The Americas YASKAWA Representative

- 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

YASKAWA

MOTOMAN-GP8,-GP7
INSTRUCTIONS

TYPE:
YR-1-06VX8-F40 (FOOD-GRADE GREASE SPECIFICATIONS)
YR-1-06VX7-F40 (FOOD-GRADE GREASE SPECIFICATIONS)
YR-1-06VX8-F41 (SPECIAL SURFACE TREATMENT FOR FOOD SPECIFICATIONS)

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

MOTOMAN INSTRUCTIONS

MOTOMAN-GP8,-GP7 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)*

Part Number: 194559-1CD
Revision: 0

MANUAL NO.
HW1486547

DANGER

- This instruction manual is intended to explain mainly on the mechanical part of the MOTOMAN-GP8, -GP7 for the application to the actual operation and for proper maintenance and inspection. It describes on safety and handling, details on specifications, necessary items on maintenance and inspection, to explain operating instructions and maintenance procedures. Be sure to read and understand this instruction manual thoroughly before installing and operating the manipulator. Any matter not described in this manual must be regarded as “prohibited” or “improper”.
- General information related to safety are described in “Chapter 1. Safety” of the YRC1000/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 manipulator.

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.

At any rate, be sure to follow these important items.

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

DANGER

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

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

WARNING

- Maintenance and inspection must be performed by specified personnel.

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

- For disassembly or repair, contact your YASKAWA representative.

<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 <YRC1000/YRC1000micro>

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

Explanation of Warning Labels

The following warning labels are attached to the manipulator.

Always follow the warnings on the labels.

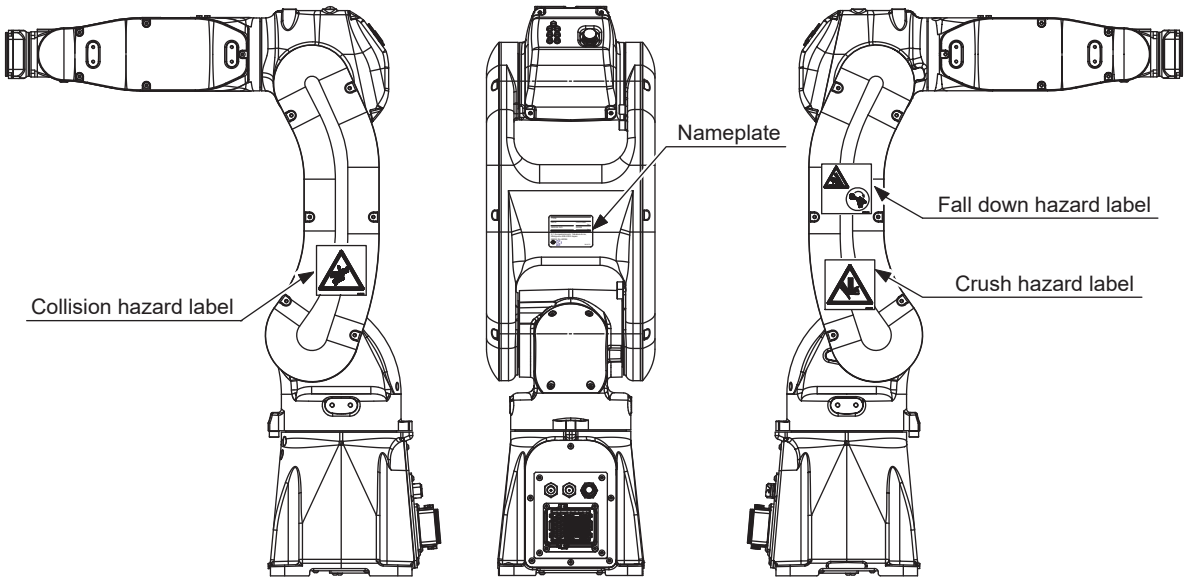
Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.

However, for the YR-1-06VX8-F41 (special surface treatment for food specification), the warning labels are included. Affix to a highly visible location, such as on the peripheral equipment of the manipulator, and strictly observe the instructions on the label. If necessary, provide a plate for affixing the label.

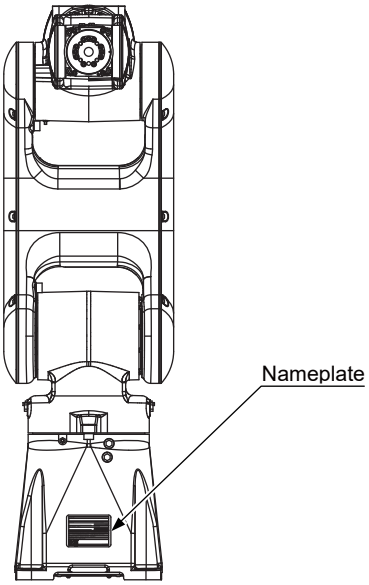
(The operating range labels and hanging labels that are non-warning labels are also included.)

Fig. : Warning Label Locations

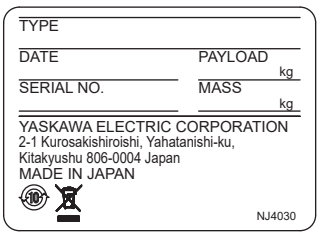
•YR-1-06VX8-F40, YR-1-06VX7-F40



•YR-1-06VX8-F41



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.

Contents

1 Product Confirmation

CAUTION

- Confirm that the manipulator and the YRC1000/YRC1000micro have the same order number. Pay special attention when installing two or more manipulators.

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

1.1 Contents Confirmation

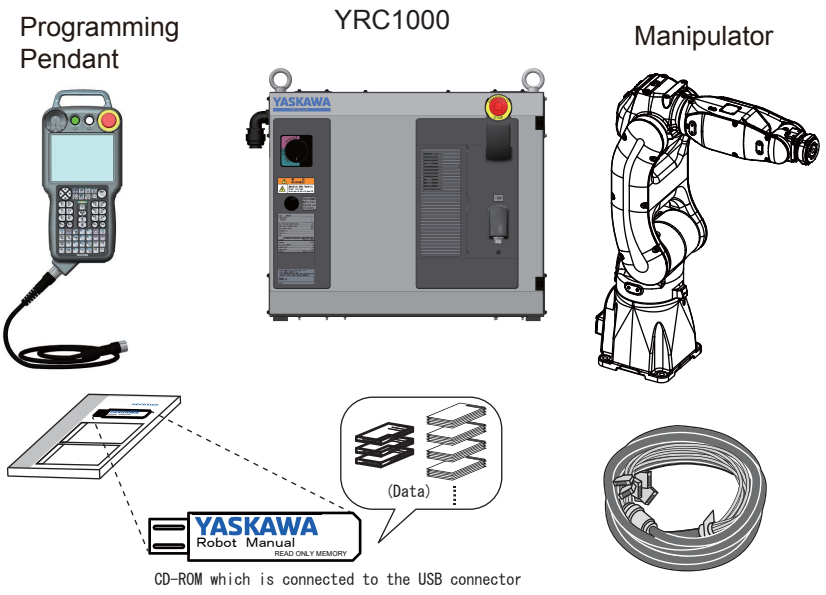
■ YRC1000

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

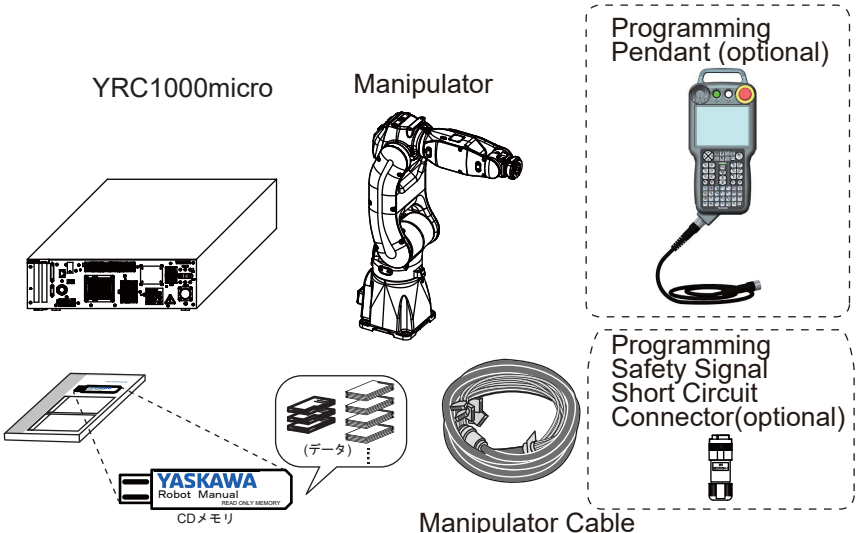


■ YRC1000micro

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)



Complete Set of Manuals
(in the CD-ROM which is connected to the USB connector)

Accessories of Manipulator (YRC1000/YRC1000micro)	**Pcs**
Hexagon socket head cap screw M10 (length:35 mm) *High strength stainless*	4
Conical spring washer M10 *Stainless*	4
Hexagon head screw M8 (length: 12 mm) *Stainless* (-F41 only)	2
Warning label (-F41 only)	3
Hanging label (-F41 only)	1
Operating range label (-F41 only)	1
Model label (-F41 only)	1
YASKAWA logo label (-F41 only)	2
Home position mark (-F41 only)	11
Coordination label (optional) (-F41 only)	2
Destination-only label (optional) (-F41 only)	1

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)

