

MOTOMAN-GP8/AR700, -GP7/AR900 INSTRUCTIONS

TYPE:**YR-1-06VX8-A00 (STANDARD SPECIFICATIONS)****YR-1-06VX7-A00 (STANDARD SPECIFICATIONS)****YR-1-06VX8-B00 (CORROSION PROOF SPECIFICATIONS)****YR-1-06VX7-B00 (CORROSION PROOF SPECIFICATIONS)**

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

MOTOMAN INSTRUCTIONS**MOTOMAN-GP8/AR700, -GP7/AR900 INSTRUCTIONS****YRC1000 INSTRUCTIONS****YRC1000 OPERATOR'S MANUAL (GENERAL) (SUBJECT SPECIFIC)****YRC1000 MAINTENANCE MANUAL****YRC1000 ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)****YRC1000micro INSTRUCTIONS****YRC1000micro OPERATOR'S MANUAL****YRC1000micro MAINTENANCE MANUAL****YRC1000micro 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*)

- 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



DANGER

- This instruction manual is intended to explain mainly the mechanical part of the MOTOMAN-GP8/AR700, -GP7/AR900, both its application to the actual operation and proper maintenance and inspection. It describes safety and handling, details of specifications, necessary information about maintenance and inspection, and explains operating instructions and maintenance procedures. Be sure to read and understand this instruction manual thoroughly before installing and operating the manipulator. Anything 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/YRC1000micro INSTRUCTIONS. To ensure correct and safe operation, carefully read "Chapter 1. Safety" of the YRC1000/YRC1000micro 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 product.

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



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.



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.



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 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.

Be sure to follow these important instructions.



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 motors and do not release brakes except during an emergency or abnormality.

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.

<YRC1000>

**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 the play mode or in the 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 the 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.

<YRC1000micro>



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 button on the programming pendant or on the external control device, etc.
 - Disconnect the safety plug of the safety fence.
(when in the play mode or in the 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 YRC1000micro power
 - Moving the manipulator by using the programming pendant
 - Running the system in the 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 button is located on the upper right of the programming pendant.

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

<YRC1000micro only>**DANGER**

- In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button.
Connect the external emergency stop button to the 4-14 pin and 5-15 pin of the Safety connector (Safety).
- Upon shipment of the YRC1000micro, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.
If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

<YRC1000/YRC1000micro>**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/YRC1000micro 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, in case the 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 <YRC1000>

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

Definition of Terms Used Often in This Manual <YRC1000micro>

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the YRC1000micro controller, manipulator cables, the YRC1000micro programming pendant (optional), and the YRC1000micro programming pendant safety signal short circuit connector (optional).

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
YRC1000micro controller	YRC1000micro
YRC1000micro programming pendant	Programming pendant (optional)
Cable between the manipulator and the controller	Manipulator cable
YRC1000micro programming pendant safety signal short circuit connector	Programming pendant safety signal short circuit connector (optional)

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

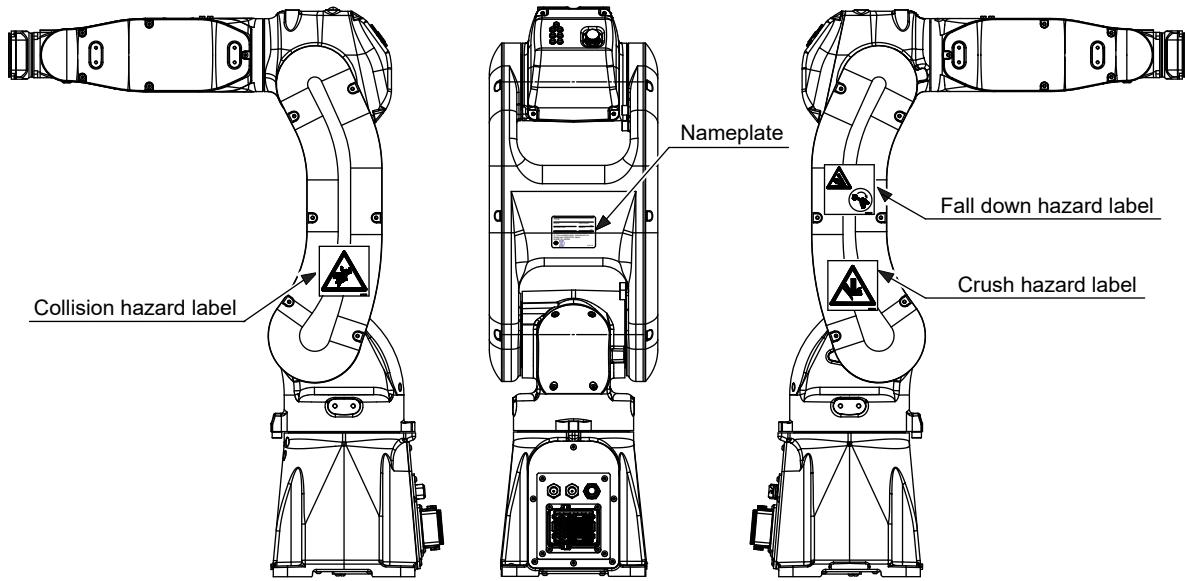
The following warning labels are attached to the manipulator.

Always follow the warnings on the labels.

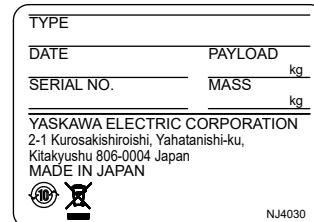
An identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.

Warning labels marked with (*) are optional. If a warning label is selected as an option, the language on the warning label can also be selected.

Fig. : Warning Label Locations (GP8/AR700, GP7/AR900)



Nameplate



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/YRC1000micro power
- Moving the manipulator by using the programming pendant
- Running the system in the check mode
- Performing automatic operations

Crush hazard label



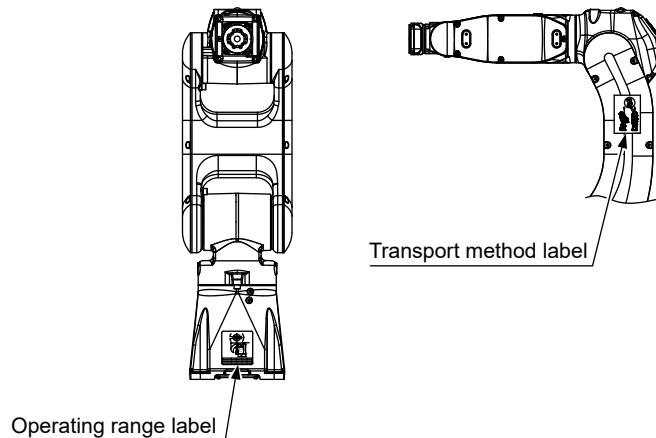
Description

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.

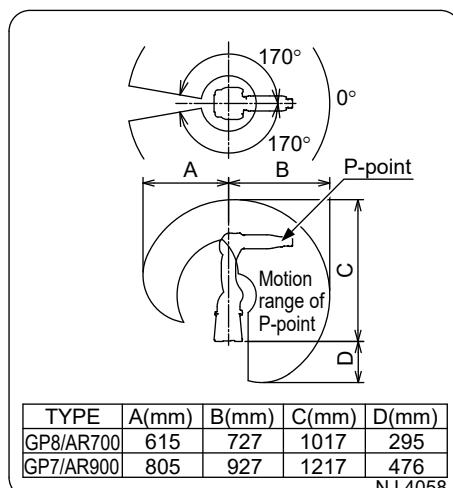
Descriptions of Other Labels

The following labels are attached to the manipulator.

Fig. : Positions of Other Labels (GP8/AR700, GP7/AR900)



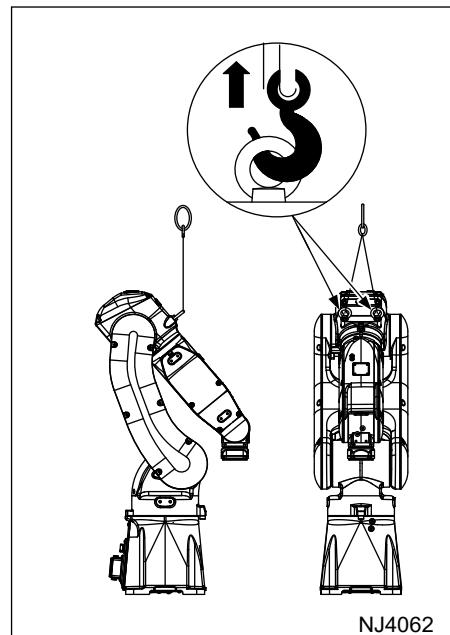
Operating range label



Description

This label shows the operating range of the manipulator.

For the installation location of the manipulator, refer to “Installation and Wiring Safety” and “Work Area Safety” in chapter 1.5 of “YRC1000 INSTRUCTIONS (RE-CTO-A221)” and “YRC1000micro INSTRUCTIONS (RE-CTO-A222)”.

Transport method label**Description**

This label shows the transporting position of the manipulator.
For the transport method, refer to *chapter 2 “Transporting”* in this manual.

Method to Move Robot Axes during an Emergency or Abnormality (YRC1000)

The axes of the robot can be moved without drive power from the motor by releasing the brakes during an emergency or abnormality, such as if a person is crushed by the robot or a person is trapped inside the machine. For details on the brake release unit (optional), refer to the following manuals.

Manual Name	Manual No.
YRC1000 OPTIONS INSTRUCTIONS FOR BRAKE RELEASE UNIT INSTALLED IN CONTROLLER CABINET	HW1484107
YRC1000 OPTIONS INSTRUCTIONS FOR INDEPENDENT TYPE BRAKE RELEASE UNIT (HANDY TYPE)	HW1484109
YRC1000 OPTIONS INSTRUCTIONS FOR INDEPENDENT TYPE BRAKE RELEASE UNIT (HANDY TYPE) (AC 220V/200V POWER SUPPLY SPECIFICATION)	HW2480839

Prepare the necessary quantity of brake release units for the environment in which the robot is used and store the brake release units so that an emergency or abnormality can be handled quickly and appropriately.



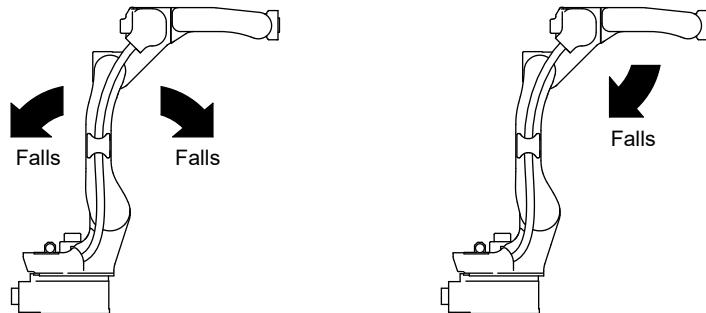
DANGER

- Do not use the brake release unit except during an emergency or abnormality.

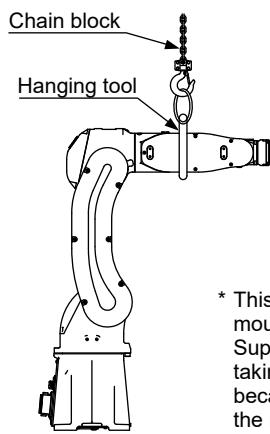
The arm rotates in an unexpected direction when the brakes are released and this may cause a serious personal injury. For this reason, ensure that the brakes are released by first confirming safety, such as by supporting the arm in an appropriate manner to handle arm rotation when the brakes are released.

Fig. : Fall Directions of Arm When L-Axis or U-Axis Motor Brake Is Released and Example of Method to Support Arm

When L-Axis Motor Brake Is Released When U-Axis Motor Brake Is Released



Method to Support Arm



* This figure is an example when the robot is mounted to the floor.
Support the arm in an appropriate manner by taking into consideration the effect of gravity because the direction the arm falls depends on the installation angle.

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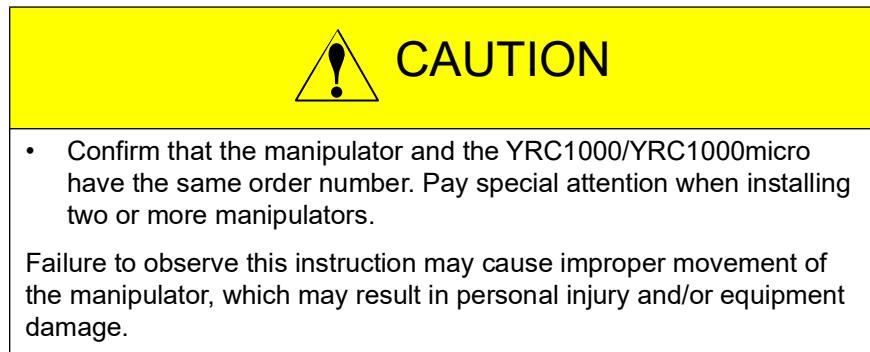
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 1 Product Confirmation
 1.1 Contents Confirmation

1 Product Confirmation



1.1 Contents Confirmation

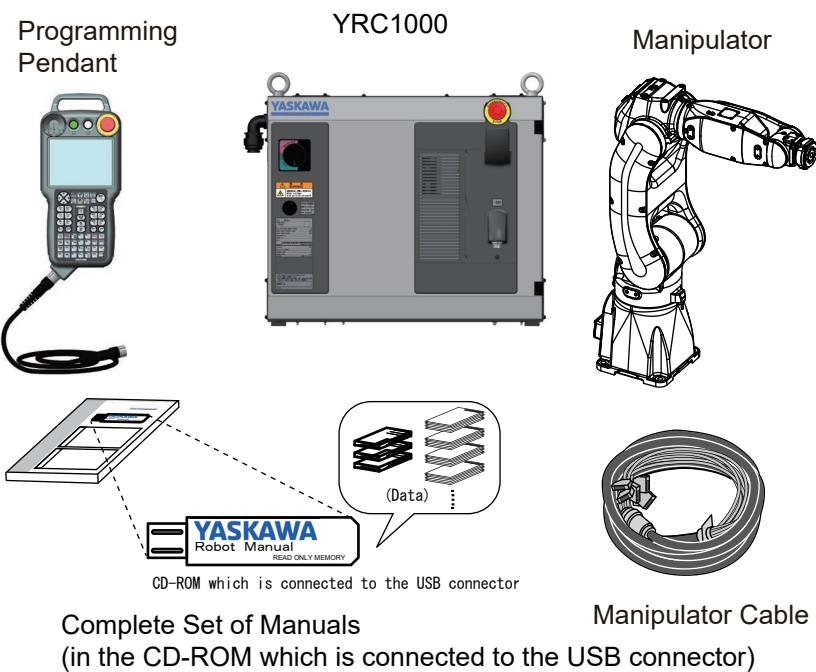
■ YRC1000

Confirm the contents of the delivery when the product arrives.

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

YRC1000 Packing contents

- Manipulator (accessories included)
- YRC1000 (spare parts included)
- Manipulator Cable (between manipulator and the YRC1000)
- Complete set of manuals
(in the CD-ROM which is connected to the USB connector)
- Programming pendant



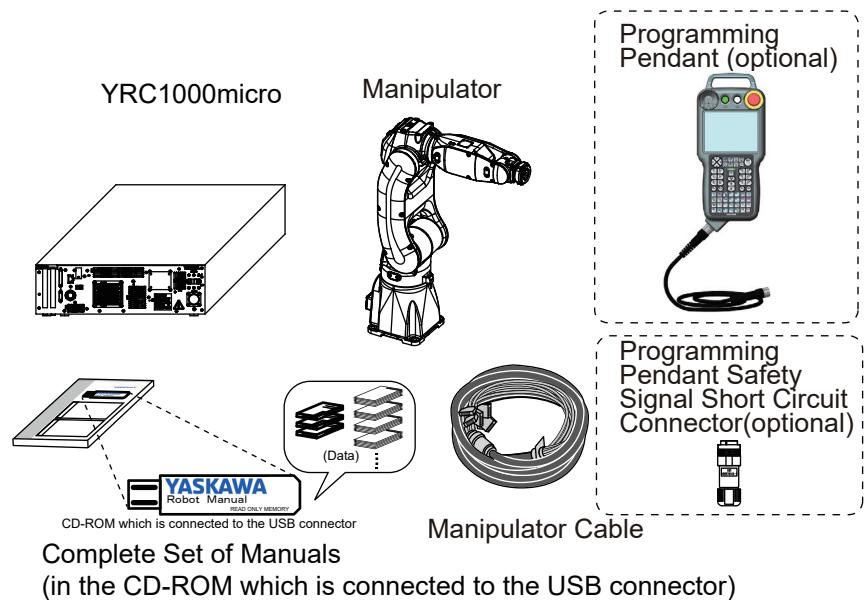
 1 Product Confirmation
 1.1 Contents Confirmation

■ YRC1000micro

Confirm the contents of the delivery when the product arrives.

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

- Manipulator (accessories included)
- YRC1000micro (spare parts included)
- Manipulator Cable (between manipulator and the YRC1000micro)
- Complete set of manuals
(in the CD-ROM which is connected to the USB connector)
- Programming pendant (optional)
- Programming pendant safety signal short circuit connector (optional)



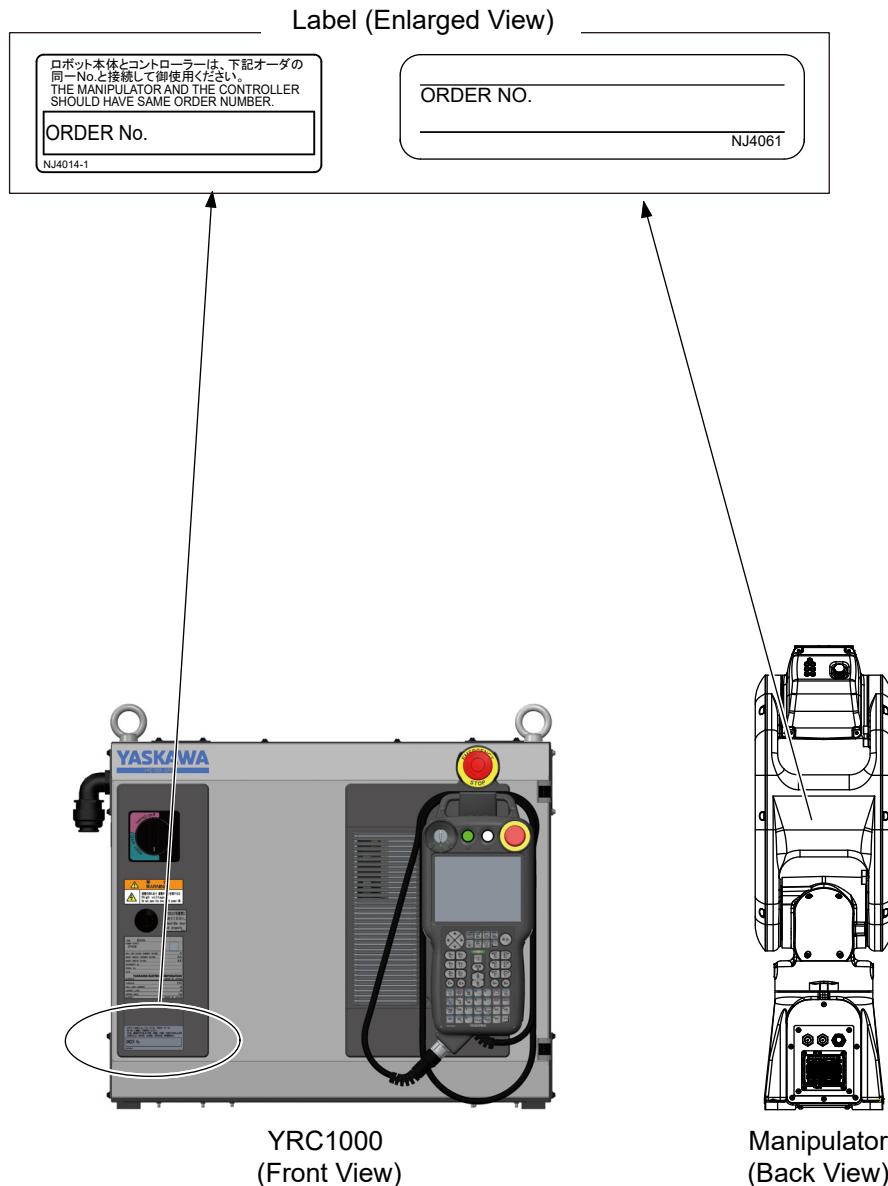
Accessories of Manipulator (YRC1000/YRC1000micro)	Pcs
Hexagon socket head cap screw M10 (length:35 mm)	4
Conical spring washer M10	4

-
- 1 Product Confirmation
 - 1.2 Order Number Confirmation
-

1.2 Order Number Confirmation

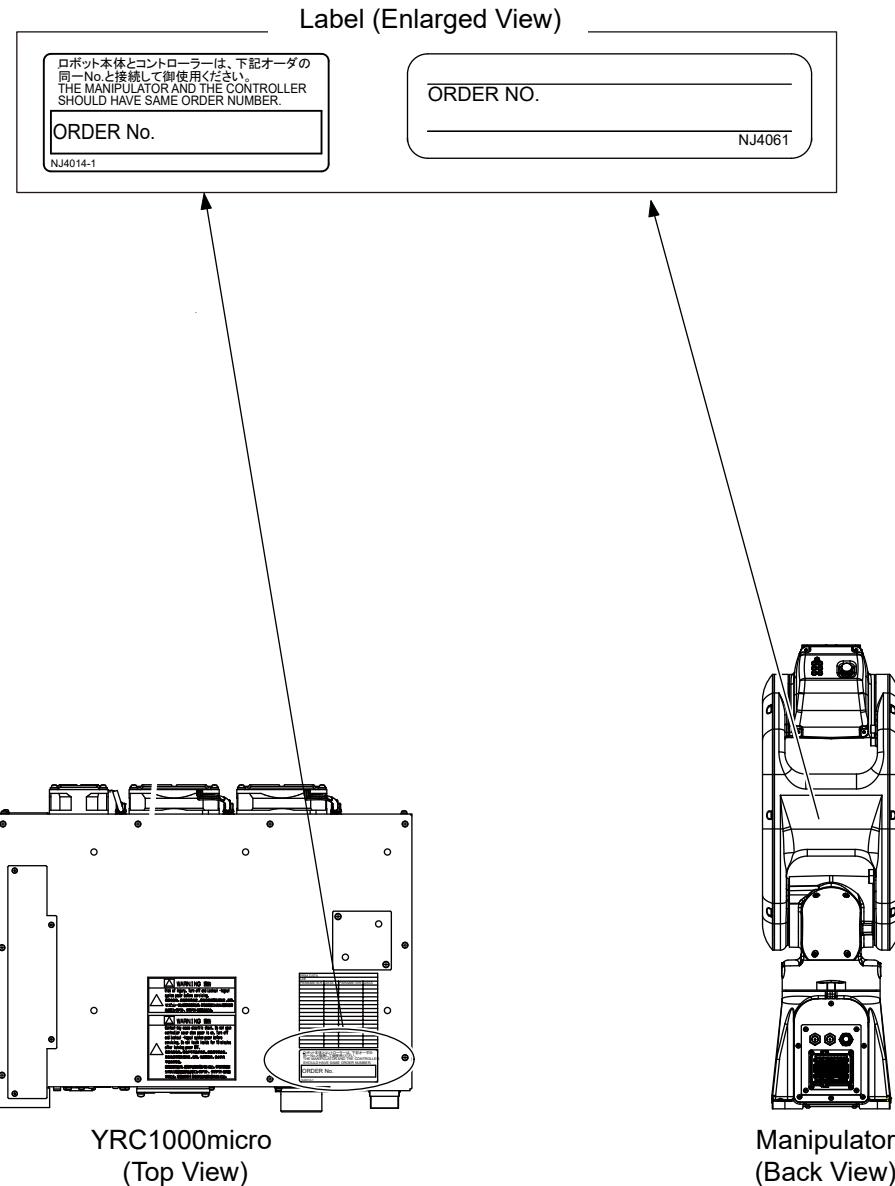
Confirm the order number of the manipulator corresponds to the YRC1000/YRC1000micro. The order number is located on a label as shown below.

Fig. 1-1(a): Location of Order Number Labels (YRC1000)



1 Product Confirmation
1.2 Order Number Confirmation

Fig. 1-1(b): Location of Order Number Labels (YRC1000micro)



2 Transporting



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 Transporting Method

- Check that the eye bolts are securely fastened.
- The weight of the manipulator is approximately 35 kg for GP8/AR700, 37 kg for GP7/AR900 (including the shipping bolts and brackets). Use a wire rope strong enough to withstand the weight.
- Attached eye bolts are designed to support the manipulator' mass. Do not use them for anything other than transporting the manipulator.
- 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.



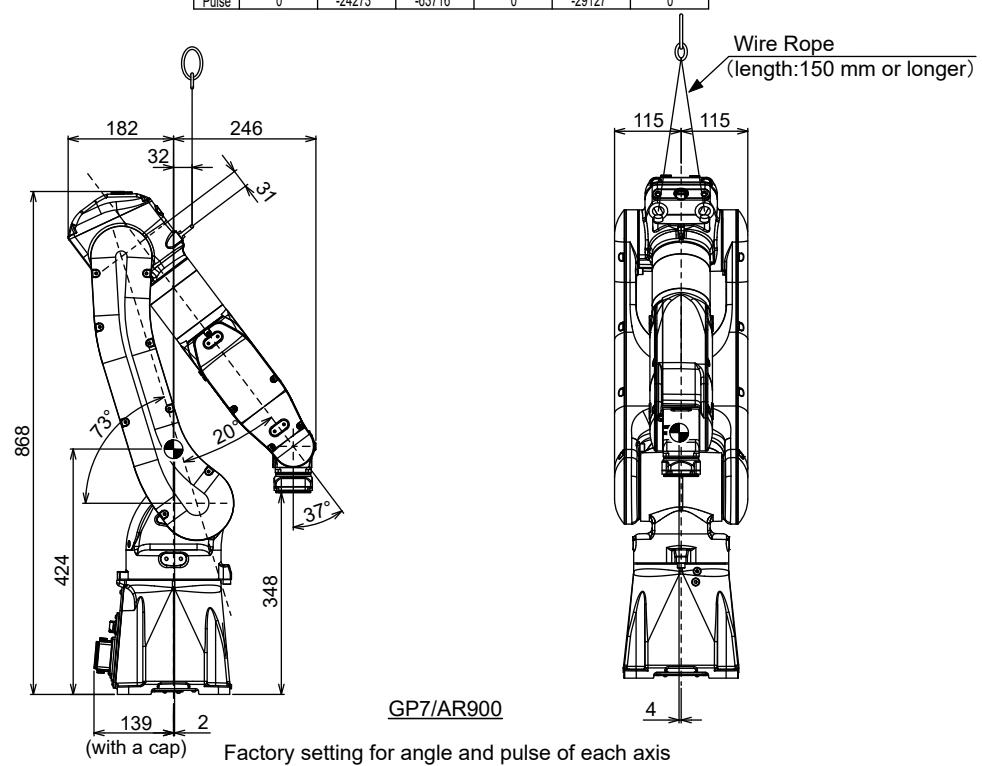
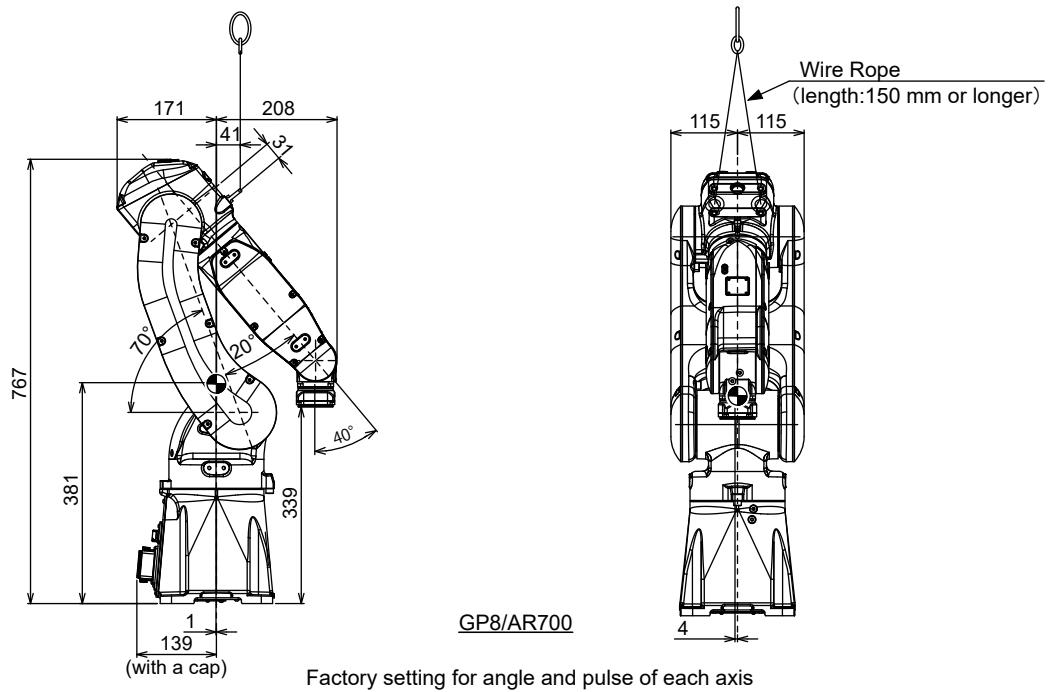
 2 Transporting
 2.1 Transporting Method

2.1.1 Using a Crane

As a rule, the manipulator should be lifted by a crane with two wire ropes when removing it from the package and moving it.

Be sure to lift the manipulator in the posture as shown in fig. 2-1 “*Transporting Position (factory setting)*”. The length of the wire rope must be 150 mm or longer. (⊕ indicates the position of the center of gravity).

Fig. 2-1: Transporting Position (factory setting)



 2 Transporting
 2.1 Transporting Method

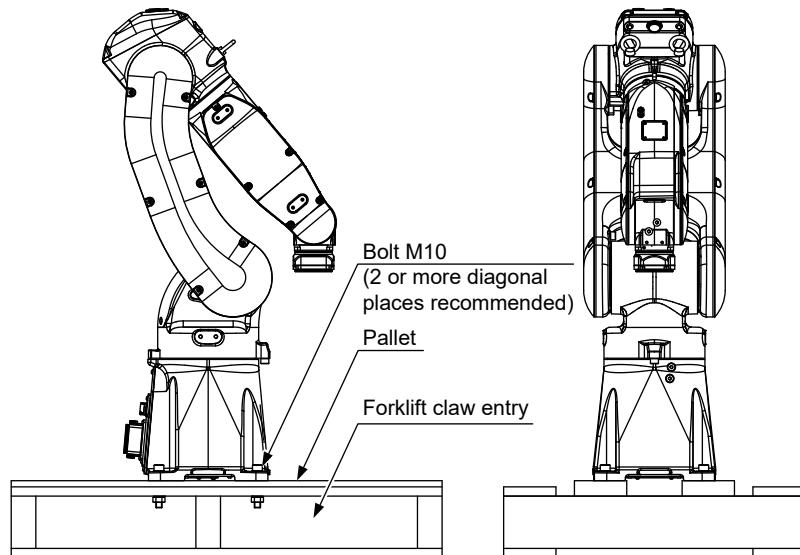
2.1.2 Using a Forklift

When using a forklift, put a pallet under the manipulator in the posture as shown in *fig. 2-2 "Using a Forklift"* and secure the manipulator by using bolts or screws. Insert claws under the pallet and lift it. The pallet must be strong enough to support the manipulator.

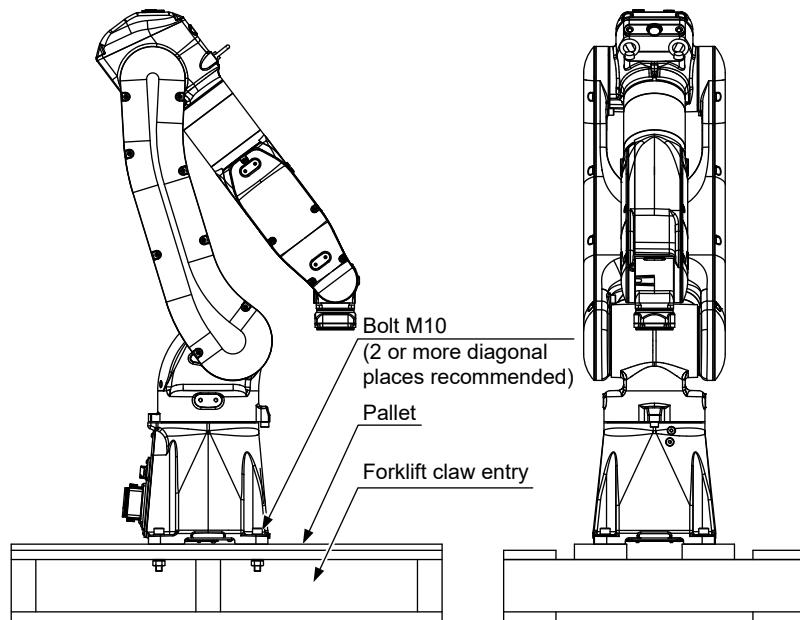
Transport the manipulator slowly with due caution in order to avoid overturning or slippage.

