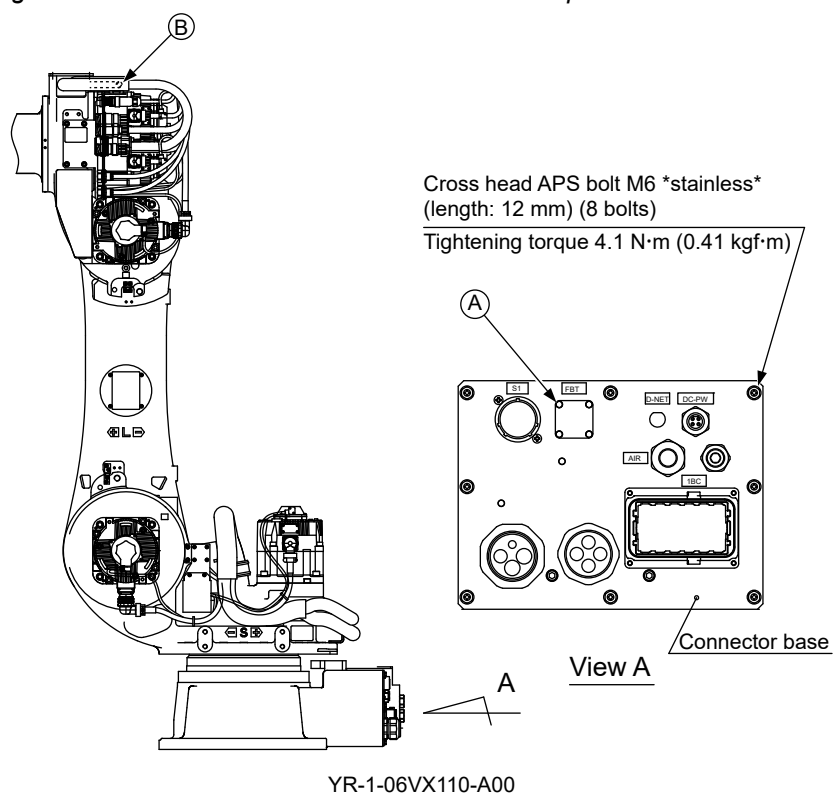


- The tube is made of polyurethane with an inner diameter of 12 mm. Before wiring inside the manipulator, consider the space between the tube and cable and the cable's flexibility.
- Friction between the fieldbus cable and the tube may occur, depending on the outer diameter and the fieldbus cable material. This friction may block it from passing through. In such cases, lubricant or blowing air may clear up the opening.
- Passing the fieldbus cable inside the manipulator is recommended before installing the fieldbus cable connector.
- When installing the connector base, make sure that the cable does not get caught between the connector base and the manipulator.

7 System Application

7.4 How to Wire Fieldbus Cable inside Manipulator

Fig. 7-5: How to Wire Fieldbus Cable inside Manipulator



8 Electrical Equipment Specification

8.1 Overrun Limit Switches (Optional)

The overrun limit switches (referred to below as the limit switches) can be optionally installed for the S-, L-, E-, and U-axes. The soft limit and the activation angles of the limit switch for each axis when the manipulator is shipped with limit switches installed at the factory are given in *table 8-1(a) "Degrees of Angle (with limit switch installed) (YR-1-06VX110-A00)"* and *table 8-1(b) "Degree of Angle (with limit switch installed) (YR-1-07VXB110-A00)"*.

Table 8-1(a): Degrees of Angle (with limit switch installed) (YR-1-06VX110-A00)

	Soft limit	Limit switch activation angle
S-axis	-180° - +180°	-181° - +181°
L-axis	-90° - + 115°	-91° - + 116°
U-axis	-80° - + 90°	-81° - + 91°

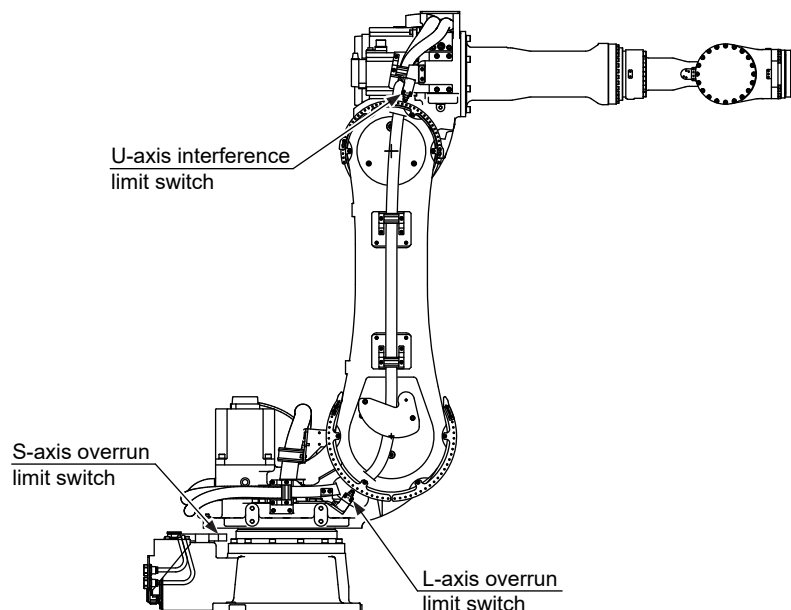
Table 8-1(b): Degree of Angle (with limit switch installed) (YR-1-07VXB110-A00)

	Soft limit	Limit switch activation angle
S-axis	-180° - + 180°	-181° - + 181°
L-axis	-45° - + 145°	-46° - + 146°
E-axis	-45° - + 120°	-46° - + 121°
U-axis	-70° - + 90°	-71° - + 91°

8.1.1 Position of Limit Switch

For the locations of the limit switches, refer to *fig. 8-1(a) "Location of Limit Switches (YR-1-06VX110-A00)"* and *fig. 8-1(b) "Location of Limit Switches (YR-1-07VXB110-A00)"*.

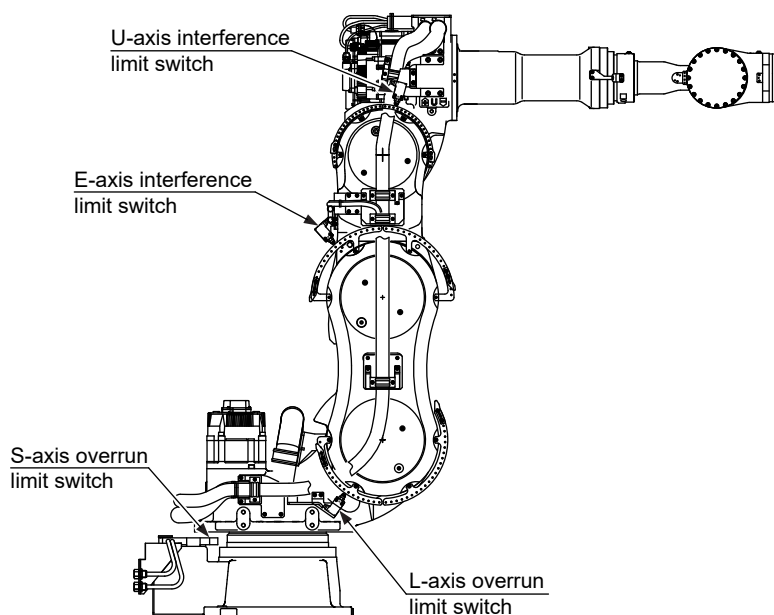
Fig. 8-1(a): Location of Limit Switches (YR-1-06VX110-A00)



8 Electrical Equipment Specification

8.1 Overrun Limit Switches (Optional)

Fig. 8-1(b): Location of Limit Switches (YR-1-07VXB110-A00)



8.1.2 Adjustment to the Activation Angle of Limit Switch

When altering the operating angle of the manipulator, adjust both the soft limit and the activation angle of the limit switch. The activation angle of the limit switch must be larger than the soft limit.

For adjusting soft limit, refer to chapter 6.13 “Softlimit Setting Function” in “YRC1000 GENERAL OPERATOR’S MANUAL (RE-CSO-A051)”.

For releasing soft limit, refer to chapter 8.10 “Soft Limit Release Function” in “YRC1000 INSTRUCTIONS (RE-CTO-A221)”.

For adjusting the activation angle of the limit switch, refer to the following page.

- Adjusting activation angle of limit switch of S-axis

The angle of limit switch of S-axis can be adjusted by altering the position of the S-axis stopper. For altering the stopper’s position, refer to *chapter 5.5 “Alterable Operating Range”*.

- Adjusting activation angle of limit switch of L-axis

The angle of limit switch of L-axis can be adjusted by altering the position of the dog on the ring which is mounted on the L-axis. Refer to *fig. 8-2(a) “Assembly of Dog (YR-1-06VX110-A00)”* and *fig. 8-2(b) “Assembly of Dog (YR-1-07VXB110-A00)”*.

- Adjusting activation angle of limit switch of U-axis

The angle of limit switch of U-axis can be adjusted by altering the position of the dog on the ring which is mounted on the U-axis. Refer to *fig. 8-2(a)* and *fig. 8-2(b)*.

- Adjusting activation angle of limit switch of E-axis

The angle of limit switch of E-axis can be adjusted by altering the position of the dog on the ring which is mounted on the E-axis. Refer to *fig. 8-2(b)*.

8 Electrical Equipment Specification

8.1 Overrun Limit Switches (Optional)

Fig. 8-2(a): Assembly of Dog (YR-1-06VX110-A00)