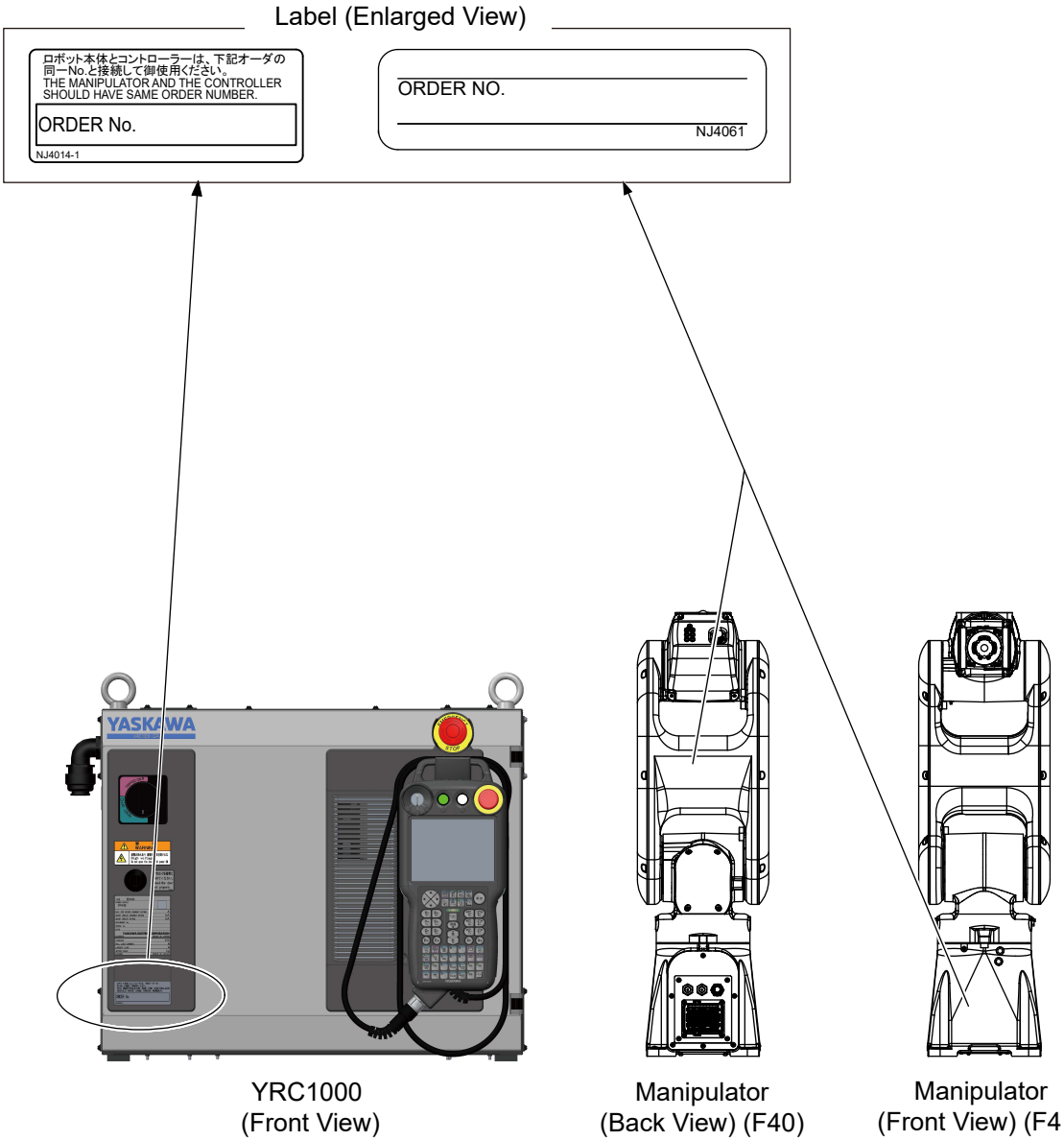
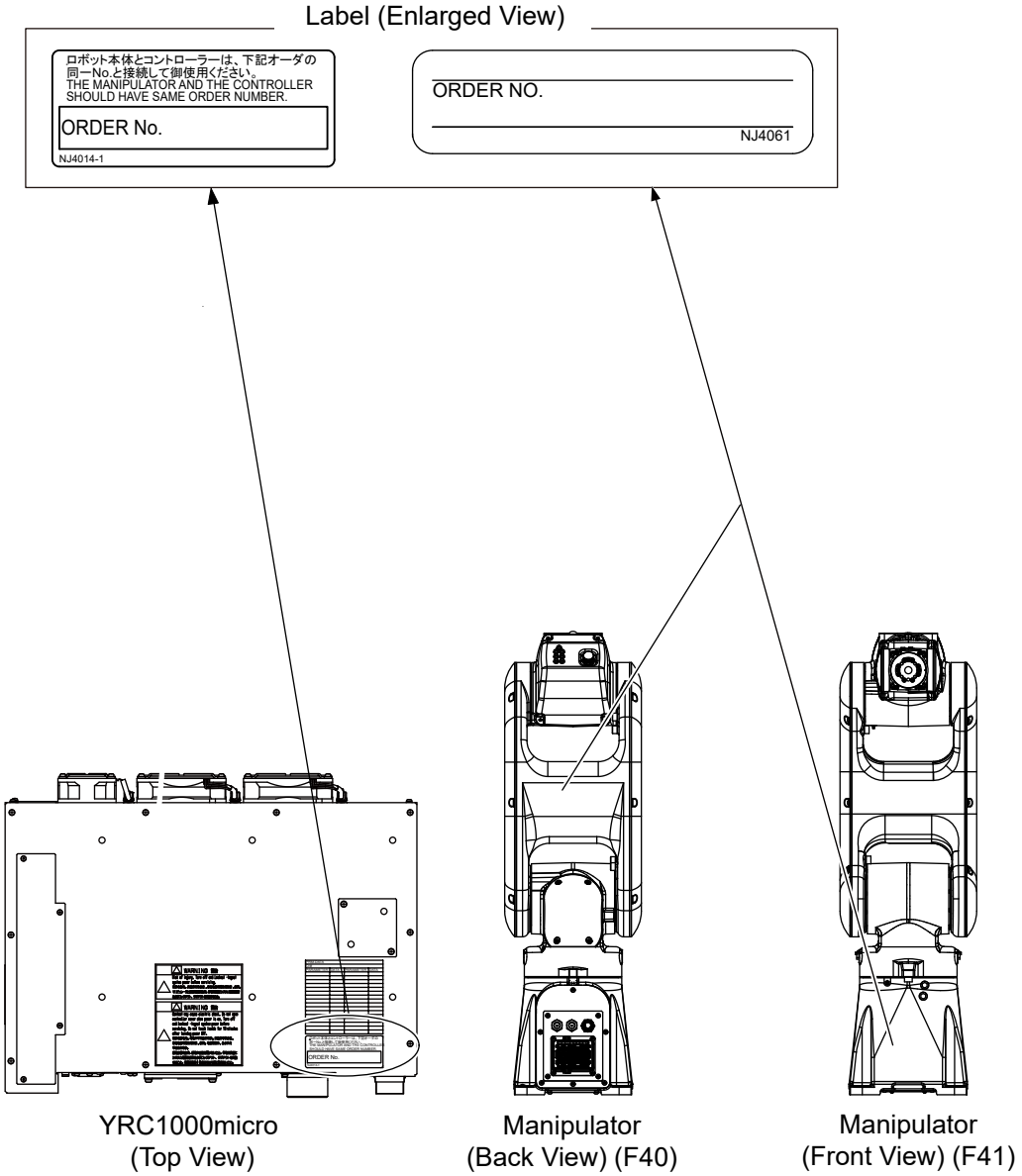


Fig. 1-1(b): Location of Order Number Labels (YRC1000micro)



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

NOTE

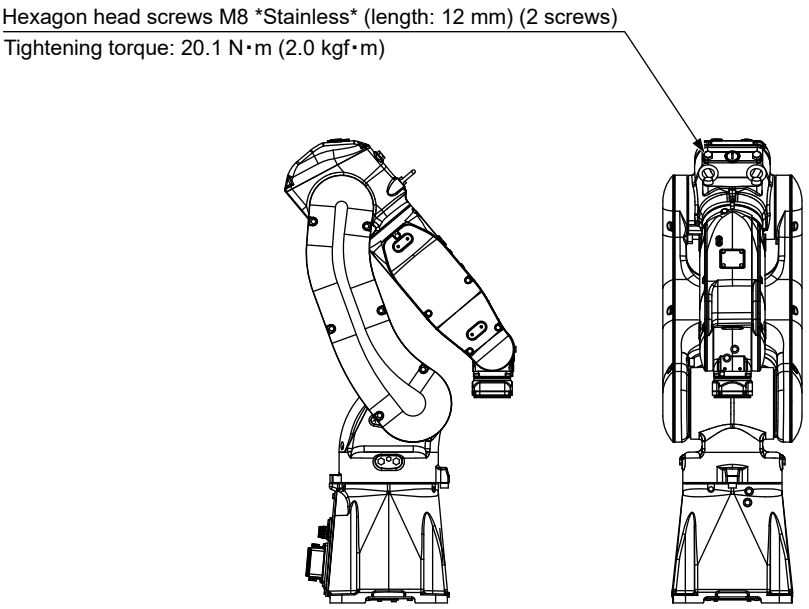
- Eyebolts are accessories that are mounted to the manipulator from the time of shipping. Check that the eyebolts are securely fastened.
- The weight of the manipulator is approximately 35kg for GP8, 37kg for GP7 (including the shipping bolts and brackets). Use a wire rope strong enough to withstand the weight.
- Attached eyebolts 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.
- After installation, remove the eyebolts. Be sure to keep these eyebolts in a safe place because they will be needed for transportation when the manipulator is moved.

2 Transporting
2.1 Transporting Method

The YR-1-06VX8-F41 (special surface treatment for food specification) is mounted with two eyebolts and two hexagon head screws M8 (length:12 mm) . After installation, remove the eyebolts and mount the two hexagon head screws M8 (length:12 mm) that were included.

Mount the hexagon head screws at the locations shown in *fig. 2-1 “Hexagon Head Screw Mounting Locations (YR-1-06VX8-F41)”* .

Fig. 2-1: Hexagon Head Screw Mounting Locations (YR-1-06VX8-F41)

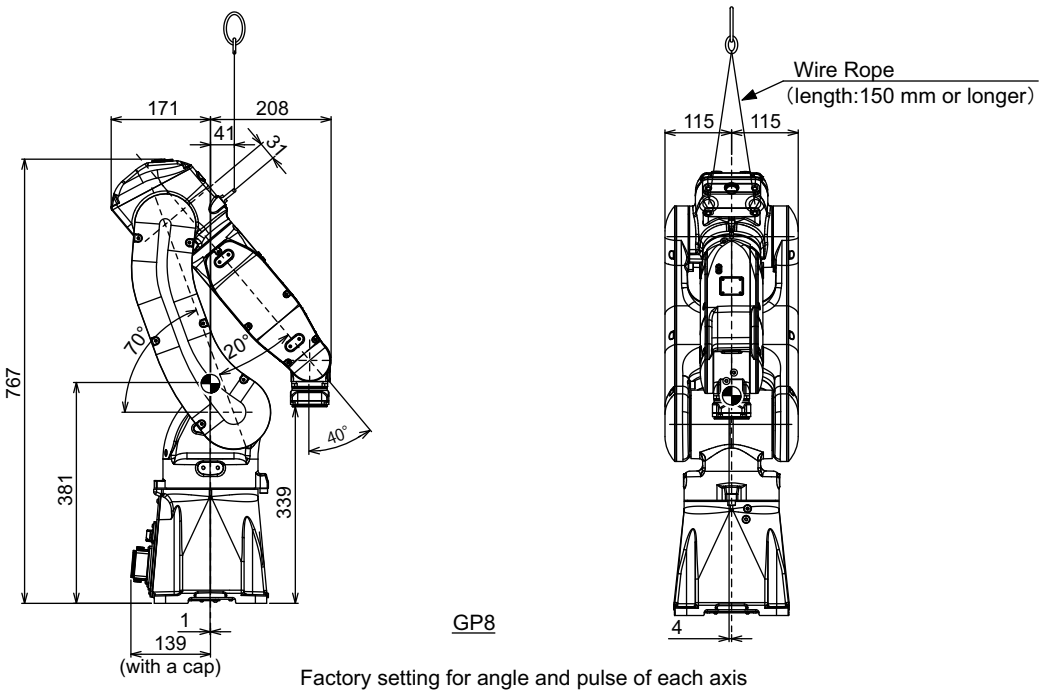


2.1.1 Using a Crane

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

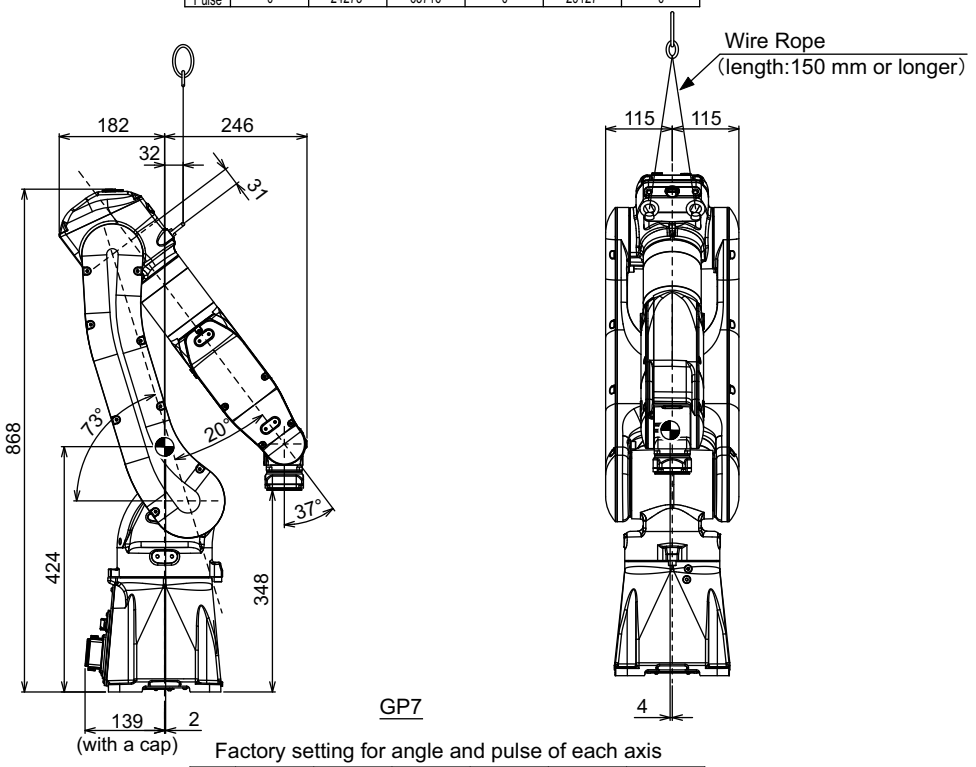
Be sure to lift the manipulator in the posture as shown in *fig. 2-2 "Transporting Position (factory setting)"* . The length of the wire rope must be 150 mm or longer. (◔ indicates the position of the center of gravity).