Fig. 2-2: Using a Forklift

GP8/AR700



GP7/AR900



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/YRC1000micro, 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.

- When mounting the manipulator on the wall, the wall must have sufficient strength and rigidity to support the weight of the manipulator. In addition, take precautionary measures on the manipulator base to prevent the manipulator from falling.

Failure to observe this instruction 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 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 the safety fence. They prevent unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance.

Responsibility for Safeguarding (ISO10218)

The user of a manipulator or robot system shall 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, shall correspond directly to the type and level of hazard presented by the robot system consistent with the robot application. Safeguarding may include but not be limited to safeguarding devices, barriers, interlock barriers, perimeter guarding, awareness barriers, and awareness signals.

3.2 Mounting Procedures for Manipulator 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(a) "Reaction Force and Torque of GP8/AR700"*, *table 3-1(b) "Reaction Force and Torque of GP7/AR900"*.

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(a): Reaction Force and Torque of GP8/AR700

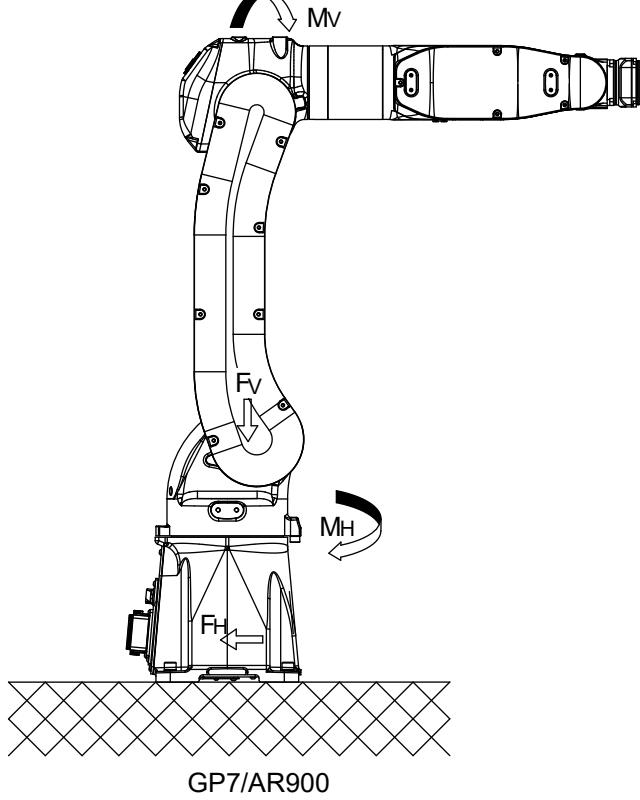
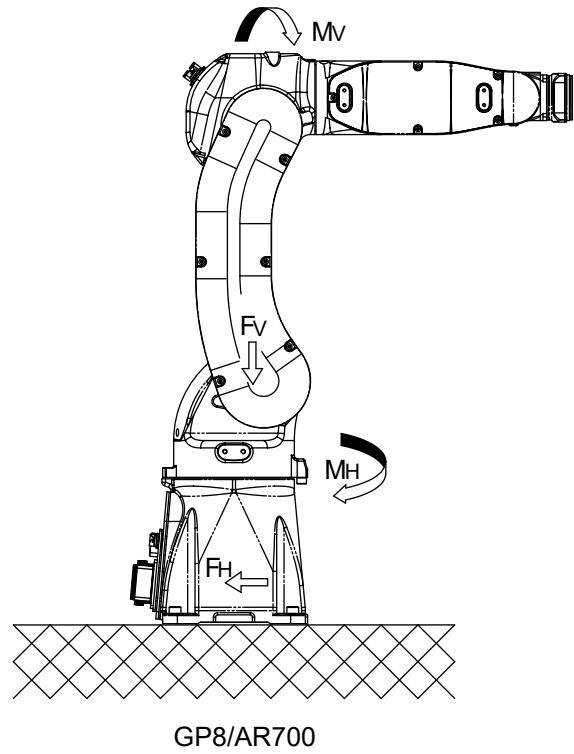
	Horizontal rotation		Vertical rotation	
	Reaction force F_H	Torque M_H	Reaction force F_V	Torque M_V
Emergency stop	1079 N (110 kgf)	765 N·m (78 kgf·m)	1765 N (180 kgf)	1000 N·m (102 kgf·m)
Acceleration/deceleration	343 N (35 kgf)	216 N·m (22 kgf·m)	343 N (35 kgf)	265 N·m (27 kgf·m)

Table 3-1(b): Reaction Force and Torque of GP7/AR900

	Horizontal rotation		Vertical rotation	
	Reaction force F_H	Torque M_H	Reaction force F_V	Torque M_V
Emergency stop	1570 N (160 kgf)	1140 N·m (116 kgf·m)	1570 N (160 kgf)	1140 N·m (116 kgf·m)
Acceleration/deceleration	450 N (46 kgf)	310 N·m (32 kgf·m)	300 N (31 kgf)	320 N·m (33 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 30 mm or more thickness, and anchor bolts of M10 or larger size.

The manipulator base is tapped for four mounting holes.

Fix the manipulator base to the baseplate with the four hexagon socket head cap screws M10 (Tensile strength: 1200N/mm², recommended length: 35 mm) by using the tightening torque 48N·m.

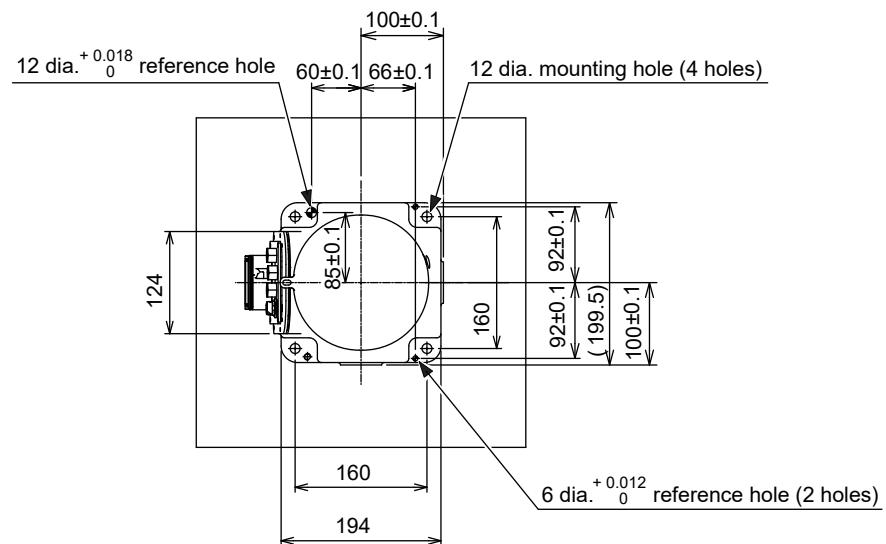
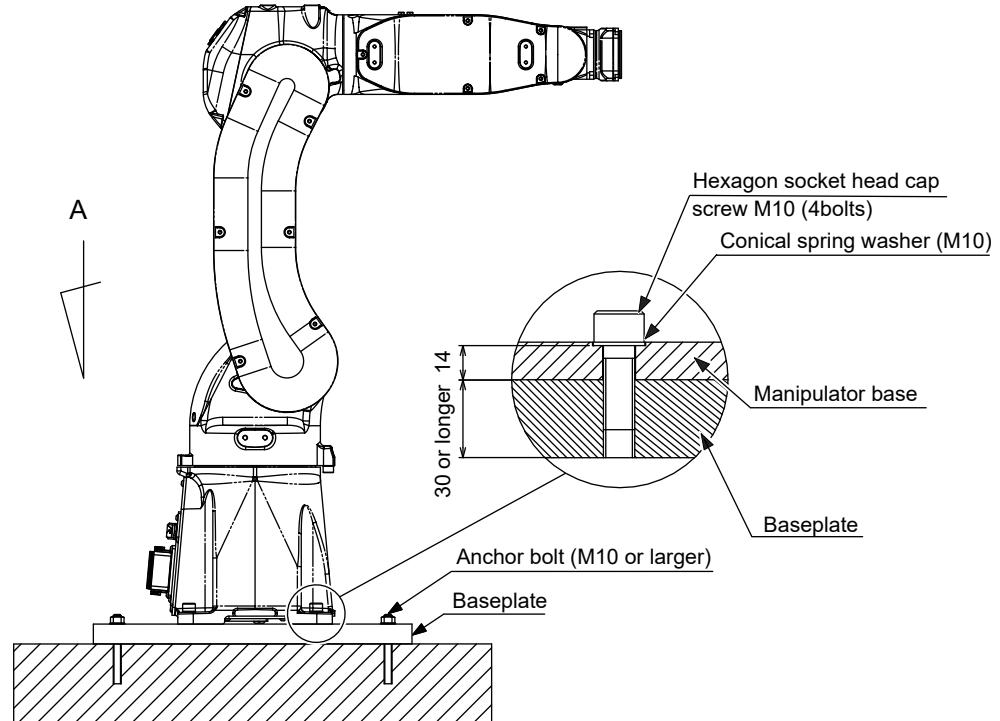
The hexagon socket head cap screws and the anchor bolts must be tightened firmly so that they will not work loose during the operation.

When conducting maintenance on the S-axis or replacing the wire harness in the manipulator, the manipulator and the baseplate must be separated. If the positions of the manipulator before and after its re-installation are different, teaching points of all JOBs must be modified. Thus, positioning of the manipulator by using the reference hole or the reference plane is recommended.

Refer to *fig. 3-2 “Mounting the Manipulator on Baseplate (GP8/AR700)”*.

3 Installation
3.2 Mounting Procedures for Manipulator Base

Fig. 3-2: Mounting the Manipulator on Baseplate (GP8/AR700)



View A

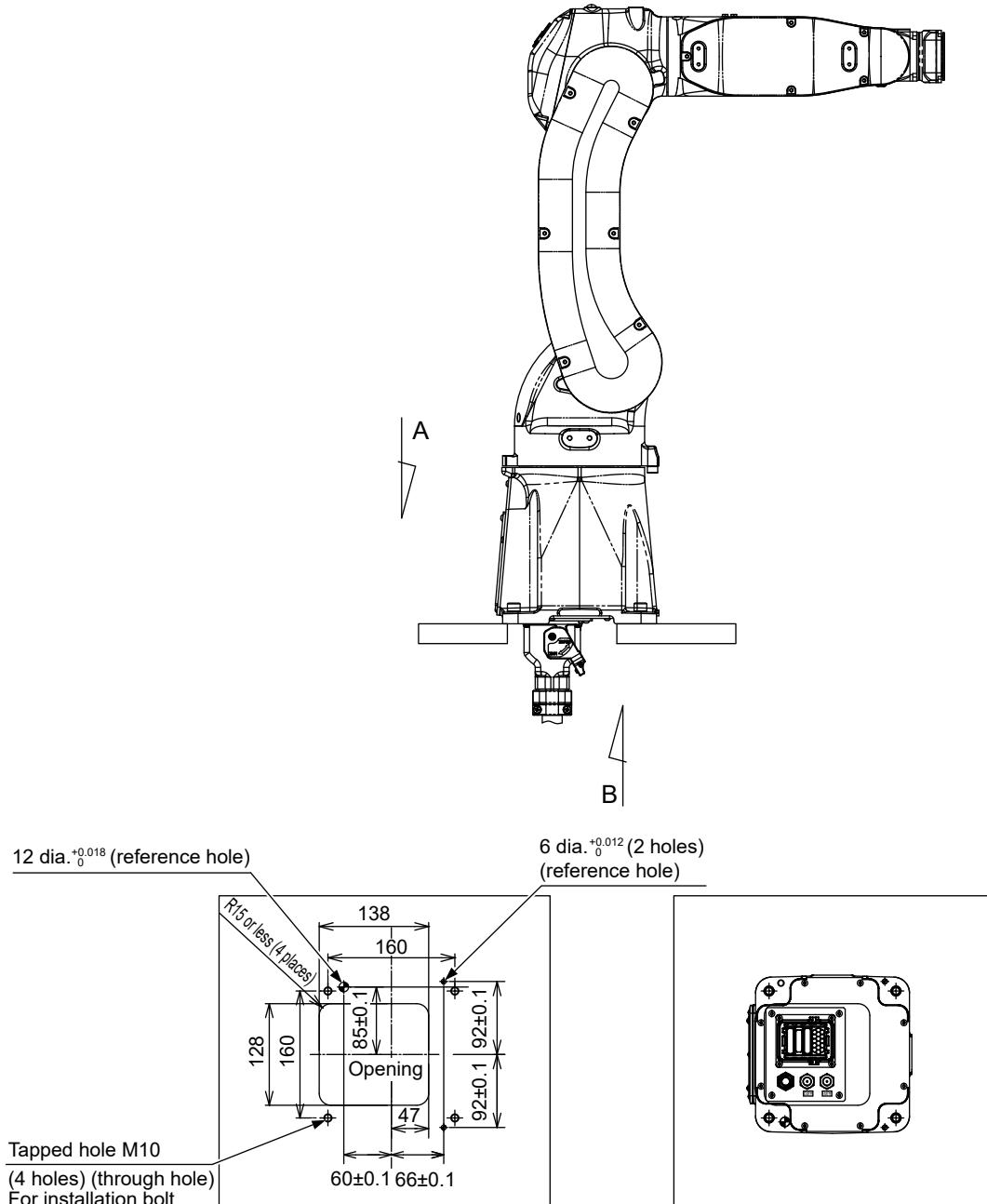
3 Installation

3.2 Mounting Procedures for Manipulator Base

<Optional: Manipulator Cable on the Bottom>

Prepare the baseplate with an opening, as shown in the following figure, when the manipulator cable is on the bottom.

Fig. 3-3: Example of Manipulator Installation Base When the Manipulator Cable Is on the Bottom



Example of Manipulator Installation Base (View A) When Installing Manipulator (View B)

3.3 Mounting Method

The MOTOMAN-GP8/AR700, -GP7/AR900 are available in four different ways: floor-mounted, wall-mounted, tilt-mounted and ceiling-mounted. For the wall-mounted, tilt-mounted and ceiling-mounted ways, the three points listed below are different from the floor-mounted method.

- S-axis Operating Range
- Precautions to Prevent the Manipulator from Falling

3.3.1 S-Axis Operating Range

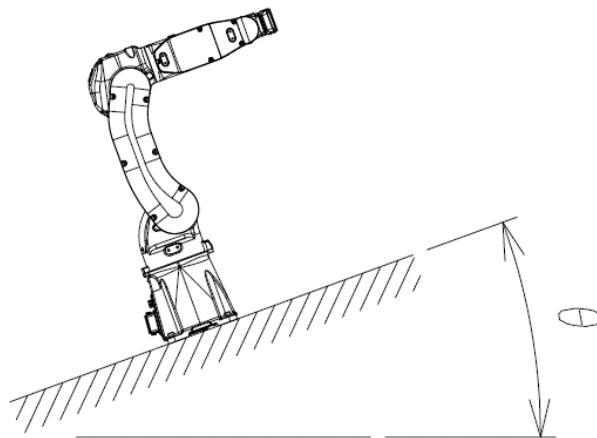
For the wall-mounted way, the S-axis operating range is $\pm 30^\circ$.
(Optional)

For the tilt-mounted way, the operating range of the S-axis varies as shown in the following table.

Table 3-2: Installation Angle for Tilt-Mounted Way and Operating Range of S-Axis

Installation angle (θ)	Operating range of S-axis
$0^\circ \leq \theta \leq 30^\circ$	within $\pm 170^\circ$ (no limit)
$30^\circ < \theta \leq 35^\circ$	within $\pm 60^\circ$
$35^\circ < \theta \leq 45^\circ$	within $\pm 45^\circ$
$45^\circ < \theta$	within $\pm 30^\circ$

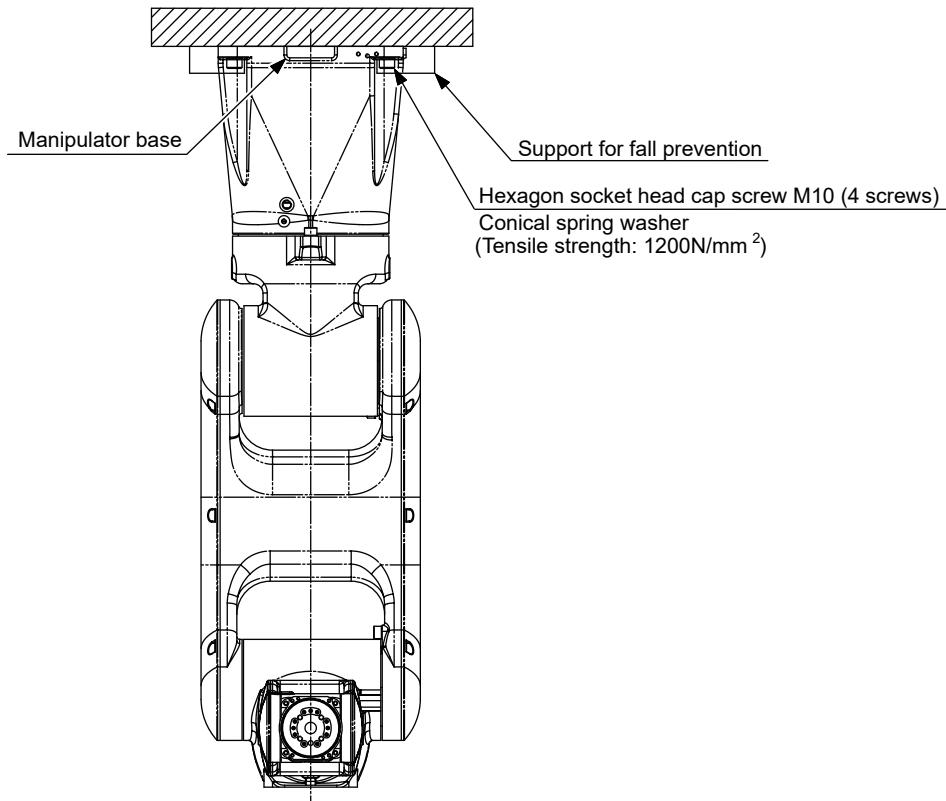
Fig. 3-4: Installation Angle for Tilt-Mounted Way



3.3.2 Precautions to Prevent the Manipulator from Falling

For the wall- or ceiling-mounted ways, take appropriate measures to avoid the manipulator falling in case of emergency. Refer to fig. 3-5 “Precaution against Falling (GP8/AR700)” for details.

Fig. 3-5: Precaution against Falling (GP8/AR700)



If you are using the wall- or ceiling-mounted way, be sure to tell YASKAWA when placing the order.

3.4 Location

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

Table 3-3: Ambient Conditions

Item	Type
	YR-1-06VX8-A00, -B00
	YR-1-06VX7-A00, -B00
Ambient temperature during operation	0°C - +45°C
Humidity	20%RH - 80%RH (non-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 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 due to the resistance of the drive.

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

The MOTOMAN-GP8/AR700, -GP7/AR900 manipulators conform to IP67.

< Definition of IP (protection class) >



- Definition of IP6

IP6□: Protection from the entry of dust.

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

However, 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 100Ω 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.)

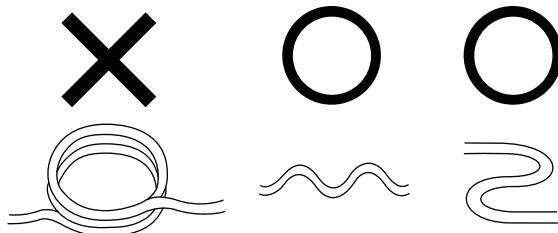
Failure to observe this warning may result in electric shock and/or personal injury.

- 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/YRC1000micro, 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

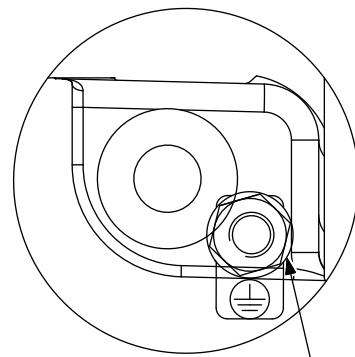
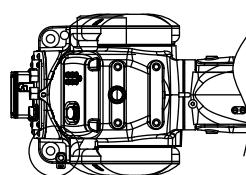
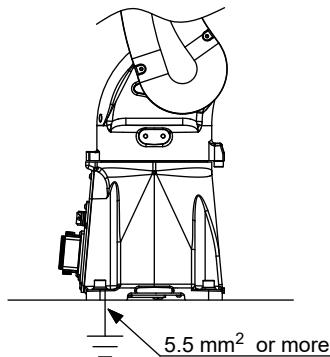
Follow the electrical installation standards and wiring regulations for grounding. A ground wire of 5.5 mm² or more is recommended.

Refer to *fig. 4-1 “Grounding Method (GP8/AR700, GP7/AR900)”* to connect the ground line directly to the manipulator.



- 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 (GP8/AR700, GP7/AR900)



Bolt M8 (for grounding)
(Deliverd with the manipulator)

4.2 Cable Connection

Connect the both edge of the manipulator cable to the manipulator base connectors and to the YRC1000/YRC1000micro. Before connecting the cable to the manipulator, verify the numbers on the connector as shown in *fig. 4-3(a) "Manipulator Cable for YRC1000"* and *fig. 4-3(b) "Manipulator Cable for YRC1000micro"*.

For the connecting position, refer to *fig. 4-4 "Manipulator Cable Connection (Manipulator Side)"* and *fig. 4-5(a) "Manipulator Cable Connection (YRC1000 Side)"* and *fig. 4-5(b) "Manipulator Cable Connection (YRC1000micro Side)"*.

Refer to *table 4-1 "Specifications of Manipulator Cable"* and *fig. 4-6(a) "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/YRC1000micro. Insert the manipulator cable to a fixed depth then the lever rotates about 30 degrees 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 degrees 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

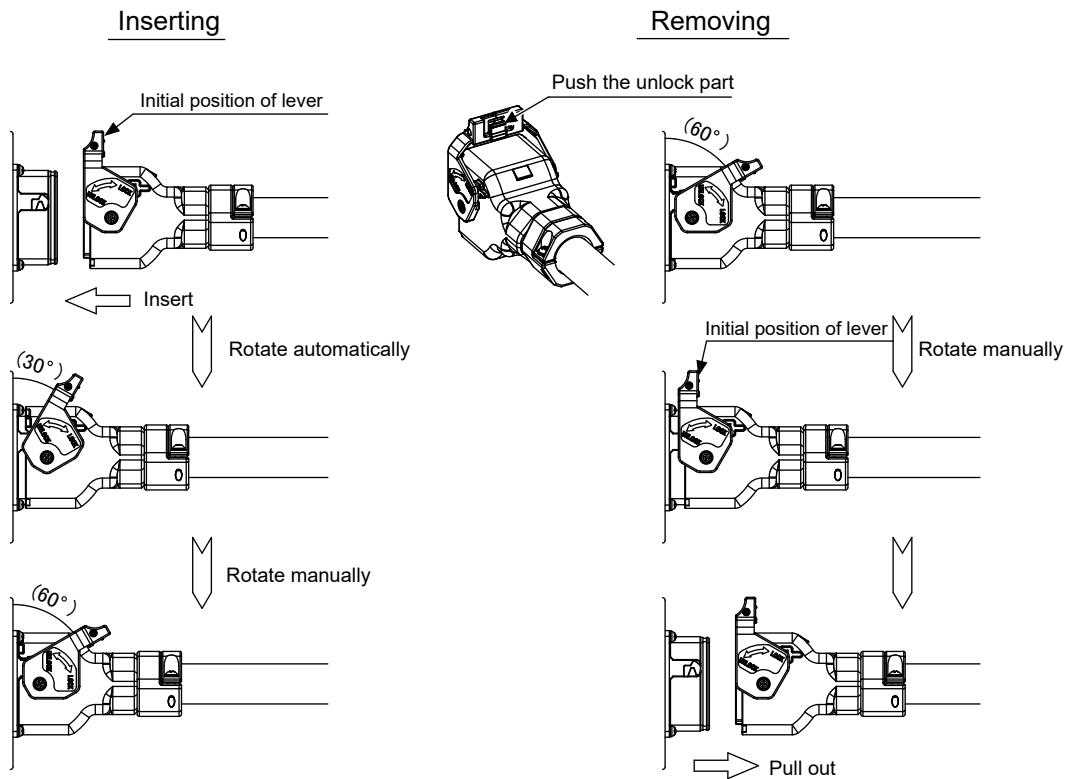


Fig. 4-3(a): Manipulator Cable for YRC1000

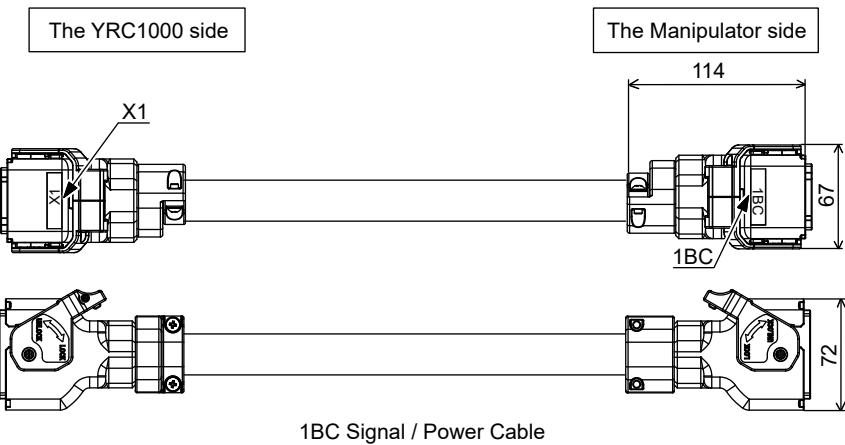
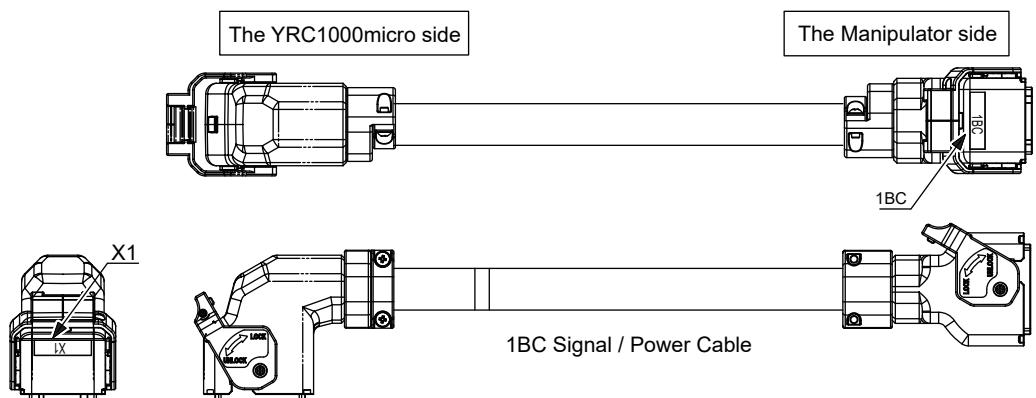


Fig. 4-3(b): Manipulator Cable for YRC1000micro)



4 Wiring
 4.2 Cable Connection

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

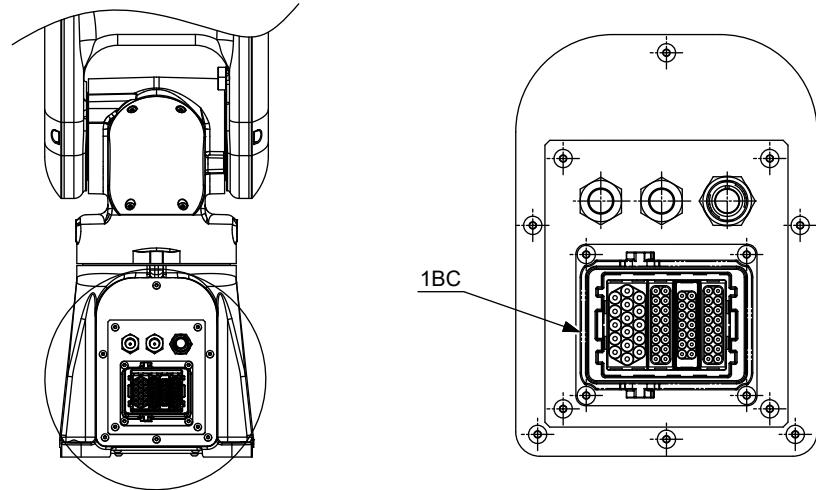


Fig. 4-5(a): Manipulator Cable Connection (YRC1000 Side)

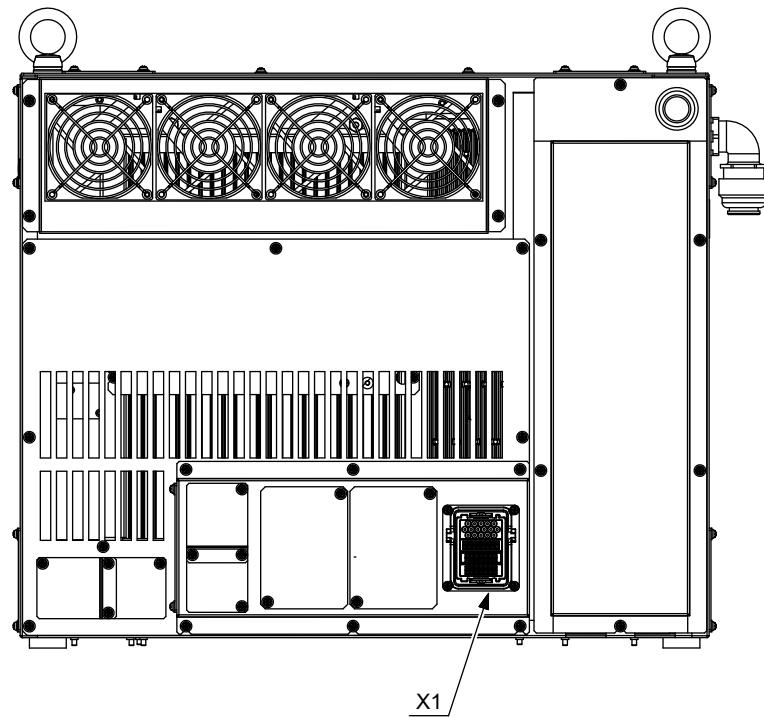
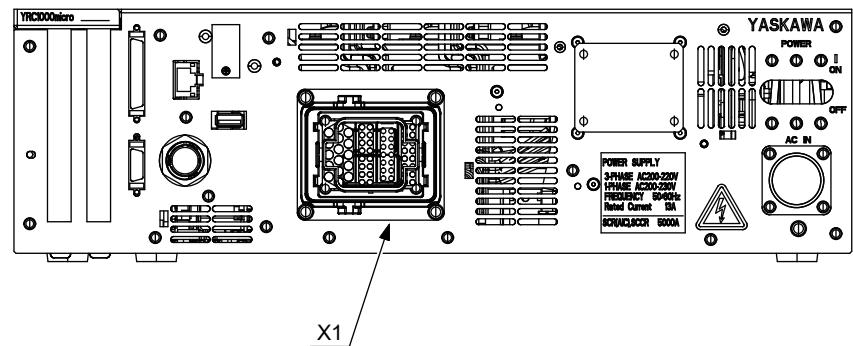


Fig. 4-5(b): Manipulator Cable Connection (YRC1000micro Side)



 4 Wiring
 4.2 Cable Connection

Table 4-1: Specifications of Manipulator Cable

Outside diameter (mm)	Minimum bending radius (mm)		Distance between A and B (mm)
	Fixed part	Moving part	
25.1	90	260 ¹⁾	350

1 The high flexible cable with a 150-mm bending radius is also available as an option.

Fig. 4-6(a): Manipulator Cable Connection (Manipulator Side)

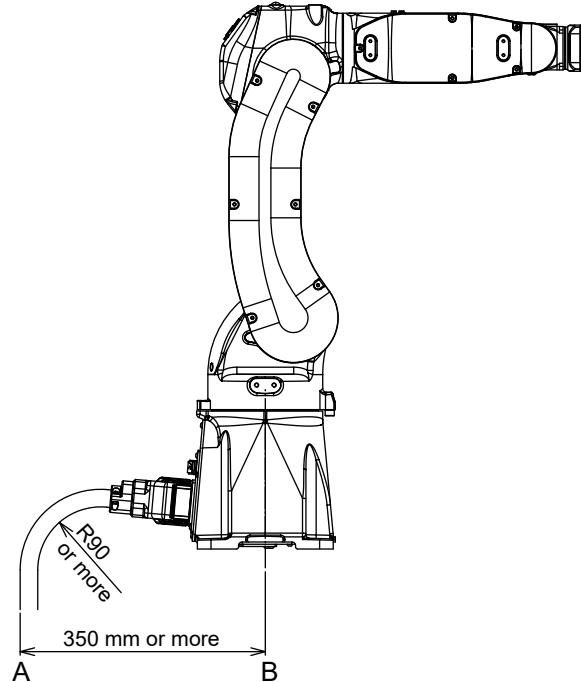
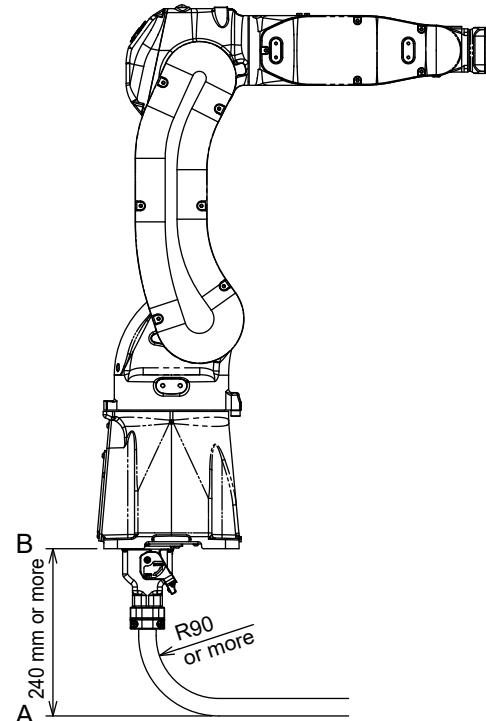


Fig. 4-6(b): Manipulator Cable Connection (Manipulator Side, Manipulator Cable on the Bottom Option)



5 Basic Specifications

5.1 Basic Specifications

Table 5-1: Basic Specifications (GP8/AR700)

Item	Model	MOTOMAN-GP8/AR700
Structure		Vertically articulated
Degree of freedom		6
Payload	Wrist part	8 kg
	U-arm ¹⁾	1 kg
Repeatability ²⁾		0.01 mm
Range of motion	S-axis (turning)	-170° - +170° (On the wall: -30° - +30°)
	L-axis (lower arm)	-65° - +145°
	U-axis (upper arm)	-70° - +190°
	R-axis (wrist roll)	-190° - +190°
	B-axis (wrist pitch/yaw)	-135° - +135°
	T-axis (wrist twist)	-360° - +360°
Maximum speed ³⁾	S-axis	7.94 rad/s, 455° /s
	L-axis	6.72 rad/s, 385° /s
	U-axis	9.07 rad/s, 520° /s
	R-axis	9.59 rad/s, 550° /s
	B-axis	9.59 rad/s, 550° /s
	T-axis	17.45 rad/s, 1000° /s
Allowable moment ⁴⁾	R-axis	17 N·m (1.73 kgf·m)
	B-axis	17 N·m (1.73 kgf·m)
	T-axis	10 N·m (1.02 kgf·m)
Allowable inertia ⁴⁾ (GD ² /4)	R-axis	0.5 kg·m ²
	B-axis	0.5 kg·m ²
	T-axis	0.2 kg·m ²
Approx. mass		35 kg
Protective enclosure		IP67
Clean rating (reference) ⁵⁾		Equivalent to ISO class 5
Mounting method ⁶⁾		Floor-, ceiling-, wall-, tilt-mounted
Power requirement ⁷⁾		1 kVA
Applicable controller ⁸⁾	YRC1000	ERAR-1000-06VX8-□ *□: Depends on the specification.
	YRC1000micro	ERBR-100-06VX8-□ *□: Depends on the specification.
Equivalent continuous A-weighted sound pressure level ⁹⁾		75 dB or less

- The mountable load on the U-arm will vary depending on the load mass of the wrist part. For details, refer to chapter 7.1.1 “Allowable Load”.
- Repeatability conforms to ISO 9283.
- The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
- Refer to chapter 6.1 “Allowable Wrist Load” for details on the allowable moment and the allowable inertia.
- The clean rating is for reference and not guaranteed.
- When wall- or tilt-mounted, the S-axis motion range is limited. For details, refer to chapter 3.3.1 “S-Axis Operating Range”.
- 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.
- The last digit of the type number differs depending on the specification. Refer to “YRC1000 INSTRUCTIONS (RE-CTO-A221)”, “YRC1000micro INSTRUCTIONS (RE-CTO-A222)”, YRC1000 supplementary instructions, and YRC1000micro supplementary instructions.
- The equivalent continuous A-weighted sound pressure level is measured in accordance with ISO 11201 (EN 31201).