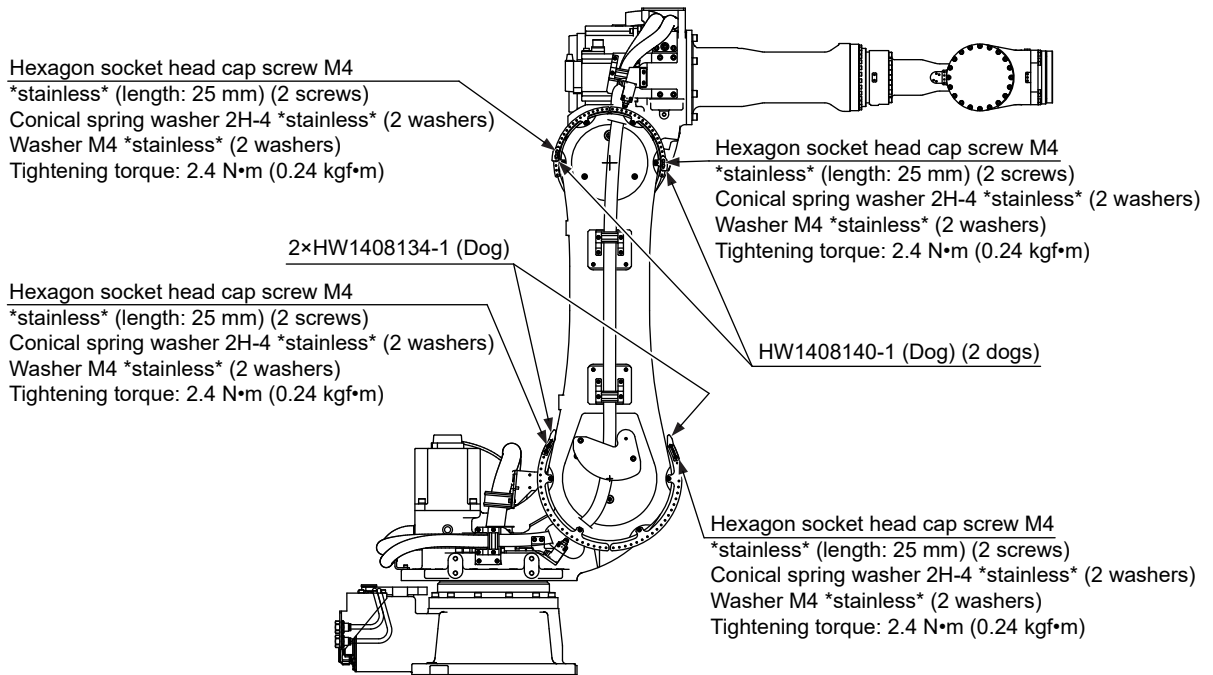
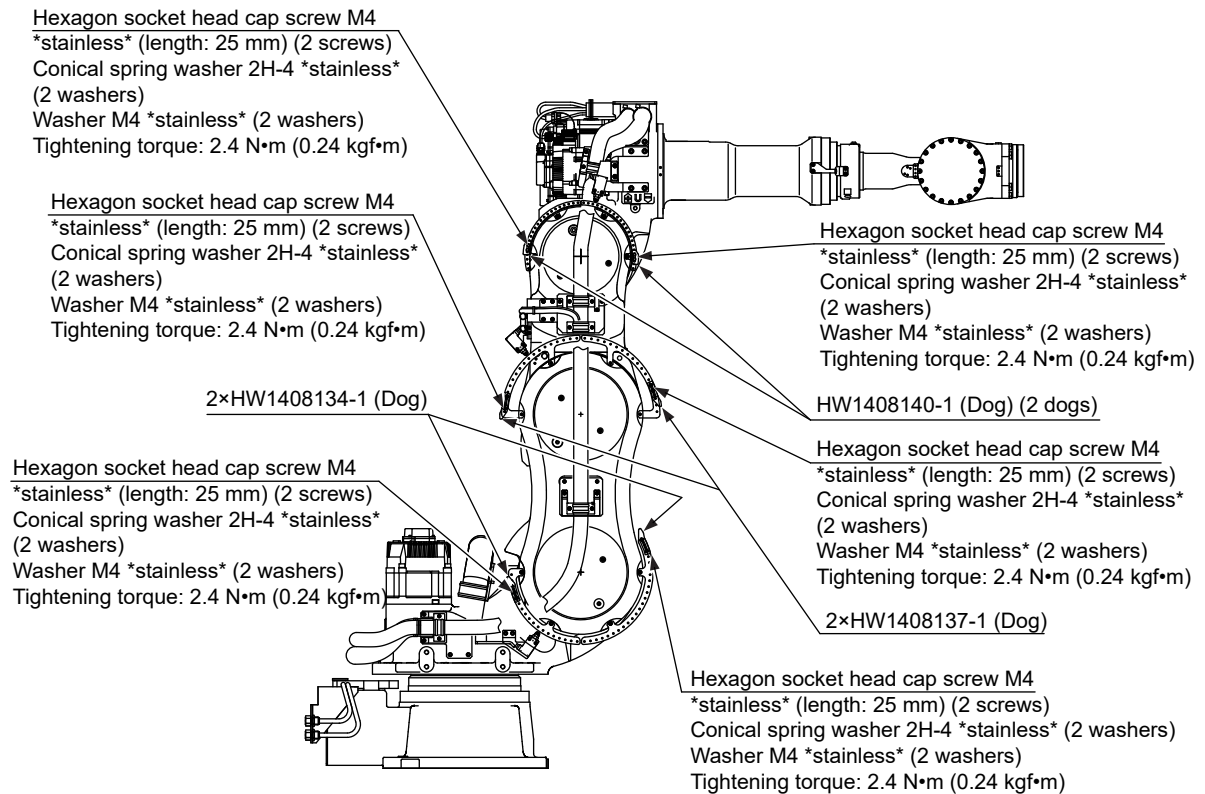


Fig. 8-2(b): Assembly of Dog (YR-1-07VXB110-A00)



8	Electrical Equipment Specification
8.2	Servo ON Lamp (Optional)

8.2 Servo ON Lamp (Optional)

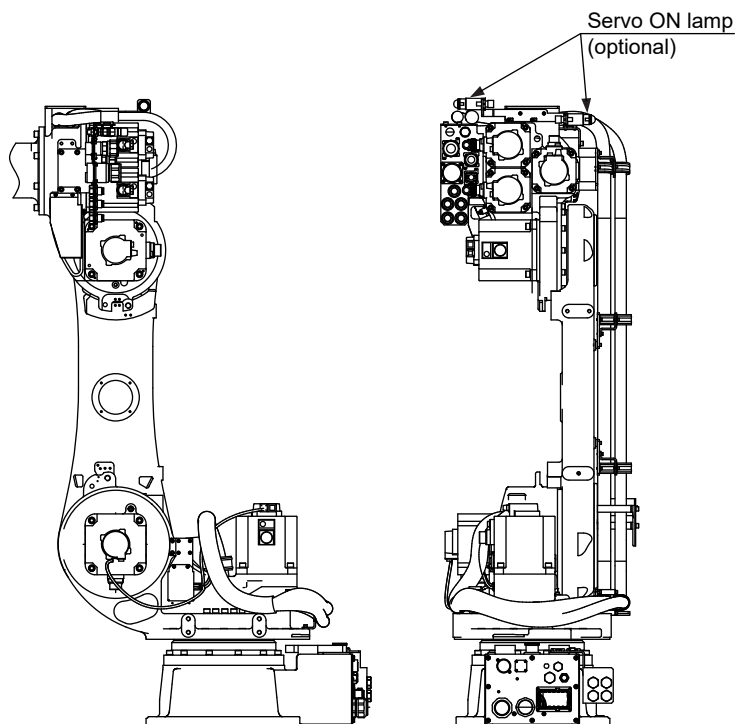
The servo ON lamp can be optionally installed.

8.2.1 Location of Servo ON Lamp

For the location of the servo ON lamp, refer to *fig. 8-3 “Location of Servo ON Lamp”*.

The servo ON lamp is optional. Refer to *fig. 8-3 “Location of Servo ON Lamp”*.

Fig. 8-3: Location of Servo ON Lamp



8.3 Internal Connections

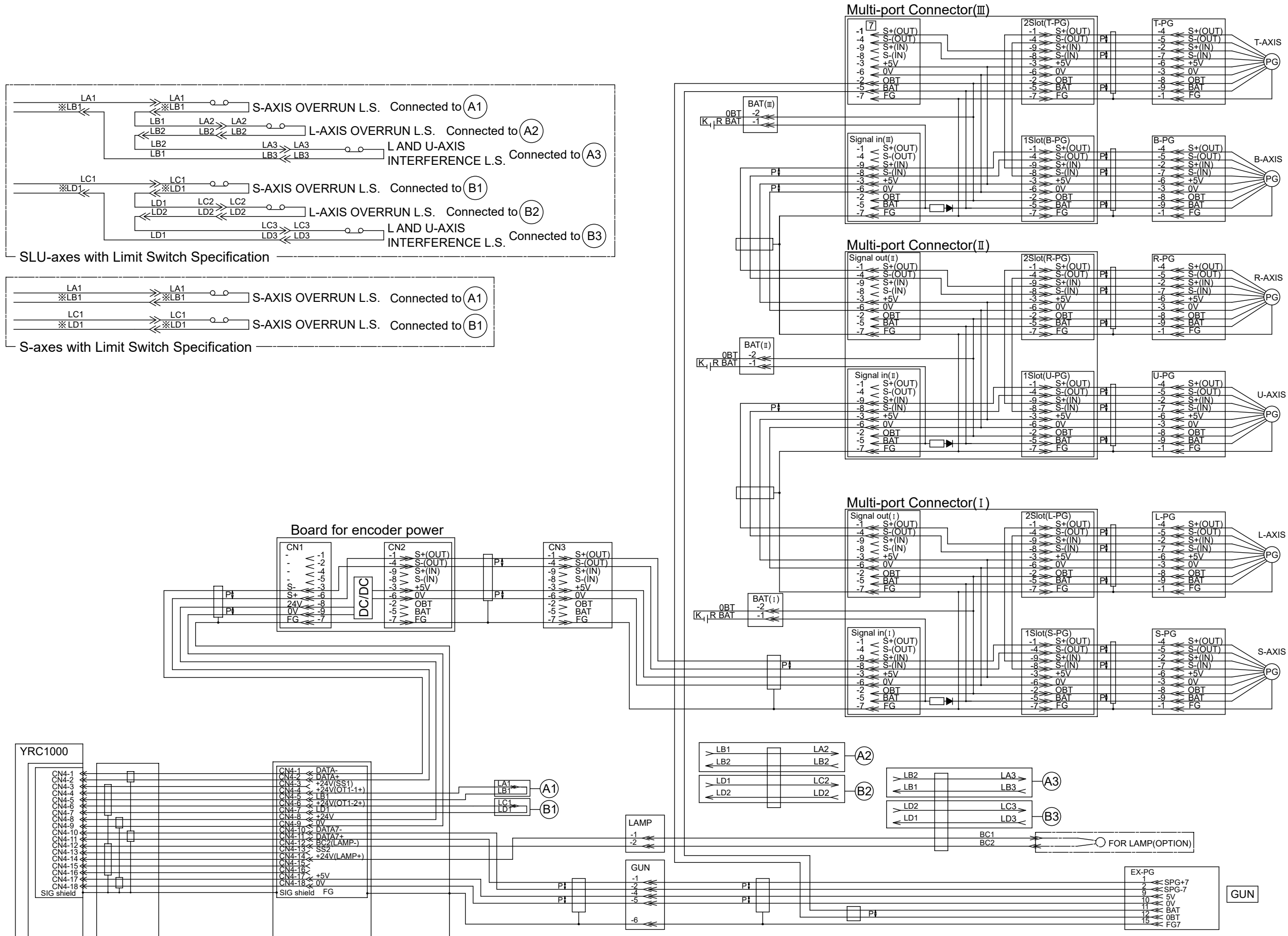
Diagrams for Internal connections of the manipulator (YR-1-06VX110-A00) are shown in *fig. 8-4(a) "Internal Connection Diagram (YR-1-06VX110-A00)"* and *fig. 8-4(b) "Internal Connection Diagram (YR-1-06VX110-A00)"*.

Diagrams for Internal connections of the manipulator (YR-1-07VXB110-A00) are shown in *fig. 8-5(a) "Internal Connection Diagram (YR-1-07VXB110-A00)"* and *fig. 8-5(b) "Internal Connection Diagram (YR-1-07VXB110-A00)"*.