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



Factory setting for angle and pulse of each axis

Axis	S	L	U	R	B	T
Angle	0°	-20°	-70°	0°	-40°	0°
Pulse	0	-24273	-63716	0	-29127	0



Factory setting for angle and pulse of each axis

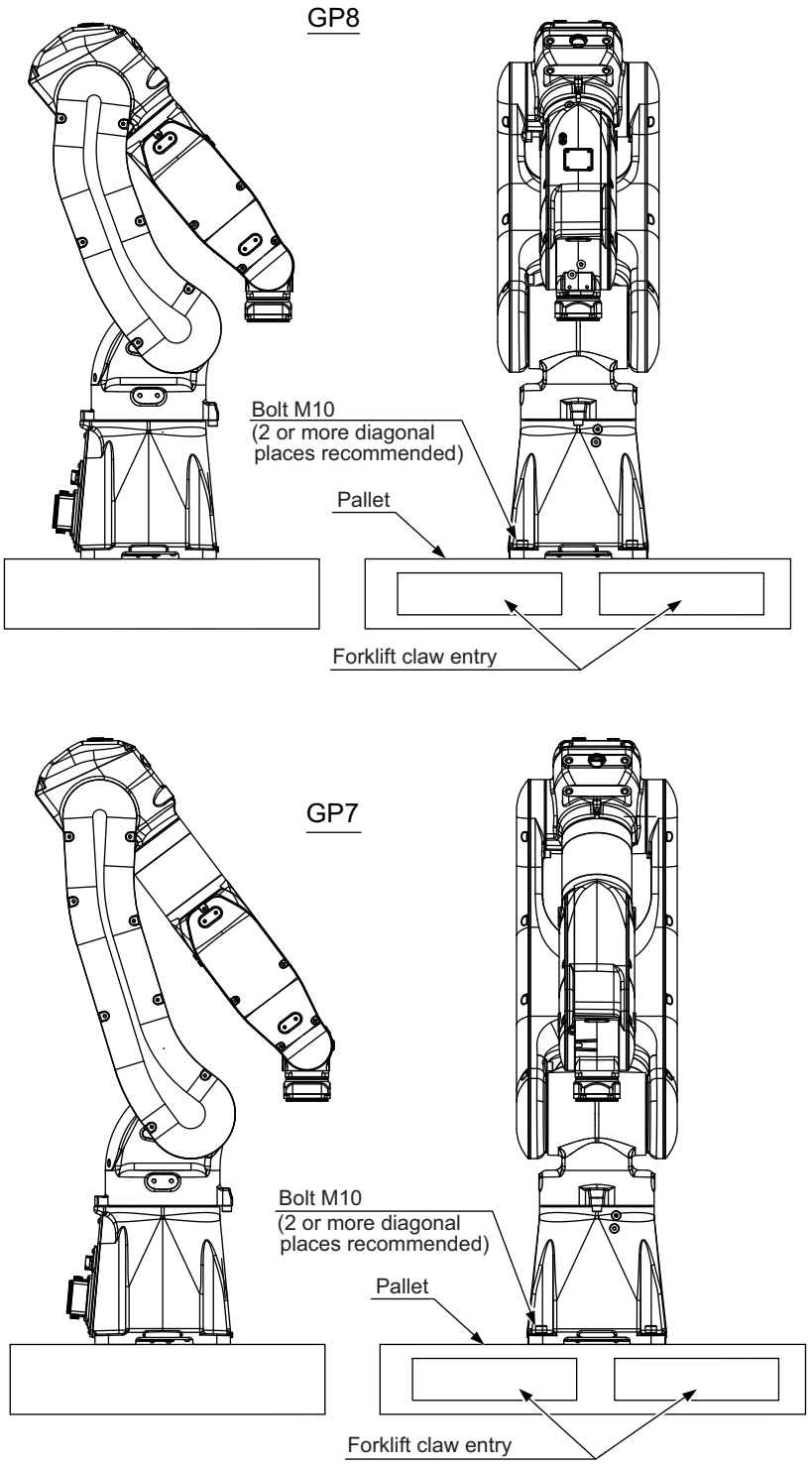
Axis	S	L	U	R	B	T
Angle	0°	-17°	-70°	0°	-37°	0°
Pulse	0	-25790	-79644	0	-26943	0

2.1.2 Using a Forklift

When using a forklift, put a pallet under the manipulator in the posture as shown in *fig. 2-3 "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. 2-3: Using a Forklift



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 thepower cable is being connected.

Failure to observe this instruction may result in damage to an electricdevice 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 waring 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.

3.1 Installation of the Safety fence

To insure safety, be sure to install 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"* , *table 3-1(b) "Reaction Force and Torque of GP7"* .

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

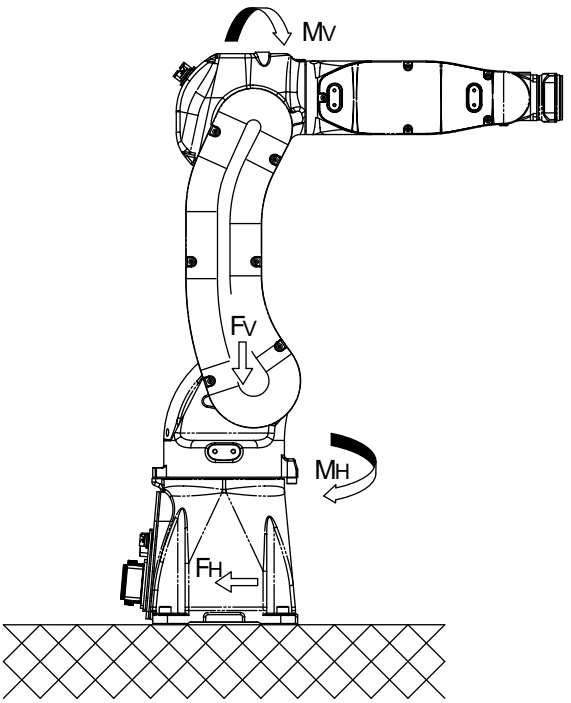
Table 3-1(a): Reaction Force and Torque of GP8

	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)

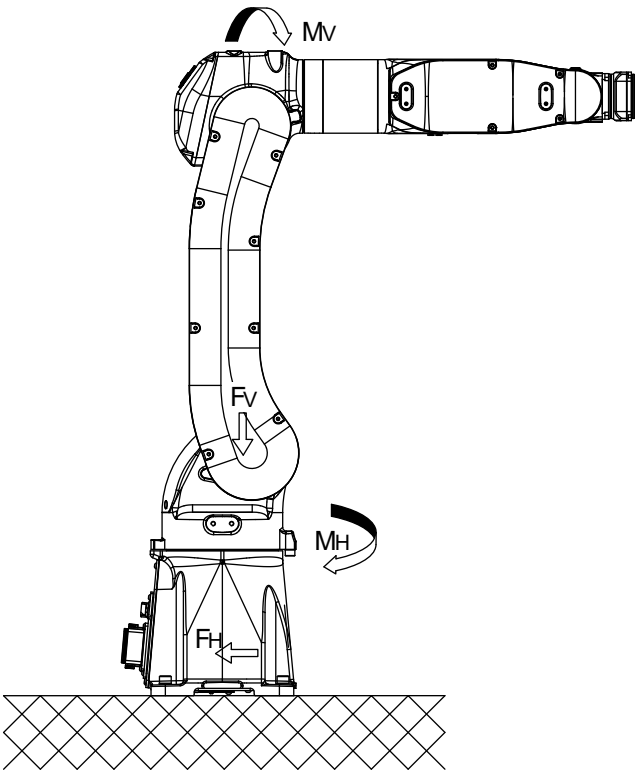
Table 3-1(b): Reaction Force and Torque of GP7

	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)

Fig. 3-1: Manipulator Reaction Force and Torque



GP8



GP7

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.

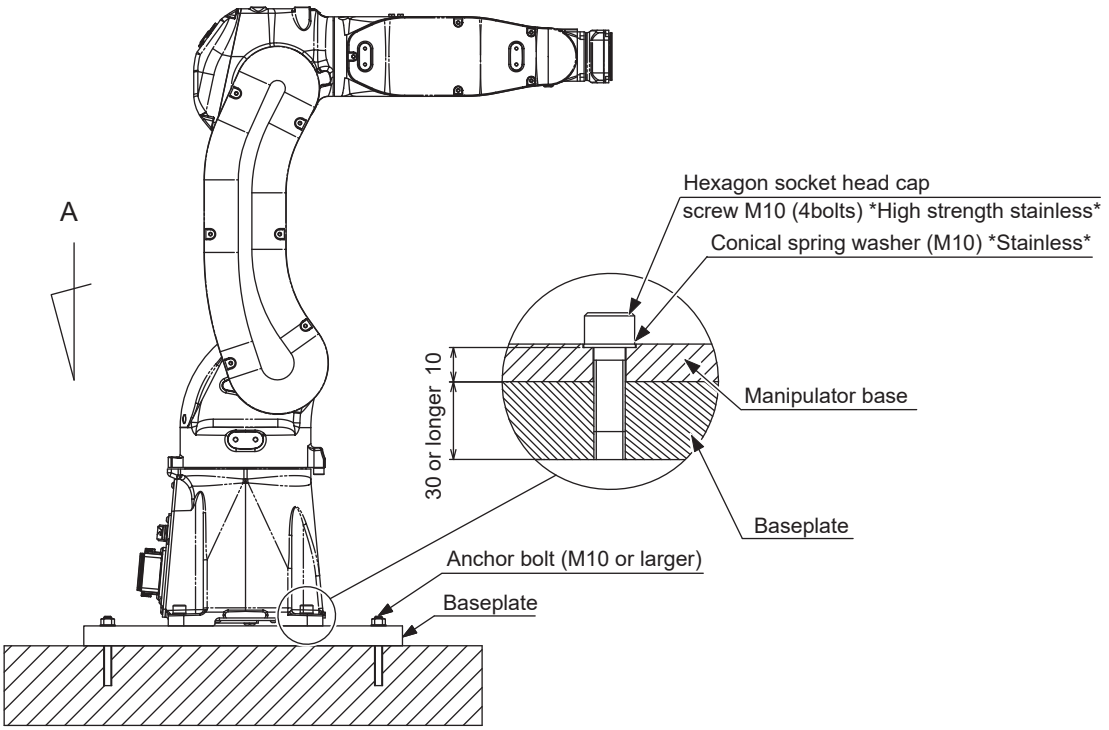
The manipulator base is tapped for four mounting holes.
Fix the manipulator base to the baseplate with the four hexagon socket head cap screws M10 *High strength stainless* (Tensile strength: 1000N/mm^2, recommended length: 35 mm) by using the tightening torque 48N･m.

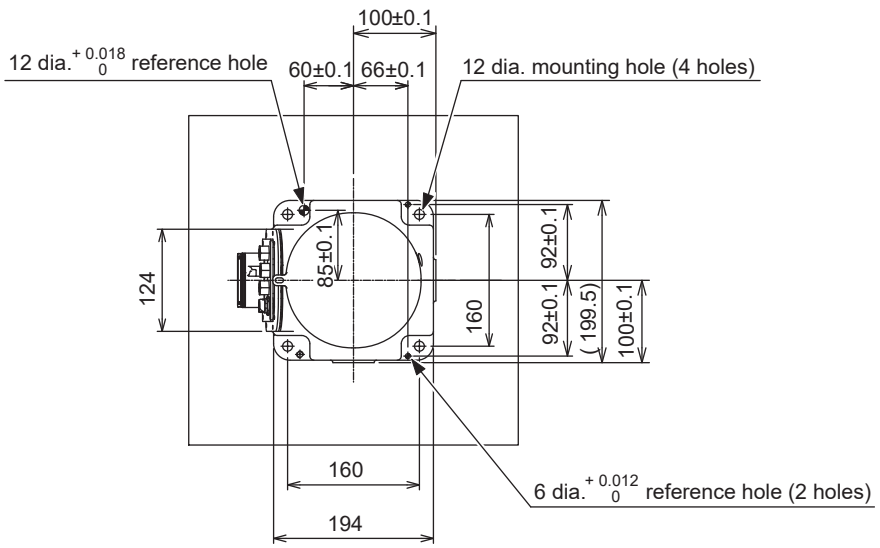
The hexagon head cap screws and the anchor bolts must be tightened firmly so that they will not work loose during the operation.