<Measurement conditions>

 - The maximum load and speed are used for measurement.
 - 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 (GP7/AR900)

Item	Model	MOTOMAN-GP7/AR900
Structure		Vertically articulated
Degree of freedom		6
Payload	Wrist part	7 kg
	U-arm ¹⁾	1 kg
Repeatability ²⁾		0.01 mm
Range of motion	S-axis (turning)	-170° - +170° (On the wall: -30° - +30°)
	L-axis (lower arm)	-65° - +145°
	U-axis (upper arm)	-70° - +190°
	R-axis (wrist roll)	-190° - +190°
	B-axis (wrist pitch/yaw)	-135° - +135°
	T-axis (wrist twist)	-360° - +360°
Maximum speed ³⁾	S-axis	6.54 rad/s, 375° /s
	L-axis	5.50 rad/s, 315° /s
	U-axis	7.15 rad/s, 410° /s
	R-axis	9.59 rad/s, 550° /s
	B-axis	9.59 rad/s, 550° /s
	T-axis	17.45 rad/s, 1000° /s
Allowable moment ⁴⁾	R-axis	17 N•m (1.73 kgf•m)
	B-axis	17 N•m (1.73 kgf•m)
	T-axis	10 N•m (1.02 kgf•m)
Allowable inertia ⁴⁾ (GD ² /4)	R-axis	0.5 kg•m ²
	B-axis	0.5 kg•m ²
	T-axis	0.2 kg•m ²
Approx. mass		37 kg
Protective enclosure		IP67
Clean rating (reference) ⁵⁾		Equivalent to ISO class 5
Mounting method ⁶⁾		Floor-, ceiling-, wall-, tilt-mounted
Power requirement ⁷⁾		1 kVA
Applicable controller ⁸⁾	YRC1000	ERAR-1000-06VX8-□ *□: Depends on the specification.
	YRC1000micro	ERBR-100-06VX8-□ *□: Depends on the specification.
Equivalent continuous A-weighted sound pressure level ⁹⁾		75 dB or less

1 The mountable load on the U-arm will vary depending on the load mass of the wrist part. For details, refer to *chapter 7.1.1 "Allowable Load"*.

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 clean rating is for reference and not guaranteed.

6 When wall- or tilt-mounted, the S-axis motion range is limited. For details, refer to *chapter 3.3.1 "S-Axis Operating Range"*.

7 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.

8 The last digit of the type number differs depending on the specification. Refer to "YRC1000 INSTRUCTIONS (RE-CTO-A221)", "YRC1000micro INSTRUCTIONS (RE-CTO-A222)", YRC1000 supplementary instructions, and YRC1000micro supplementary instructions.

9 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.

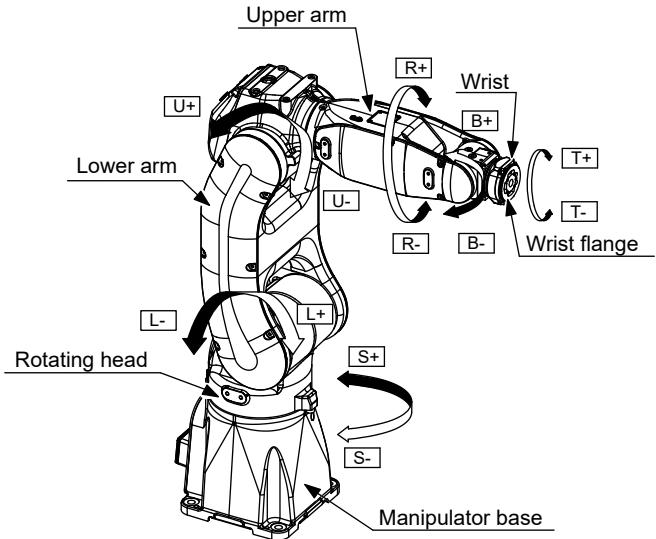
2. Measurement position

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

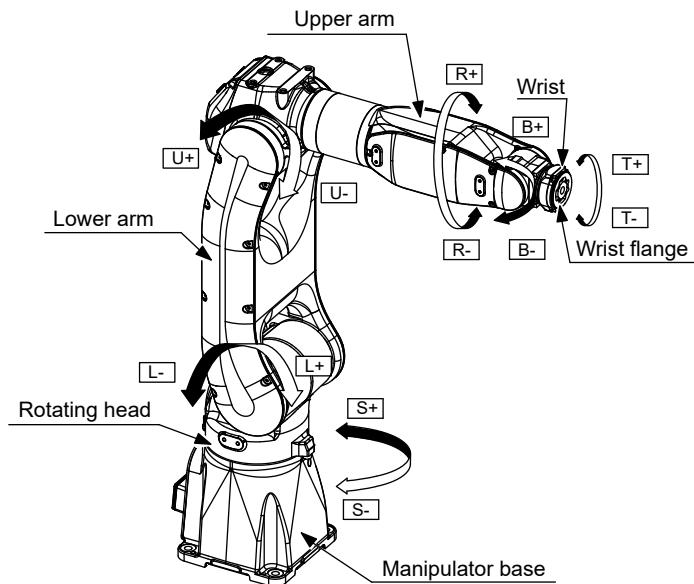
-Distance from the target object to the measuring instrument: 400 mm from P-point maximum envelope

5.2 Part Names and Working Axes

Fig. 5-1: Part Names and Working Axes



GP8/AR700

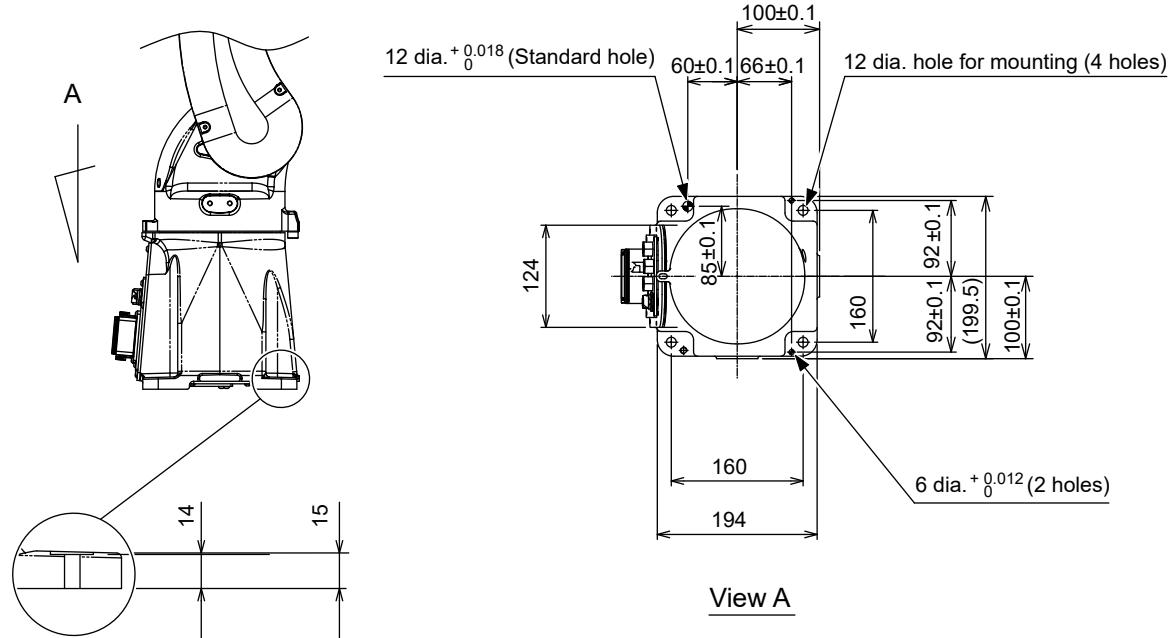


GP7/AR900

5 Basic Specifications
5.3 Baseplate Dimensions

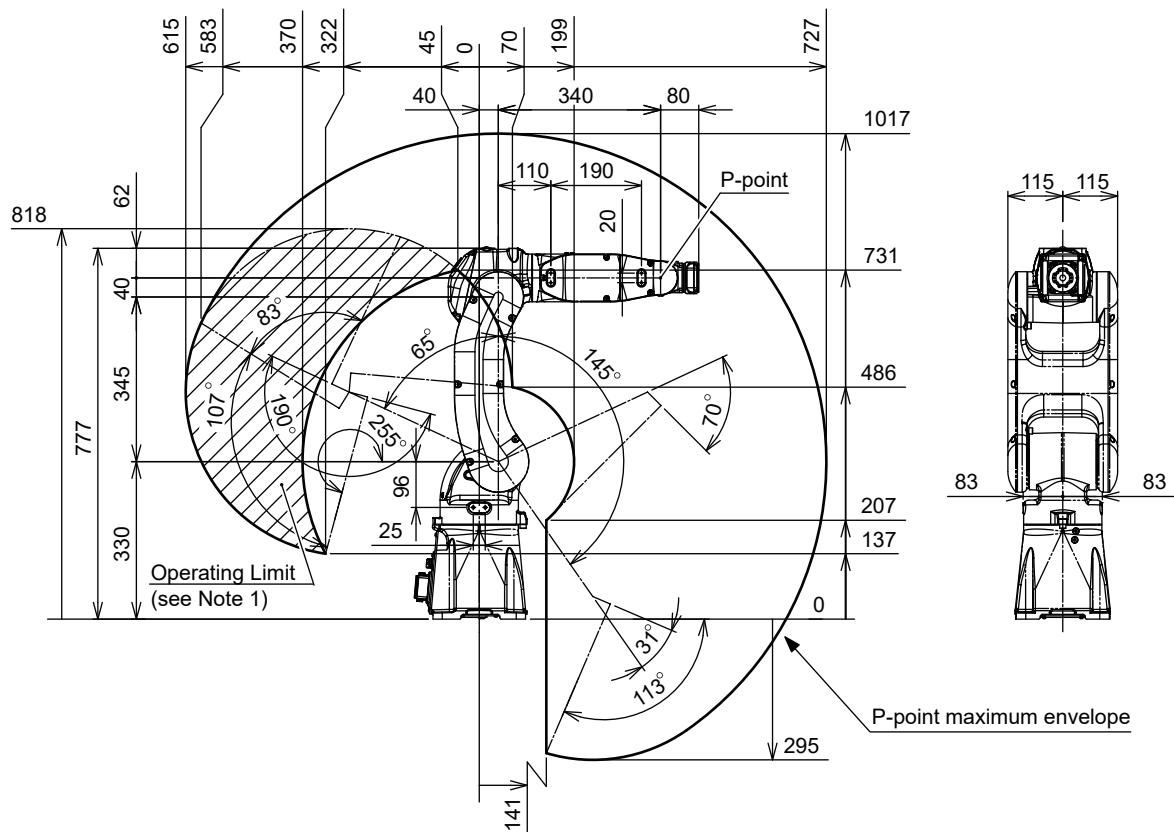
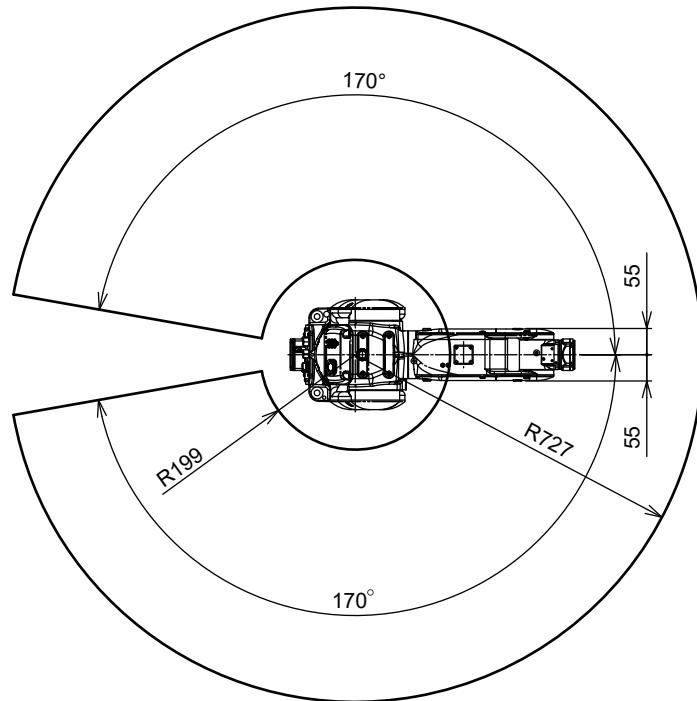
5.3 Baseplate Dimensions

Fig. 5-2: Manipulator Base Dimensions



5.4 Dimensions and P-Point Maximum Envelope

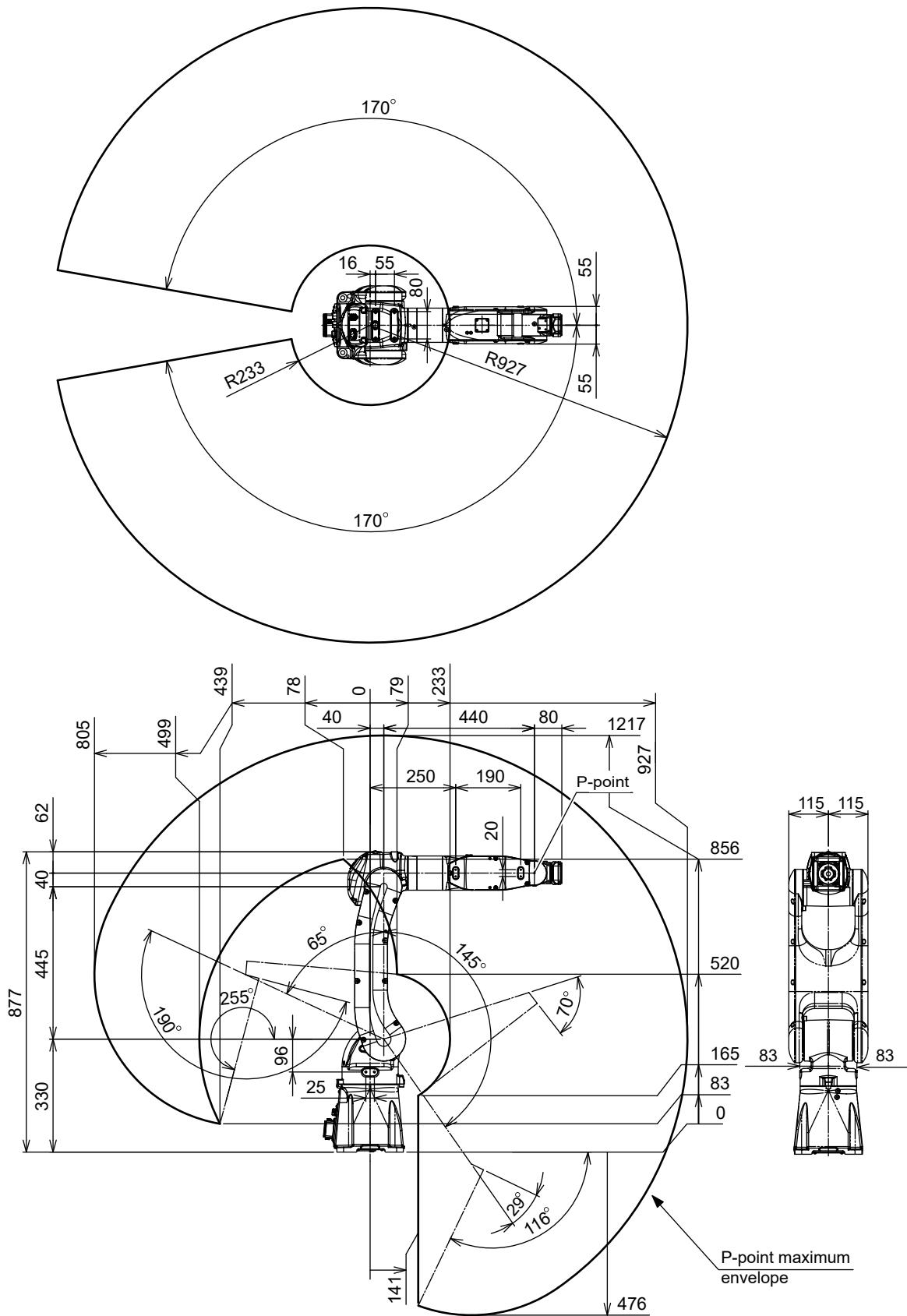
Fig. 5-3(a): GP8/AR700: Dimensions and P-Point Maximum Envelope (in mm)



Note 1: The shaded area in the P-point maximum envelope indicates the area where the P-point cannot reach when the mating connector in the casing cover is used or when air is used or when the optional solenoid valve is used.

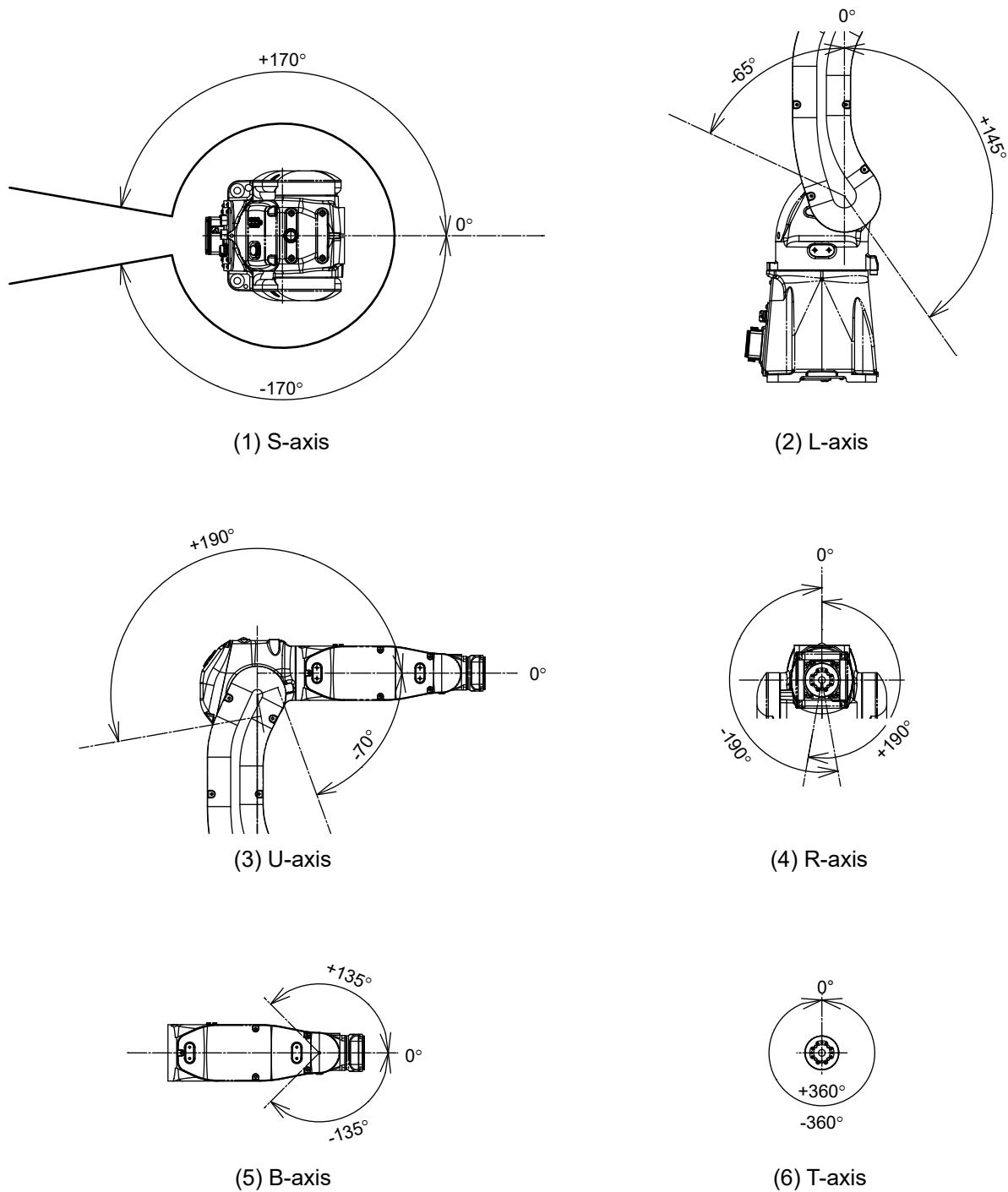
5 Basic Specifications
5.4 Dimensions and P-Point Maximum Envelope

Fig. 5-3(b): GP7/AR900: Dimensions and P-Point Maximum Envelope (in mm)



5 Basic Specifications
5.4 Dimensions and P-Point Maximum Envelope

Fig. 5-4: Home Position and Operating Range of Each Axis



The operating range of the robot can be changed from the standard values by setting the operating range of each axis. To make this robot conform to UL 1740 as a robot system, the functional safety function option must be configured.



For the configuration method, refer to “Axis Range Limit Function” in chapter 4.1 of “YRC1000 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY FUNCTION (HW1483576)” and “YRC1000micro OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY FUNCTION (HW1484544)”.

5	Basic Specifications
5.5	Stopping Distance and Time for S-, L-, and U-Axes

5.5 Stopping Distance and Time for S-, L-, and U-Axes

5.5.1 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 a 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 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.

5.5.2 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

5.5.3 Stopping Distance and Time for Stop Category 0: S-, L- and U-Axes

Measurement Conditions

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

5.5.3.1 Stopping Distance and Time for Stop Category 0: S-, L- and U-Axes (GP8/AR700)

Axis	Stopping distance (deg)	Stopping Time (sec)
S-axis	35.5	0.247
L-axis	30.0	0.347
U-axis	59.9	0.364

5.5.3.2 Stopping Distance and Time for Stop Category 0: S-, L- and U-Axes (GP7/AR900)

Axis	Stopping distance (deg)	Stopping Time (sec)
S-axis	32.7	0.247
L-axis	27.3	0.280
U-axis	42.8	0.298

5.5.4 Stopping Distance and Time for Stop Category 1: S-, L- and U-Axes

5.5.4.1 Extension

Refer to fig. 5-5 "S-Axis Extension", fig. 5-6 "L-Axis Extension" and fig. 5-7 "U-Axis Extension" for each axis arm extension.

Fig. 5-5: S-Axis Extension

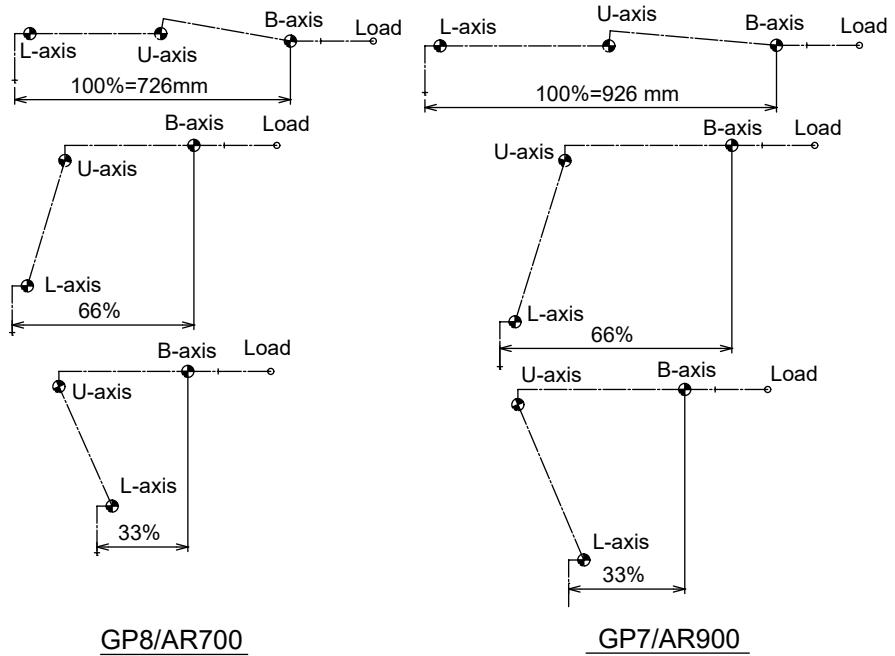
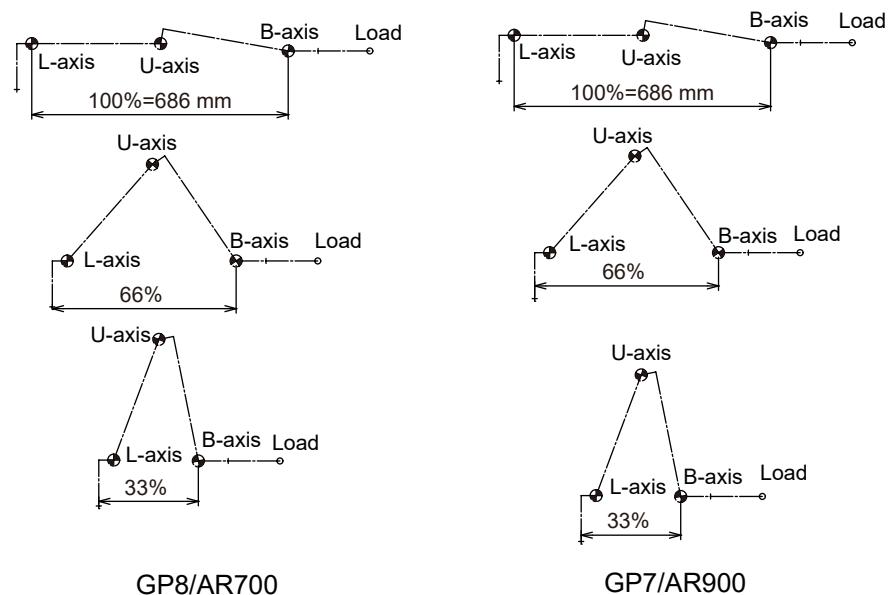