8	Electrical Equipment Specification
8.3	Internal Connections

8 Electrical Equipment Specification
8.3 Internal Connections

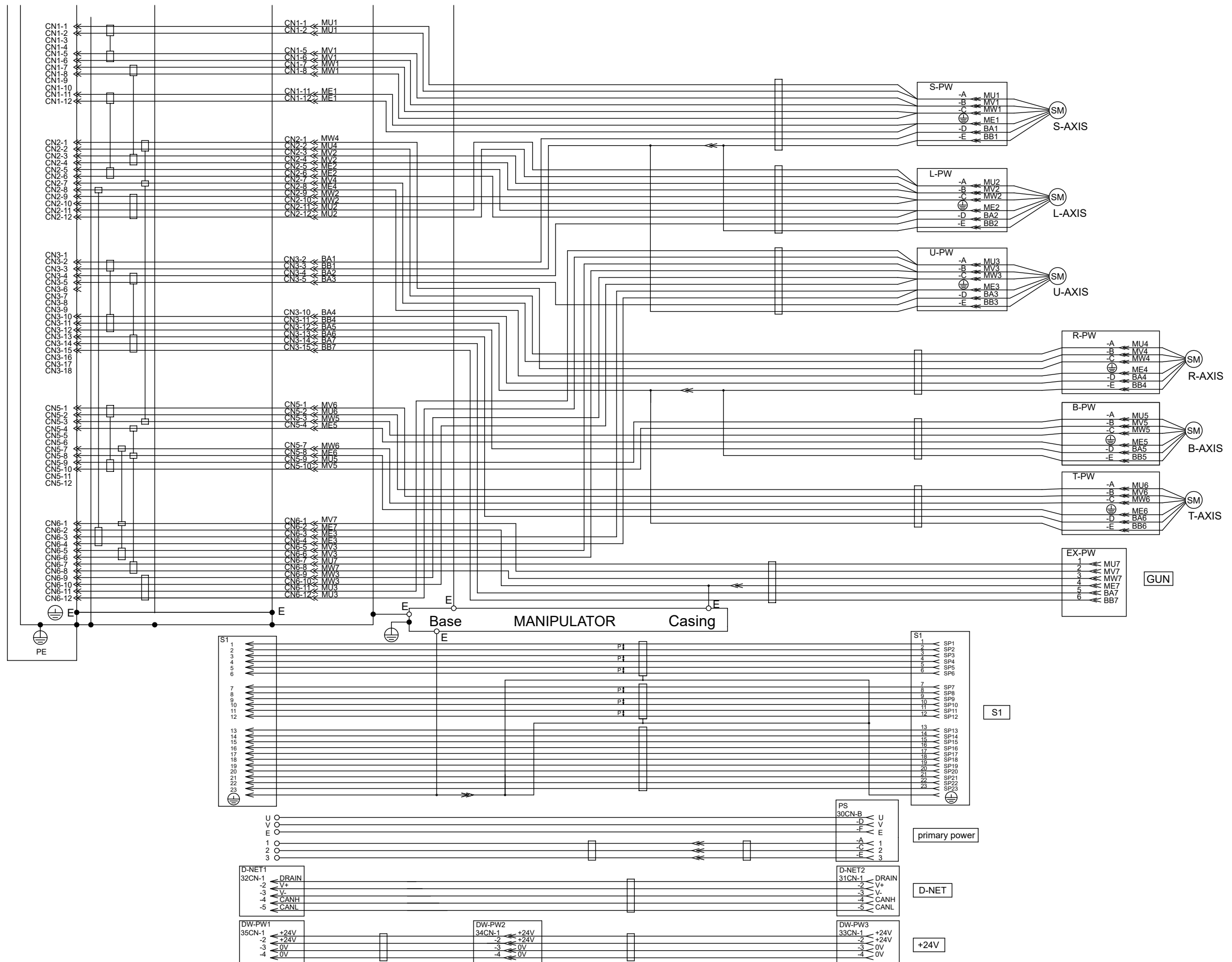
Fig. 8-4(a): Internal Connection Diagram (YR-1-06VX110-A00)



8 Electrical Equipment Specification

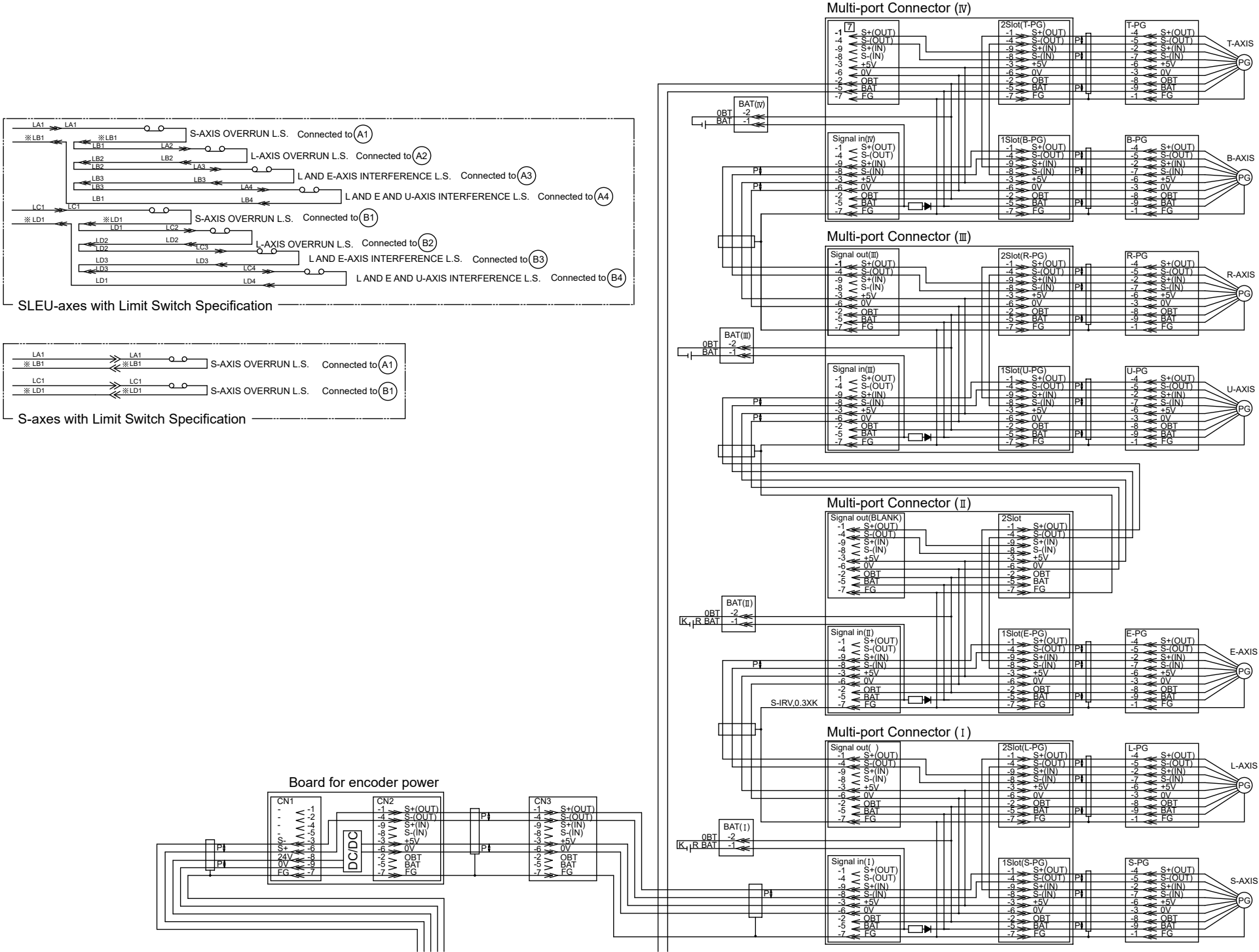
8.3 Internal Connections

Fig. 8-4(b): Internal Connection Diagram (YR-1-06VX110-A00)



8 Electrical Equipment Specification
8.3 Internal Connections

Fig. 8-5(a): Internal Connection Diagram (YR-1-07VXB110-A00)



8 Electrical Equipment Specification

8.3 Internal Connections

Fig. 8-5(b): Internal Connection Diagram (YR-107VXB110-A00)



9 Maintenance and Inspection



DANGER

- Do not remove the motor, and do not release the brake.

Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the manipulator's arm.



WARNING

- 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.
- 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.

NOTICE

- Do not remove the connector between the motor and the multi-port connector during 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 ensure that the mechanism will be able to function for a long period, but also to prevent malfunctions and ensure safe operation. Inspection intervals are classified into six levels as shown in *table 9-1 "Inspection Items"*.

In *table 9-1*, the inspection items are categorized by three types of operations: operations which can be performed by personnel authorized by the user, operations to be performed by trained personnel, and operations to be performed by your YASKAWA representative. Only specified personnel should perform the inspection work.



- The interval between inspections is calculated according to the total servo operation time.
- If axes are used very frequently (in handling applications, etc.), inspections may be required at shorter intervals. Contact your YASKAWA representative.
- A small amount of oil used to maintain sealing performance may leak from the bottom part of the gas balancer.

Table 9-1: Inspection Items (Sheet 1 of 2)

Items ¹⁾	Schedule					Method	Operation	Inspection Charge		
	Daily	1000 h Cycle	12000 h Cycle	24000 h	36000 h			Specified Personnel	Licensee	Your YASKAWA representative
1 Alignment mark	●					Visual	Check alignment mark accordance at the home position. Check for damage. Check for misalignment of the position at the check point.	●	●	●
2 Working area and manipulator	●					Visual	Check for seeped oil. (Wipe off seeped oil with a cloth when found.) Clean the work area if dust or spatter is present. Check for damage and outside cracks.	●	●	●
3 Baseplate mounting bolts		●				Spanner Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
4 Covers, bolts for the connector base		●				Driver Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
5 Connector for manipulator cable		●				Manual	Check for loose connectors.	●	●	●
6 Protective tubing		●				Visual	Clean the spatter. Check for holes or tears.	●	●	●
7 Wire harnesses in manipulator (Power supply board included)	●					Visual	Check for damage and contamination.	●	●	●
			●			Manual Visual	Check the condition of the internal wiring harness Check wear to the protective spring (replace if there is abnormal wear).		●	●
				●			Replace.		●	●
8 Battery pack in manipulator				●			Replace the battery pack when the battery alarm occurs or the manipulator drove for 24000 h.		●	●
9 Motors for all axes			●				Check for grease leakage.	●	●	●

Table 9-1: Inspection Items (Sheet 2 of 2)

Items ¹⁾		Schedule					Method	Operation	Inspection Charge		
		Daily	1000 h Cycle	12000 h Cycle	24000 h	36000 h			Specified Personnel	Licensee	Your YASKAWA representative
10	Speed reducers for all axes			●			Grease Gun	Check for malfunction. (Replace if necessary.) Replace grease ²⁾ (12000 h cycle).		●	●
11	R-, B-, and T-axes gear			●			Grease Gun	Check for malfunction. (Replace if necessary.) Replace grease ²⁾ (12000 h cycle).		●	●
12	Overhaul					●					●

1 Inspection No. correspond to the numbers in *fig. 9-1(a) "Inspection Items (Figure of Home Position) (YR-1-06VX110-A00)"* and *fig. 9-1(b) "Inspection Items (Figure of Home Position) (YR-1-07VXB110-A00)"*.

2 For the grease, refer to *fig. 9-2 "Inspection Parts and Grease Used"*.

Table 9-2: Inspection Parts and Grease Used

No.	Grease Used	Inspected Parts
10, 11	Molywhite RE No.00	Speed reducers for all axes R-, B-, and T-axes gear

The numbers in the above table correspond to the numbers in *table 9-1 “Inspection Items”*.