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 reinstallation 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)”* .

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



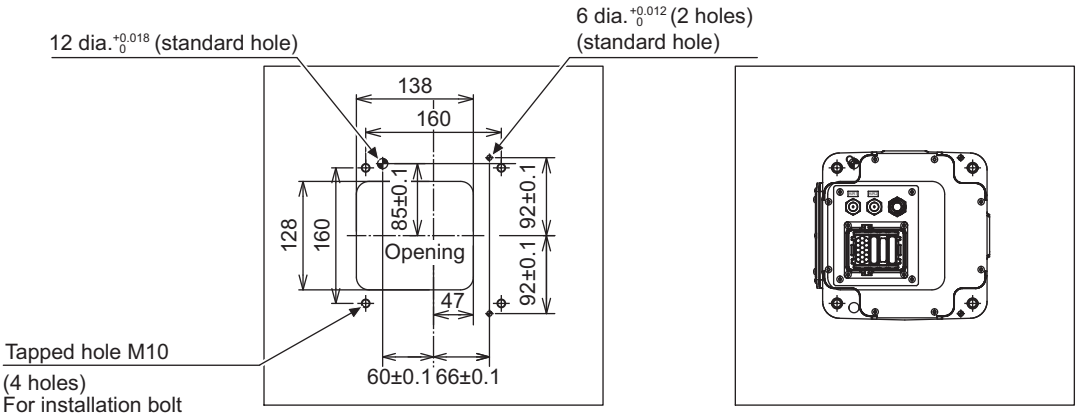


View A

<Optional: Manipulator Cable on the Bottom>

Prepare the base plate 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

When Installing Manipulator (Bottom View)

3.3 Mounting Method

The MOTOMAN-GP8, -GP7 are available in four types: floor-mounted, wall-mounted, tilt-mounted and ceiling-mounted.
For wall-mounted, tilt-mounted and ceiling-mounted type, the two points listed below are different from the floor-mounted type.

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

3.3.1 S-Axis Operating Range

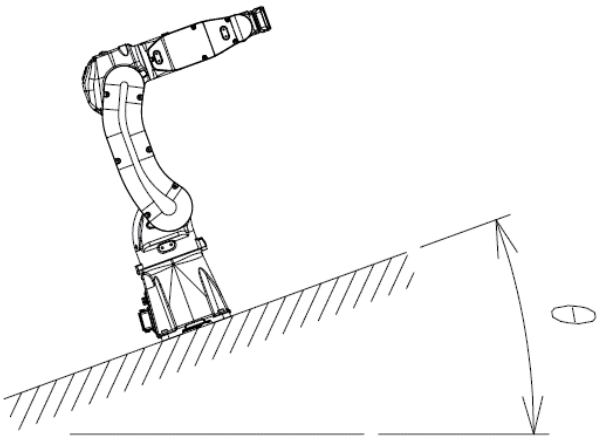
For the wall-mounted way, the S-axis operating range is ±30°. (Optional)

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° ≤ θ ≤ 30°	within ±170° (no limit)
30° < θ ≤ 35°	within ±60°
35° < θ ≤ 45°	within ±45°
45° < θ	within ±30°

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



When installing a tilt-mounted, wall-mounted, or ceiling-mounted type, be sure to enter the ground installation angle on the programming pendant.

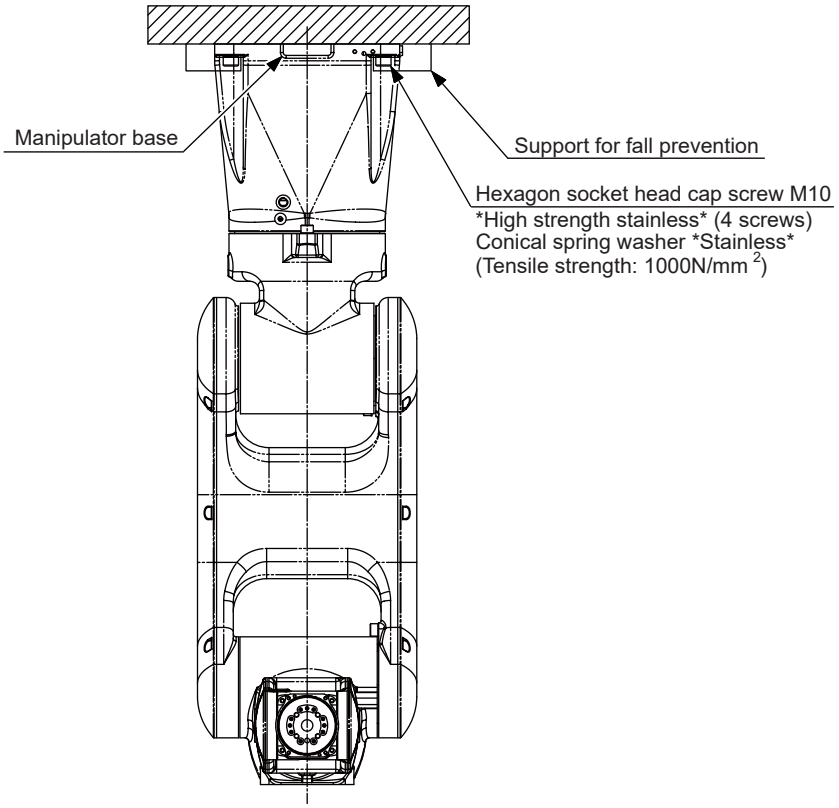
NOTE

For details on how to enter the data, refer to chapter 8.4 “ARM Control” in “YRC1000 INSTRUCTIONS (RE-CTO-A221)/YRC1000micro INSTRUCTIONS (RE-CTO-A222)”. Be sure to also change the S-axis operating range angle. For details on the change procedure, refer to *chapter 5.6 “Alterable Operating Range of S-axis”* .

3.3.2 Precautions to Prevent the Manipulator from Falling

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

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



NOTE In case of using the wall-/ceiling-mounted way, inform YASKAWA of the matter when placing an order. Be sure to contact your YASKAWA representative to execute a wall/ ceiling installation on site.

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-F40 YR-1-06VX7-F40 YR-1-06VX8-F41
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

NOTE

When operating the manipulator after it has been dormant in an environment at low temperatures of 15°C or less, an alarm may occur due to resistance in the drive unit for some jobs performed by the customer.

Before starting operation, perform breaking-in operation (warm-up operation) to ensure that the wrist axis is fully operational.

3.5 Notes on Dust-Proof/Water-Proof Specifications

The MOTOMAN-GP8, -GP7 manipulators conform to IP67.

NOTE

< Definition of IP (protection class) >

• Definition of IP67

IP6□: Protection from the entry of dust.

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

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.
- For YR-1-06VX8-F41 (special surface treatment for food specification), we have verified resistance to the chemicals shown in *chapter 3.6 "Resistance to Chemicals"* . For details, refer to section *chapter 3.6*.

3.6 Resistance to Chemicals

YR-1-06VX8-F41 (special surface treatment for food specification) applies the chemical-proof materials or surface treatment, which can resist the acid or alkaline cleaning fluid. Therefore, the manipulator can be cleaned by blowing the cleaning fluid directly.

Use the following surface-resistant cleaning fluids listed in the table below.

Table 3-4: Cleaning Fluids with Confirmed Cleaning Resistance

Cleaning Fluid Name	Manufacturer	Acid or Alkaline	Main Component	PH	Dilution Ratio
Ratner W54	Nippon Kayaku Food Techno Co., Ltd.	Weak acid	Ethanol	PH 6	-
Topax191	ECOLAB	Alkaline	Sodium hydroxide	PH 12.7 to 13.2	3% or less
Topax56	ECOLAB	Acid	Phosphoric acid	PH 12.7 to 13.2	3% or less
Topactive DES	ECOLAB	Acid	Acetic acid	PH 2 to 3	1% or less
Share Form Protect	Creo Co., Ltd.	Alkaline	Potassium hydroxide	PH 11.5	3% or less

NOTE

- Use the cleaning fluid after being diluted to each concentration. However, if using a cleaning fluid that is not listed in the table above, contact your YASKAWA representative before use.
- After washing or before using the manipulator, make sure to confirm that there is no abnormality of the manipulator, such as external damage or wear. Contact your YASKAWA representative if there is any abnormality.
- Never use hypochlorous acid for washing.
- Do not use high-pressure cleaners.
- The cleaning fluid listed in the above table may be restricted by law or difficult to obtain, depending on the country / region where the robot is used. Use in accordance with the laws of each country.
- Immediately after cleaning, completely wipe off the cleaning fluid or wash away the fluid with water. For gaps and drainage holes, be sure to drain the fluid sufficiently using an air blower. Incomplete wiping or washing may cause the robot's surface to become discolored or corroded.

4 Wiring

WARNING

- Ground resistance must be 100 Ω or less.

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

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

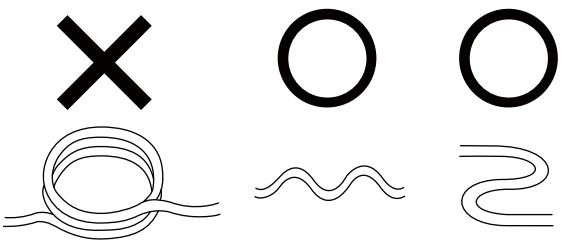
Failure to observe this warning may result in electric shock and/or personal injury.

- Wiring must be performed by authorized or certified personnel.

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

- When laying the cables from the manipulator to the YRC1000/ 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.



4.1 Grounding

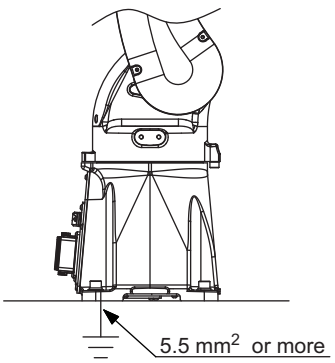
Follow the electrical installation standards and wiring regulations for grounding. A ground wire of 5.5 mm^2 or more is recommended.

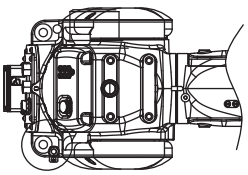
Refer to *fig. 4-1 "Grounding Method (GP8, GP7)"* to connect the ground line directly to the manipulator.

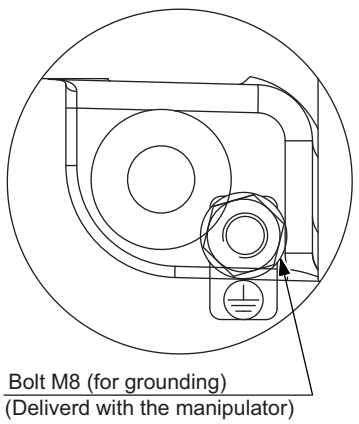
NOTE

- Never use this wire sharing with other ground lines or grounding electrodes for other electric power, motor power, welding devices, etc.
- Where metal ducts, metallic conduits, or distributing racks are used for cable laying, ground in accordance with electrical installation standards.
- If the base of the manipulator will be used in an environment where it will be exposed to cleaning fluids or similar substances, use a ground wire that has anti-corrosion treatment.

Fig. 4-1: Grounding Method (GP8, GP7)







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 "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.

■ 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 degree forward automatically.
2. Push the lever with hand and turn it (about 30 degree) until the lock is clicked.