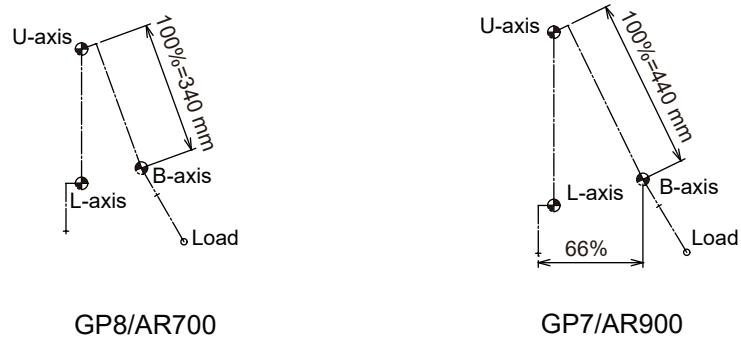
Fig. 5-6: L-Axis Extension

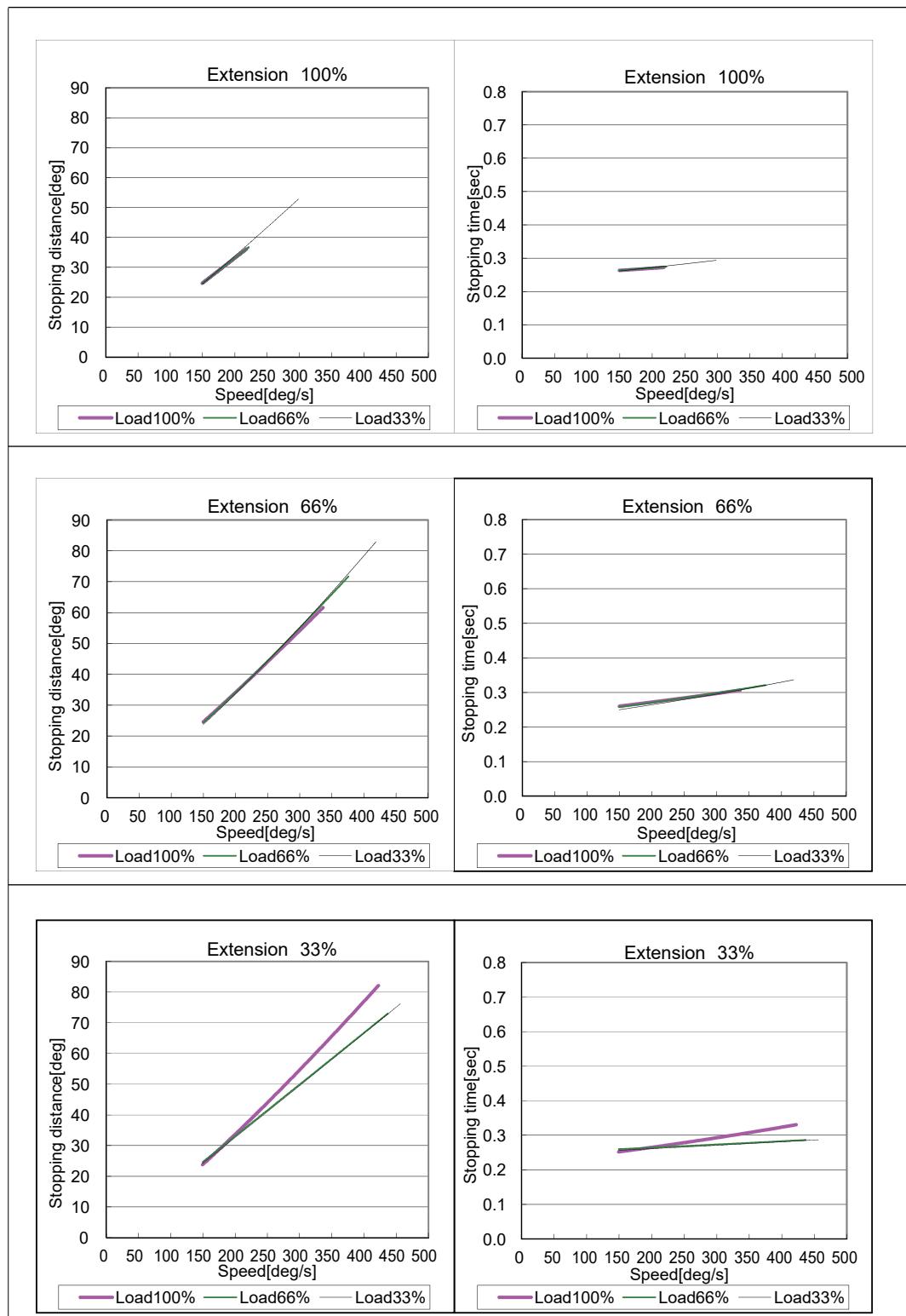


5 Basic Specifications

5.5 Stopping Distance and Time for S-, L-, and U-Axes

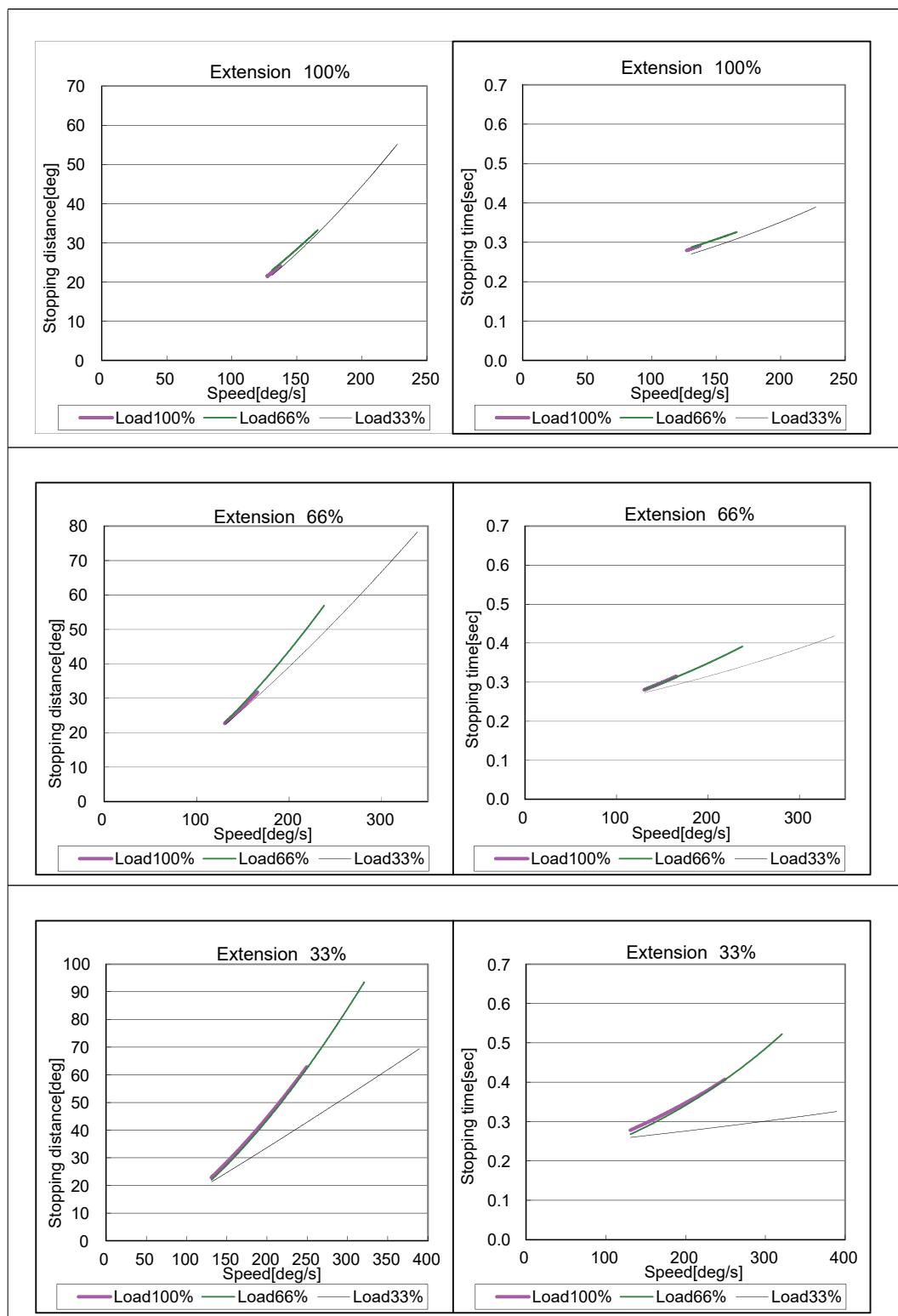
Fig. 5-7: U-Axis Extension

GP8/AR700GP7/AR900

5 Basic Specifications**5.5 Stopping Distance and Time for S-, L-, and U-Axes****5.5.4.2 Stopping Distance and Time for Stop Category 1: S-Axis (GP8/AR700)**

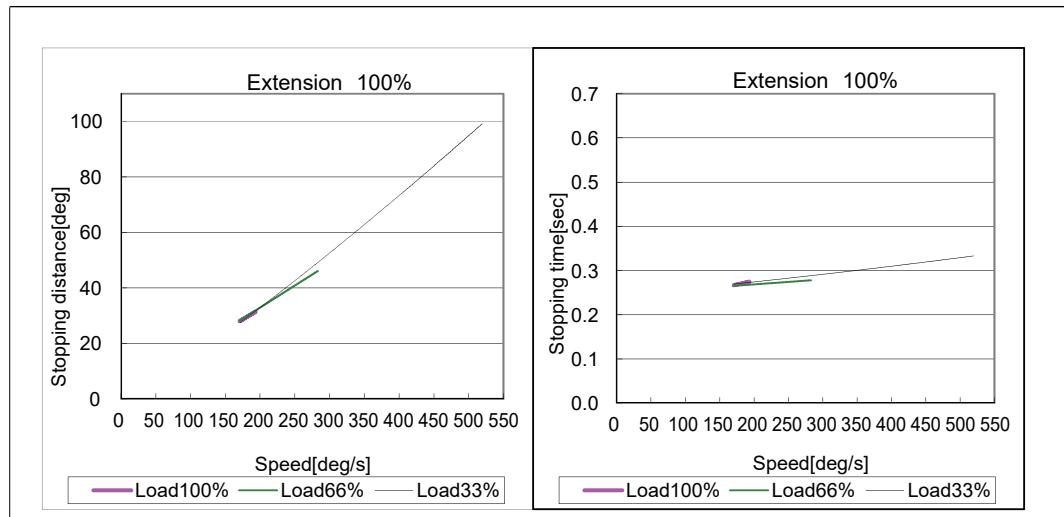
5 Basic Specifications
 5.5 Stopping Distance and Time for S-, L-, and U-Axes

5.5.4.3 Stopping Distance and Time for Stop Category 1: L-Axis (GP8/AR700)



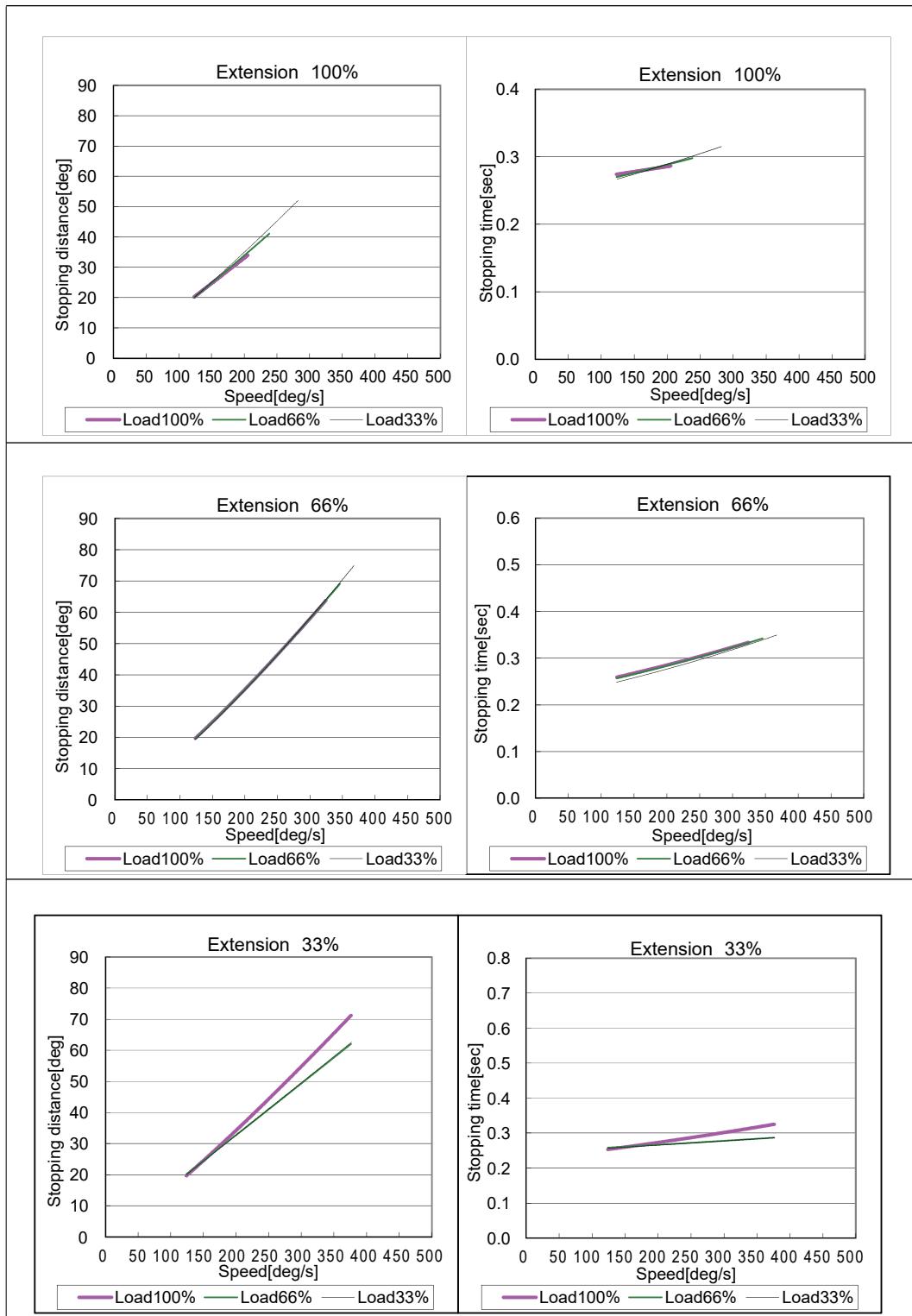
5 Basic Specifications
5.5 Stopping Distance and Time for S-, L-, and U-Axes

5.5.4.4 Stopping Distance and Time for Stop Category 1: U-Axis (GP8/AR700)



5 Basic Specifications
5.5 Stopping Distance and Time for S-, L-, and U-Axes

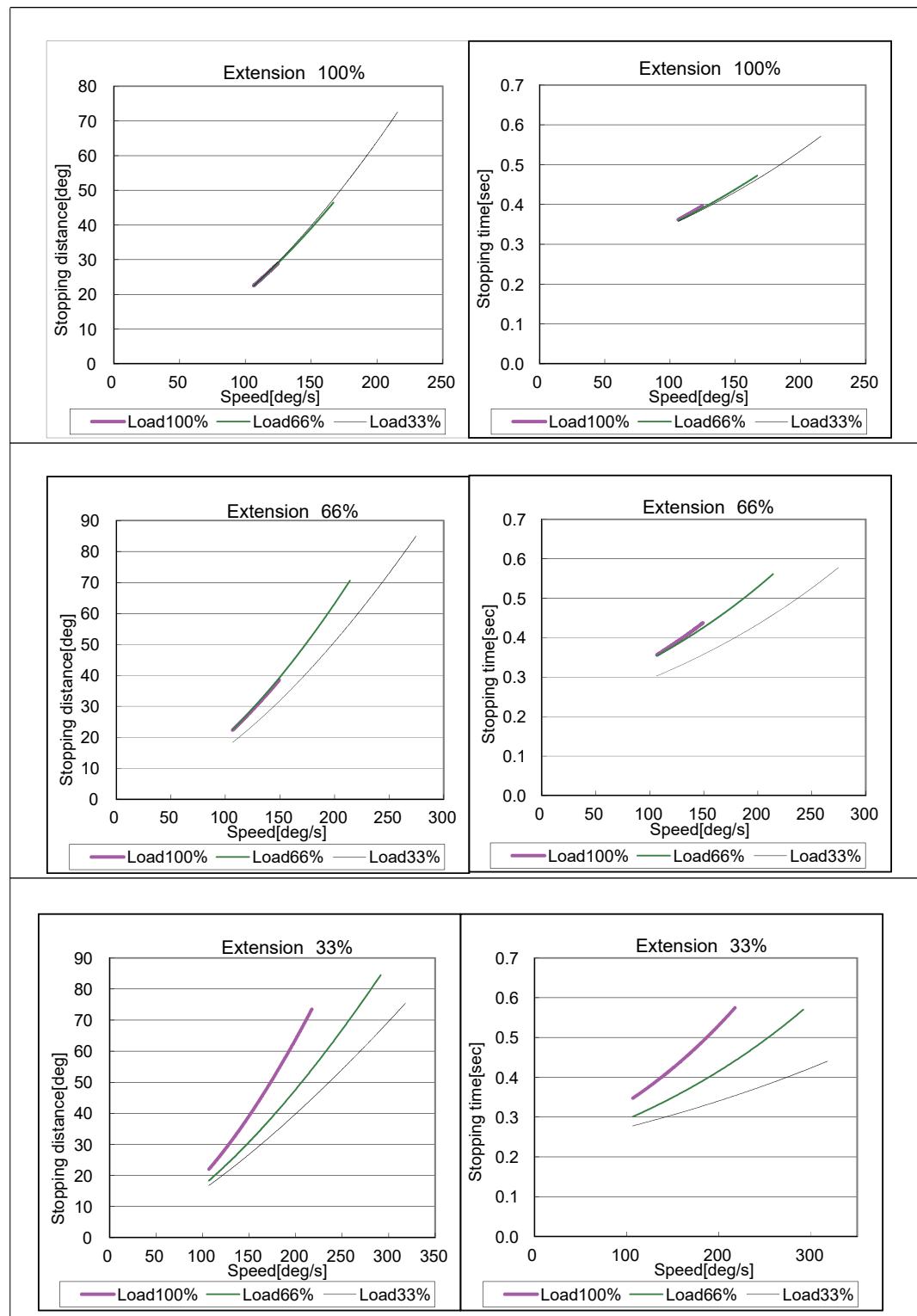
5.5.4.5 Stopping Distance and Time for Stop Category 1: S-Axis (GP7/AR900)



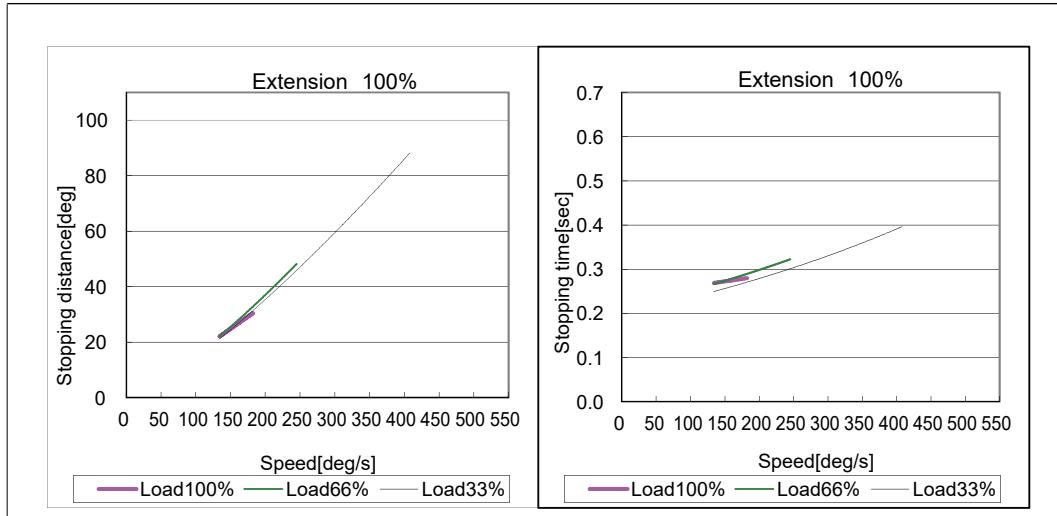
5 Basic Specifications

5.5 Stopping Distance and Time for S-, L-, and U-Axes

5.5.4.6 Stopping Distance and Time for Stop Category 1: L-Axis (GP7/AR900)



5 Basic Specifications**5.5 Stopping Distance and Time for S-, L-, and U-Axes**

5.5.4.7 Stopping Distance and Time for Stop Category 1: U-Axis (GP7/AR900)

5.6 Alterable Operating Range of S-axis

The operating range of the S-axis can be altered in accordance with the operating conditions as shown in *table 5-3 “S-Axis Operating Range (GP8/AR700, GP7/AR900)”*. If alteration is necessary, contact your YASKAWA representative in advance.

Table 5-3: S-Axis Operating Range (GP8/AR700, GP7/AR900)

Item	Specifications
S-Axis Operating Range	-170° - +170°(standard) -150° - +150° -135° - +135° -120° - +120° -105° - +105° -90° - +90° -75° - +75° -60° - +60° -45° - +45° -30° - +30° -15° - +15°

5.6.1 Components for Altering Operating Range

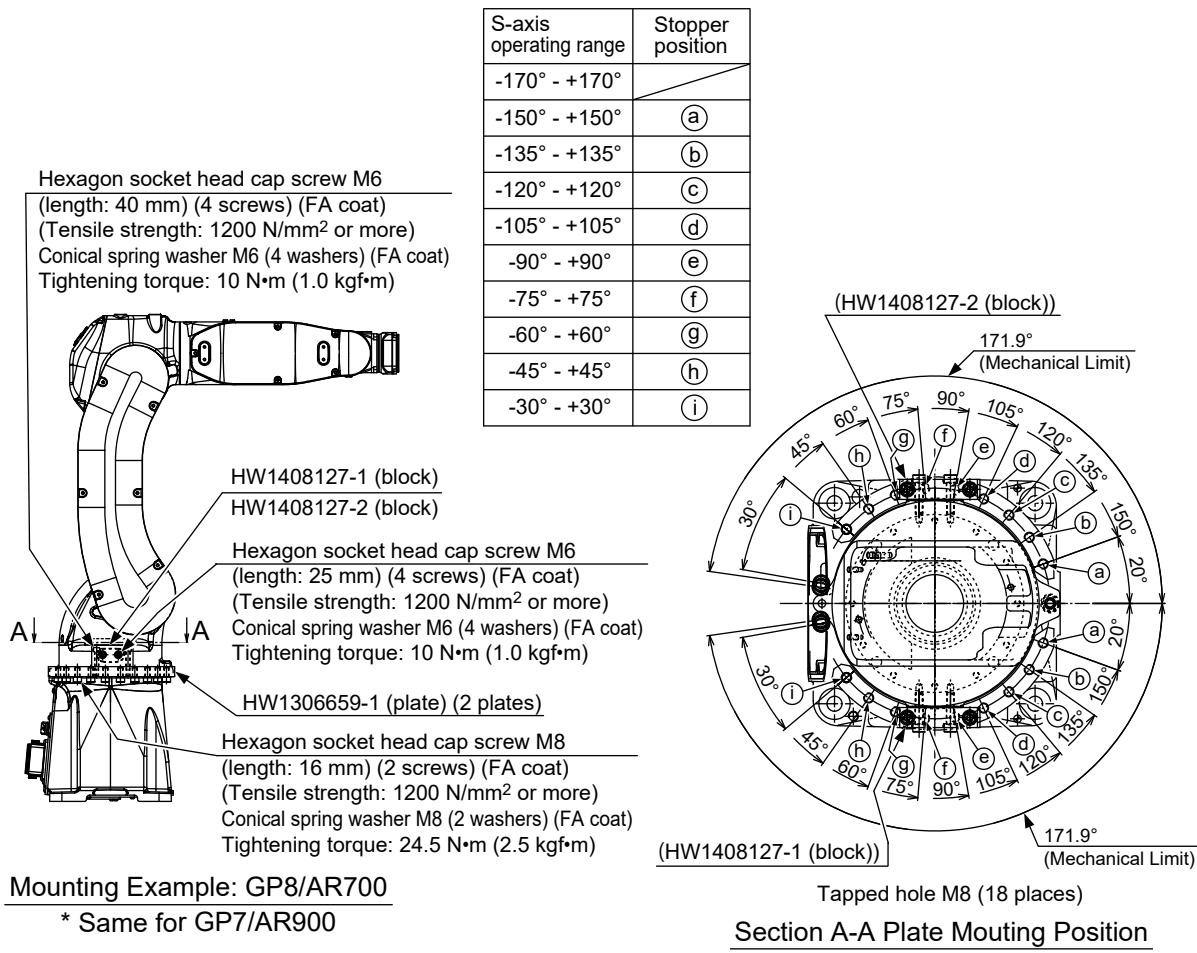
Prepare the components listed in *fig. 5-8 “The Components of the S-Axis Stopper and Stopper Mounting Position.”*, when modifying the angle of S-axis.

- (1) Plate (HW1306659-1) (2 plates)
- (2) Block (HW1408127-1) (1 block)
- (3) Block (HW1408127-2) (1 block)
- (4) Hexagon socket head cap screw M6
(length: 40 mm) (4 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)
- (5) Hexagon socket head cap screw M6
(length: 25 mm) (4 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)
- (6) Conical spring washer M6 (8 washers) (FA coat)
- (7) Hexagon socket head cap screw M8
(length: 16 mm) (2 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)
- (8) Conical spring washer M8 (2 washers) (FA coat)

5 Basic Specifications

5.6 Alterable Operating Range of S-axis

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



5.6.2 Notes on the Mechanical Stopper Installation of S-Axis

When mounting the S-axis mechanical stopper, as shown in *fig. 5-8 “The Components of the S-Axis Stopper and Stopper Mounting Position.”*, mount the HW1306659-1 (2 plates) and the HW1408127-1, HW1408127-2 (blocks) on the S-head (2 places) by using the screws specified in the *fig. 5-8*.

If the operating angle is $\pm 170^\circ$ (standard), the mechanical stopper is not necessary.

The mechanical stopper can be set at 15° pitch intervals from $\pm 30^\circ$ to $\pm 150^\circ$ range. For the settable angles, refer to *table 5-4 “The Settable Angle for S-Axis Stopper”*.



1. Use the specified bolts when mounting the S-axis mechanical stopper.
2. Turn OFF the electric power supply before mounting.

5.6.3 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)” /“YRC1000micro GENERAL OPERATOR’S MANUAL (RE-CSO-A058)”. With programming pendant, input the numeric value as shown in the following table to modify the parameter.

Degree		$\pm 30^\circ$	$\pm 45^\circ$	$\pm 60^\circ$	$\pm 75^\circ$	$\pm 90^\circ$
Pulse	GP8/ AR700	± 30720	± 46080	± 61440	± 76800	± 92160
	GP7/ AR900	± 37236	± 55855	± 74473	± 93091	± 111709

Degree		$\pm 105^\circ$	$\pm 120^\circ$	$\pm 135^\circ$	$\pm 150^\circ$	$\pm 170^\circ$
Pulse	GP8/ AR700	± 107520	± 122880	± 138240	± 153600	± 174080
	GP7/ AR900	± 130327	± 148945	± 167564	± 186182	± 211007



When modifying the range of motion for machinery, adjust both the pulse limitation and the angle of the S-axis mechanical stopper.

 5 Basic Specifications
 5.6 Alterable Operating Range of S-axis

The settable angles for S-axis stopper are shown in *table 5-4 "The Settable Angle for S-Axis Stopper"*.

Table 5-4: The Settable Angle for S-Axis Stopper

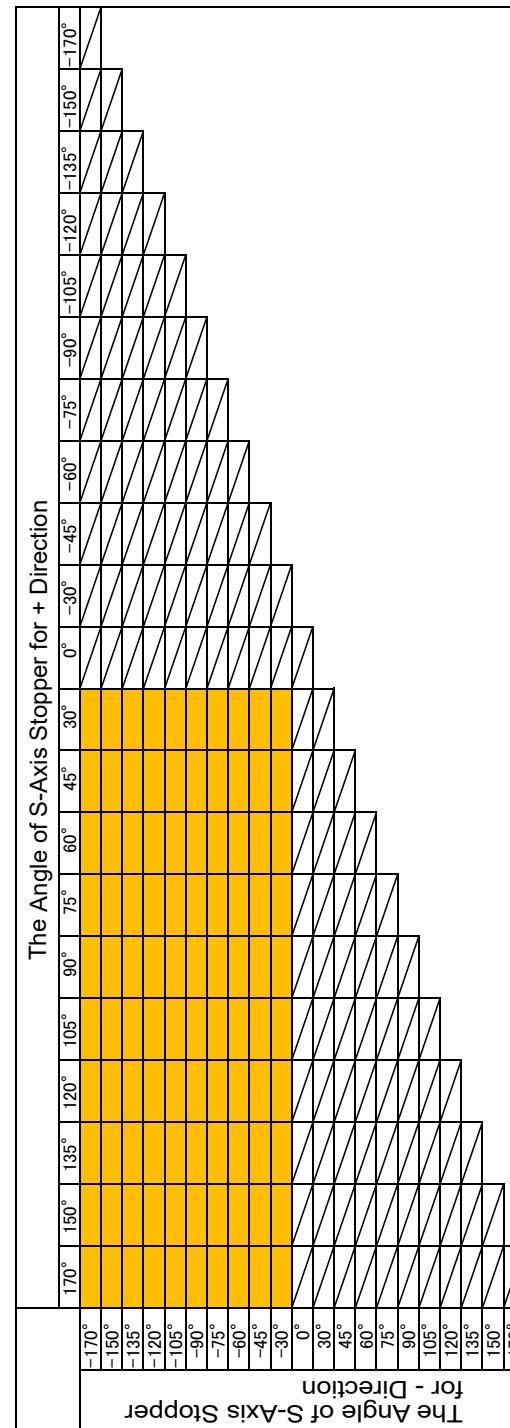


Table 5-4 "The Settable Angle for S-Axis Stopper" indicates the angle range which allows S-axis to be set for + direction and - direction angles.
(Ex. -150° to +150° is settable, however 0° to +135° is not settable)



5.7 Alterable Operating Range of L-axis

The operating range of the L-axis can be altered in accordance with the operating conditions as shown in *table 5-5 “L-Axis Operating Range (GP8/AR700, GP7/AR900)”*.

If alteration is necessary, contact your YASKAWA representative in advance.

Table 5-5: L-Axis Operating Range (GP8/AR700, GP7/AR900)

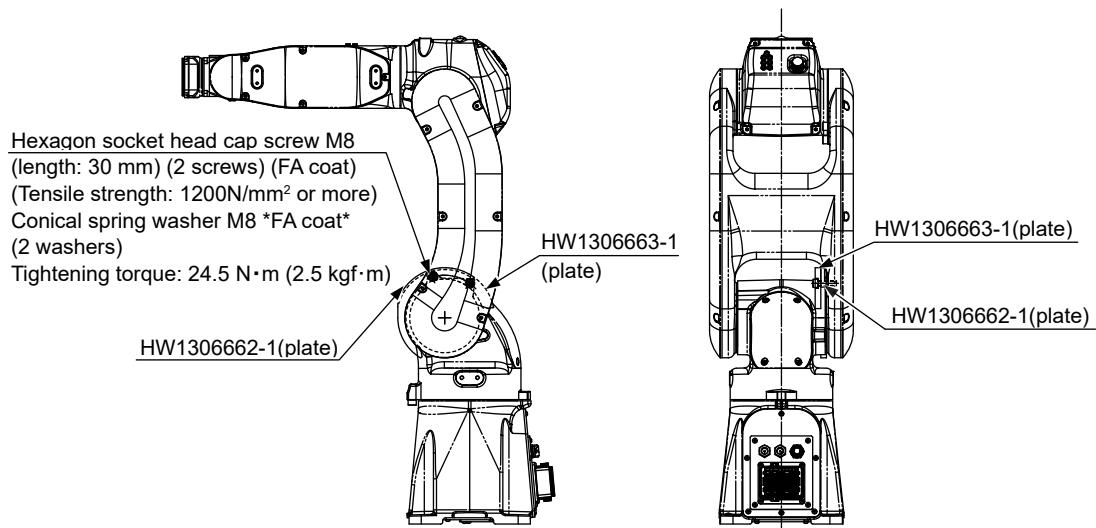
Item	Specifications
L-axis operating range	- 65° - + 145°(standard) - 30° - + 90°

5.7.1 Components for Altering Operating Range

Prepare the components listed in *fig. 5-9 “Components of the L-Axis Stopper and Stopper Mounting Position”*, when modifying the angle of L-axis.

- (1) Plate (HW1306662-1) (1 plate)
- (2) Plate (HW1306663-1) (1 plate)
- (3) Hexagon socket head cap screw M8
(length: 30 mm) (2 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)
- (4) Conical spring washer M8 (2 washers) (FA coat)

Fig. 5-9: Components of the L-Axis Stopper and Stopper Mounting Position



 5 Basic Specifications
 5.7 Alterable Operating Range of L-axis

5.7.2 Notes on the Mechanical Stopper Installation of L-Axis

When mounting the L-axis mechanical stopper, as shown in *fig. 5-9 “Components of the L-Axis Stopper and Stopper Mounting Position”*, mount the HW1306662-1 and HW1306663-1 (plates) on the L-arm by using the screws specified in the *fig. 5-9*.

If the operating angle is -65° to +145° (standard), the mechanical stopper is not necessary.

The mechanical stopper can be set from -30° to +90° range. For the settable angles, refer to *table 5-6 “The Settable Angle for L-Axis Stopper”*.



1. Use the specified bolts when mounting the L-axis mechanical stopper.
2. Turn OFF the electric power supply before mounting.

5.7.3 Adjustment to the Pulse Limitation of L-Axis

For altering the range of motion of L-axis, refer to chapter 6.13 “Softlimit Setting Function” in “YRC1000 GENERAL OPERATOR’S MANUAL (RE-CSO-A051)” /“YRC1000micro GENERAL OPERATOR’S MANUAL (RE-CSO-A058)”. With programming pendant, input the numeric value as shown in the following table to modify the parameter.

Degree		-65°	-30°	+90°	+145°
Pulse	GP8/AR700	-78886	-36408	+109227	+175977
	GP7/AR900	-98608	-45511	+136533	+219971



When modifying the range of motion for machinery, adjust both the pulse limitation and the angle of the L-axis mechanical stopper.

 5 Basic Specifications
 5.7 Alterable Operating Range of L-axis

The settable angles for the L-axis stopper are shown in *table 5-6 “The Settable Angle for L-Axis Stopper”*.

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

The Angle of L-Axis Stopper for + Direction	
L-Axis Stopper for - Direction	The Angle of L-Axis Stopper for + Direction
145°	90°
-65°	-30°
-65°	-65°
-30°	
90°	
145°	



"Table 5-6 The Settable Angle for L-Axis Stopper" indicates the angle range which allows L-axis to be set for + direction and - direction angles.
 (-65° to +145° (standard) or -30° to +90° is settable.)

5	Basic Specifications
5.8	Alterable Operating Range of U-axis

5.8 Alterable Operating Range of U-axis

The operating range of the U-axis can be altered in accordance with the operating conditions as shown in *table 5-7 “U-Axis Operating Range (GP8/AR700, GP7/AR900)”*.

If alteration is necessary, contact your YASKAWA representative in advance.