Fig. 9-1(a): Inspection Items (Figure of Home Position) (YR-1-06VX110-A00)

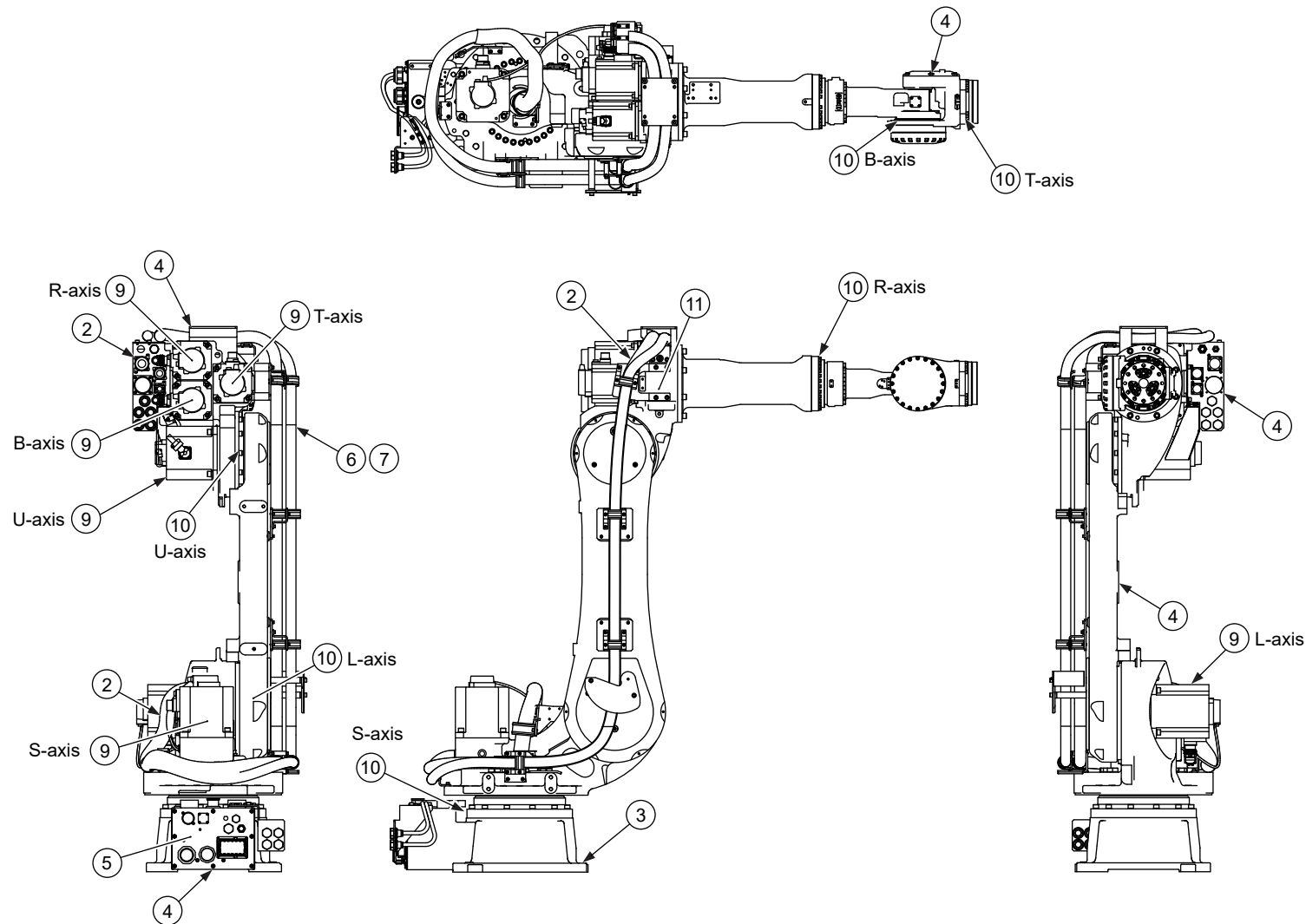
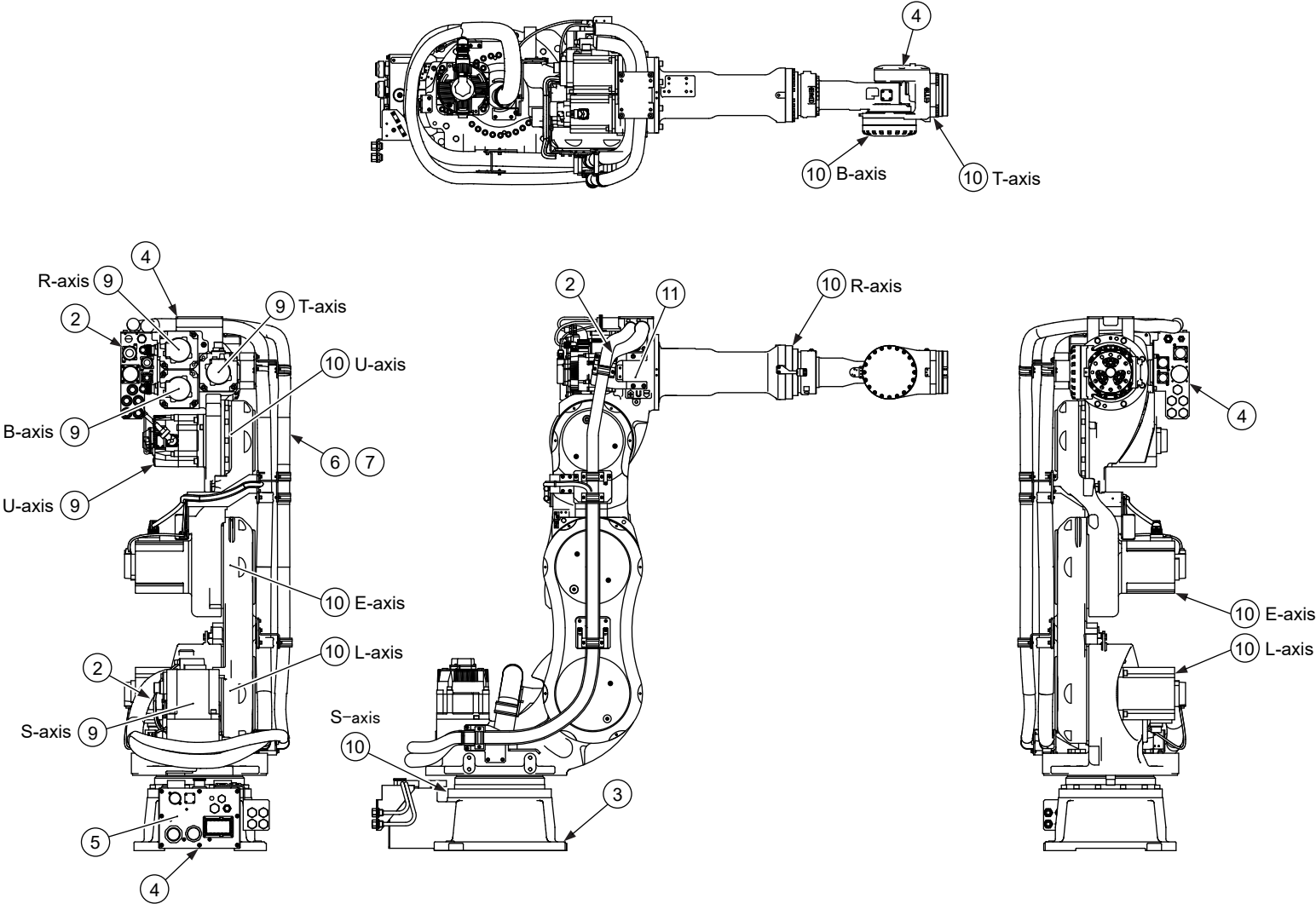


Fig. 9-1(b): Inspection Items (Figure of Home Position) (YR-1-07VXB110-A00)



9.2 Notes for Maintenance

9.2.1 Multi-Port Connector

Multi-port connectors (refer to *fig. 9-2 "Multi-Port Connector"*) for the motor signals are mounted on each part of the manipulator. (For the locations, refer to *fig. 9-7 "Location of the Battery and Multi-port Connector"*). The multi-port connector has four ports: two for the motor and the other two for the wire harness. (Refer to *fig. 9-3 "Wiring of Multi-Port Connector Part"*)

When disconnecting the connector of the multi-port connector during the battery replacement, be careful not to disconnect the connector between the motor and the multi-port connector. If the connector between the motor and the multi-port connector is disconnected, the encoder absolute data will clear.

Fig. 9-2: Multi-Port Connector

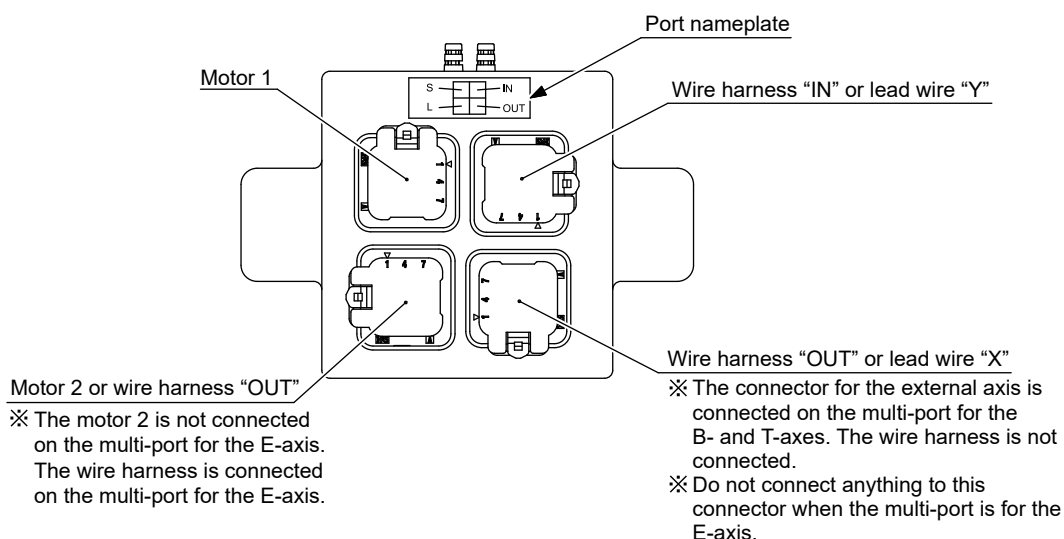
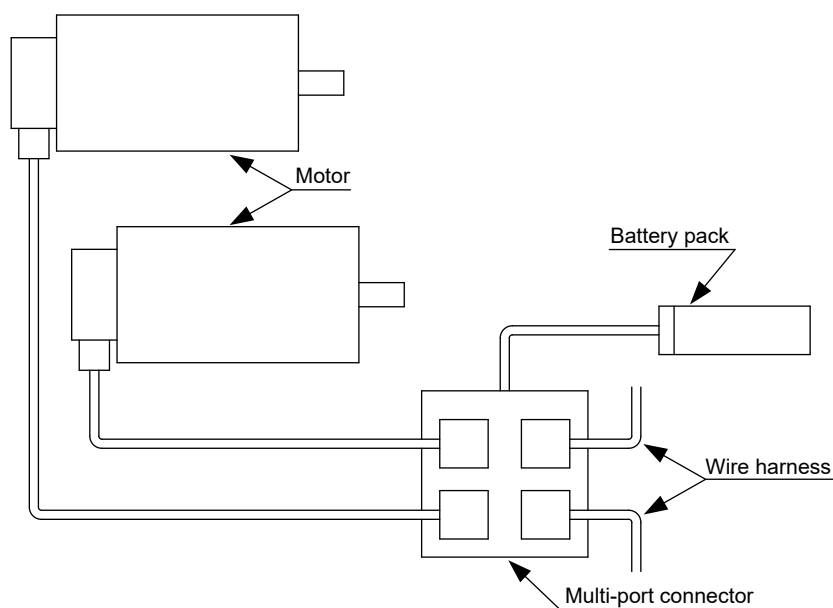