■ Procedures for removing the connector

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

Fig. 4-2: Connection of Manipulator Cable

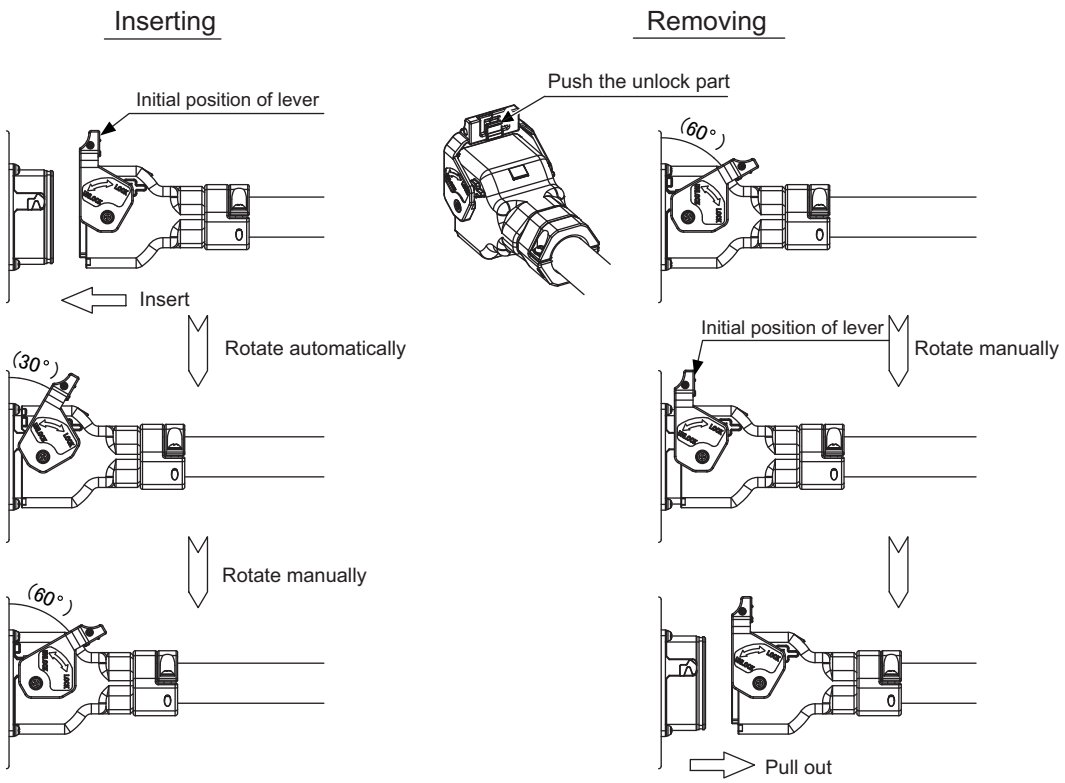


Fig. 4-3(a): Manipulator Cable for YRC1000

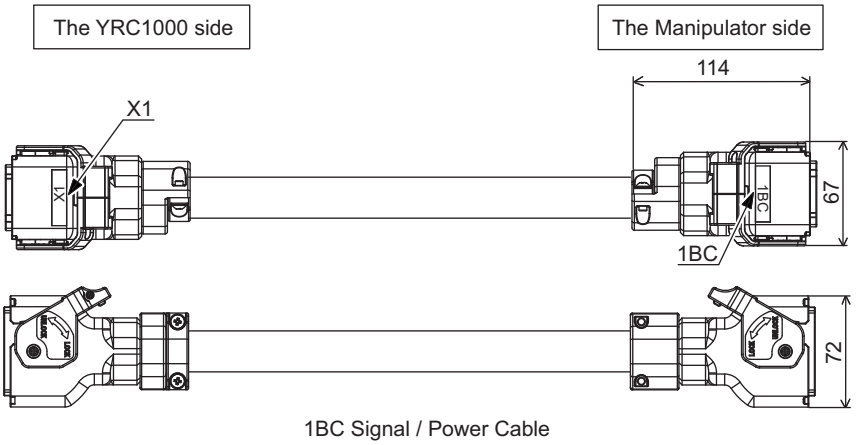


Fig. 4-3(b): Manipulator Cable for YRC1000micro)

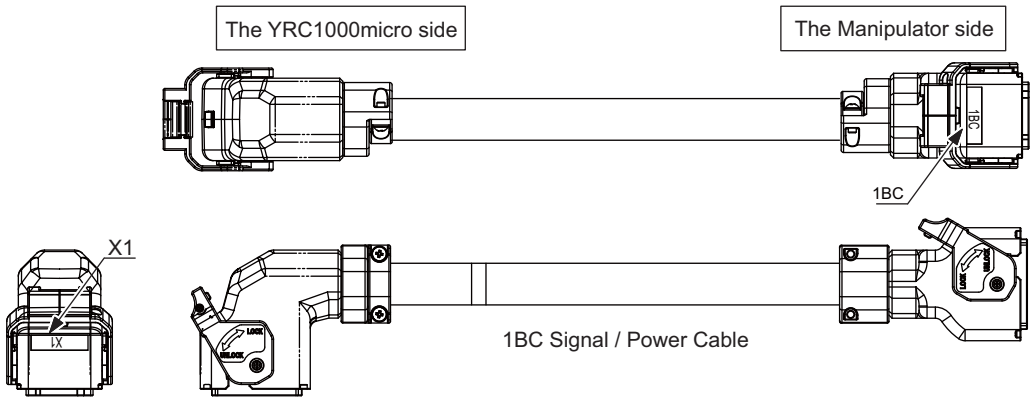


Fig. 4-4: Manipulator Cable Connection (Manipulator Side)

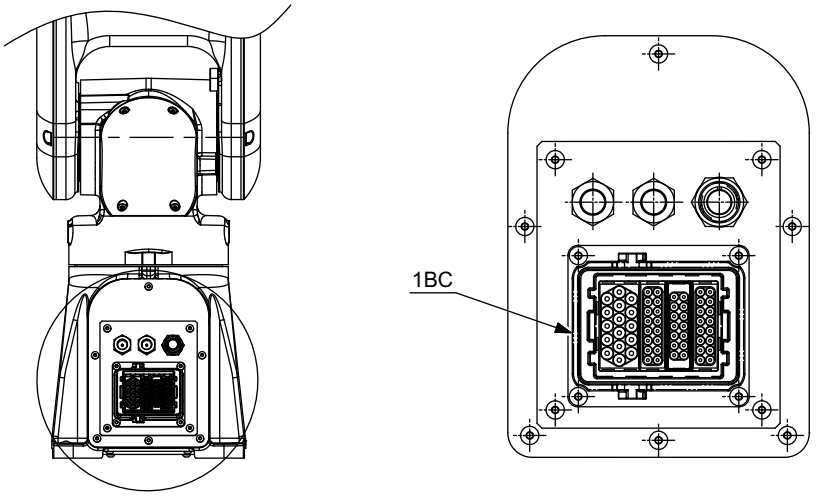


Fig. 4-5(a): Manipulator Cable Connection (YRC1000 Side)

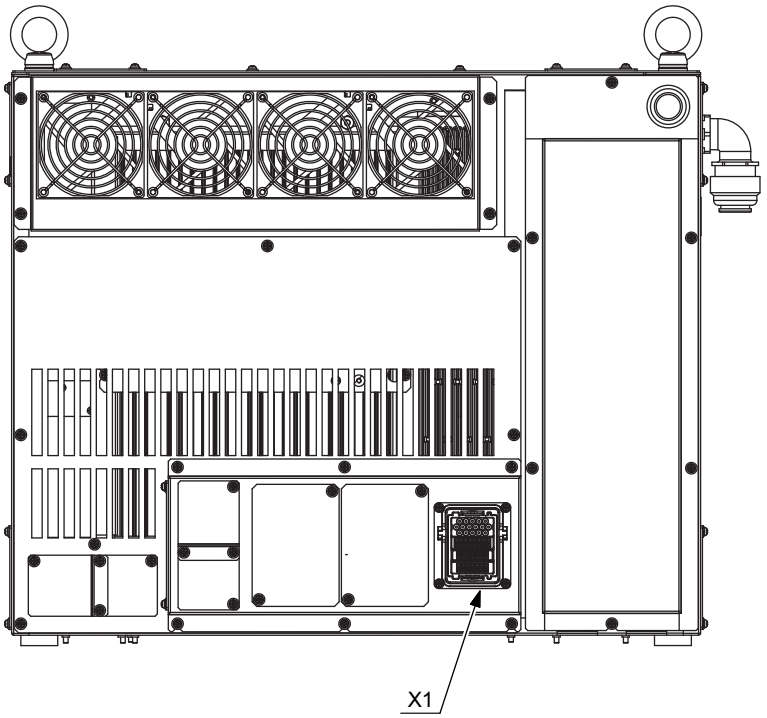


Fig. 4-5(b): Manipulator Cable Connection (YRC1000micro Side)

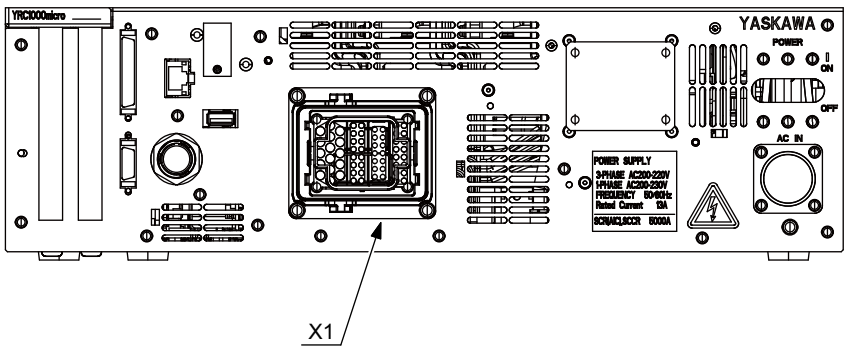
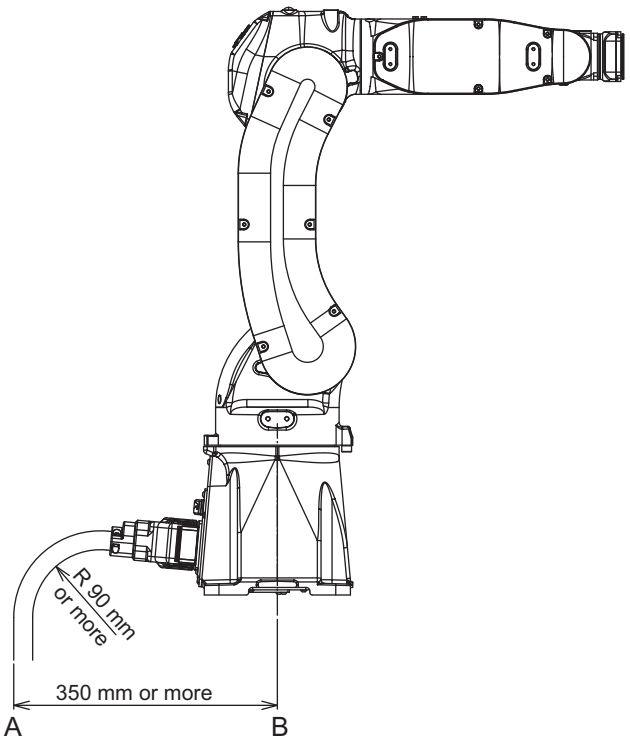


Table 4-1: Specifications of Manipulator Cable

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: Manipulator Cable Connection (Manipulator Side)



5 Basic Specifications

YR-1-06VX8-F40/YR-1-06VX7-F40 (food-grade grease specification) has the following features for the food processing market.

- Use of food-grade grease
- Can be wiped clean with water

YR-1-06VX8-F41 (special surface treatment for food specification) has the following features for the food processing market.

- Use of food-grade grease
- Use of special surface treatment that eliminates the risk of paint peeling
- Special surface treatment enables cleaning with detergents (refer to *chapter 3.6 “Resistance to Chemicals”*
- Washable in cold water

For its main applications, YR-1-06VX8-F40/YR-1-06VX7-F40 (food-grade grease specification) is recommended for use in post-packaging processes.

YR-1-06VX8-F41 (special surface treatment for food specification) is intended for use in pre-packaging processes.