Table 5-7: U-Axis Operating Range (GP8/AR700, GP7/AR900)

Item	Specifications
U-axis operating range	<ul style="list-style-type: none"> - 70° - + 190°(standard) - 35° - + 140° - 15° - + 140° - 35° - + 120° - 15° - + 120° - 35° - + 100° - 15° - + 100° - 35° - + 80° - 15° - + 80°

5.8.1 Components for Altering Operating Range

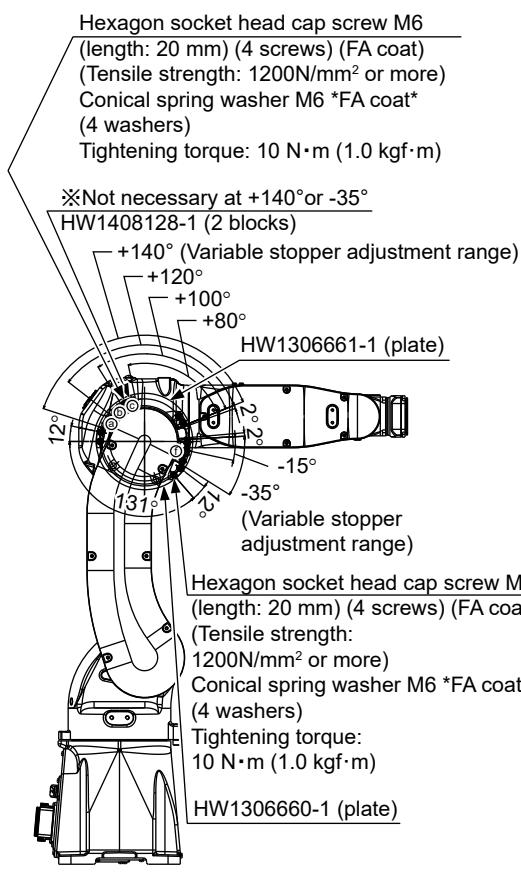
Prepare the components listed in *fig. 5-10 “The Components of the U-Axis Stopper and Stopper Mounting Position”*, when modifying the angle of the U-axis.

- (1) Plate (HW1306660-1) (1 plate)
- (2) Plate (HW1306661-1) (1 plate)
- (3) Block (HW1408128-1) (2 blocks)
- (4) Hexagon socket head cap screw M6
(length: 20 mm) (8 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)
- (5) Conical spring washer M6 (8 washers) (FA coat)
- (6) Low head hexagon socket head cap screw M8
(length: 20 mm) (2 screws) (FA coat)
(Tensile strength: 1200N/mm² or more)

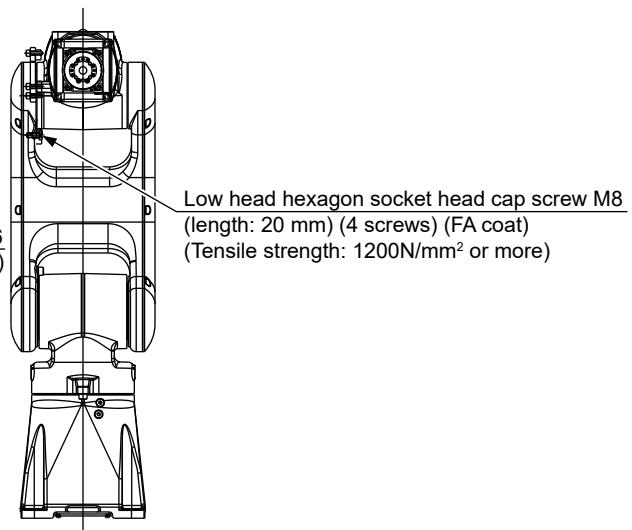
5 Basic Specifications

5.8 Alterable Operating Range of U-axis

Fig. 5-10: The Components of the U-Axis Stopper and Stopper Mounting Position



Item	Stopper position of + direction	Stopper position of - direction	U-axis operating angle
-A	-	-	-35°+140°
-B	(f)	-	-15°+140°
-C	(a)	-	-35°+120°
-D	(f)	-	-15°+120°
-E	-	-	-35°+100°
-F	(f)	-	-15°+100°
-G	(c)	-	-35°+80°
-H	(f)	-	-15°+80°



5.8.2 Notes on the Mechanical Stopper Installation of U-Axis

When mounting the U-axis mechanical stopper, as shown in *fig. 5-10 “The Components of the U-Axis Stopper and Stopper Mounting Position”*, mount the HW1306660-1, HW1306661-1 (plates) and the HW1408128-1 (2 blocks) on the L-arm by using the screws specified in the *fig. 5-10*.

If the operating angle is -70° to +190° (standard), the mechanical stopper is not necessary.

The mechanical stopper can be set at 20° pitch intervals from 80° to 140° (+ direction) or from 15° to 35° (- direction) range. For the settable angles, refer to *table 5-8 “The Settable Angle for U-Axis Stopper”*.



1. Use the specified bolts when mounting the U-axis mechanical stopper.
2. Turn OFF the electric power supply before mounting.

5.8.3 Adjustment to the Pulse Limitation of U-Axis

For altering the range of motion of U-axis, refer to chapter 6.13 “Softlimit Setting Function” in “YRC1000 GENERAL OPERATOR’S MANUAL (RE-CSO-A051)” /“YRC1000micro GENERAL OPERATOR’S MANUAL (RE-CSO-A058)”. With programming pendant, input the numeric value as shown in the following table to modify the parameter.

Degree		-70°	-35°	-15°	+80°	+100°
Pulse	GP8/AR700	-63716	-31858	-13653	+72818	+91022
	GP7/AR900	-79645	-39822	-17066	+91022	+113777

Degree		+120°	+140°	+190°
Pulse	GP8/AR700	+109227	+127431	+172943
	GP7/AR900	+136533	+159289	+216178



When modifying the range of motion for machinery, adjust both the pulse limitation and the angle of the U-axis mechanical stopper.

5 Basic Specifications

5.8 Alterable Operating Range of U-axis

The settable angles for L-axis stopper are shown in *table 5-8 “The Settable Angle for U-Axis Stopper”*.

Table 5-8: The Settable Angle for U-Axis Stopper

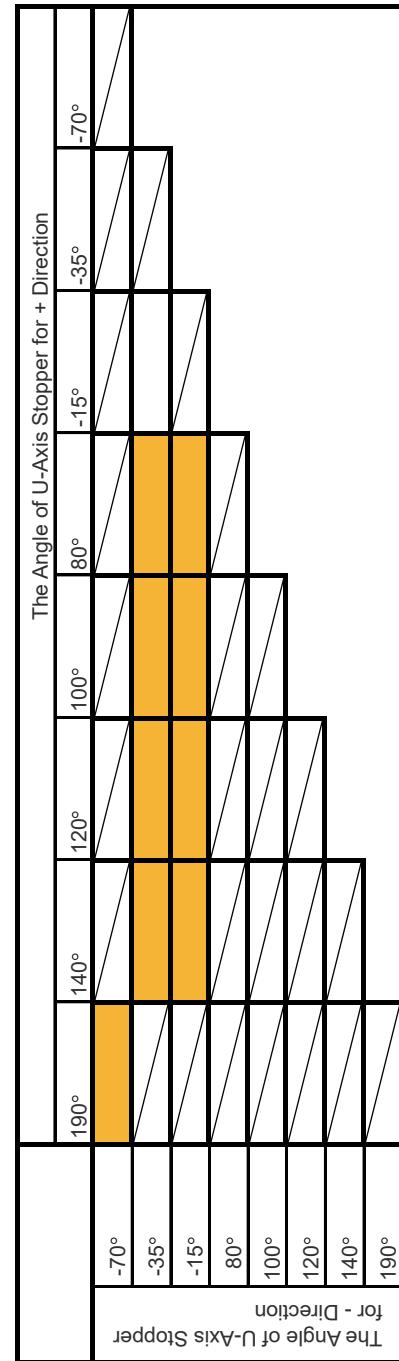


Table 5-8 “The Settable Angle for U-Axis Stopper” indicates the angle range which allows U-axis to be set for + direction and - direction angles.
(Ex. -35° to +140° is settable, however +80° to +140° is not settable)



	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 is 8 kg maximum for GP8/AR700 and 7 kg maximum for GP7/AR900. However, the requirements listed in *table 6-1 “Allowable Wrist Load (GP8/AR700, GP7/AR900)”* must be satisfied regarding the moment and the inertia.

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

Table 6-1: Allowable Wrist Load (GP8/AR700, GP7/AR900)

Axis	Allowable moment N·m (kgf·m) ¹⁾	Allowable inertia ($GD^2/4$) kg·m ²
R-Axis	17 (1.73)	0.5
B-Axis	17 (1.73)	0.5
T-Axis	10 (1.02)	0.2

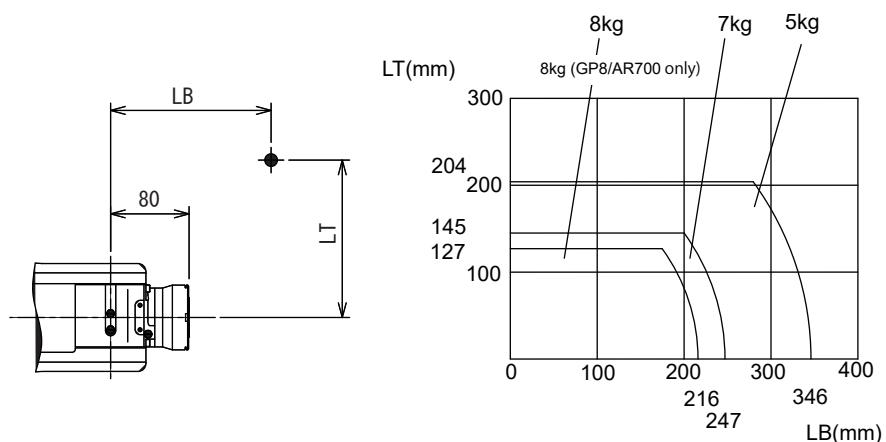
1 (): Gravitational unit

When the volume of the load is relatively small, refer to the moment arm rating (L_B , L_T) shown in *fig. 6-1 “Moment Arm Rating”*.

Each value of the allowable inertia above is calculated assuming that the moment load is at the maximum. Thus, in the case 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)"/ “YRC1000micro INSTRUCTIONS (RE-CTO-A222)”.

Fig. 6-1: Moment Arm Rating



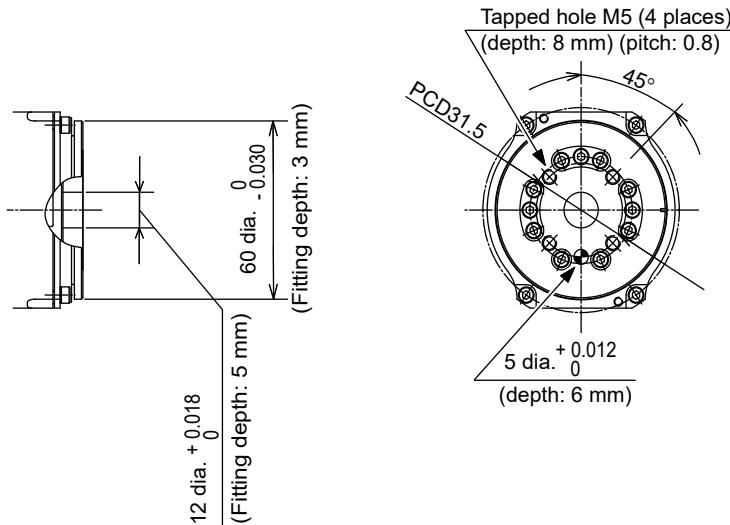
 6 Allowable Load for Wrist Axis and Wrist Flange
 6.2 Wrist Flange

6.2 Wrist Flange

The wrist flange dimensions are shown in *fig. 6-2 “Wrist Flange (GP8/AR700, GP7/AR900)”*.

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

Fig. 6-2: Wrist Flange (GP8/AR700, GP7/AR900)


NOTE

- Wash off anti-corrosive paint (yellow) on the wrist flange surface with thinner before mounting the tools.
- During initial operations, the lubricant may seep from the lip part of the oil seal. Wipe off the seeped lubricant with a cloth before use.

7 System Application

7.1 Peripheral Equipment Mounts



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.

The peripheral equipment mounts are provided on the U-axis (upper arm) as shown in *fig. 7-1 “Installing Peripheral Equipment”* for easier installation of the user's system applications. The following conditions shall be observed to attach or install peripheral equipment.

7.1.1 Allowable Load

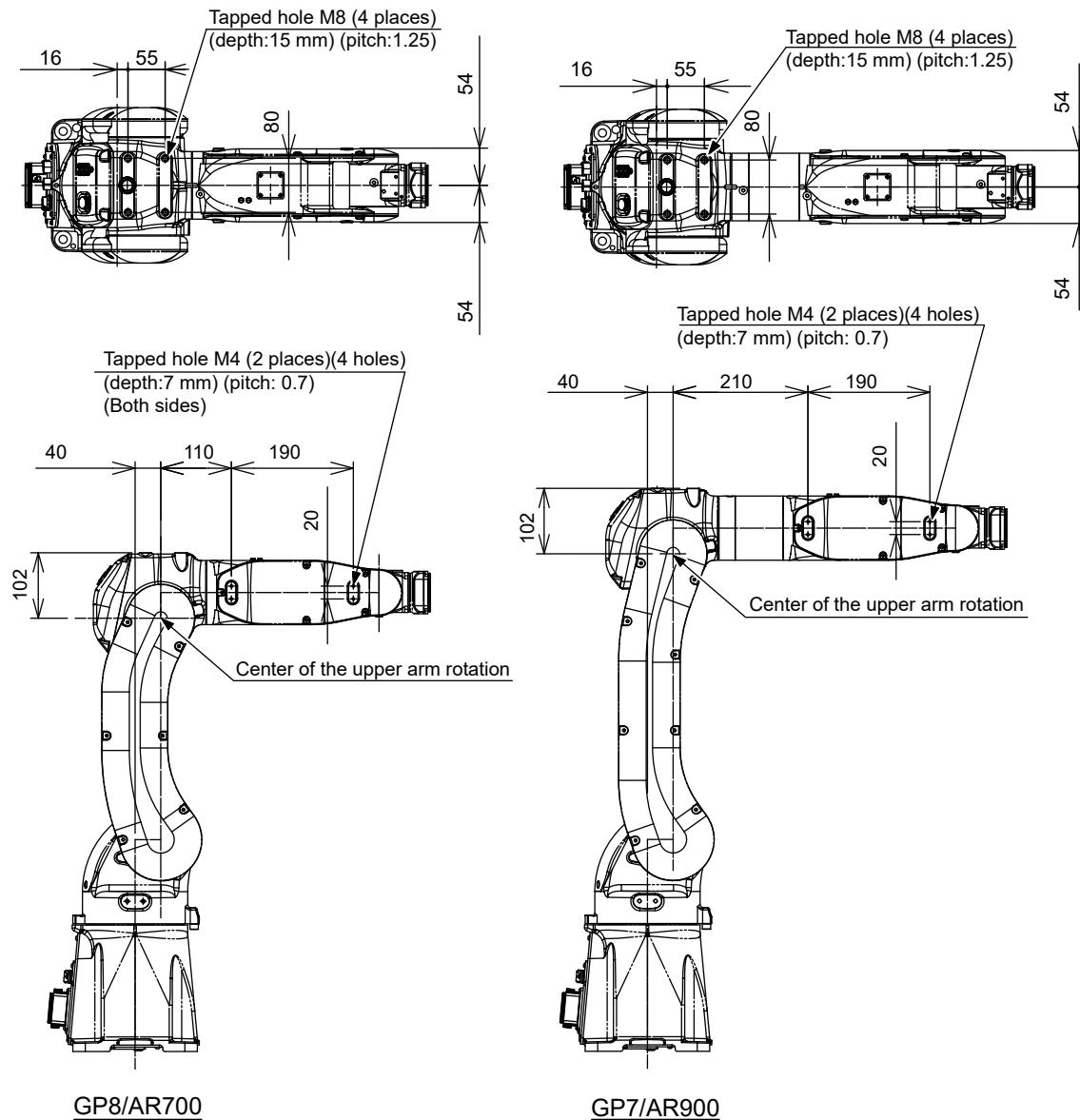
The allowable load on the U-Axis are maximum of 9 kg for the GP8/AR700 and 8kg for the GP7/AR900, including the wrist load. For instance, when the mass installed in the wrist point is 8 kg for the GP8/AR700, the mass which can be installed on the upper arm is 1 kg.

When a load is applied on the upper arm or the rotary head, the load setting must be performed. For setting procedures, refer to chapter 8.4 ARM Control in “YRC1000 INSTRUCTIONS (RE-CTO-A221) / “YRC1000micro INSTRUCTIONS (RE-CTO-A222) ”.

7.1.2 Installation Position

The limitation on where to install the peripheral equipment is shown in fig. 7-1 "Installing Peripheral Equipment".

Fig. 7-1: Installing Peripheral Equipment



 7 System Application
 7.2 Internal User I/O Wiring Harness and Air Lines

7.2 Internal User I/O Wiring Harness and Air Lines

Internal user I/O wiring harness (18 wires: 0.2 mm^2) and two air lines are incorporated in the manipulator for the drive of the peripheral devices mounted on the upper arm as shown in *fig. 7-2 “Connectors for Internal User I/O Wiring Harness and Air Line (Standard or Corrosion-Proof Specifications)”*.

The connector pins 1 to 18 are assigned as shown in *fig. 7-3 “Details of the Connector Pin Numbers (Standard, Corrosion-Proof, or Food-Grade Grease Specifications)”*.

Note that the number of pins used for internal user I/O wiring harness and the inside diameter and number of air hoses are different for optional specifications. For details, refer to *fig. 7-4 “Connectors for Internal User I/O Wiring Harness and Air Line (When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)”, fig. 7-5 “Details of the Connector Pin Numbers (When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)”, fig. 7-6 “Connectors for Internal User I/O Wiring Harness and Air Line (with the Manipulator Cable on the Bottom)”, fig. 7-7 “Details of the Connector Pin Numbers (with the Manipulator Cable on the Bottom)”, fig. 7-8 “Connectors for Internal User I/O Wiring Harness and Air Line (with the Built-in Solenoid Valve)”, and fig. 7-9 “Details of the Connector Pin Numbers (with the Built-in Solenoid Valve)”*.

For the internal piping diagram of the built-in solenoid valve, refer to *fig. 7-10 “Internal Piping Diagram (With the Built-in Solenoid Valve)”*.

Wiring must be performed by users.

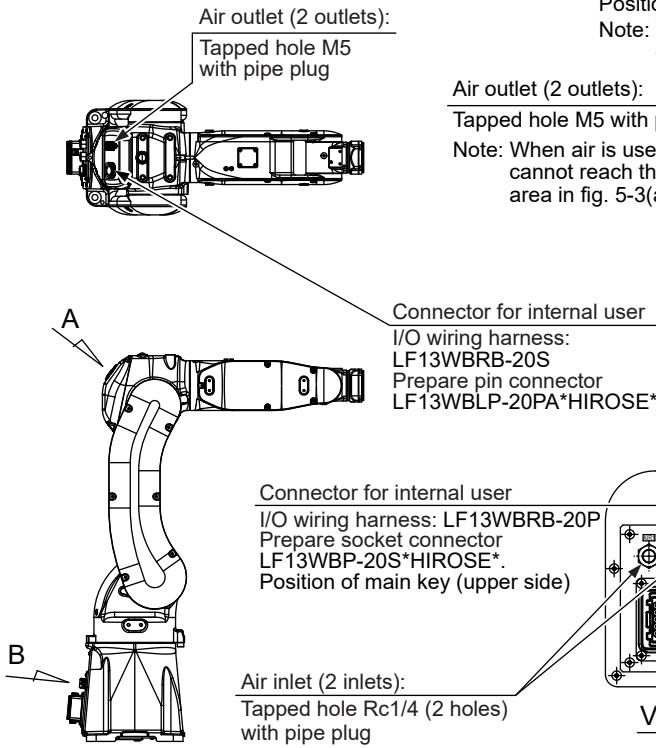
The operating conditions are shown in the following table.

The allowable current for internal user I/O wiring harness	2.5 A or less for each wire (The total current value for pins 1 to 18 must be 40 A or less.)
The maximum pressure for the air line	490 kPa (5 kgf/cm ²) or less Inside diameter of air lines is as follows: • connector base to casing: 4.0 mm dia. • casing to U-arm: 2.5 mm dia.
The range of temperature for the use of the air line	0°C to +45°C

7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

*Fig. 7-2: Connectors for Internal User I/O Wiring Harness and Air Line
(Standard or Corrosion-Proof Specifications)*

GP8/AR700



Connector for internal user I/O wiring harness

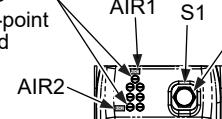
Position of main key (upper side)

Note: When the mating connector is used,
the P-point cannot reach the shaded
area in fig. 5-3 (a).

Air outlet (2 outlets):

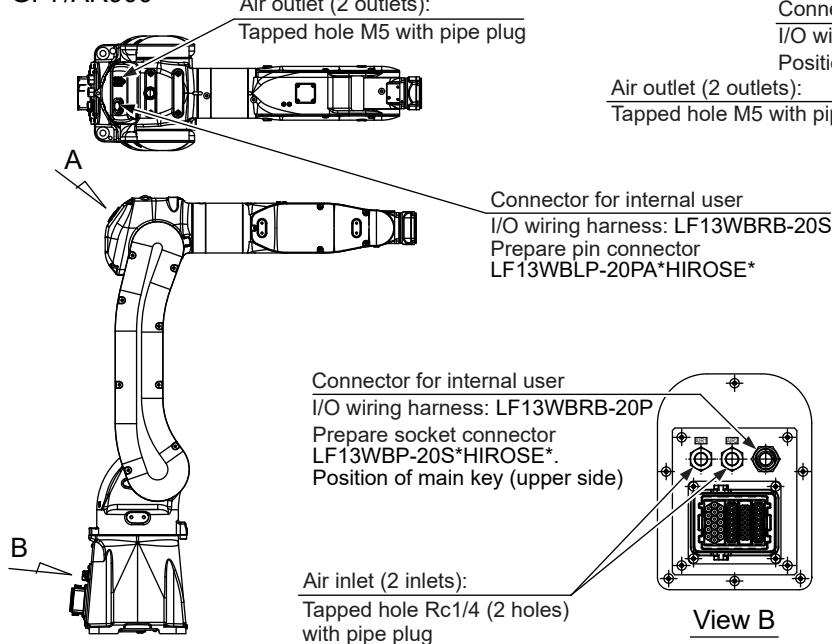
Tapped hole M5 with pipe plug

Note: When air is used, the P-point
cannot reach the shaded
area in fig. 5-3(a).



View A

GP7/AR900

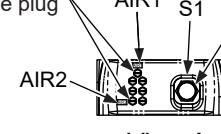


Connector for internal user I/O wiring harness

Position of main key (upper side)

Air outlet (2 outlets):

Tapped hole M5 with pipe plug



View A

Connector for internal user I/O wiring harness

Position of main key (upper side)

Air outlet (2 outlets):

Tapped hole M5 with pipe plug

Connector for internal user I/O wiring harness

Position of main key (upper side)

Air inlet (2 inlets):

Tapped hole Rc1/4 (2 holes) with pipe plug

Connector for internal user I/O wiring harness

Position of main key (upper side)

Air outlet (2 outlets):

Tapped hole M5 with pipe plug

Connector for internal user I/O wiring harness

Position of main key (upper side)

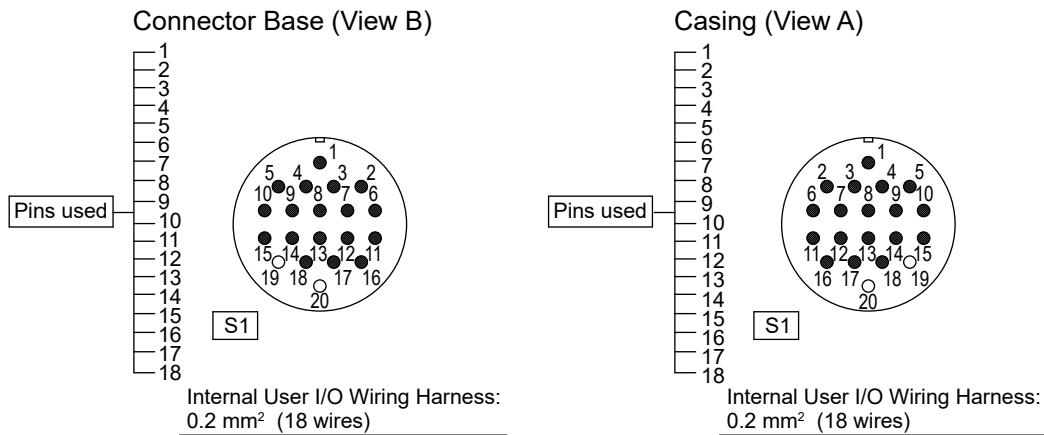
Air inlet (2 inlets):

Tapped hole Rc1/4 (2 holes) with pipe plug

View B

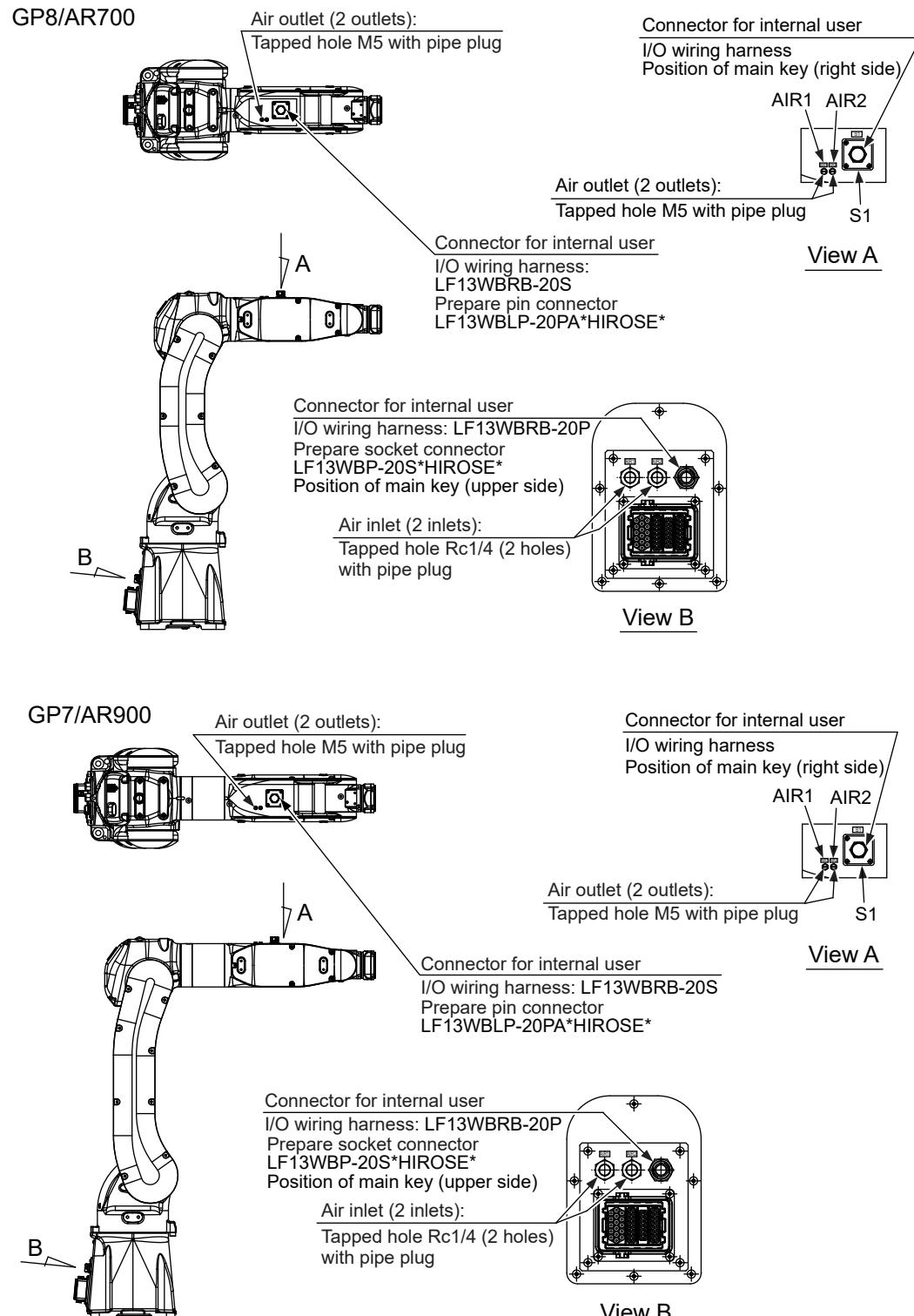
7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

*Fig. 7-3: Details of the Connector Pin Numbers
(Standard, Corrosion-Proof, or Food-Grade Grease Specifications)*



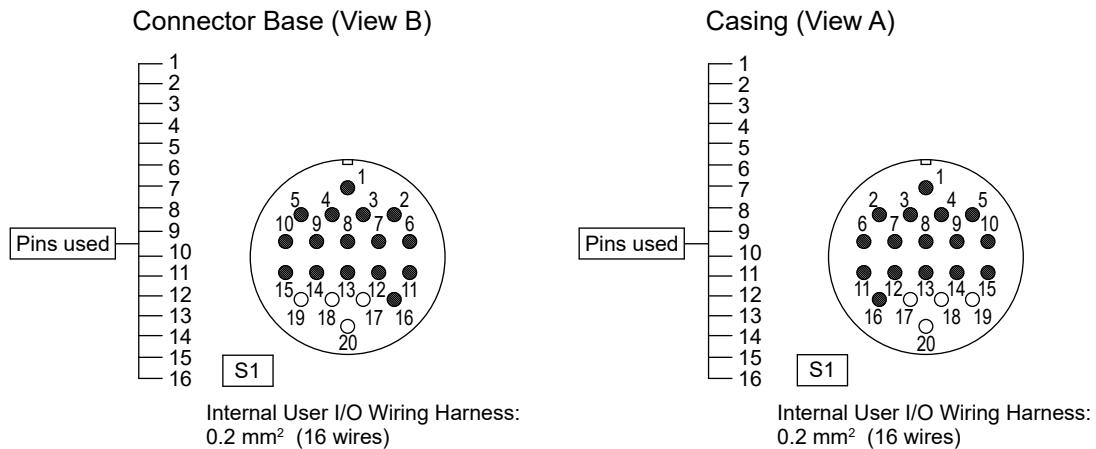
7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

*Fig. 7-4: Connectors for Internal User I/O Wiring Harness and Air Line
(When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)*



7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

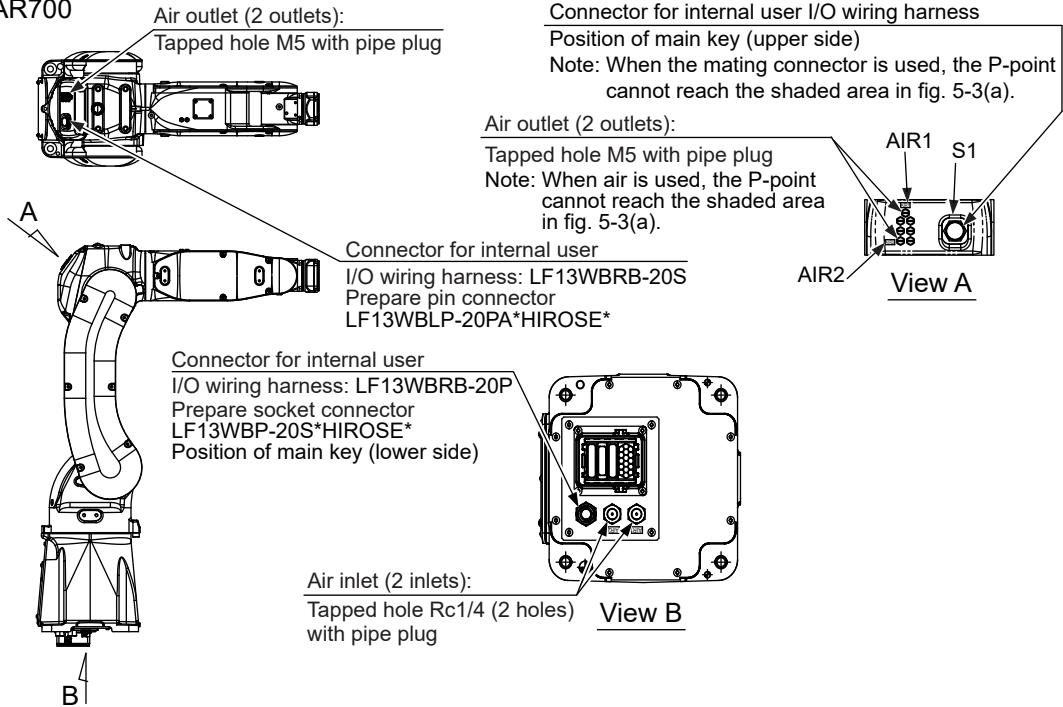
*Fig. 7-5: Details of the Connector Pin Numbers
(When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)*