Fig. 9-3: Wiring of Multi-Port Connector Part

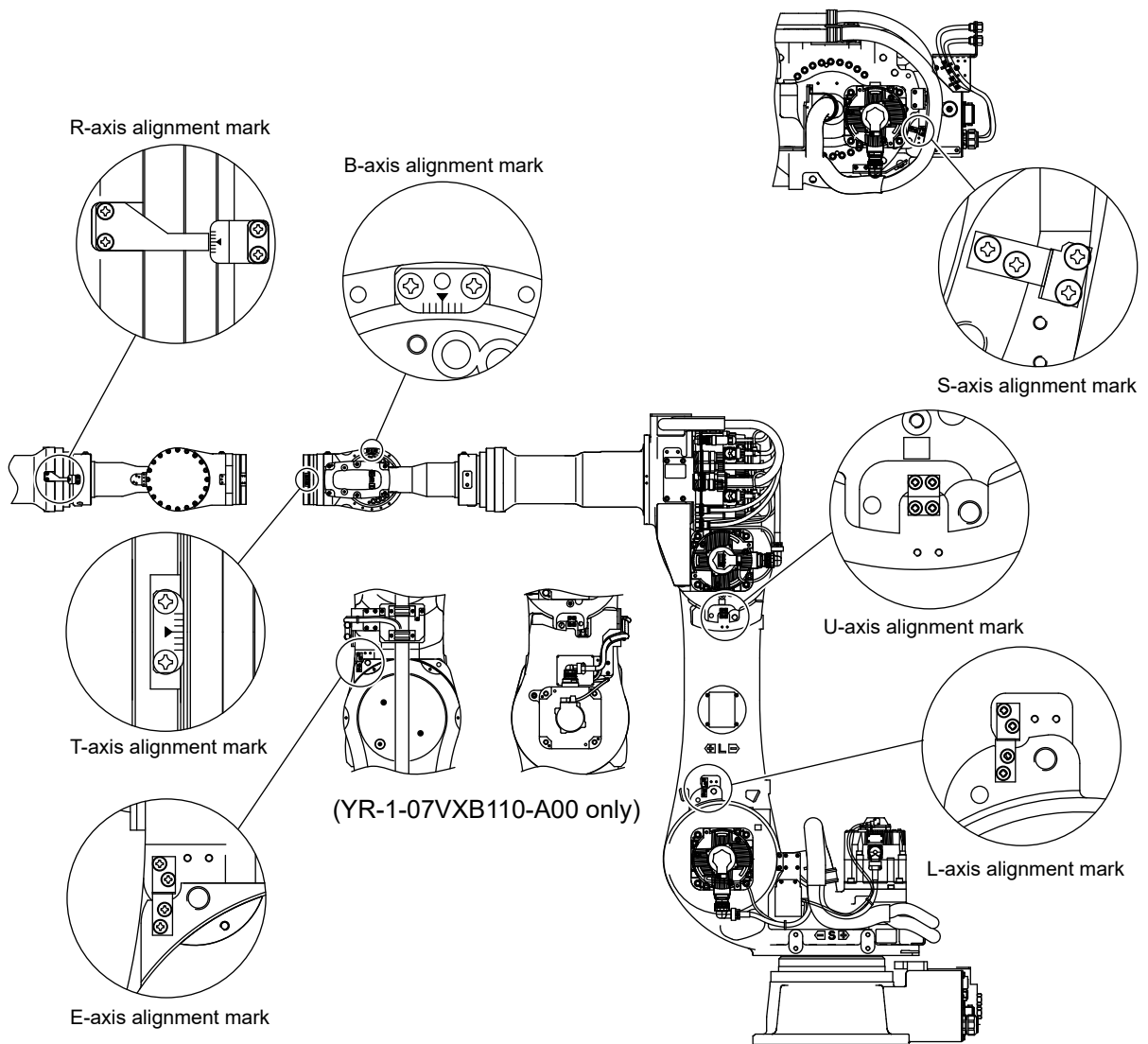


9.3 Notes on Maintenance Procedures

9.3.1 Home Position Check

There are alignment marks on each axis to check the home position. With those alignment marks, periodically check for home position deviation. When home position is cleared or deviated, contact your YASKAWA representative.

Fig. 9-4: Alignment Mark Check

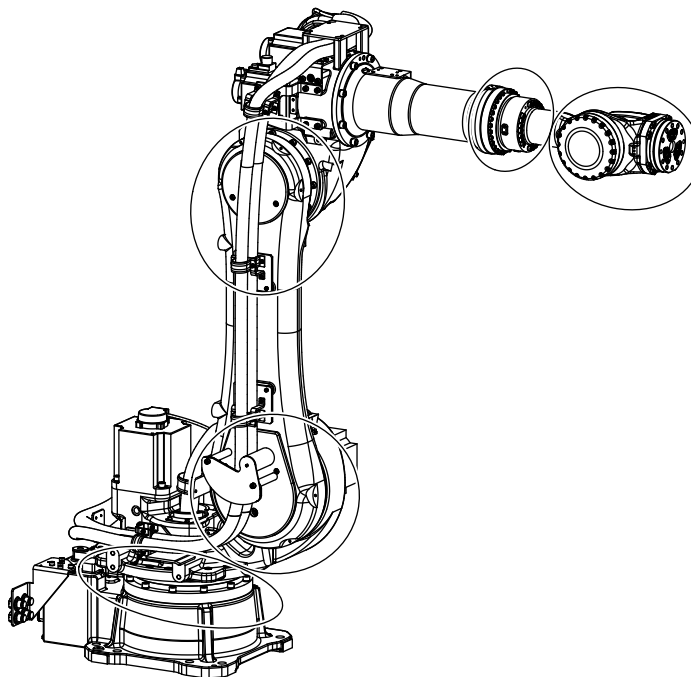


9 Maintenance and Inspection
9.3 Notes on Maintenance Procedures

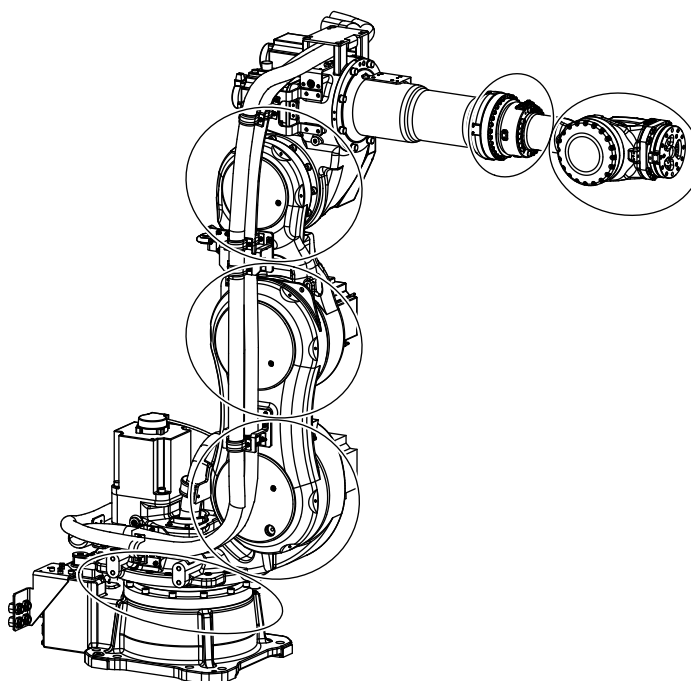
9.3.2 Seeped Oil Check

Periodically check for contamination due to seeped oil or oil spot. Especially the parts indicated in *fig. 9-5 "Inspection Parts for Seeped Oil Check"* must be inspected carefully. Wipe off seeped oil or oil spot with a cloth before use.

Fig. 9-5: Inspection Parts for Seeped Oil Check



(YR-1-06VX110-A00)



(YR-1-07VXB110-A00)

9.3.3 L-, E-, U-, R-, B-, and T-axis Motors

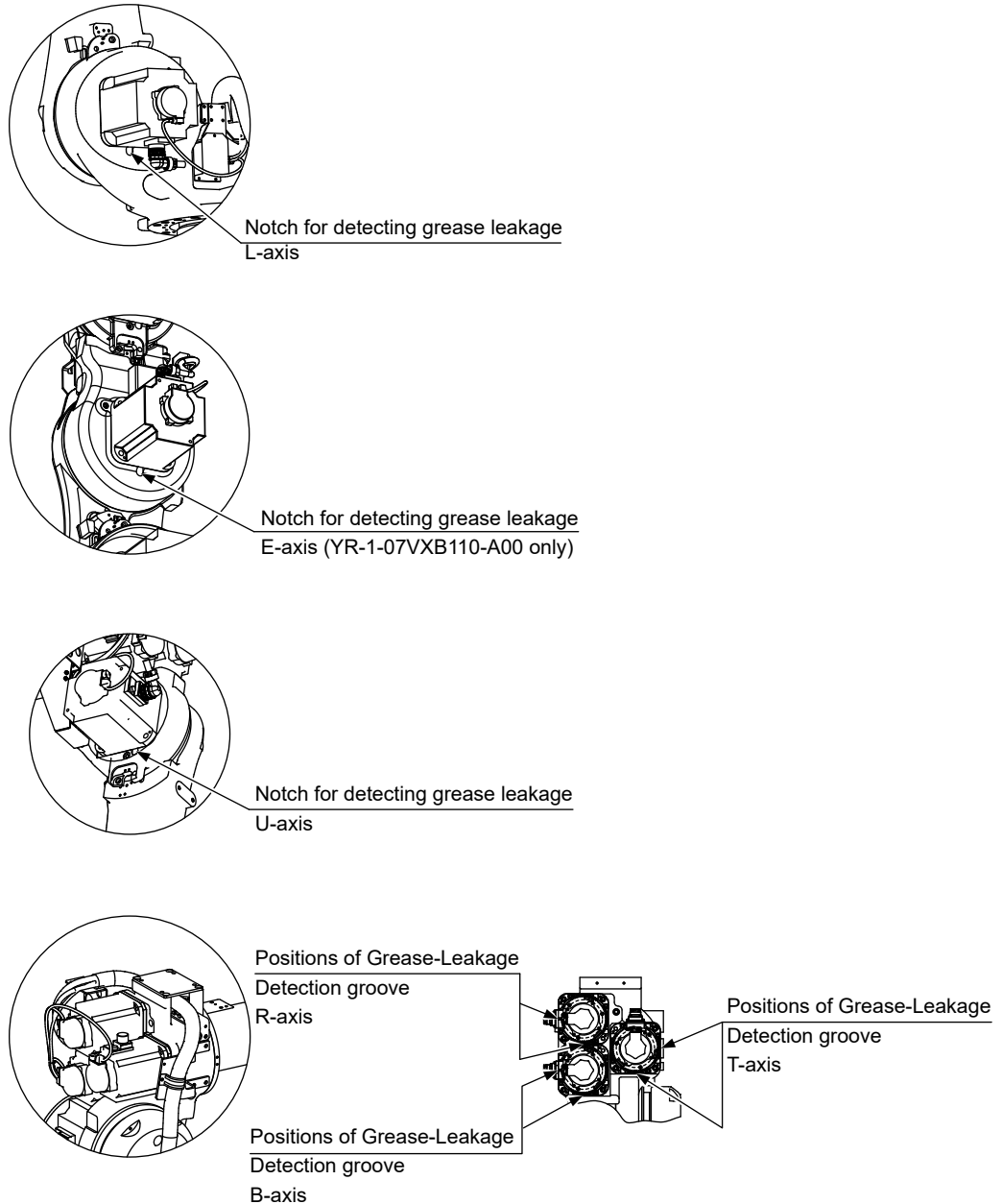
For castings of the L-, E-, U-, R-, B- and T-axis motor, there is a notch for detecting grease leakage.

Check if grease is leaking from the notch.

For the notch part of each axis, refer to *fig. 9-6 "Positions of Grease-Leakage Detection Hole"*.

If grease leakage is detected, contact your YASKAWA representative.