5.1 Basic Specifications

Table 5-1: Basic Specifications (GP8)[1)]

Item \ Model		MOTOMAN-GP8
Structure		Vertically Articulated
Degree of freedom		6
Payload	Wrist part	8 kg
	U-arm[2)]	1 kg
Repeatability[3)]		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	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
Mounting method[5)]		Floor-, wall-, tilt-, ceiling-mounted,
Power Capacity		1 kVA
Applicable controller[6)]	YRC1000	ERAR-1000-06VX8-☐ *☐: Depends on the specification.
	YRC1000micro	ERBR-100-06VX8-☐ *☐: Depends on the specification.
Noise[7)]		75 dB or less

1 SI units are used in this table. However, gravitational unit is used in ( )
2 The load applied 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"* .
3 Conformed to ISO9283.
4 Refer to *fig. 6-1 "Moment Arm Rating"* for details on the allowable moment and the allowable inertia.
5 For the tilt-, and the wall-mounted way, S-axis has the limited operating range. For details, refer to *chapter 3.3.1 "S-Axis Operating Range"* .
6 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.
7 Conformed to equivalent continuous A-weighted sound pressure level measured in accordance with ISO11201(EN31201)
1, Measurement is carried out when the maximum load is mounted to the manipulator and operated in the maximum speed.
2, Measurement is carried out:
-between 1.2 m and 1.5 m above the ground.
-400 mm away from the P-point maximum envelope.

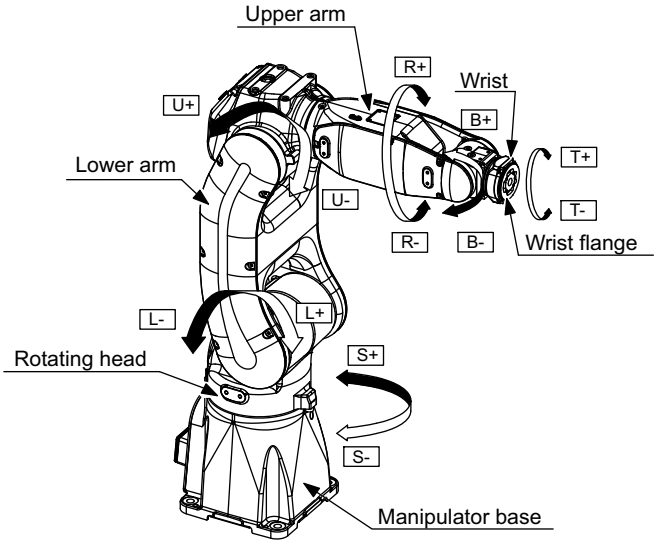
Table 5-2: Basic Specifications (GP7)[1)]

Item \ Model		MOTOMAN-GP7
Structure		Vertically Articulated
Degree of freedom		6
Payload	Wrist part	7 kg
	U-arm[2)]	1 kg
Repeatability[3)]		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	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
Mounting method[5)]		Floor-, wall-, tilt-, ceiling-mounted,
Power Capacity		1 kVA
Applicable controller[6)]	YRC1000	ERAR-1000-06VX8-☐ *☐: Depends on the specification.
	YRC1000micro	ERBR-100-06VX8-☐ *☐: Depends on the specification.
Noise[7)]		75 dB or less

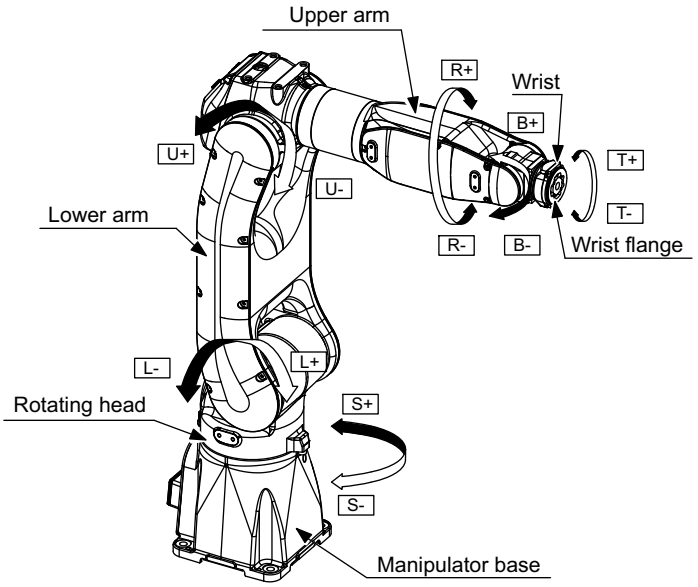
1 SI units are used in this table. However, gravitational unit is used in ( )
2 The load applied on the U-arm will vary depending on the load mass of the wrist part. For details, refer to *chapter 7.1.1 "Allowable Load"* .
3 Conformed to ISO9283.
4 Refer to *fig. 6-1 "Moment Arm Rating"* for details on the allowable moment and the allowable inertia.
5 For the tilt-, and the wall-mounted way, S-axis has the limited operating range. For details, refer to *chapter 3.3.1 "S-Axis Operating Range"* .
6 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.
7 Conformed to equivalent continuous A-weighted sound pressure level measured in accordance with ISO11201(EN31201)
1, Measurement is carried out when the maximum load is mounted to the manipulator and operated in the maximum speed.
2, Measurement is carried out:
-between 1.2 m and 1.5 m above the ground.
-400 mm away from the P-point maximum envelope.

5.2 Part Names and Working Axes

Fig. 5-1: Part Names and Working Axes



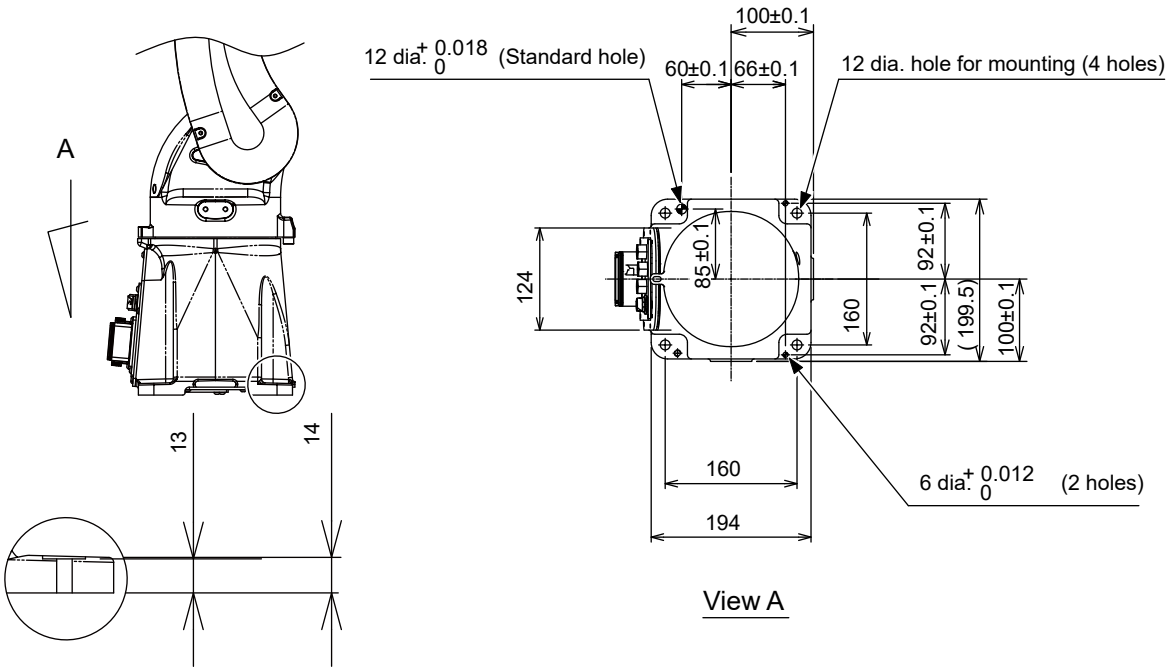
GP8



GP7

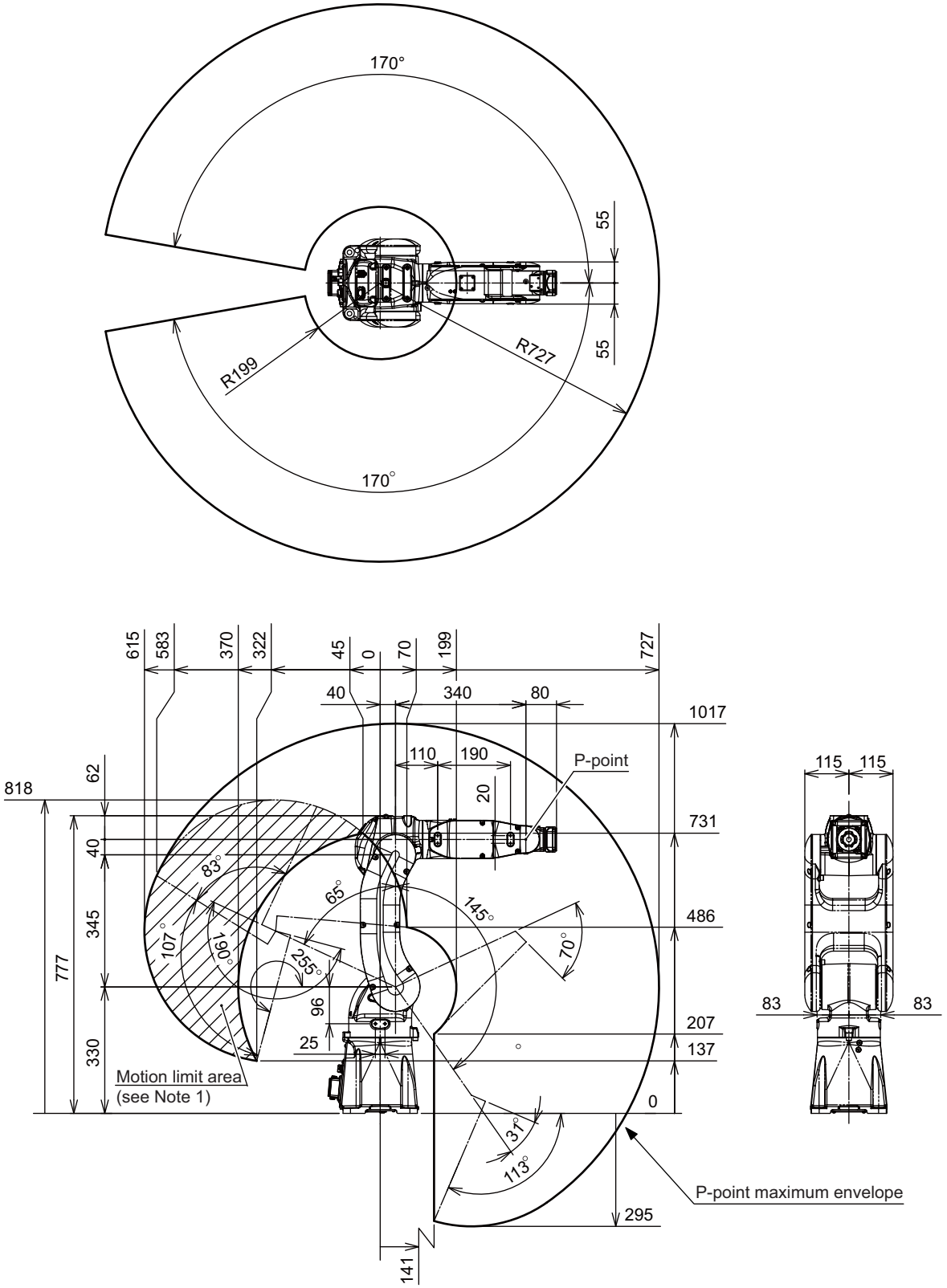
5.3 Baseplate Dimensions

Fig. 5-2: Manipulator Base Dimensions



5.4 Dimensions and P-Point Maximum Envelope

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



Note 1: The hatched 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.