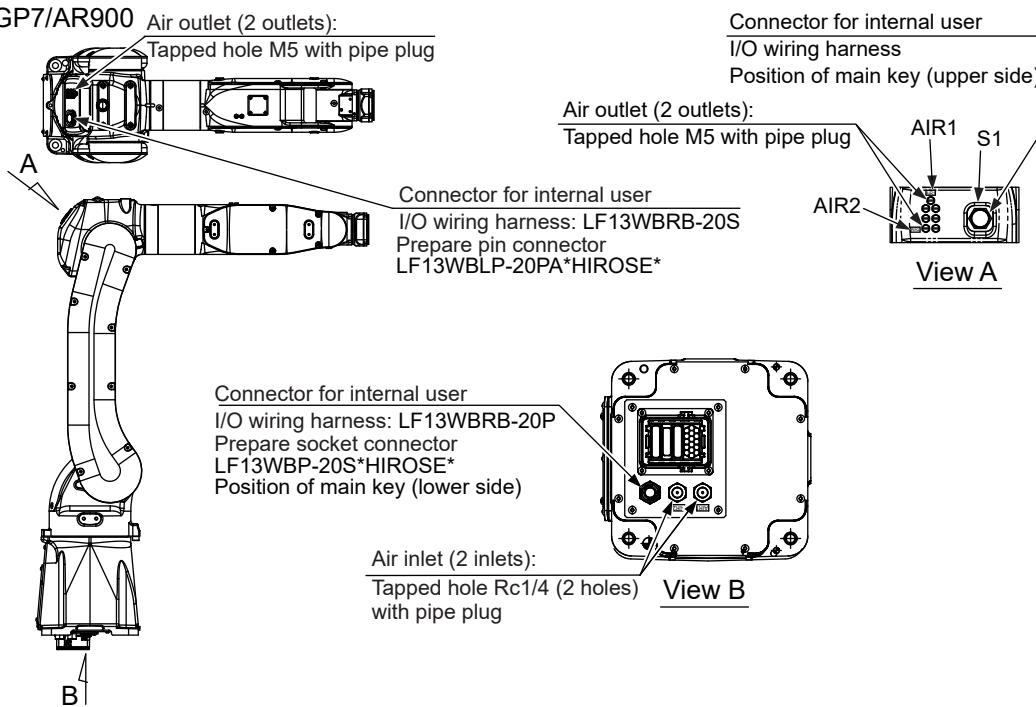
7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

*Fig. 7-6: Connectors for Internal User I/O Wiring Harness and Air Line
 (with the Manipulator Cable on the Bottom)*

GP8/AR700

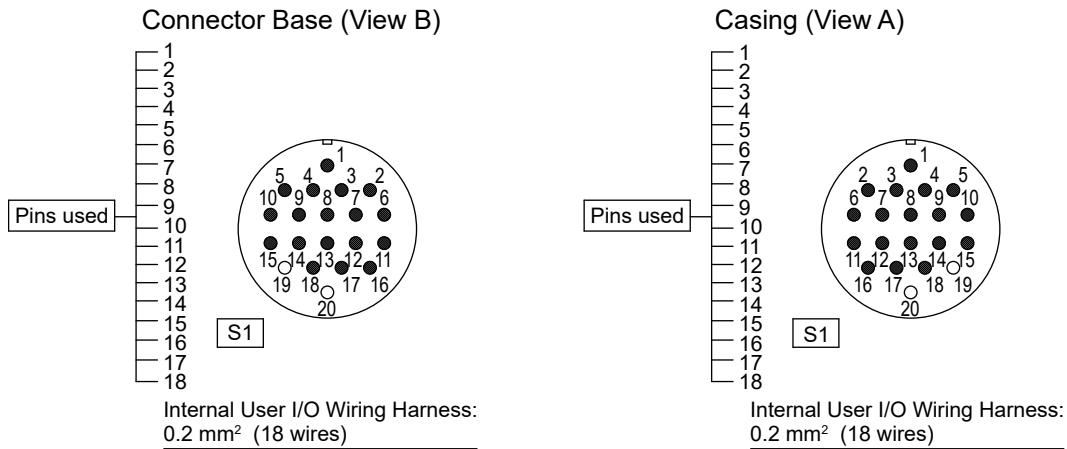


GP7/AR900



7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

Fig. 7-7: Details of the Connector Pin Numbers
(with the Manipulator Cable on the Bottom)

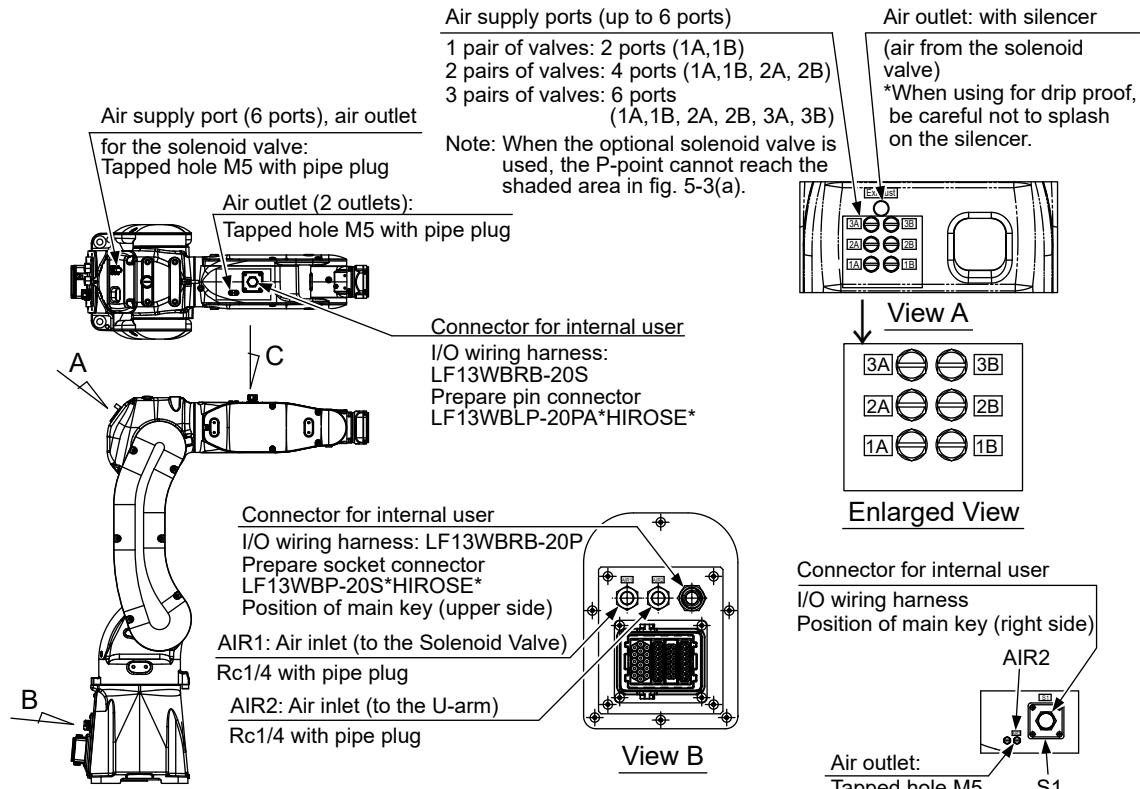


7 System Application

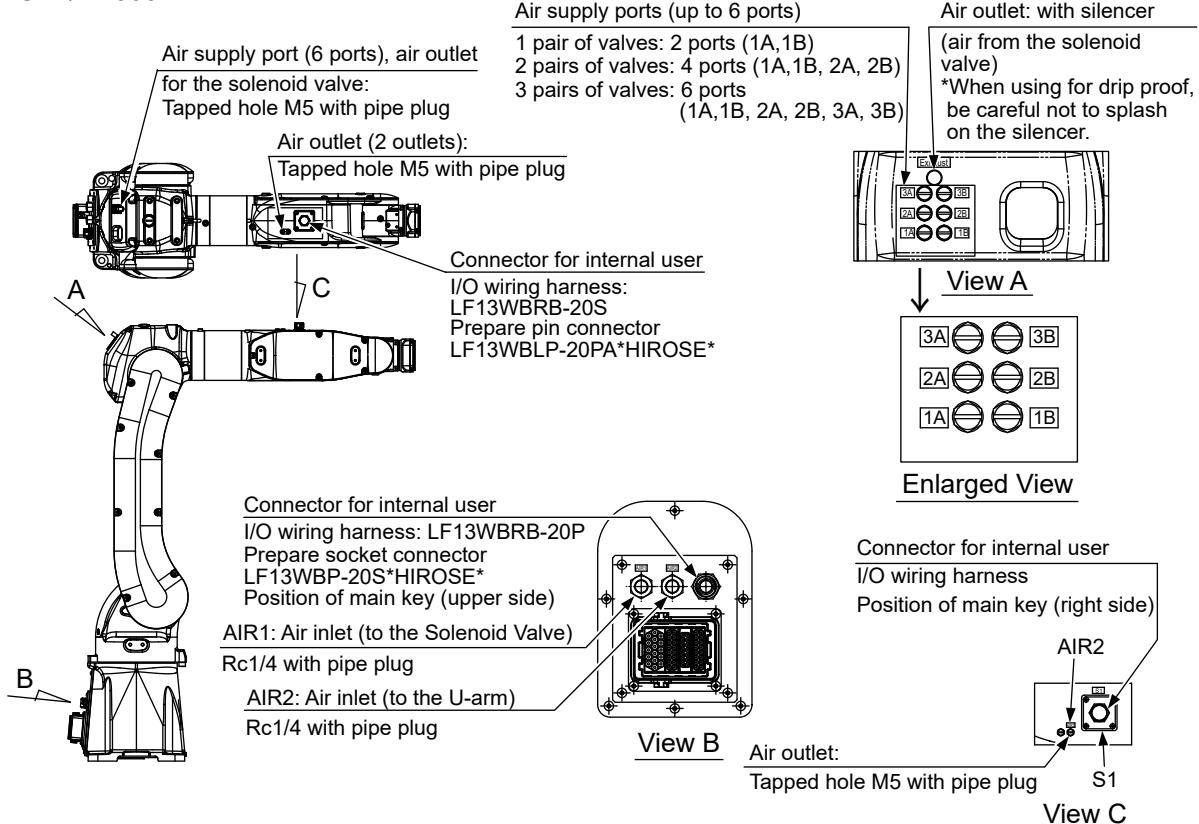
7.2 Internal User I/O Wiring Harness and Air Lines

Fig. 7-8: Connectors for Internal User I/O Wiring Harness and Air Line (with the Built-in Solenoid Valve)

GP8/AR700

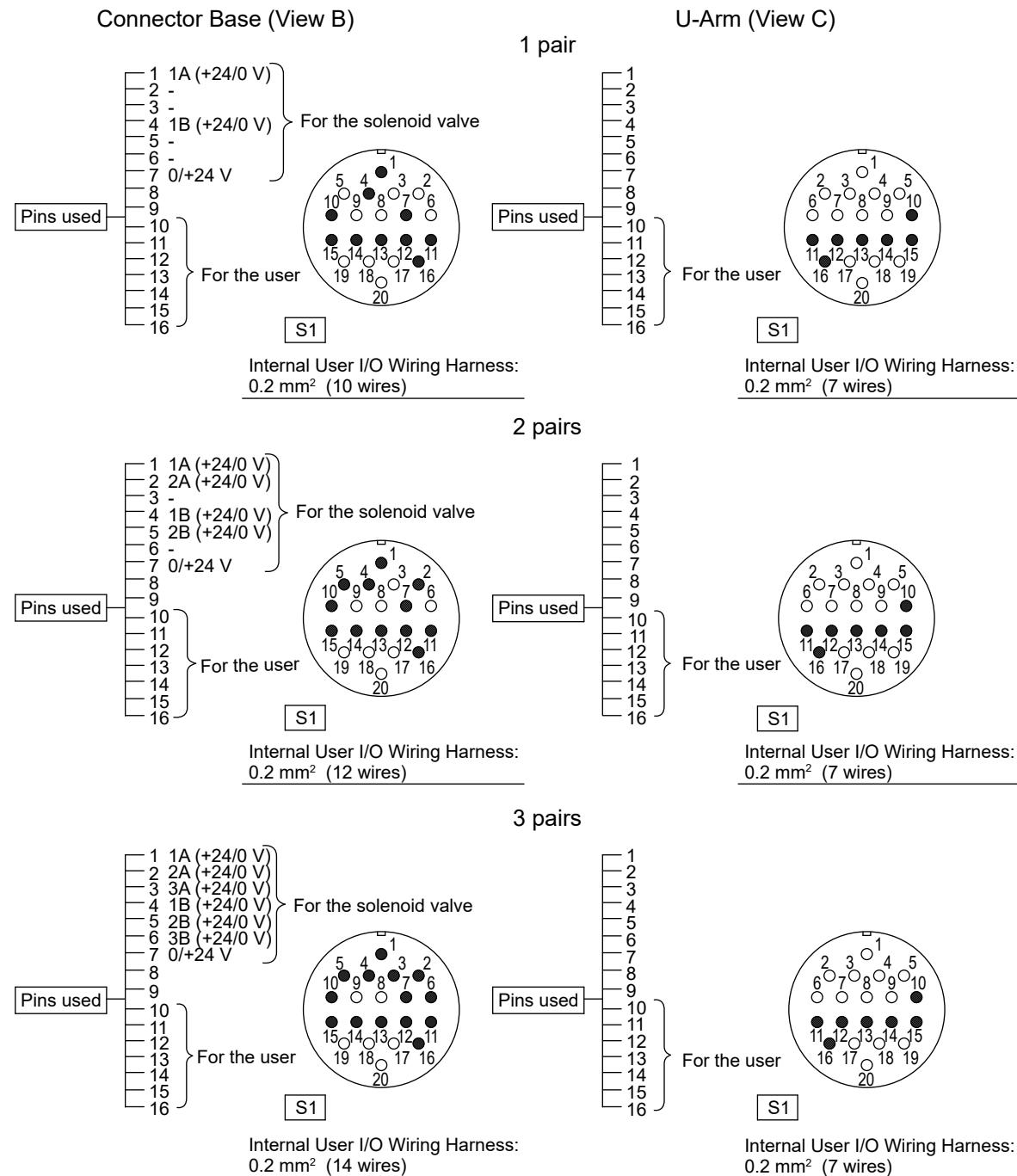


GP7/AR900



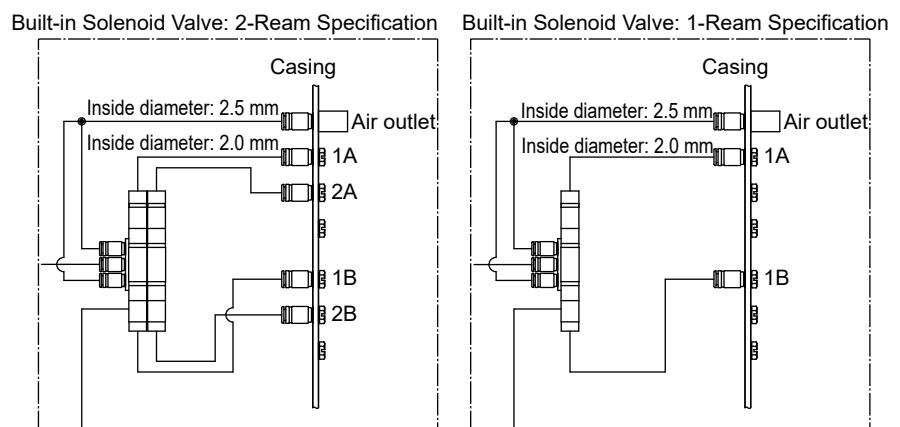
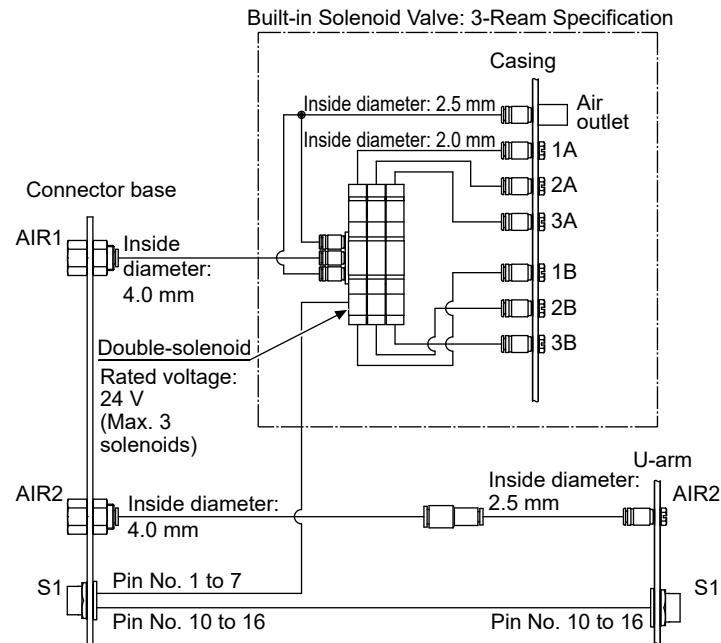
7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

Fig. 7-9: Details of the Connector Pin Numbers (with the Built-in Solenoid Valve)



7 System Application
7.2 Internal User I/O Wiring Harness and Air Lines

Fig. 7-10: Internal Piping Diagram (With the Built-in Solenoid Valve)



*Type of the solenoid valve: M4SA020-M3-*3 or the equivalent
(Manufacturer: CKD Corporation)
(nonpolarity surge suppressor is mounted.)

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

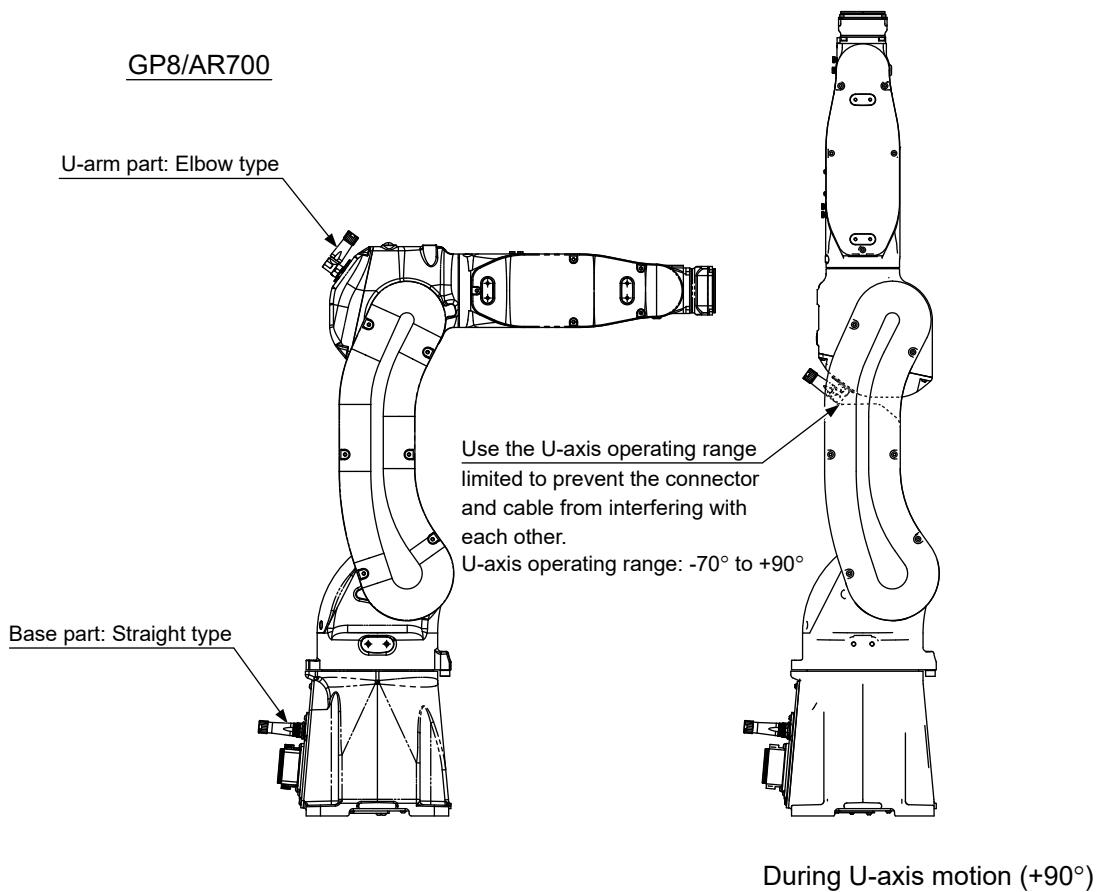
7.3 Mating Connector for Internal User I/O Wiring Harness (Optional)

The following mating connectors for the internal user I/O wiring harness are available as optional products.

Manipulator's base part	U-arm part
LF13WBP-20S CONNECTOR (straight type)	LF13WBLP-20PA CONNECTOR (elbow type)

For the GP8/AR700, the mating connector for the internal user I/O wiring harness may be attached to the casing part. In that case, however, the connector on the U-arm part will stick out from the rear of the robot. Therefore, it is necessary to limit the operating range of the U-axis. When used, check that neither the connector nor cable interferes with the robot. For GP7/AR900, no operating range restrictions are required.

Fig. 7-11: Mating Connector for Internal User I/O Wiring Harness

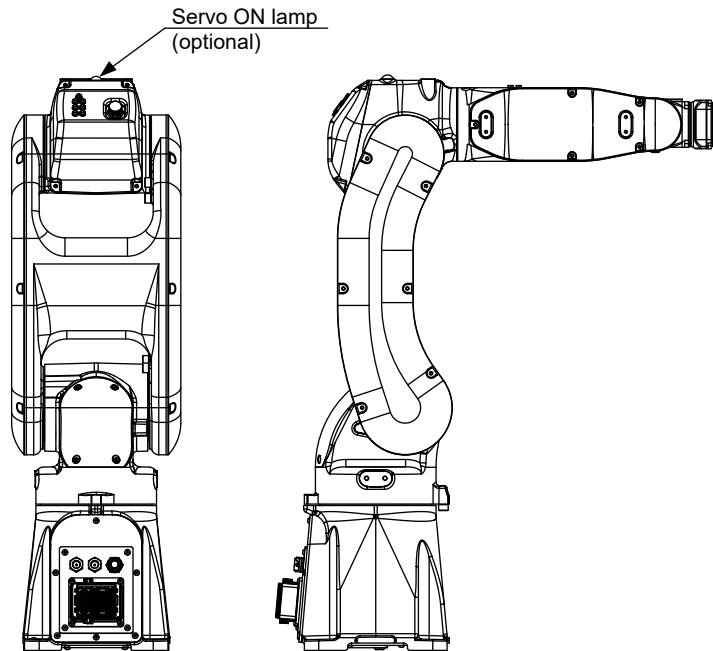


8 Electrical Equipment Specification

8.1 Position of Servo ON Lamp

Servo ON lamp is an optional. For its location, refer to *fig. 8-1 "Servo ON Lamp"*.

Fig. 8-1: Servo ON Lamp



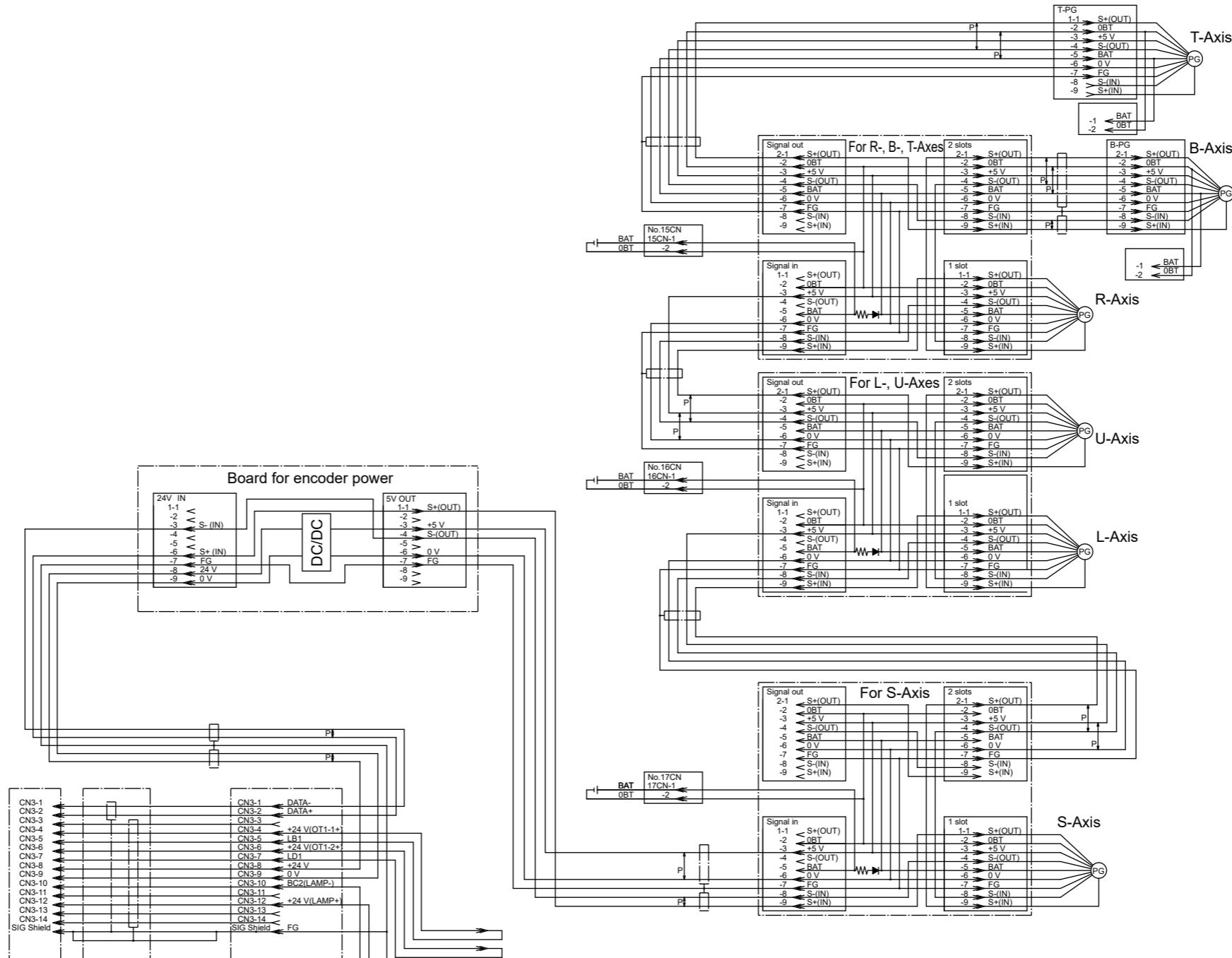
8	Electrical Equipment Specification
8.2	Internal Connections

8.2 Internal Connections

Diagrams for internal connections of the manipulator and the YRC1000/YRC1000micro are shown in *fig. 8-2(a) “Internal Connection Diagram for YRC1000 YRC1000micro (GP8/AR700, GP7/AR900)”* and *fig. 8-2(b) “Internal Connection Diagram for YRC1000 / YRC1000micro (GP8/AR700, GP7/AR900)”*

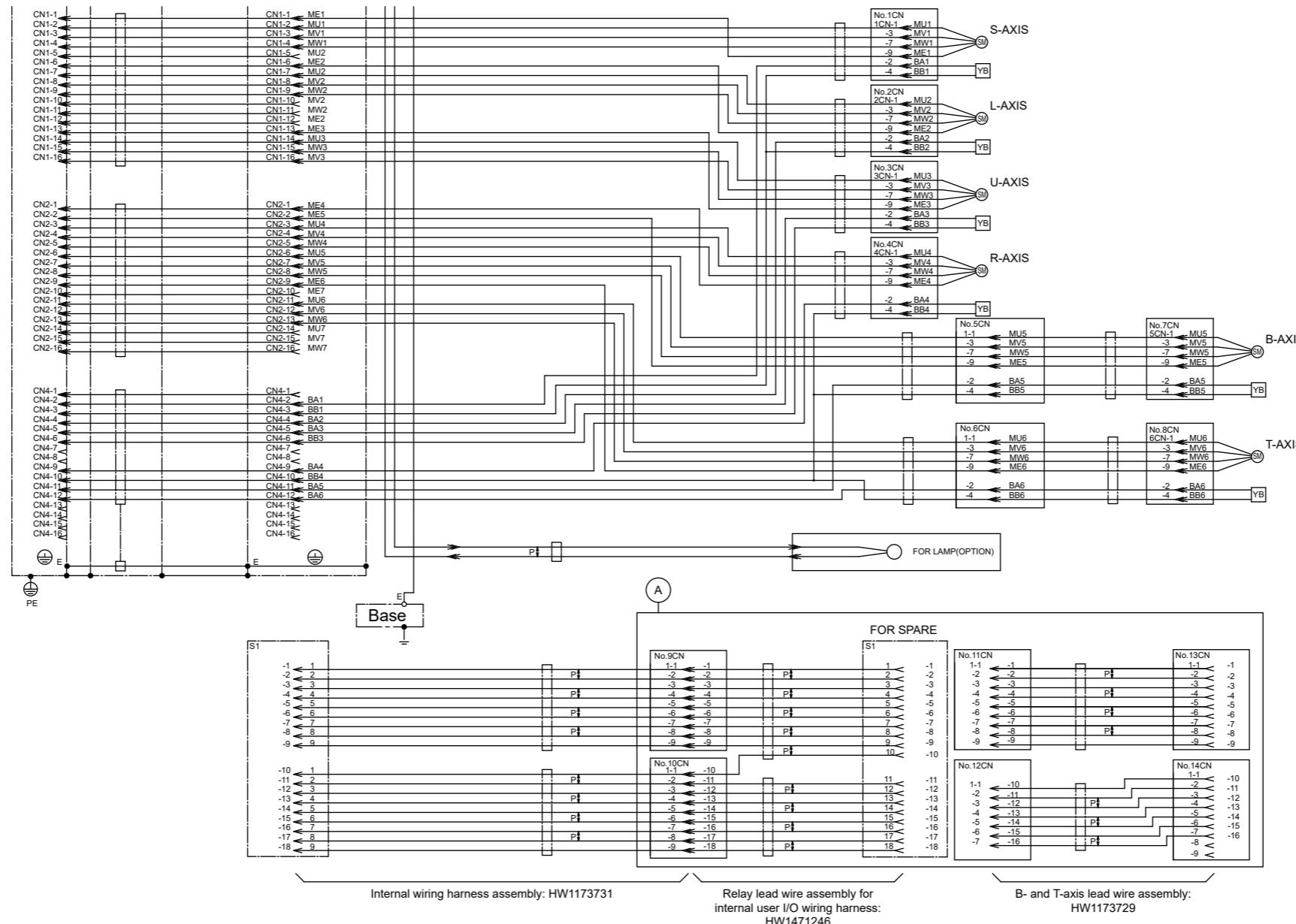
8 Electrical Equipment Specification
8.1 Internal Connections

Fig. 8-2(a): Internal Connection Diagram for YRC1000 YRC1000micro (GP8/AR700, GP7/AR900)

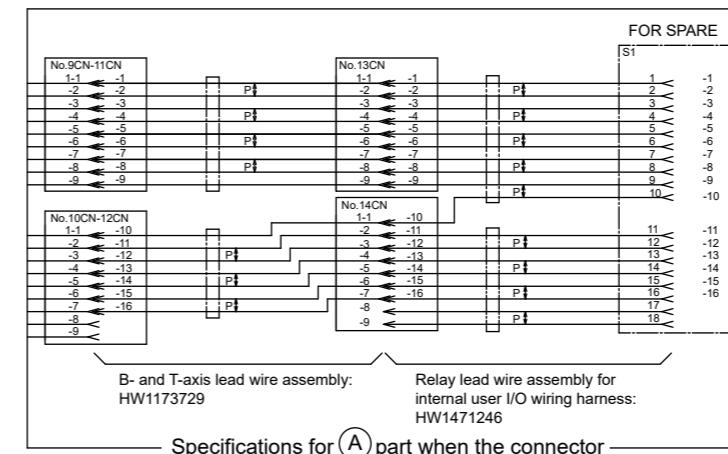


8 Electrical Equipment Specification
8.1 Internal Connections

Fig. 8-2(b): Internal Connection Diagram for YRC1000 / YRC1000micro (GP8/AR700, GP7/AR900)



Note:
1. (A) part is different when the connector for internal user I/O wiring harness is on the U-arm.



Specifications for (A) part when the connector for internal user I/O wiring harness on the U-arm.

9 Maintenance and Inspection



DANGER

- Do not remove the motor, and do not release the brake.
Failure to observe this caution 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

- The battery pack must be connected before removing detection connector when maintenance and inspection.
Failure to observe this caution may result in the loss of home position data.

9.1 Inspection Schedule

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation. Inspection intervals are classified into six levels as shown in *table 9-1 “GP8/AR700, GP7/AR900 Inspection Items”*.

In *table 9-1*, the inspection items are categorized by 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 shall perform the inspection work.



- The inspection interval must be based on the servo power supply on time.
- Individual measures are required for high-frequency handling conditions and special usage conditions. Contact your YASKAWA representative for more information.