Fig. 9-6: Positions of Grease-Leakage Detection Hole



9 Maintenance and Inspection

9.3 Notes on Maintenance Procedures

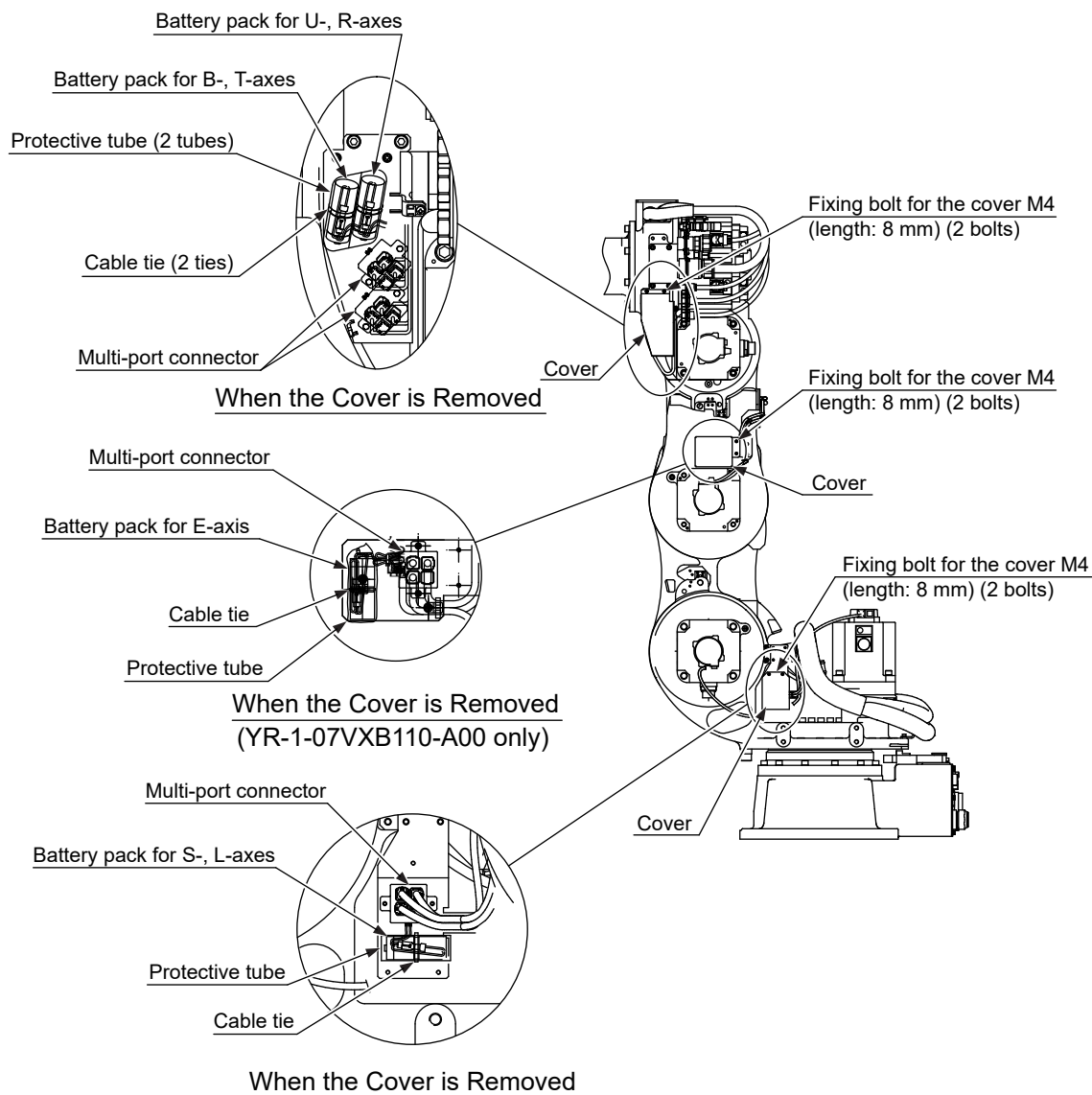
9.3.4 Battery Pack Replacement

The battery packs are installed in the position shown in *fig. 9-7 "Location of the Battery and Multi-port Connector"*.

If the battery alarm occurs in the YRC1000, replace the battery in accordance with the following procedure:

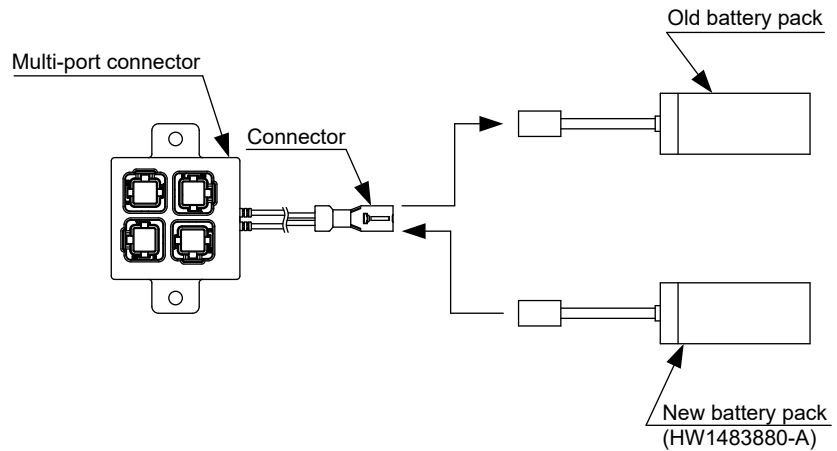
Refer to *chapter 9.2 "Notes for Maintenance"* before replacing a battery.

Fig. 9-7: Location of the Battery and Multi-port Connector



■ **Normal (The power supply of the YRC1000 can be turned ON)**

Fig. 9-8: Battery connection (the power supply of the YRC1000 can be turned ON)



1. Turn ON the power supply of the YRC1000 and turn OFF the servo power.



DANGER

- Make sure to perform the battery replacement with the emergency stop button being pressed.

Failure to observe this instruction may cause improper movement of the manipulator which may result in personal injury and/or equipment damage.

2. Loosen the cover mounting bolts and remove the cover.
3. The old battery pack is fixed by using the cable tie. Cut the cable tie (1 place) to remove the old battery pack from the protective tube.
4. The connector is in the protective tube. Cut the cable ties (2 places) fixing the protective tube, and take out the connector.
5. Remove the old battery pack from the multi-port connector and mount the new battery pack.
6. Fix the new battery pack by using the cable tie T50R-HSW.
7. After placing the connector and the lead wires around the connector into the protective tube, fix the opening of the protective tube by using the cable tie T18L-HSW.
8. Fix the new battery pack and the protective tube in which the connector is placed at step 7 by using the cable tie T18L-HSW.
9. Tighten the cover mounting bolts to reinstall the cover.

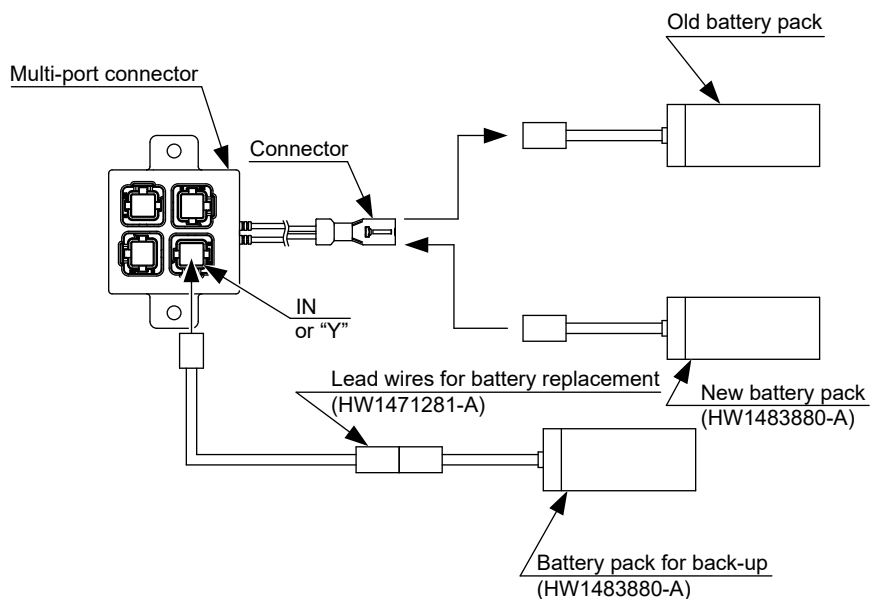


NOTE When reinstalling the cover, be careful not to get caught the cable.

9 Maintenance and Inspection
 9.3 Notes on Maintenance Procedures

■ **When the Power Supply of the YRC1000 Cannot Be Turned ON**

Fig. 9-9: Battery Connection (the power supply of the YRC1000 cannot be turned ON)



1. Prepare lead wires for battery replacement and a battery pack for backup. (Apart from the new battery pack for replacement, prepare a battery pack for backup)
2. Loosen the cover mounting bolts and remove the cover.
3. Remove the connector from the "IN" or "Y" port of the multi-port connector.
Connect the lead wires for battery replacement to the "IN" or "Y" port of the multi-port connector.
4. Connect the battery pack for backup to the lead wires for battery replacement.



Before removing the old battery pack, make sure to connect the battery pack for backup to prevent the encoder absolute data from clearing.

5. The old battery pack is fixed by using the cable tie. Cut the cable tie (1 place) to remove the old battery pack from the protective tube.
6. The connector is in the protective tube. Cut the cable ties (2 places) fixing the protective tube, and take out the connector.
7. Remove the old battery pack from the multi-port connector and mount the new battery pack.
8. Remove the lead wires for battery replacement and the battery pack for backup from the multi-port connector, connect the connector which has been removed at step 3 of this procedure to the "IN" or "Y" port again.



If the battery pack for backup remains connected, an electric current flows from the new battery to the backup battery and which may result in the voltage drop in the new battery. Remove the battery pack for backup immediately after connecting the new battery.

9. Fix the new battery pack by using the cable tie T50R-HSW.

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9.3 Notes on Maintenance Procedures

10. After placing the connector and the lead wires around the connector into the protective tube, fix the opening of the protective tube by using the cable tie T18L-HSW.
11. Fix the new battery pack and the protective tube in which the connector is placed at step 10 by using the cable tie T18L-HSW.
12. Tighten the cover mounting bolts to reinstall the cover.



When reinstalling the cover, be careful not to get caught the cable.

9	Maintenance and Inspection
9.4	Notes on Grease Replenishment/Exchange Procedures

9.4 Notes on Grease Replenishment/Exchange Procedures

9.4.1 Grease Exchange Procedures for Speed Reducers and Gears

9.4.1.1 Notes on Grease Exchange Procedures

Make sure to follow the instructions listed below at grease replenishment/exchange. Failure to observe the following notes may result in damage to motor and speed reducer.



- If grease is injected without removing the plug from the grease exhaust port, the grease will leak inside a motor, or an oil seal of a speed reducer will come off. Make sure to remove the plug or it may result in a failure.
Also, when using a tube, the length must be 150 mm or shorter and the inside diameter must be 6 mm or longer. If the tube is too long, the exhaust resistance at the tube part is increased, and the inner pressure of the grease bath is raised. It may result in coming off of an oil seal.
- Make sure to use a grease pump to inject grease. Set the grease injection rate to 7 g/s or less. (Air supply pressure to the grease pump: 0.3 MPa or less (rough standard))
- When using extrusion air for discharging the grease, set air supply pressure at 0.025 MPa or less.
If the air supply pressure is higher than above mentioned value, an oil seal of a speed reducer will come off, and it may result in a failure.
- When using extrusion air for discharging grease, grease may be vigorously discharged from the exhaust port. Perform an operation such as using a tube at the grease exhaust port to pour into an appropriate container.
- Make sure to fill the hose on the grease inlet with grease beforehand to prevent air from leaking into the speed reducer.
- After injecting grease, discharge the specified amount of grease. If insufficient, the inner pressure is raised during the operation, and grease may leak. When discharged too much, the speed reducer is not lubricated sufficiently during the operation, and it may cause the early failure of the speed reducer.
- When filling/exchanging grease, the grease may flow out from the grease inlet or the grease exhaust port. Prepare a container to receive the grease and a waste cloth to wipe the grease in advance.
- After mounting a speed reducer or a motor, and then wait for 30 minutes or more and then inject grease.
If grease is filled before the sealing bond is solidified, it may cause grease to leak.