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

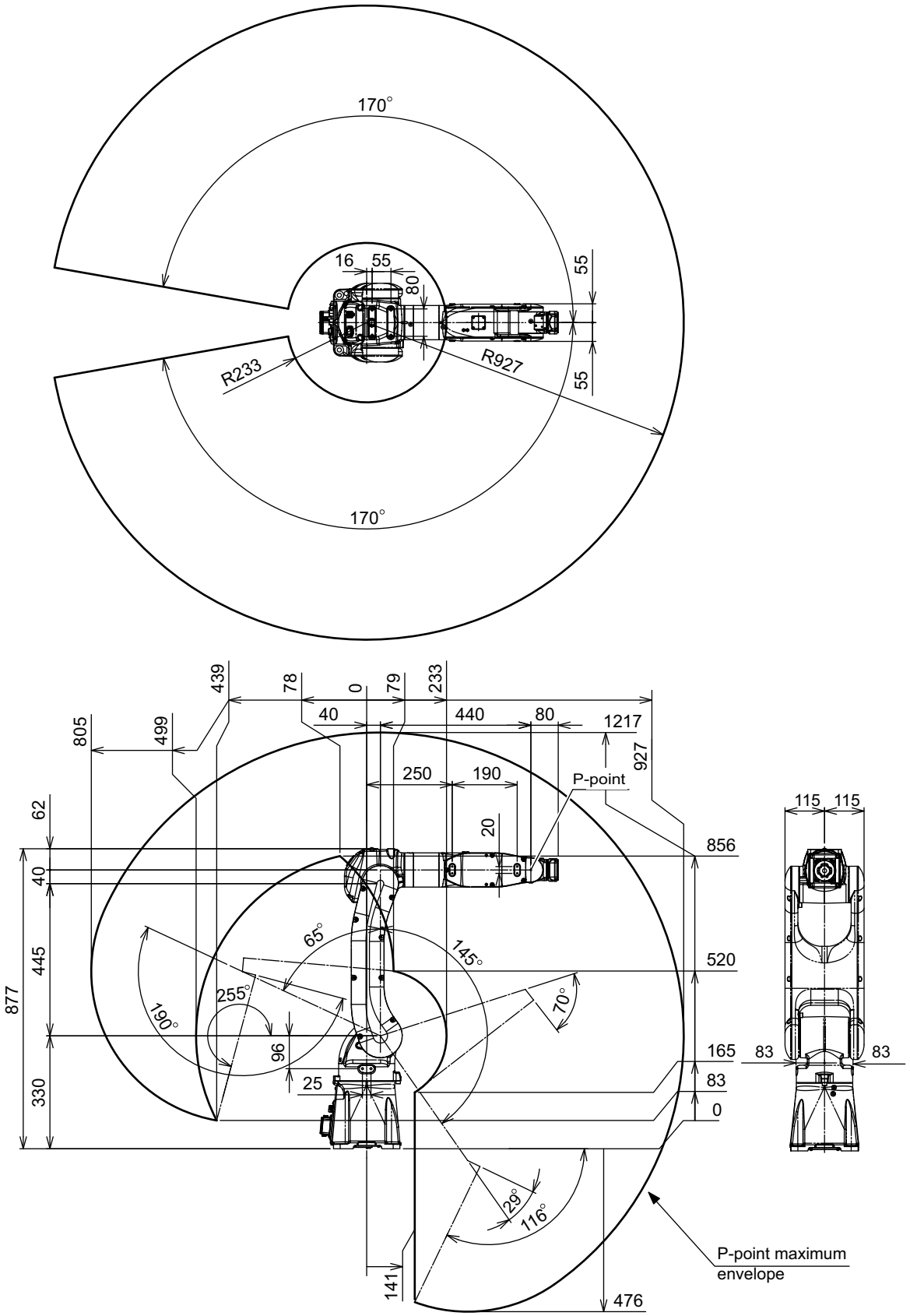
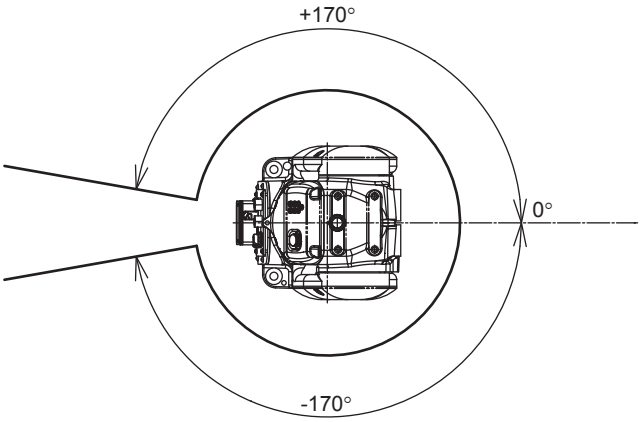
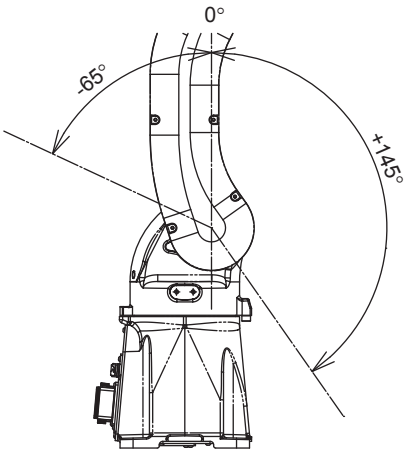


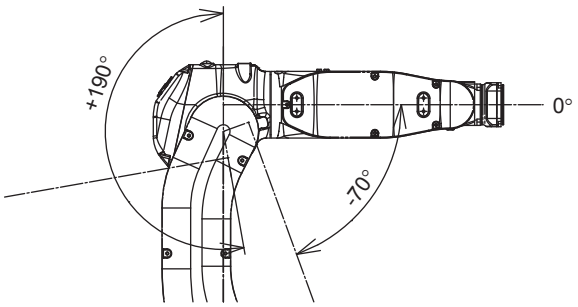
Fig. 5-4: Home Position and Operating Range of Each Axis



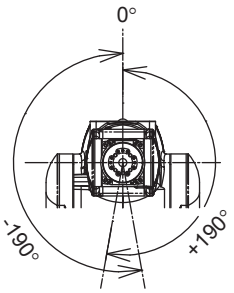
(1) S-axis



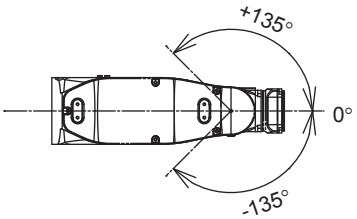
(2) L-axis



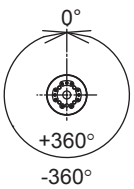
(3) U-axis



(4) R-axis



(5) B-axis



(6) T-axis

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)

Axis	Stopping distance (deg)	Stopping Time (sec)
S-axis	35.6	0.199
L-axis	36.2	0.193
U-axis	53.7	0.175

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

Axis	Stopping distance (deg)	Stopping Time (sec)
S-axis	40.4	0.274
L-axis	28.5	0.231
U-axis	52.4	0.220

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

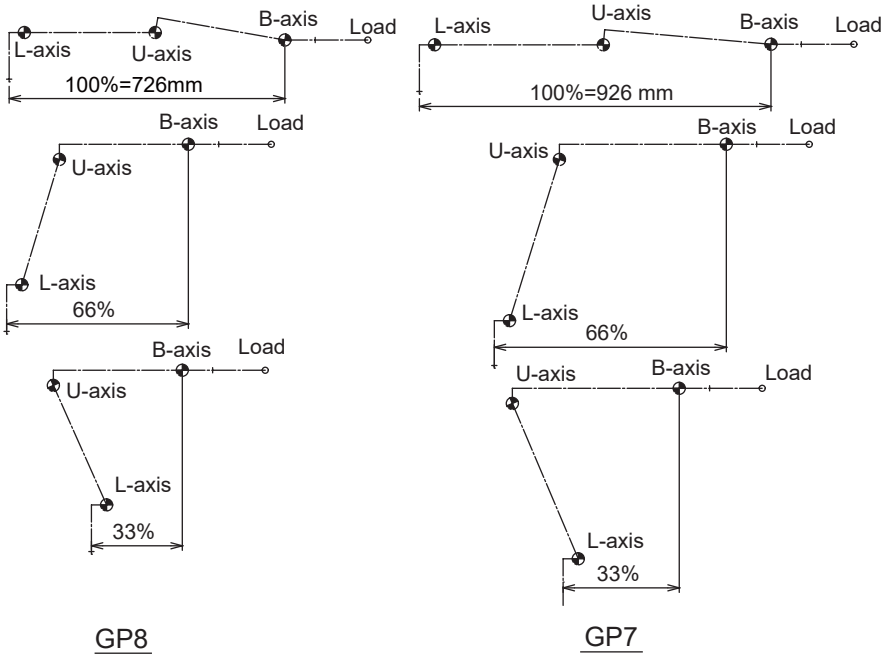


Fig. 5-6: L-Axis Extension

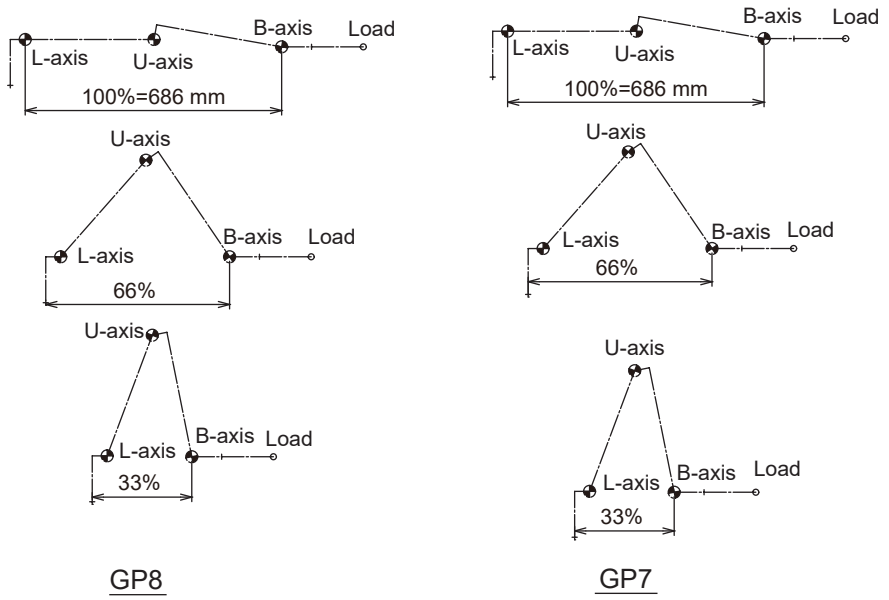
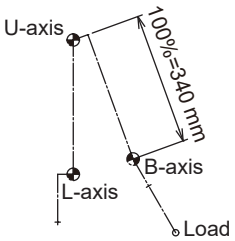
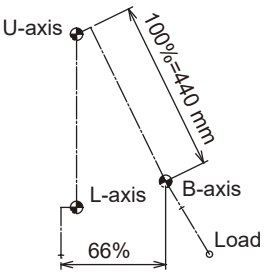