Table 9-1: GP8/AR700, GP7/AR900 Inspection Items (Sheet 1 of 2)

Items ¹⁾	Schedule				Method	Operation	Inspection Charge		
	Daily	1000H/Cycle	12000H/Cycle	24000H			Specified Personnel	Licensee	Your YASKAWA representative
1	Alignment mark	●			Visual	Check alignment mark accordance at the home position. Check for damage.	●	●	●
2	Working area and manipulator	●			Visual	Check for oil seepage. (Clean if oil seepage occurs.) Clean the work area if dust or spatter is present. Clean the seeped oil or etc. ²⁾ Check for damage and outside cracks.	●	●	●
3	Baseplate mounting bolts	●			Spanner Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
4	Cover mounting screws	●			Screwdriver, Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
5	Connector base	●			Manual	Check for loose connectors.	●	●	●
6	Connector of manipulator cable	●			Manual	Check for loose connectors.	●	●	●
7	L, U, R, B, T-axis timing belt		●		Manual Visual	Check the tension and the condition. (Replace if failure of tooth, swelling, or abnormal abrasion occurs.)	●	●	●
8	Wire harness in manipulator		●		Visual Multimeter	Check for conduction between the main connector of base and intermediate connector with manually shaking the wire. Check for wear of protective spring.	●	●	●
			●			Replace ³⁾			●
9	Battery pack in manipulator		●			Replace the battery pack when the battery alarm occurs or the manipulator drove for 24000H.	●	●	
10	S-axis speed reducer S-axis gear		●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease ⁴⁾ (12000H cycle). See chapter 9.4.1	●	●	
11	LU-axes speed reducers		●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease ⁴⁾ (12000H cycle). See chapter 9.4.3 and chapter 9.4.4	●	●	

Table 9-1: GP8/AR700, GP7/AR900 Inspection Items (Sheet 2 of 2)

Items ¹⁾	Method	Schedule				Operation	Inspection Charge		
		Daily	1000H Cycle	12000H Cycle	24000H		Specified Personnel	Licensee	Your YASKAWA representative
12	R-axis speed reducer			●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease ⁴⁾ (12000H cycle). See chapter 9.4.5	●	●
13	BT-axes speed reducers T-axis gear			●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease ⁴⁾ (12000H cycle). See chapter 9.4.6	●	●
14	Overhaul				●				●

1 Inspection No. correspond to the numbers in fig. 9-1(a) "GP8/AR700: Inspection Items" and fig. 9-1(b) "GP7/AR900: Inspection Items".

2 Due to the operating conditions or the ambient environment, the oil may seep from the lip part of the oil seal and adhere to the outside of the lip part. The seeped oil may accumulate and fall in drops depending on the operation. Before the operation, clean the oil in the lower side of the oil seal of sliding parts to prevent the seeped oil from accumulating. Frequent reverse motions or operations under a high-temperature environment may lead to a high temperature of the motor and the oil may seep due to a rise in the internal pressure of the grease bath. In that case, release the grease inlet immediately after completing the operation to lower the internal pressure. (When releasing the grease inlet, ensure that grease does not scatter.)

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

4 For the grease, refer to table 9-2 "Inspection Parts and Grease Used (GP8/AR700, GP7/AR900)".

Table 9-2: Inspection Parts and Grease Used (GP8/AR700, GP7/AR900)

No.	Grease Used	Inspected Parts
10, 11, 12, 13	Harmonic Grease SK-1A	S, L, U, R, B and T-axes speed reducers, T- and S-axes gears

The numbers in the above table correspond to the numbers in table 9-1 "GP8/AR700, GP7/AR900 Inspection Items".

Fig. 9-1(a): GP8/AR700: Inspection Items

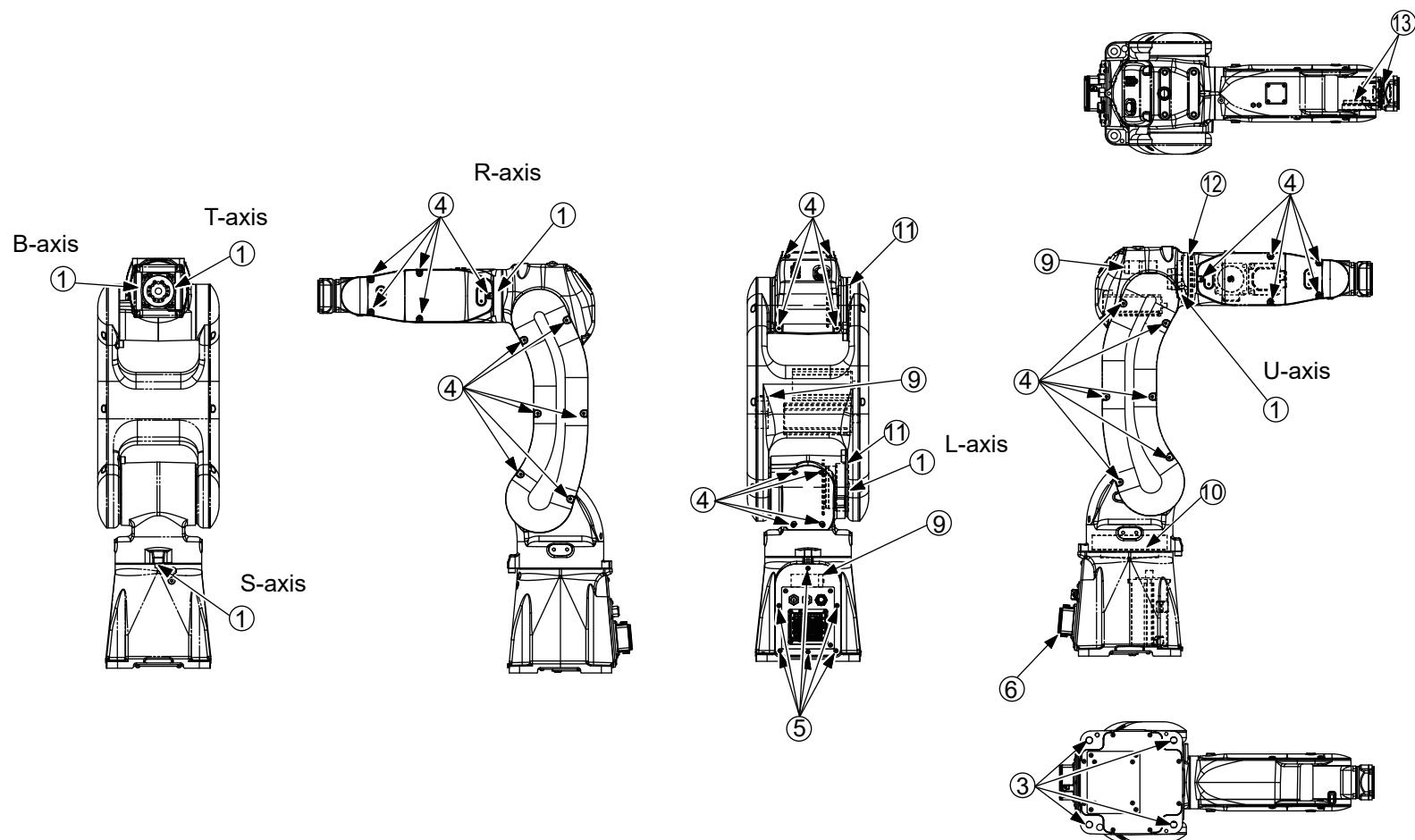
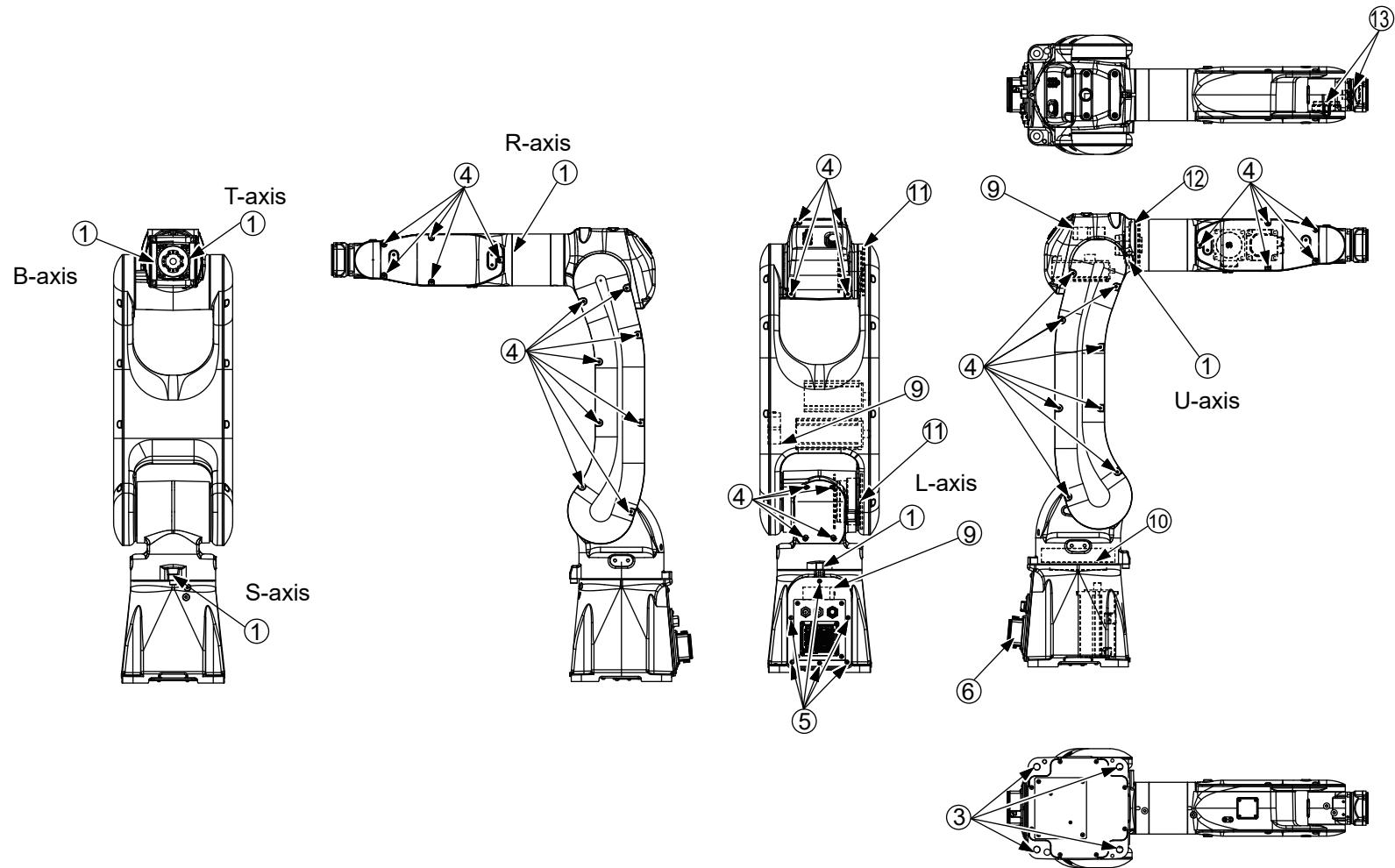


Fig. 9-1(b): GP7/AR900: Inspection Items



 9 Maintenance and Inspection
 9.2 Notes for Maintenance

9.2 Notes for Maintenance

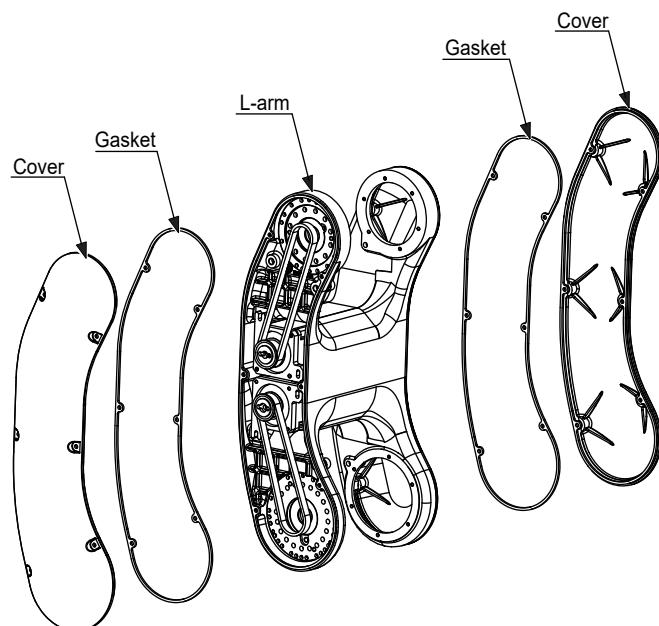
9.2.1 Cover gasket

The motor, the battery pack and the belt drive part are located in the manipulator. To avoid fumes caused by liquid or welding operations, the jointed faces of each cover are sealed with a gasket.

If the cover is removed during the maintenance operation, make sure to replace the gasket. (Refer to *table 10-1 “Spare Parts for the YR-1-06VX8-A00(B00)”* and *table 10-2 “Spare Parts for the YR-1-06VX7-A00(B00)”*)
Apply an adhesive (Cemedine 575F) to the gasket.

The gasket should adhere to the covers of the respective parts or the groove of the enclosure.

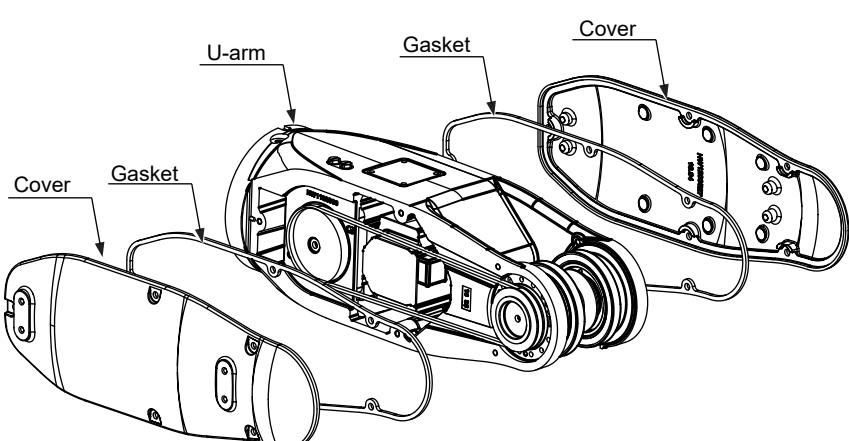
Fig. 9-2: Sealing Part of L-arm



Example: GP8/AR700

*Same for GP7/AR900

Fig. 9-3: Sealing Part of U-arm



Example: GP8/AR700

*Same for GP7/AR900

9 Maintenance and Inspection
9.2 Notes for Maintenance

Fig. 9-4: Sealing Part of the Base

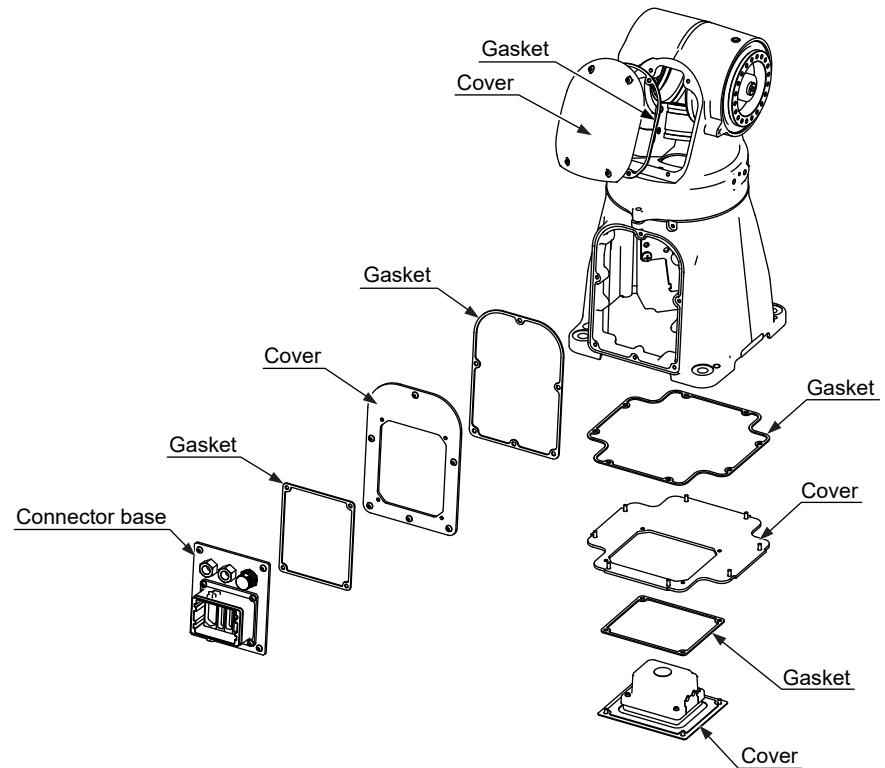
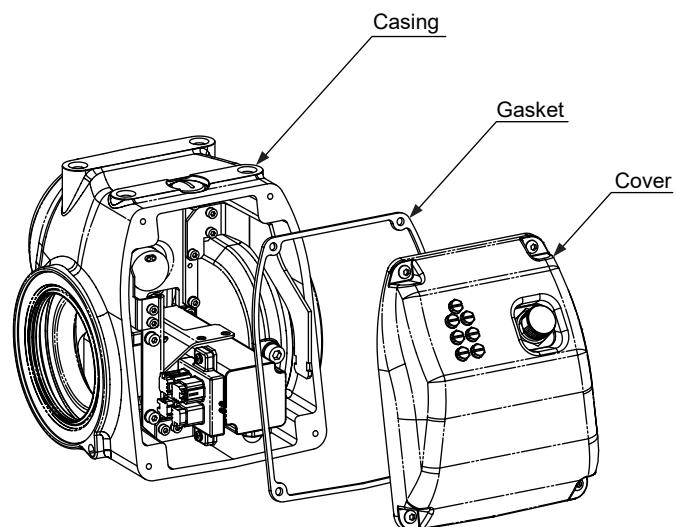


Fig. 9-5: Sealing Part of the Casing



9 Maintenance and Inspection
9.2 Notes for Maintenance

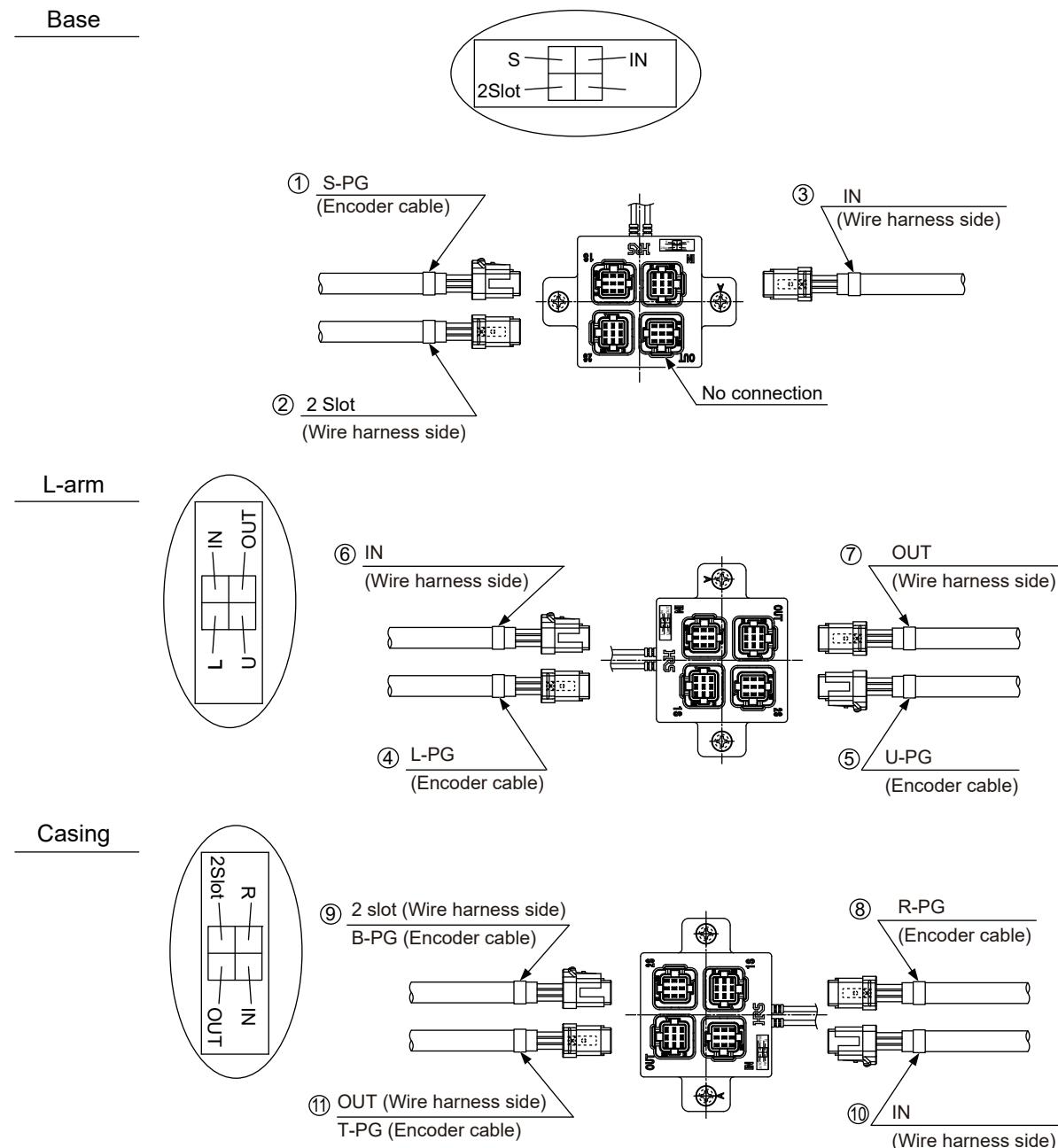
9.2.2 Multi-Port Connector

Three multi-port connectors (refer to *fig. 9-6 "Multi-Port Connector"*) for the motor signals are mounted on each part of the manipulator. (For the locations, refer to *fig. 9-9 "Locations 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. (For the details of the connecting to the motor or internal wiring harness, refer to *fig. 9-7 "Wiring of Multi-port Connector Part"*)

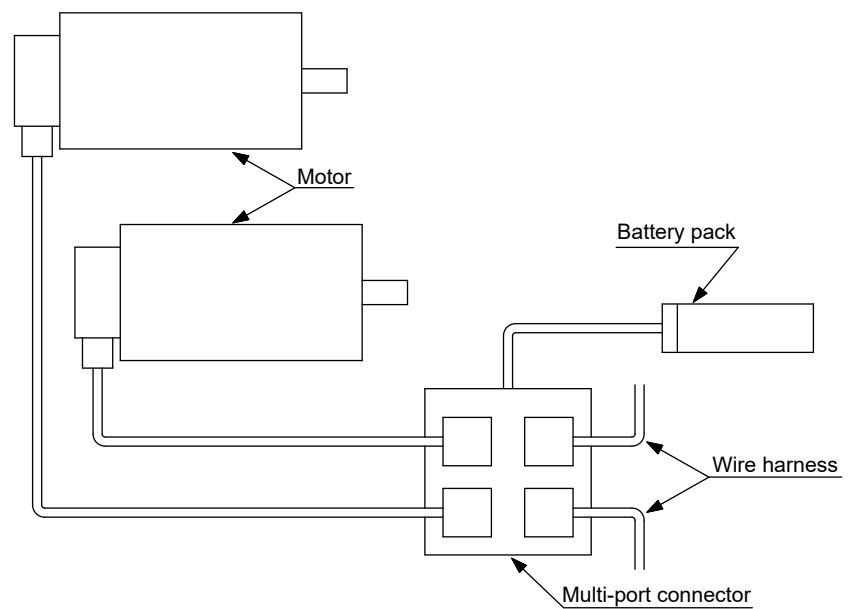
When disconnecting the connector of the multi-port connector during the battery replacement, be careful not to disconnect the connector between the motor and the multi-port connector ①④⑤⑧⑨⑪. If the connector between the motor and the multi-port connector is disconnected, the encoder absolute data disappears. If it is necessary to disconnect the cable ⑨⑪ connect the battery pack (HW9470932-A) for backup to the B- and T-axes motors.

Fig. 9-6: Multi-Port Connector



9 Maintenance and Inspection
9.2 Notes for Maintenance

Fig. 9-7: Wiring of Multi-port Connector Part

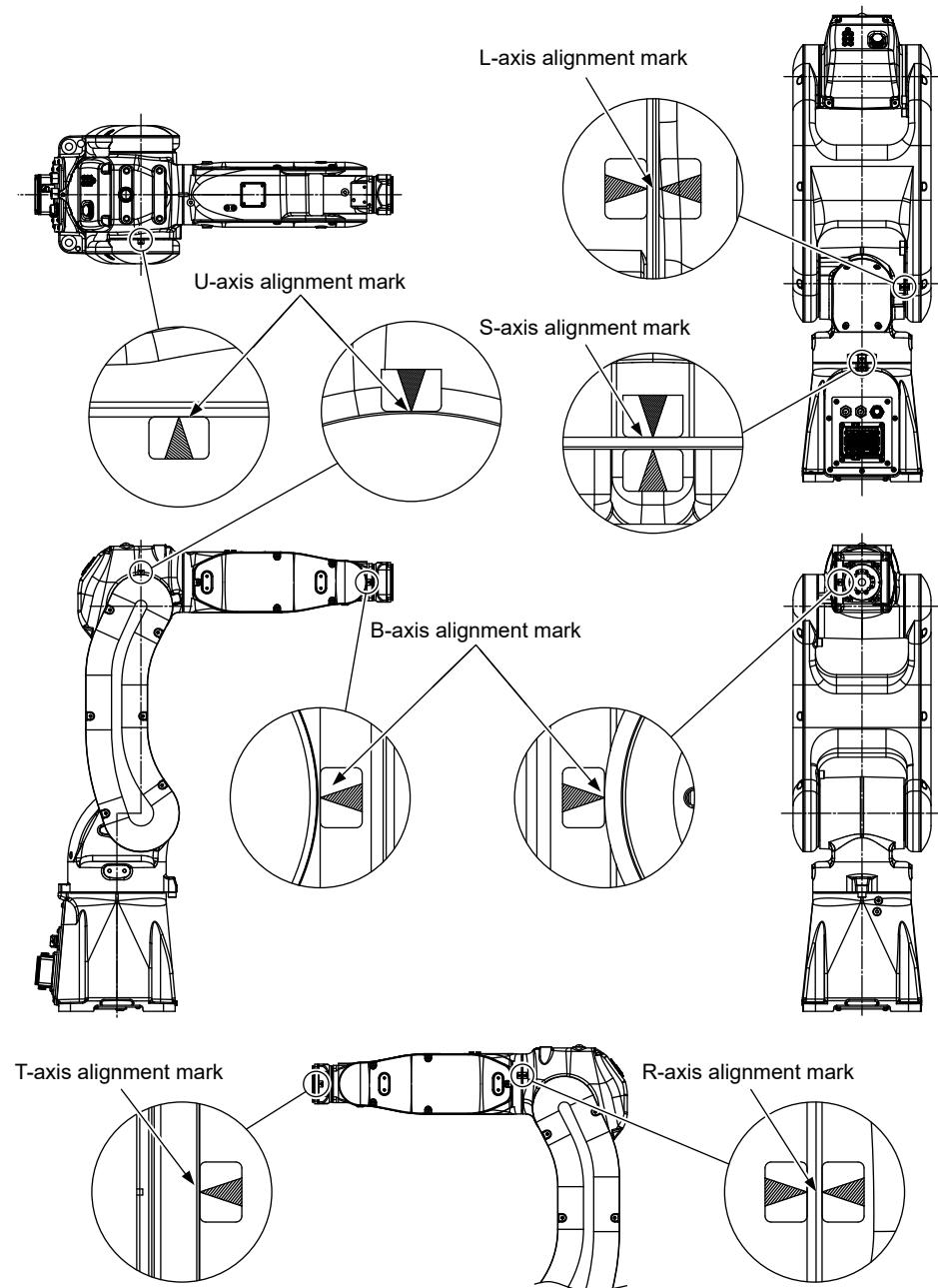


9.3 Notes on Maintenance Procedures

9.3.1 Home Position Check

There are alignment marks on each axis to check the home position. (fig. 9-8 “Alignment Mark Check”). With those alignment marks, periodically check for home position deviation. When home position is disappeared or deviated, contact your YASKAWA representative.

Fig. 9-8: Alignment Mark Check

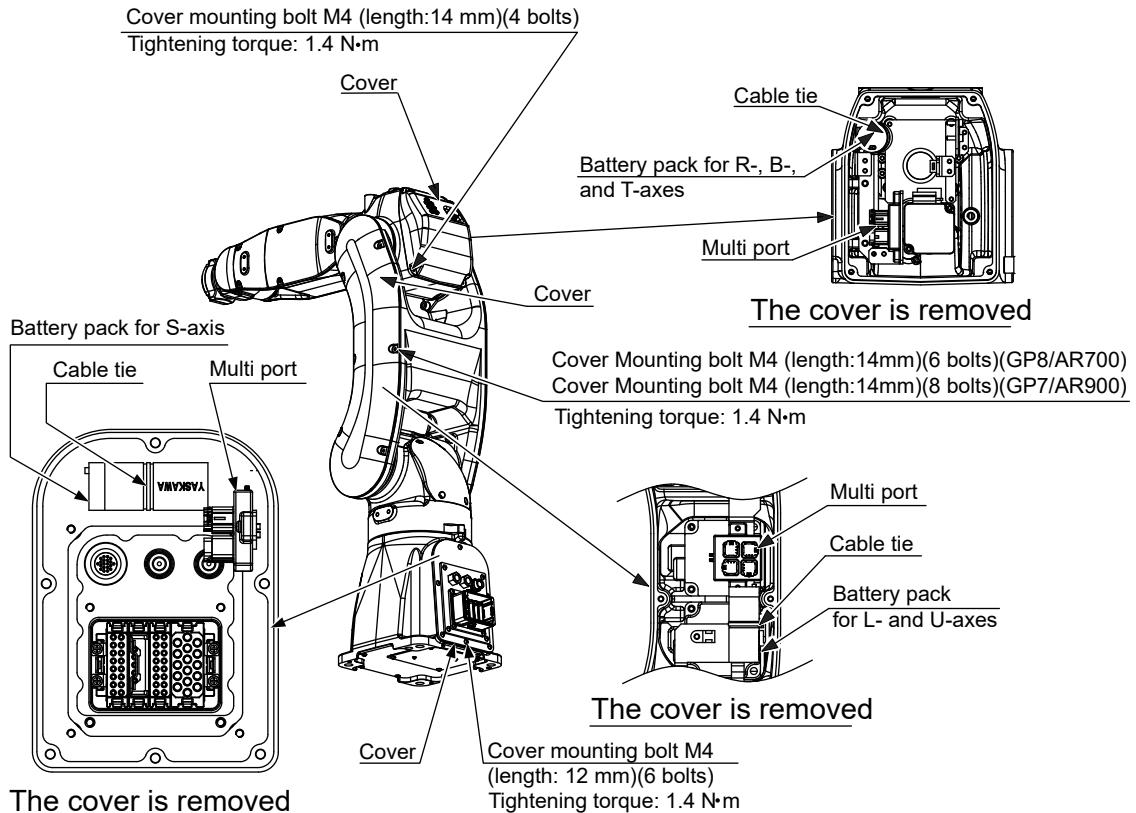


9.3.2 Battery Pack Replacement

Each of the three battery packs are located in the positions shown in fig. 9-9 “Locations of the Battery and Multi-port Connector” with the multi-port connector connectors.

When the battery alarm message is shown on the programming pendant, replace the battery pack in accordance with the following two methods. Perform the replacement by referring to chapter 9.2 “Notes for Maintenance”.

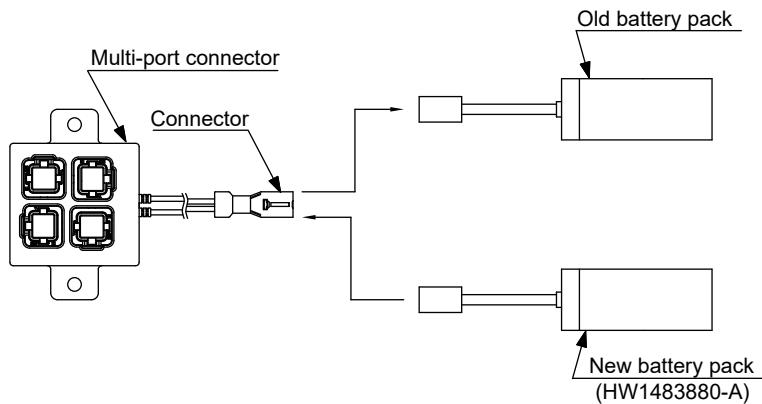
Fig. 9-9: Locations of the Battery and Multi-port Connector



9 Maintenance and Inspection
9.3 Notes on Maintenance Procedures

■ **Normal (The control power supply of the YRC1000/YRC1000micro can be turned ON)**

Fig. 9-10: Battery connection (the control power supply of the YRC1000/YRC1000micro can be turned ON)



1. Turn ON the control power supply of the YRC1000/YRC1000micro 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 bolt and remove the cover.
3. The old battery pack is fixed with cable ties. Cut the cable ties to remove the old battery pack.
4. Remove the old battery pack from the multi-port connector and mount the new battery pack.
5. Fix the new battery pack with cable ties T18L.
6. Tighten the cover mounting bolt by using the tightening torque shown in fig. 9-9 "Locations of the Battery and Multi-port Connector" to reinstall the cover.