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9.4	Notes on Grease Replenishment/Exchange Procedures



WARNING

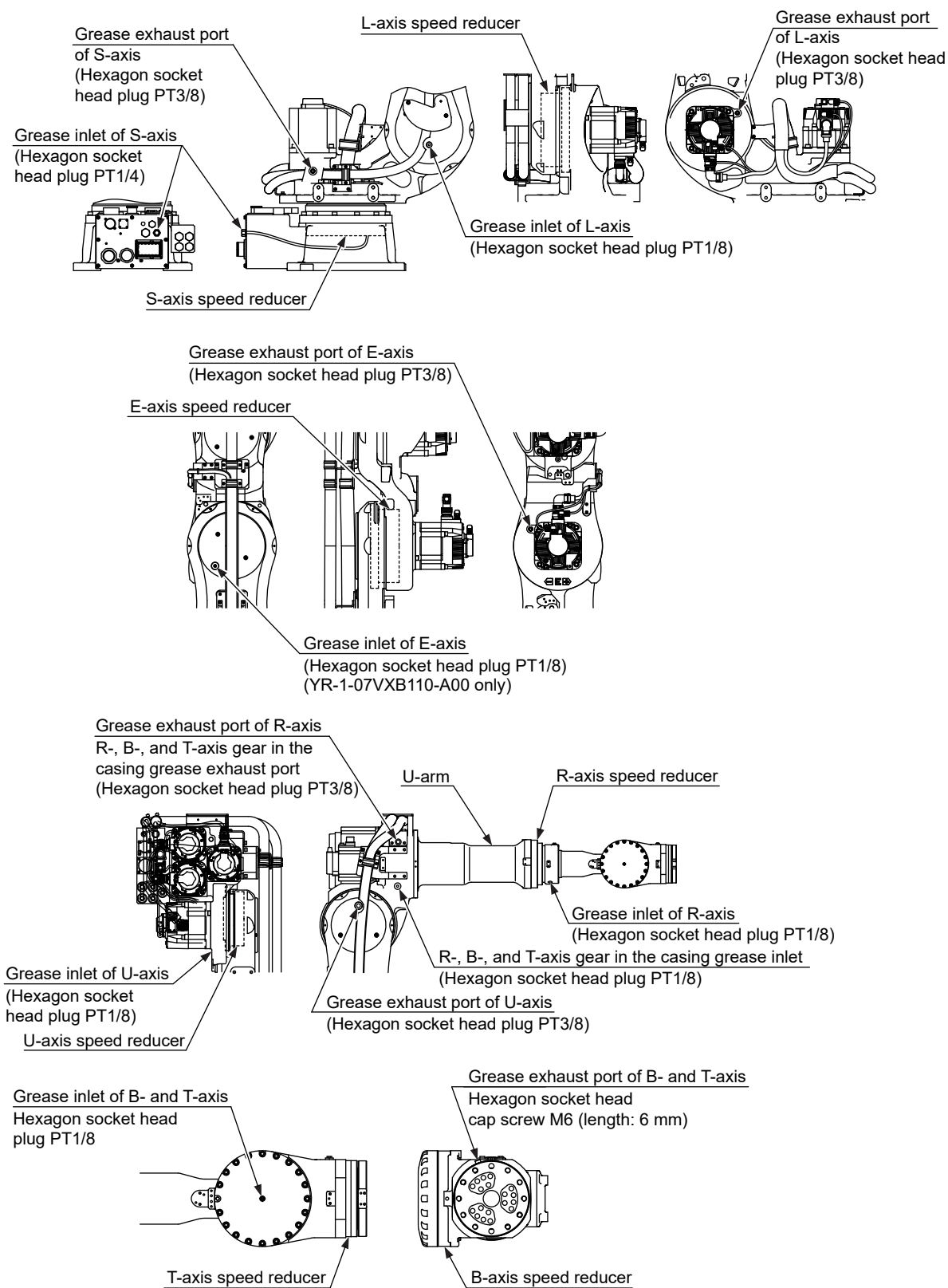
- When operating the manipulator, do not enter into the working area of the manipulator. Injury may result if anyone enter into the working area during operation.

9 Maintenance and Inspection

9.4 Notes on Grease Replenishment/Exchange Procedures

9.4.1.2 Grease Exchange Procedure

Fig. 9-10: Grease Inlets and Exhaust Ports for Each Axis



9 Maintenance and Inspection

9.4 Notes on Grease Replenishment/Exchange Procedures

1. Before injecting grease, the posture of the manipulator must be set as indicated in *table 9-3 "Recommended Posture for Grease Injection"*. If it is difficult to make the recommended posture because of external cabling or etc., adjust the posture as much as possible to make the position of the grease inlet locate in the lower part and the position of exhaust port locate in the upper part. If the exhaust port is located in the lower part, grease may not be exchanged properly.

Table 9-3: Recommended Posture for Grease Injection

Axis to inject	Posture					
	S-axis	L-axis	U-axis	R-axis	B-axis	T-axis
S-axis	Any	Any	Any	Any	Any	Any
L-axis	Any	0°	Any	Any	Any	Any
E-axis (YR-1-07VXB110-A00)	Any	0°	Any	Any	Any	Any
U-axis	Any	0° *	0° *	Any	Any	Any
R-axis	Any	Any	0° *	0°	0°	0°
B-axis						
T-axis						

* If the recommended posture cannot be made, rotate the U-axis to make the U-arm horizontal to the ground.

2. Remove the hexagon socket head plugs from the grease inlet and grease exhaust port.
3. Install a specified grease zerk to each grease inlet.
(The grease zerk is delivered with the manipulator.)
4. Inject the grease through the grease inlet using a grease gun.
 - Grease type: Molywhite RE No.00
 - Grease lubricator: Air-operated grease gun
(e.g., Powerlube P3-01JC made by Macnaught)
 - Amount of grease: 7 g/s or less
(For example, if grease is supplied from the lubricator at 2 times/s, set the amount to 3.5 g/time or less.)
 - Air supply pressure of grease pump: Approximately 0.3 MPa or less

Table 9-4: Amount of Grease

Axis to exchange grease	Amount of grease
S-axis	Approx. 2750 g
L-axis	Approx. 1800 g
E-axis (YR-1-07VXB110-A00)	Approx. 2570 g
U-axis	Approx. 780 g
R-, B-, and T-axis gear in the casing	Approx. 2090 g
R-axis	Approx. 1740 g
B-, and T-axes	Approx. 1050 g

9 Maintenance and Inspection

9.4 Notes on Grease Replenishment/Exchange Procedures

5. Injection stop:

- <When replacing the speed reducer>
Stop injecting grease when grease can be seen from the exhaust port.
- <When exchanging grease>
The old grease is discharged from the grease exhaust port. At this time, stop injection when the mixture of the old grease and the new grease in an equal ratio is seen.
And then, skip the steps 6 and 7, and proceed to the step 8.

6. Operate each axis about 5 times in teach mode as shown in *table 9-5 "Teaching Operation for Each Axis"*.*Table 9-5: Teaching Operation for Each Axis*

Axis to replenish grease	Angle for teaching operation	Speed for teaching operation
S-axis	S-axis $\pm 45^\circ$	User-specified
L-axis	L-axis $\pm 45^\circ$	
E-axis (YR-1-07VXB110-A00)	E-axis $\pm 45^\circ$	
U-axis	U-axis $\pm 45^\circ$	
In the casing R-, B-, and T-axis gear R-, B-, and T-axis	R-axis $\pm 90^\circ$	
	B-axis $\pm 45^\circ$	
	T-axis $\pm 90^\circ$	

7. Inject grease again, and when grease comes out of the exhaust port, grease injection is completed.
8. Discharge the specified amount of grease from the grease inlet or grease exhaust port. (Refer to *table 9-6 "Amount of Grease Discharged from Each Axis"*.) In order to discharge the specified amount of grease, receive the discharged grease by using a container, and then measure the weight of the discharged grease by weighing the container until the amount reaches to the specified amount.
Use one of the following methods to discharge grease.

Method 1: Extruding grease by air

- (1) Connect the joint and the hose to the grease inlet.
- (2) Connect the regulator to the grease exhaust port.
- (3) Inject air from the grease exhaust port to extrude grease by air.
(Extrusion air pressure: 0.025 MPa or less)
- (4) If the grease is not discharged enough by injecting air, operate the manipulator about 5 times in teach mode as shown in *table 9-5*.

Method 2: Suctioning grease out

- (1) Keep the inlet open and insert the tube into the exhaust port.
- (2) Discharge grease by suctioning grease out of the exhaust port.
(Suction pressure: 0.025 MPa or less)
- (3) If grease is not discharged by suctioning, operate the manipulator again about 5 times in teach mode as shown in *table 9-5*.

9 Maintenance and Inspection
 9.4 Notes on Grease Replenishment/Exchange Procedures

Table 9-6: Amount of Grease Discharged from Each Axis

Axis to exchange grease	Amount of exhausted grease	
	[g]	[cc]
S-axis	0 [unnecessary]	0 [unnecessary]
L-axis	260±35	300±40
E-axis (YR-1-07VXB110-A00)	350±45	400±50
U-axis	105±15	120±15
R-, B-, and T-axis gear in the casing	105±15	120±15
R-axis	90±10	100±15
B-, and T-axes	55±5	65±10

9. For the axis where grease is exchanged, perform a playback operation indicated in *table 9-7 "Running- In Operation for Each Axis"* for running-in the speed reducer with grease.

At this time, grease may be discharged during the operation. Remove the grease zerk from the grease inlet, and clean and degrease the tap part and the thread part of the plug. Wrap the seal tape TB4501 around the plug, and then attach it to the grease inlet. Tighten the plug with the tightening torque shown in *table 9-8 "Plug Type and Tightening Torque for Each Axis"*. Also, discharge the excess grease in order not to increase the inner pressure of the speed reducer. Attach a bag to receive grease such as indicated in *fig. 9-11 "Grease Receiving Bag (Rough Standard)"*, and then perform the running-in operation.

Table 9-7: Running- In Operation for Each Axis

Axis to exchange grease	Running-in operation			
	Operation angle	Operation speed	Timer after each operation	Operating time
S-axis	S-axis ±45°	MOVJ VJ=50.00	1.0 s	15 minutes
L-axis	L-axis ±45°	MOVJ VJ=50.00	1.0 s	15 minutes
U-axis	U-axis ±45°	MOVJ VJ=50.00	1.0 s	15 minutes
In the casing R-, B-, and T-axis gear R-, B-, and T-axis	R-axis ±90°	MOVJ VJ=50.00	1.0 s	15 minutes
	B-axis ±45°			
	T-axis ±90°			

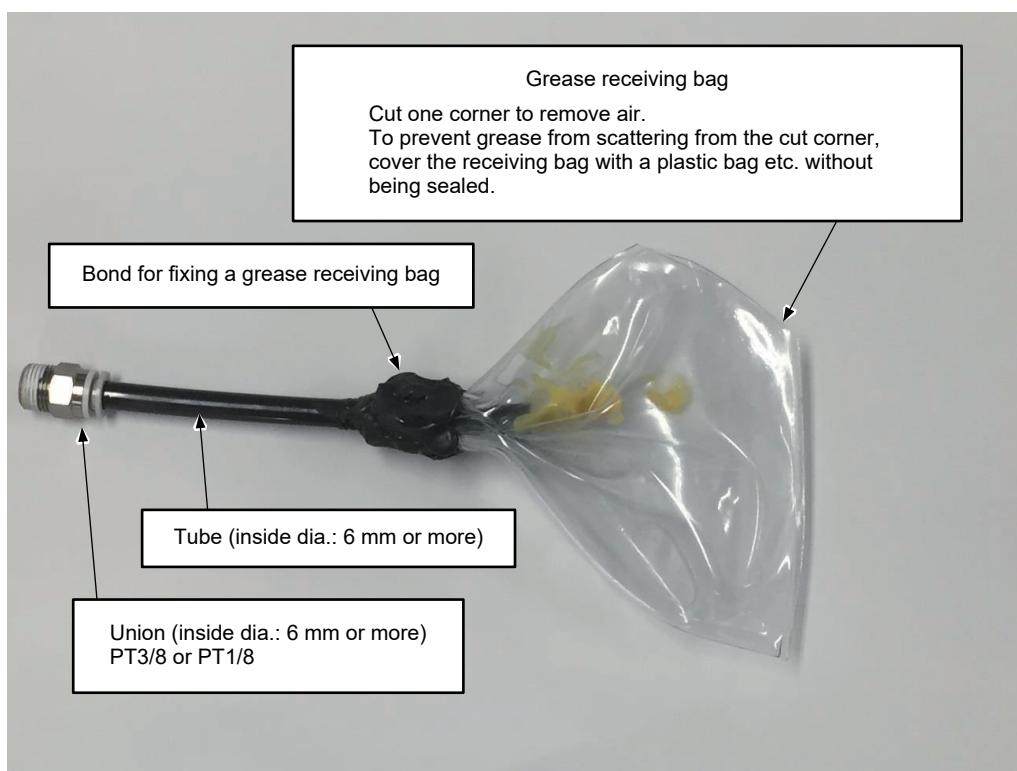
Table 9-8: Plug Type and Tightening Torque for Each Axis

Axis to exchange grease	Plug for the grease inlet		Plug for the grease exhaust port	
	Plug type	Tightening torque	Plug type	Tightening torque
S-axis	PT1/4	12 N•m (1.2 kgf•m)	PT3/8	23 N•m (2.34 kgf•m)
L-axis	PT1/8	4.9 N•m (0.5 kgf•m)		
U-axis				
In the casing R-, B-, and T-axis gear R-, B-, and T-axis				
R-axis				
B- and T-axis				

9 Maintenance and Inspection

9.4 Notes on Grease Replenishment/Exchange Procedures

Fig. 9-11: Grease Receiving Bag (Rough Standard)



10. Wipe the discharged grease with a cloth, and reinstall the plug. Clean and degrease the tap part and the thread part of the plug. Wrap the seal tape TB4501 around the plug, attach the plug with seal tape to the grease exhaust port, and then tighten it with the tightening torque shown in *table 9-8 "Plug Type and Tightening Torque for Each Axis"*.

10 Recommended Spare Parts

It is recommended to keep the parts and components in the following table in stock as spare parts for your manipulator.

To purchase lead wires of the wire harness or etc., check the order/manufacture no. and contact your YASKAWA representative.

Product performance cannot 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 10-1: Recommend Spare Parts for the YR-1-06VX110-A00 (Sheet 1 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	Molywhite RE No.00	YASKAWA Electric Corporation	16 kg	-	
A	2	Liquid Gasket	TB1206C	Three Bond Co., Ltd.	-	-	
A	3	Adhesive	LOCTITE243	Henkel Japan Ltd	-	-	
A	4	Seal Tape	TB4501	Three Bond Co., Ltd.	-	-	
A	5	Battery Pack	HW1483880-A	YASKAWA Electric Corporation	1	3	
A	6	Lead Wire for Battery Replacement	HW1471281-A	YASKAWA Electric Corporation	1	-	
B	7	Replacement Kit for S-Axis Speed Reducer ¹⁾	HW1485121-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382898-A Input gear: HW0312836-1
B	8	Replacement Kit for L-Axis Speed Reducer ¹⁾	HW1485122-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382456-B Input gear: HW1303989-1
B	9	Replacement Kit for U-Axis Speed Reducer ¹⁾	HW1485123-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382715-A Input gear: HW0409102-1
B	10	Replacement Kit for R-Axis Speed Reducer ¹⁾	HW1485124-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382808-A

10 Recommended Spare Parts

Table 10-1: Recommend Spare Parts for the YR-1-06VX110-A00 (Sheet 2 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
B	11	Replacement Kit for B-Axis Speed Reducer ¹⁾	HW1485125-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382809-A Input gear: HW1304006-1
B	12	Replacement Kit for T-Axis Speed Reducer ¹⁾	HW1485126-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382810-A Input gear: HW1304008-1
B	13	Wrist Unit	HW1173122-A	YASKAWA Electric Corporation	1	1	
B	14	Internal Wiring Harness	HW1173266-A	YASKAWA Electric Corporation	1	1	
B	15	Lead Wire for S-Axis Signal	HW1372597-AJ	YASKAWA Electric Corporation	1	1	Lead wire between the S-axis motor and the multi-port connector
B	16	Lead Wire for L-Axis Signal	HW1372597-AK	YASKAWA Electric Corporation	1	1	Lead wire between the L-axis motor and the multi-port connector
B	17	Lead Wire for U-Axis Signal	HW1372597-AL	YASKAWA Electric Corporation	1	1	Lead wire between the U-axis motor and the multi-port connector
B	18	Lead Wire for R-Axis Signal	HW1372597-AM	YASKAWA Electric Corporation	1	1	Lead wire between the R-axis motor and the multi-port connector
B	19	Lead Wire for B-Axis Signal	HW1372597-AN	YASKAWA Electric Corporation	1	1	Lead wire between the B-axis motor and the multi-port connector
B	20	Lead Wire for T-Axis Signal	HW1372597-AO	YASKAWA Electric Corporation	1	1	Lead wire between the T-axis motor and the multi-port connector
B	21	Lead Wire	HW1471359-A	YASKAWA Electric Corporation	1	1	Lead wire between the multiport in the casing and the multiport
C	22	Bypass Cable	HW1471212-C	YASKAWA Electric Corporation	1	1	Signal lead wires for tentative recovery from failure
C	23	S- and U-Axes AC Servomotor	SGM7G-30APK-YR1* HW1385396-A	YASKAWA Electric Corporation	1	2	
C	24	L-axis AC Servomotor	SGM7G-44APK-YR2* HW1385399-A	YASKAWA Electric Corporation	1	1	
C	25	R-, B-, and T-Axes AC Servomotor	SGM7G-13APK-YR1* HW1385395-A	YASKAWA Electric Corporation	1	3	

Table 10-1: Recommend Spare Parts for the YR-1-06VX110-A00 (Sheet 3 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
C	26	Multi-Port Connector	HW1384619-A	YASKAWA Electric Corporation	1	3	
C	27	Power Supply Board Box	HW1372943-A	YASKAWA Electric Corporation	1	1	
C	28	Dummy Connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For dismounting function of the axis

1 The replacement kit for the speed reducer includes the following parts.

- Speed reducer and gear (described in Remarks)
- Required parts to change speed reducer (oil seals, bolts, or other parts)

For details of the replacement kit for the speed reducer, contact your YASKAWA representative.

10 Recommended Spare Parts

Table 10-2: Recommend Spare Parts for the YR-1-07VXB110-A00 (Sheet 1 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	Molywhite RE No.00	YASKAWA Electric Corporation	16 kg	-	
A	2	Liquid Gasket	TB1206C	Three Bond Co., Ltd.	-	-	
A	3	Adhesive	LOCTITE243	Henkel Japan Ltd	-	-	
A	4	Seal Tape	TB4501	Three Bond Co., Ltd.	-	-	
A	5	Battery Pack	HW1483880-A	YASKAWA Electric Corporation	1	4	
A	6	Lead Wire for Battery Replacement	HW1471281-A	YASKAWA Electric Corporation	1	-	
B	7	Replacement Kit for S-Axis Speed Reducer ¹⁾	HW1485127-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382898-A Input gear: HW0312836-1
B	8	Replacement Kit for L-Axis Speed Reducer ¹⁾	HW1485128-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382456-B Input gear: HW1303989-1
B	9	Replacement Kit for E-Axis Speed Reducer ¹⁾	HW1485129-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW0388209-F Input gear: HW1303890-1
B	10	Replacement Kit for U-Axis Speed Reducer ¹⁾	HW1485130-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382715-A Input gear: HW0409102-1
B	11	Replacement Kit for R-Axis Speed Reducer ¹⁾	HW1485131-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382808-A
B	12	Replacement Kit for B-Axis Speed Reducer ¹⁾	HW1485132-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382809-A Input gear: HW1304006-1
B	13	Replacement Kit for T-Axis Speed Reducer ¹⁾	HW1485133-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1382810-A Input gear: HW1304008-1
B	14	Wrist Unit	HW1173122-A	YASKAWA Electric Corporation	1	1	
B	15	Internal Wiring Harness	HW1173275-A	YASKAWA Electric Corporation	1	1	
B	16	Lead Wire for S-Axis Signal	HW1372597-AJ	YASKAWA Electric Corporation	1	1	Lead wire between the S-axis motor and the multi-port connector

Table 10-2: Recommend Spare Parts for the YR-1-07VXB110-A00 (Sheet 2 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
B	17	Lead Wire for L-Axis Signal	HW1372597-AK	YASKAWA Electric Corporation	1	1	Lead wire between the L-axis motor and the multi-port connector
B	18	Lead Wire for E-Axis Signal	HW1372597-AP	YASKAWA Electric Corporation	1	1	Lead wire between the E-axis motor and the multi-port connector
B	19	Lead Wire for U-Axis Signal	HW1372597-AL	YASKAWA Electric Corporation	1	1	Lead wire between the U-axis motor and the multi-port connector
B	20	Lead Wire for R-Axis Signal	HW1372597-AM	YASKAWA Electric Corporation	1	1	Lead wire between the R-axis motor and the multi-port connector
B	21	Lead Wire for B-Axis Signal	HW1372597-AN	YASKAWA Electric Corporation	1	1	Lead wire between the B-axis motor and the multi-port connector
B	22	Lead Wire for T-Axis Signal	HW1372597-AO	YASKAWA Electric Corporation	1	1	Lead wire between the T-axis motor and the multi-port connector
B	23	Lead Wire	HW1471359-A	YASKAWA Electric Corporation	1	1	Lead wire between the multiport in the casing and the multiport
C	24	Bypass Cable	HW1471212-C	YASKAWA Electric Corporation	1	1	Signal lead wires for tentative recovery from failure
C	25	S- and U-Axes AC Servomotor	SGM7G-30APK-YR1* HW1385396-A	YASKAWA Electric Corporation	1	2	
C	26	L-Axis AC Servomotor	SGM7G-44APK-YR2* HW1385399-A	YASKAWA Electric Corporation	1	1	
C	27	E-Axis AC Servomotor	SGM7G-37APK-YR1* HW1385397-A	YASKAWA Electric Corporation	1	1	
C	28	R-, B-, and T-Axes AC Servomotor	SGM7G-13APK-YR1* HW1385395-A	YASKAWA Electric Corporation	1	3	
C	29	Multi-Port Connector	HW1384619-A	YASKAWA Electric Corporation	1	4	
C	30	Power Supply Board Box	HW1372943-A	YASKAWA Electric Corporation	1	1	
C	31	Dummy Connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For dismounting function of the axis

1 The replacement kit for the speed reducer includes the following parts.

- Speed reducer and gear (described in Remarks)
- Required parts to change speed reducer (oil seals, bolts, or other parts)

For details of the replacement kit for the speed reducer, contact your YASKAWA representative.

MOTOMAN-GP110,GP110B INSTRUCTIONS

For inquiries or after-sales service on this product, contact your local YASKAWA representative as shown below.

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