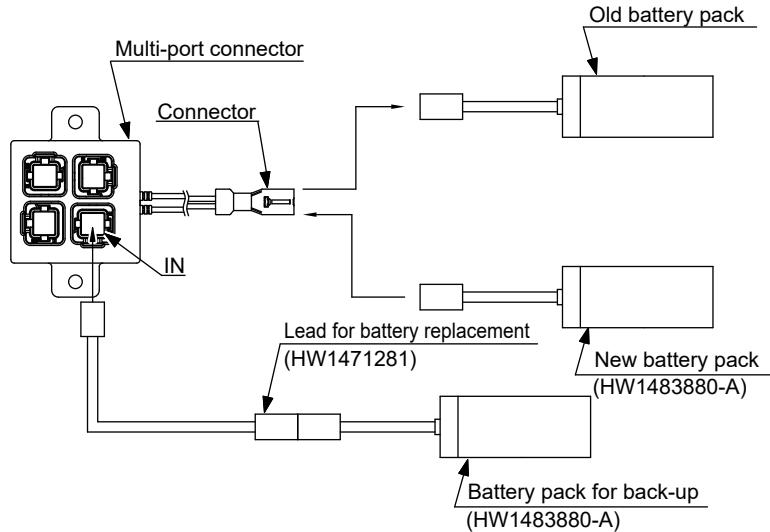


When reinstalling the cover, be careful not to get caught the cable.

9 Maintenance and Inspection
9.3 Notes on Maintenance Procedures

■ When the control power supply of the YRC1000/YRC1000micro cannot be turned ON

Fig. 9-11: Battery connection (the control power supply of the YRC1000/YRC1000micro cannot be turned ON)



1. Prepare the lead for battery replacement (HW1471281-A) and the battery pack for backup. (Apart from the new battery pack for replacement, prepare the battery pack for backup)
2. Loosen the cover mounting bolt and remove the cover.
3. Remove the connector from the "IN" port of the multi-port connector. Connect the lead for battery replacement to the "IN" port of the multi-port connector.
4. Connect the battery pack for backup to the lead for battery replacement.
5. The old battery pack is fixed with cables ties. Cut the cable ties to remove the old battery pack.



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

6. Remove the old battery pack from the multi-port connector and mount the new battery pack.
7. Fix the new battery pack with cable ties T18L.
8. Remove the lead for battery replacement and the battery pack for backup from the multi-port connector, connect the connector which has been removed in no.3 of this procedure to the "IN" connector again.
9. Tighten the cover mounting bolt by using the tightening torque shown in fig. 9-9 "Locations of the Battery and Multi-port Connector" 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 Procedures

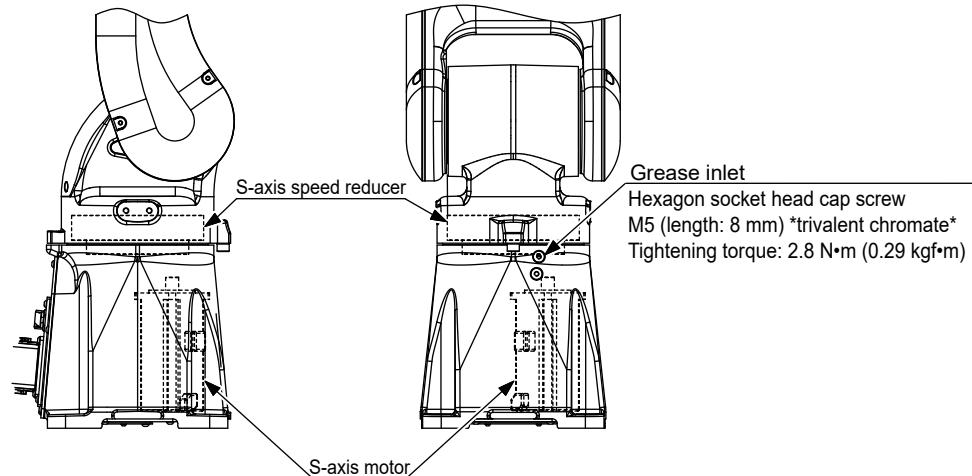
9.4 Notes on Grease Replenishment Procedures

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

- 
- A injection syringe is one of recommended spare parts for grease replenishment. Do not replenish grease by using the grease pump.
 - Soften the grease in a injection syringe by stirring or etc., and fill the necessary amount.
 - If the replenishment is performed more than the specified numbers, the internal pressure may rise during the operation and the grease leakage may occur.
 - When filling, grease may flow from the inlet.
Make sure to prepare a cloth or etc. to wipe off grease and the container which receives grease.

9.4.1 Grease Replenishment for S-Axis Speed Reducer

Fig. 9-12: S-Axis Grease Replenishment Diagram (GP8/AR700, GP7/AR900)



9.4.1.1 Grease Replenishment

(Refer to fig. 9-12 “S-Axis Grease Replenishment Diagram (GP8/AR700, GP7/AR900)”.)

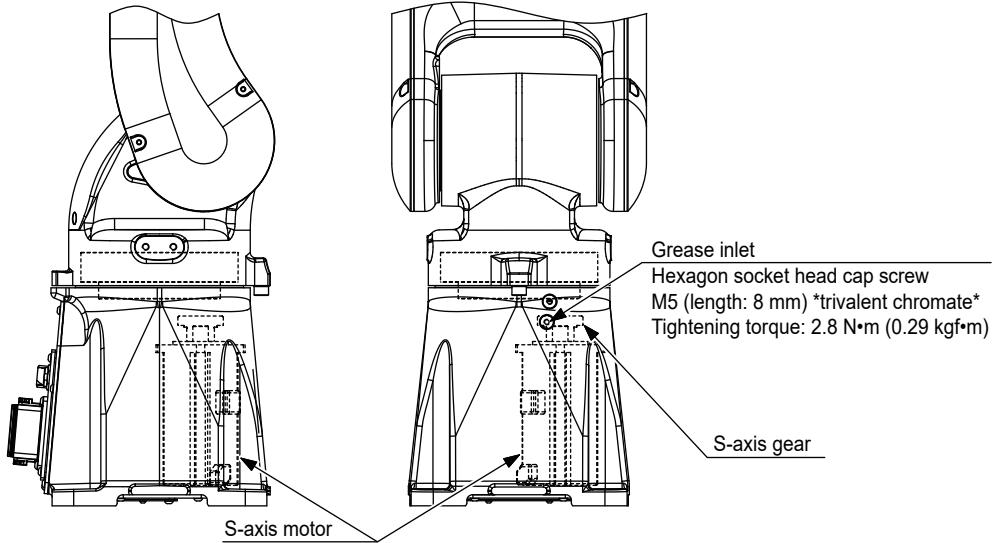
Replenish the grease in accordance with the following procedure:

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M5 (length: 8 mm) *trivalent chromate* from the grease inlet.
3. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
4. Inject the grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 3 g (3.3 cc)
5. Remove the injection syringe for replenishment from the grease inlet.
Install the hexagon socket head cap screw M5 (length: 8 mm)
trivalent chromate to the grease inlet. When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

9 Maintenance and Inspection
9.4 Notes on Grease Replenishment Procedures

9.4.2 Grease Replenishment for S-Axis Gear

Fig. 9-13: S-Axis Gear Grease Replenishment Diagram



9.4.2.1 Grease Replenishment

(Refer to *fig. 9-13 "S-Axis Gear Grease Replenishment Diagram"*.)

Replenish the grease in accordance with the following procedure:

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M5 (length: 8 mm)
trivalent chromate from the grease inlet.
3. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
4. Inject the grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 3 g (3.3 cc)
5. Remove the injection syringe for replenishment from the grease inlet.
Install the hexagon socket head cap screw M5 (length: 8 mm)
trivalent chromate to the grease inlet. When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

9.4.3 Grease Replenishment for L-Axis Speed Reducer

Fig. 9-14(a): L-Axis Grease Replenishment Diagram (GP8/AR700)

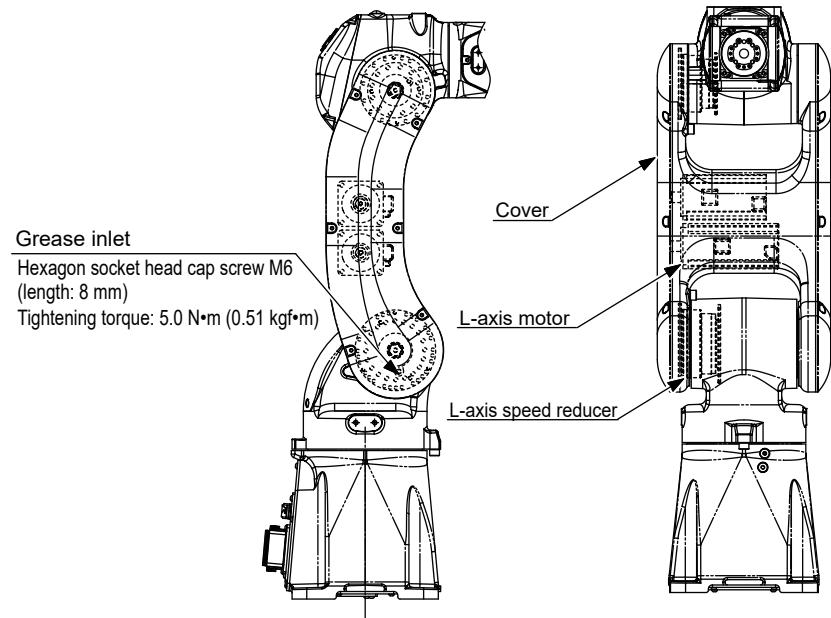
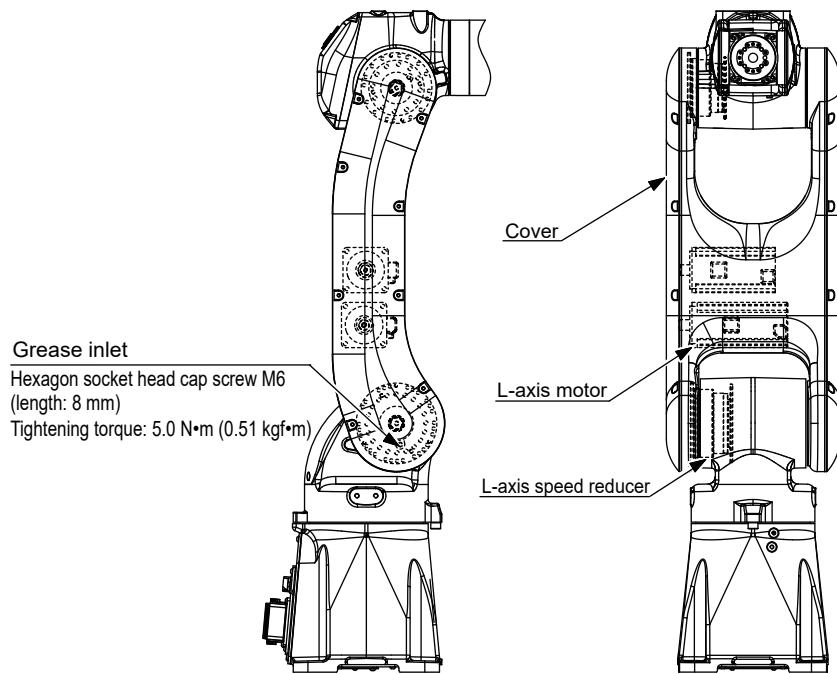


Fig. 9-14(b): L-Axis Grease Replenishment Diagram (GP7/AR900)



9 Maintenance and Inspection
9.4 Notes on Grease Replenishment Procedures

9.4.3.1 Grease Replenishment

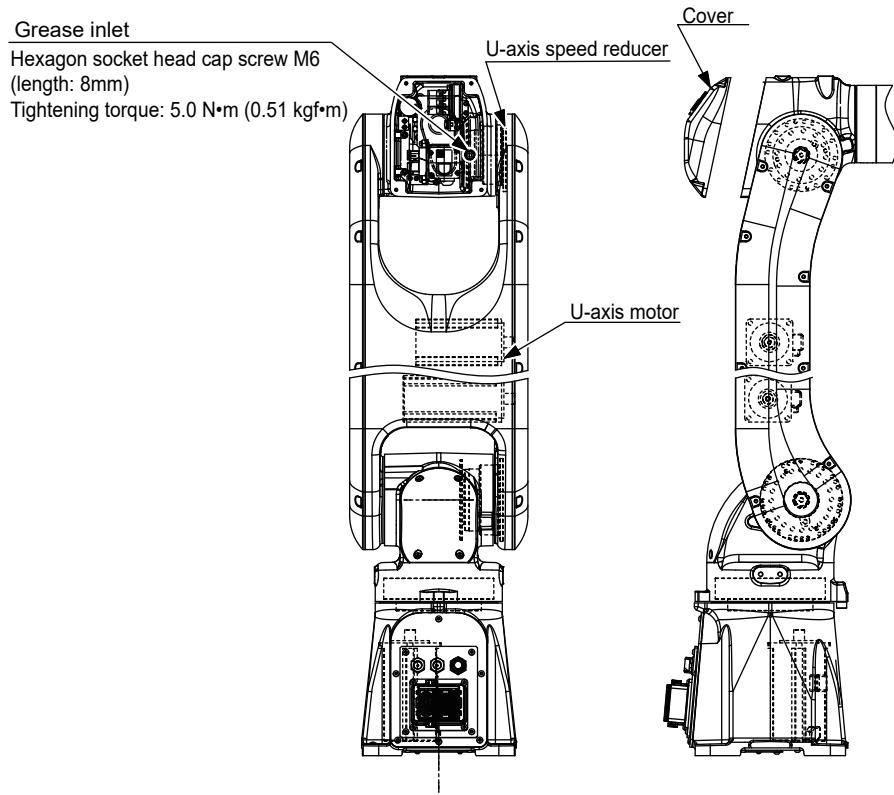
(Refer to *fig. 9-14(a) "L-Axis Grease Replenishment Diagram (GP8/AR700)"*, *fig. 9-14(b) "L-Axis Grease Replenishment Diagram (GP7/AR900)"*.)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket button head screw M4 (length: 14 mm)
trivalent chromate.
Remove the cover and gasket.
3. Remove the hexagon socket head cap screw M6 (length: 8 mm) from the grease inlet.
4. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
5. Inject grease into the grease inlet.

– Grease type:	Harmonic Grease SK-1A
– Amount of grease:	3 g (3.3 cc)
6. Remove the injection syringe for replenishment from the grease inlet.
Install the hexagon socket head cap screw M6 (length: 8 mm) to the grease inlet. When installing the bolts, apply Three Bond 1206C to the threading part of the screw.
7. Install the cover and gasket.
Tighten the hexagon socket button head screw M4 (length: 14 mm)
trivalent chromate.
(Tightening torque: 1.4 N·m (0.14 kgf·m))

9.4.4 Grease Replenishment for U-Axis Speed Reducer

Fig. 9-15: U-Axis Grease Replenishment Diagram (GP8/AR700, GP7/AR900)



9.4.4.1 Grease Replenishment

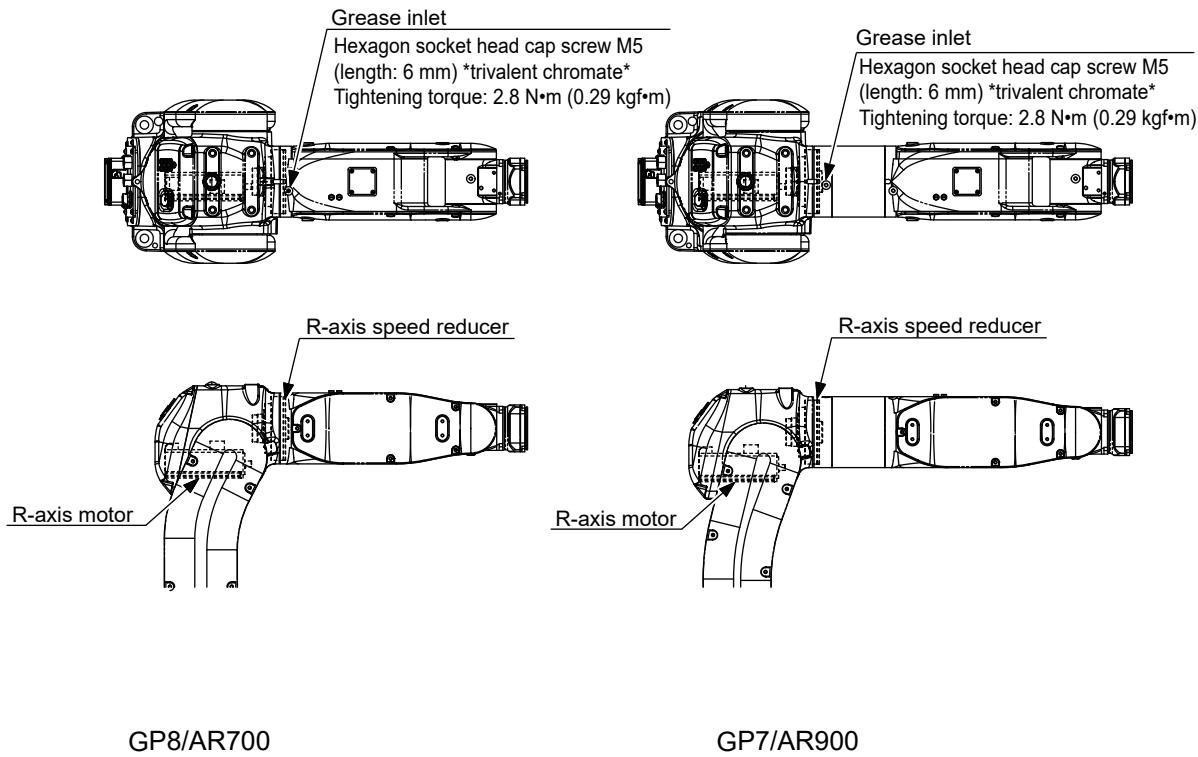
(Refer to *fig. 9-15 “U-Axis Grease Replenishment Diagram (GP8/AR700, GP7/AR900)”*.)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket button head screw M4 (length: 14 mm)
trivalent chromate.
Remove the cover and gasket.
3. Remove the hexagon socket head cap screw M6 (length: 8 mm) from the grease inlet
4. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
5. Inject grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 1.5 g (1.6 cc)
6. Remove the injection syringe for replenishment from the grease inlet.
Install the hexagon socket head cap screw M6 (length: 8 mm) to the grease inlet. When installing the bolts, apply Three Bond 1206C to the threading part of the screw.
7. Install the cover and gasket.
Tighten the hexagon socket button head screw M4 (length: 14 mm)
trivalent chromate.
(Tightening torque: 1.4 N·m (0.14 kgf·m))

9 Maintenance and Inspection
9.4 Notes on Grease Replenishment Procedures

9.4.5 Grease Replenishment for R-Axis Speed Reducer

Fig. 9-16: R-Axis Grease Replenishment Diagram



GP8/AR700

GP7/AR900

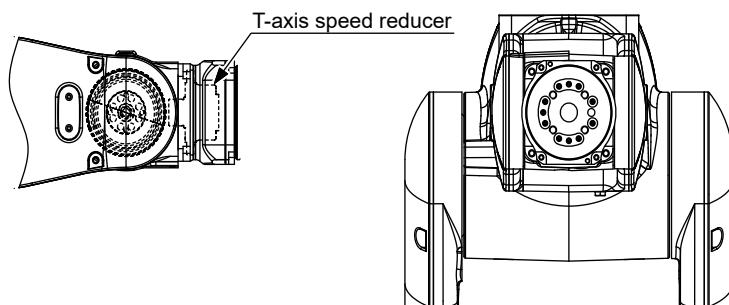
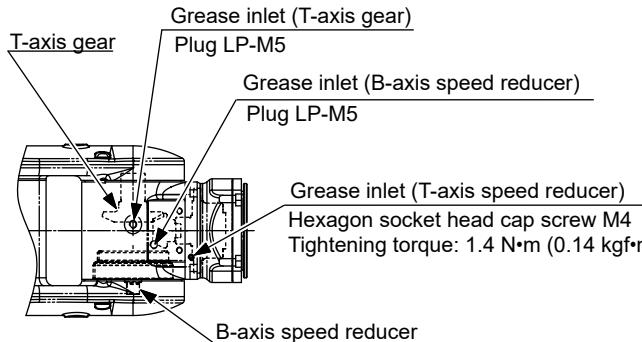
9.4.5.1 Grease Replenishment

(Refer to *fig. 9-16 “R-Axis Grease Replenishment Diagram”*.)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M5 (length: 6 mm) *trivalent chromate* from the grease inlet
3. Inject grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 1 g (1.1 cc)
4. Install the hexagon socket head cap screw M5 (length: 6 mm) *trivalent chromate* to the grease inlet.
When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

9.4.6 Grease Replenishment for B- and T-Axes Speed Reducers

Fig. 9-17: B- and T-Axes Grease Replenishment Diagram (GP8/AR700, GP7/AR900)



9.4.6.1 Grease Replenishment for B-Axis

(Refer to fig. 9-17 "B- and T-Axes Grease Replenishment Diagram (GP8/AR700, GP7/AR900)".)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the plug LP-M5 from the grease inlet
3. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
4. Inject grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 1 g (1.1 cc)
5. Install the plug LP-M5 to the grease inlet.

9.4.6.2 Grease Replenishment for T-Axis

(Refer to fig. 9-17.)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M4 and the plug LP-M5 from the grease inlet.
3. Install the injection syringe for replenishment to the grease inlet.
(The injection syringe is a recommended spare part.)
4. Inject grease into the grease inlet.
 - Grease type: Harmonic Grease SK-1A
 - Amount of grease: 1 g (1.1 cc)
5. Remove the injection syringe for replenishment from the grease inlet.
Install the screw and the plug to the grease inlet.
When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

10 Recommended Spare Parts

It is recommended to keep the parts and components in the following table in stock as spare parts for the MOTOMAN-GP8/AR700, -GP7/AR900.

To purchase lead wires of the wire harness or etc., check the order/ manufacture no. and contact 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: Spare Parts for the YR-1-06VX8-A00(B00) (Sheet 1 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
A	1	Grease	Harmonic Grease SK-1A	Harmonic Drive Systems Co., Ltd.	2.5 kg		
A	2	Grease	MP1	NIPPON GREASE Co.,Ltd	2.5 kg	-	
A	3	Adhesive	CEMEDINE 575F	CEMEDINE Co.,Ltd	1	-	
A	4	Adhesive	LOCTITE 243	Henkel Japan Ltd	1	-	
A	5	Adhesive	LOCTITE 638	Henkel Japan Ltd	1	-	
A	6	Adhesive	LOCTITE 518	Henkel Japan Ltd	1	-	
A	7	Liquid gasket	TB1206C	ThreeBond Co., Ltd.	1	-	
A	8	Battery pack	HW1483880-A	YASKAWA Electric Corporation	1	3	
A	9	Lead wire for battery replacement	HW1471281-A	YASKAWA Electric Corporation	1	-	Backup for battery replacement
A	10	Gasket	HW1407740-1	YASKAWA Electric Corporation	1	1	For the base bottom cover
A	11	Gasket	HW1407739-1	YASKAWA Electric Corporation	1	1	For the connector base
A	12	Gasket	HW1407738-1	YASKAWA Electric Corporation	1	2	For the connector base
A	13	Gasket	HW1406930-1	YASKAWA Electric Corporation	1	1	For the S-head cover
A	14	Gasket	HW2301127-1	YASKAWA Electric Corporation	1	2	For the L-arm cover
A	15	Gasket	HW2401823-1	YASKAWA Electric Corporation	1	1	For the casing cover

Table 10-1: Spare Parts for the YR-1-06VX8-A00(B00) (Sheet 2 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
A	16	Gasket	HW1305695-1	YASKAWA Electric Corporation	1	2	For the U-arm cover
A	17	Grease kit for replenishment	HW1484274-A	YASKAWA Electric Corporation	1	-	
B	18	L-axis timing belt	100Ceptor-X S5M380	Bando Chemical Industries, Ltd.	1	1	
B	19	U-axis timing belt	100Ceptor-X S5M415	Bando Chemical Industries, Ltd.	1	1	
B	20	R-axis timing belt	BG222UP3M6-HC	Tsubakimoto Chain Co.	1	1	
B	21	B-axis timing belt	BG525UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	22	T-axis timing belt	BG354UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	23	Replacement Kit for S-axis Speed Reducer ¹⁾	HW1484240-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384531-A
B	24	Replacement Kit for L-axis Speed Reducer ¹⁾	HW1484242-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384227-A
B	25	Replacement Kit for U-axis Speed Reducer ¹⁾	HW1484243-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384226-A
B	26	Replacement Kit for R-axis Speed Reducer ¹⁾	HW1484244-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW0388708-A
B	27	Replacement Kit for B-axis Speed Reducer ¹⁾	HW1484245-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384236-A
B	28	Replacement Kit for T-axis Speed Reducer ¹⁾	HW1484246-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384235-A
B	29	Wrist unit	HW1172783-A (-A00) HW1172783-A/U (-B00)	YASKAWA Electric Corporation	1	1	
B	30	Wire harness in manipulator ²⁾	HW1173731-A	YASKAWA Electric Corporation	1	1	
B	31	Lead wire for B- and T-axes ²⁾	HW1173729-A	YASKAWA Electric Corporation	1	1	
B	32	Relay lead wire for internal user I/O wiring harness	HW1471246-A	YASKAWA Electric Corporation	1	1	
B	33	Battery pack	HW9470932-A	YASKAWA Electric Corporation	1	-	Backup for B- and T-axis motor when replacing the lead wire for B- and T-axes
C	34	Bypass cable	HW1471212-A	YASKAWA Electric Corporation	1	-	Signal cable for temporary restoration in case of failure

Table 10-1: Spare Parts for the YR-1-06VX8-A00(B00) (Sheet 3 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
C	35	S- and L-axis AC servomotor	SGM7J-04APK-YR1*	YASKAWA Electric Corporation	1	2	
C	36	U-axis AC servomotor	SGM7J-02APK-YR1*	YASKAWA Electric Corporation	1	1	
C	37	R-axis AC servomotor	SGM7J-01APK-YR1*	YASKAWA Electric Corporation	1	1	
C	38	B- and T-axis AC servomotor	SGM7A-01APK-YR1*	YASKAWA Electric Corporation	1	2	
C	39	Lead wire for S-axis power	HW1372681-B	YASKAWA Electric Corporation	1	1	Lead wire between S-axis motor and the wire harness in manipulator
C	40	Lead wire for L- and U-axis power	HW1372681-A	YASKAWA Electric Corporation	1	2	Lead wire between L- and U-axis motor and the wire harness in manipulator
C	41	Lead wire for R-axis power	HW1372679-A	YASKAWA Electric Corporation	1	1	Lead wire between R-axis motor and the wire harness in manipulator
C	42	Multi-port connector	HW1384619-A	YASKAWA Electric Corporation	1	3	
C	43	Power supply board	HW1384624-A JARCR-APU01-A	YASKAWA Electric Corporation	1	1	
C	44	Dummy connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For the axes detachment function
B	45	Solenoid valve unit (1 pair)	HW2370502-C	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only
B	46	Solenoid valve unit (2 pairs)	HW2370502-B	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only
B	47	Solenoid valve unit (3 pairs)	HW2370502-A	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only

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.

2 The type varies depending on the time of shipment. Contact your YASKAWA representative when placing an order.

Table 10-2: Spare Parts for the YR-1-06VX7-A00(B00) (Sheet 1 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
A	1	Grease	Harmonic Grease SK-1A	Harmonic Drive Systems Co., Ltd.	2.5 kg	-	
A	2	Grease	MP1	NIPPON GREASE Co.,Ltd	2.5 kg	-	
A	3	Adhesive	CEMEDINE 575F	CEMEDINE Co.,Ltd	1	-	
A	4	Adhesive	LOCTITE 243	Henkel Japan Ltd	1	-	
A	5	Adhesive	LOCTITE 638	Henkel Japan Ltd	1	-	
A	6	Adhesive	LOCTITE 518	Henkel Japan Ltd	1	-	
A	7	Liquid gasket	TB1206C	ThreeBond Co., Ltd.	1	-	
A	8	Battery pack	HW1483880-A	YASKAWA Electric Corporation	1	3	
A	9	Lead wire for battery replacement	HW1471281-A	YASKAWA Electric Corporation	1	-	
A	10	Gasket	HW1407740-1	YASKAWA Electric Corporation	1	1	For base bottom cover
A	11	Gasket	HW1407738-1	YASKAWA Electric Corporation	1	2	For the connector base
A	12	Gasket	HW1407739-1	YASKAWA Electric Corporation	1	1	For the connector base
A	13	Gasket	HW1406930-1	YASKAWA Electric Corporation	1	1	For the S-head cover
A	14	Gasket	HW1305694-1	YASKAWA Electric Corporation	1	2	For the L-arm cover
A	15	Gasket	HW2401823-1	YASKAWA Electric Corporation	1	1	For the casing cover
A	16	Gasket	HW1305695-1	YASKAWA Electric Corporation	1	2	For the U-arm cover
A	17	Grease kit for replenishment	HW1484274-A	YASKAWA Electric Corporation	1	-	
B	18	L-axis timing belt	100Ceptor-X S5M380	Bando Chemical Industries, Ltd.	1	1	
B	19	U-axis timing belt	100Ceptor-X S5M590	Bando Chemical Industries, Ltd.	1	1	
B	20	R-axis timing belt	BG222UP3M6-HC	Tsubakimoto Chain Co.	1	1	
B	21	B-axis timing belt	BG525UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	22	T-axis timing belt	BG354UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	23	Replacement Kit for S-axis Speed Reducer ¹⁾	HW1484240-B	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384531-A
B	24	Replacement Kit for L-axis Speed Reducer ¹⁾	HW1484242-B	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384227-B
B	25	Replacement Kit for U-axis Speed Reducer ¹⁾	HW1484243-B	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384226-B

Table 10-2: Spare Parts for the YR-1-06VX7-A00(B00) (Sheet 2 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
B	26	Replacement Kit for R-axis Speed Reducer ¹⁾	HW1484244-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW0388708-A
B	27	Replacement Kit for B-axis Speed Reducer ¹⁾	HW1484245-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384236-A
B	28	Replacement Kit for T-axis Speed Reducer ¹⁾	HW1484246-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384235-A
B	29	Wrist unit	HW1172783-A (-A00) HW1172783-A/U (-B00)	YASKAWA Electric Corporation	1	1	
B	30	Wire harness in manipulator ²⁾	HW1173731-B	YASKAWA Electric Corporation	1	1	
B	31	Lead wire for B- and T-axes ²⁾	HW1173729-B	YASKAWA Electric Corporation	1	1	
B	32	Relay lead wire for internal user I/O wiring harness	HW1471246-A	YASKAWA Electric Corporation	1	1	
B	33	Battery pack	HW9470932-A	YASKAWA Electric Corporation	1	-	Backup for B- and T-axis motor when replacing the lead wire for B- and T-axes
C	34	Bypass cable	HW1471212-A	YASKAWA Electric Corporation	1	-	Signal cable for temporary restoration in case of failure
C	35	S-and L-axis AC servomotor	SGM7J-04APK-YR1*	YASKAWA Electric Corporation	1	2	
C	36	U-axis AC servomotor	SGM7J-02APK-YR1*	YASKAWA Electric Corporation	1	1	
C	37	R-axis AC servomotor	SGM7J-01APK-YR1*	YASKAWA Electric Corporation	1	1	
C	38	B- and T-axis AC servomotor	SGM7A-01APK-YR1*	YASKAWA Electric Corporation	1	2	
C	39	Lead wire for S-axis power	HW1372681-B	YASKAWA Electric Corporation	1	1	Lead wire between S-axis motor and the wire harness in manipulator
C	40	Lead wire for L- and U-axis power	HW1372681-A	YASKAWA Electric Corporation	1	2	Lead wire between L- and U-axis motor and the wire harness in manipulator
C	41	Lead wire for R-axis power	HW1372679-A	YASKAWA Electric Corporation	1	1	Lead wire between R-axis motor and the wire harness in manipulator
C	42	Multi-port connector	HW1384619-A	YASKAWA Electric Corporation	1	3	
C	43	Power supply board	HW1384624-A JARCR-APU01-A	YASKAWA Electric Corporation	1	1	

Table 10-2: Spare Parts for the YR-1-06VX7-A00(B00) (Sheet 3 of 3)

Rank	Parts No.	Name	Type	Manufacturer	Qty.	Qty. per Unit	Remarks
C	44	Dummy connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For the axes detachment function
B	45	Solenoid valve unit (1 pair)	HW2370502-C	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only
B	46	Solenoid valve unit (2 pairs)	HW2370502-B	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only
B	47	Solenoid valve unit (3 pairs)	HW2370502-A	YASKAWA Electric Corporation	1	1	For the CKD M4SA0 series solenoid valve built-in specifications only

- 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.
- 2 The type varies depending on the time of shipment. Contact your YASKAWA representative when placing an order.

MOTOMAN-GP8/AR700, -GP7/AR900 INSTRUCTIONS

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

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