Fig. 5-7: U-Axis Extension

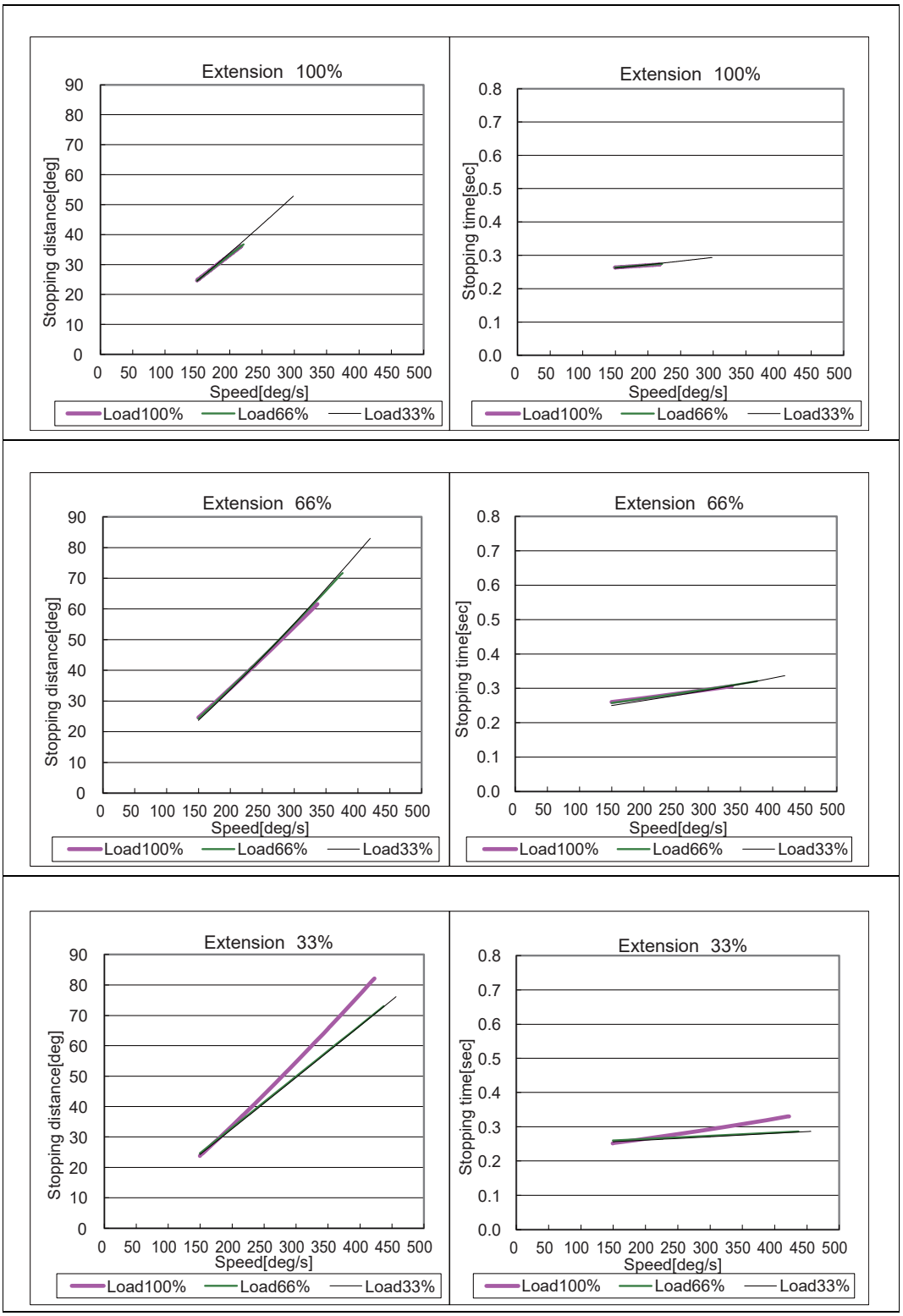


GP8

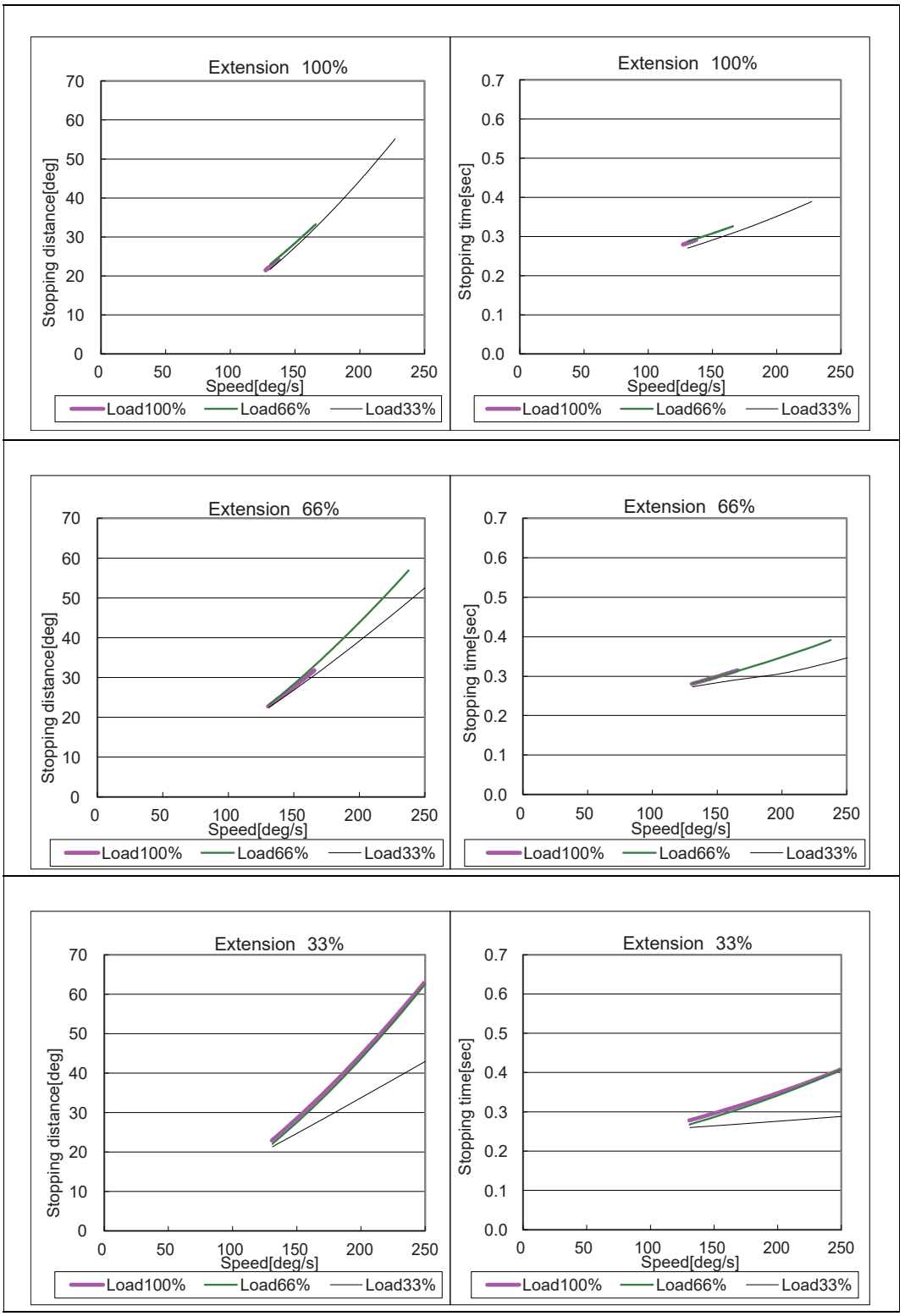


GP7

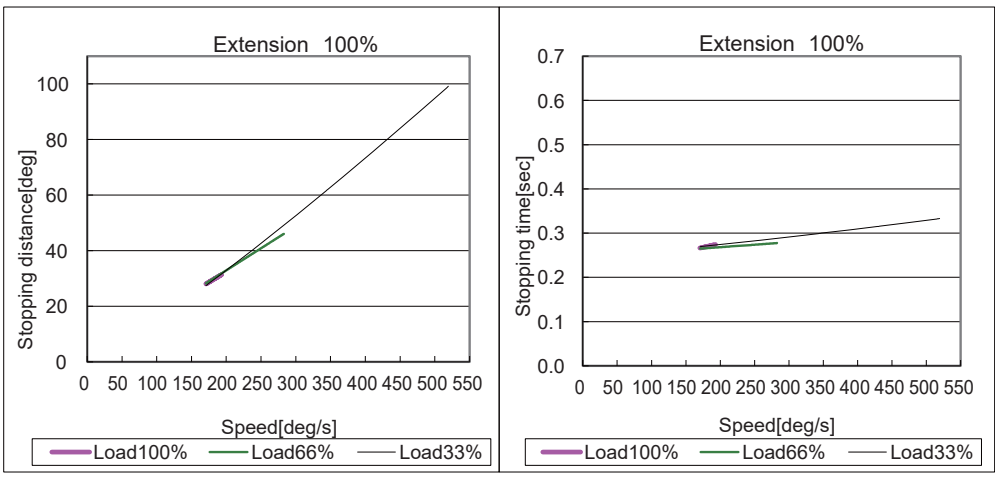
5.5.4.2 Stopping Distance and Time for Stop Category 1: S-Axis (GP8)



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

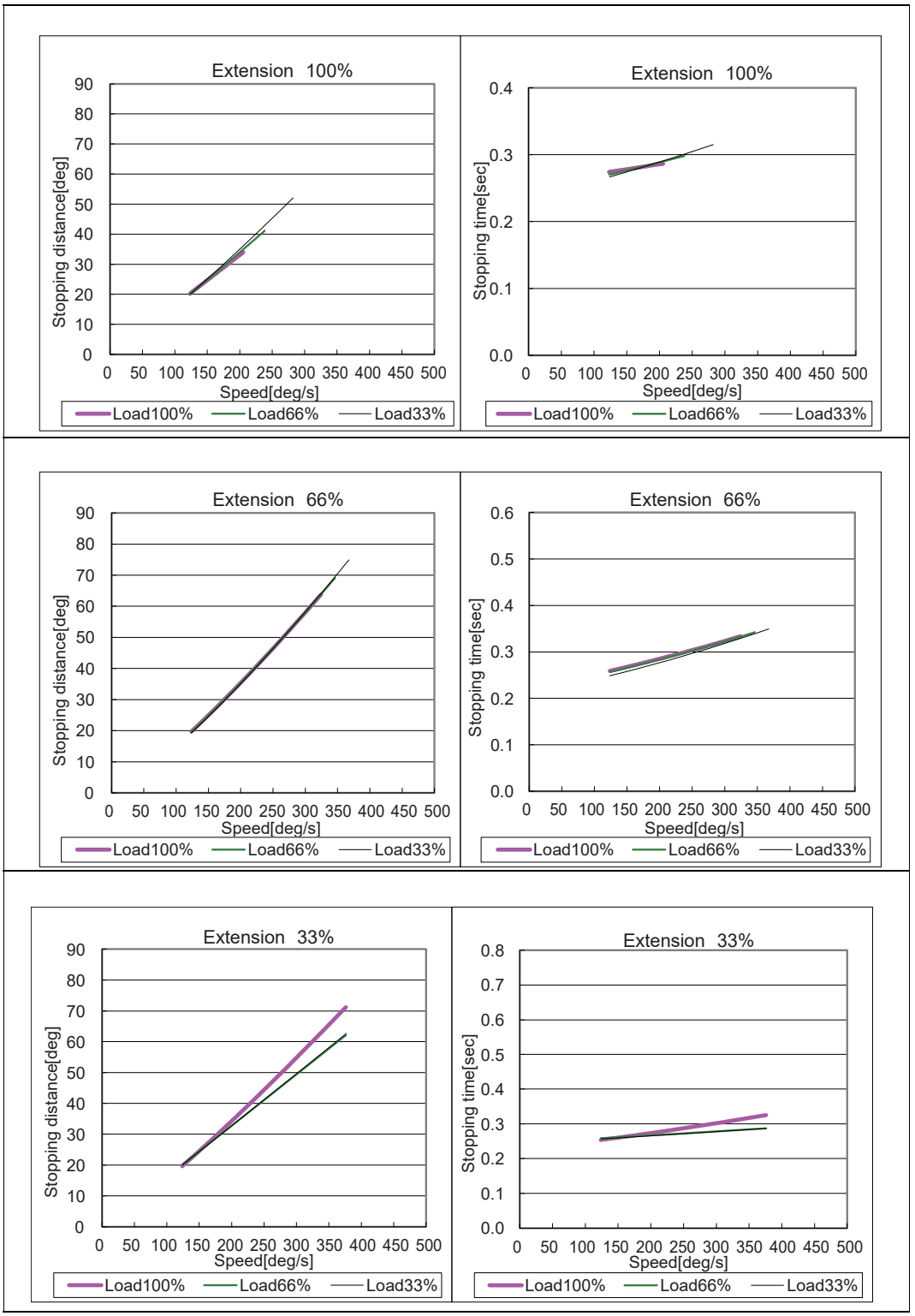


5.5.4.4 Stopping Distance and Time for Stop Category 1: U-Axis (GP8)

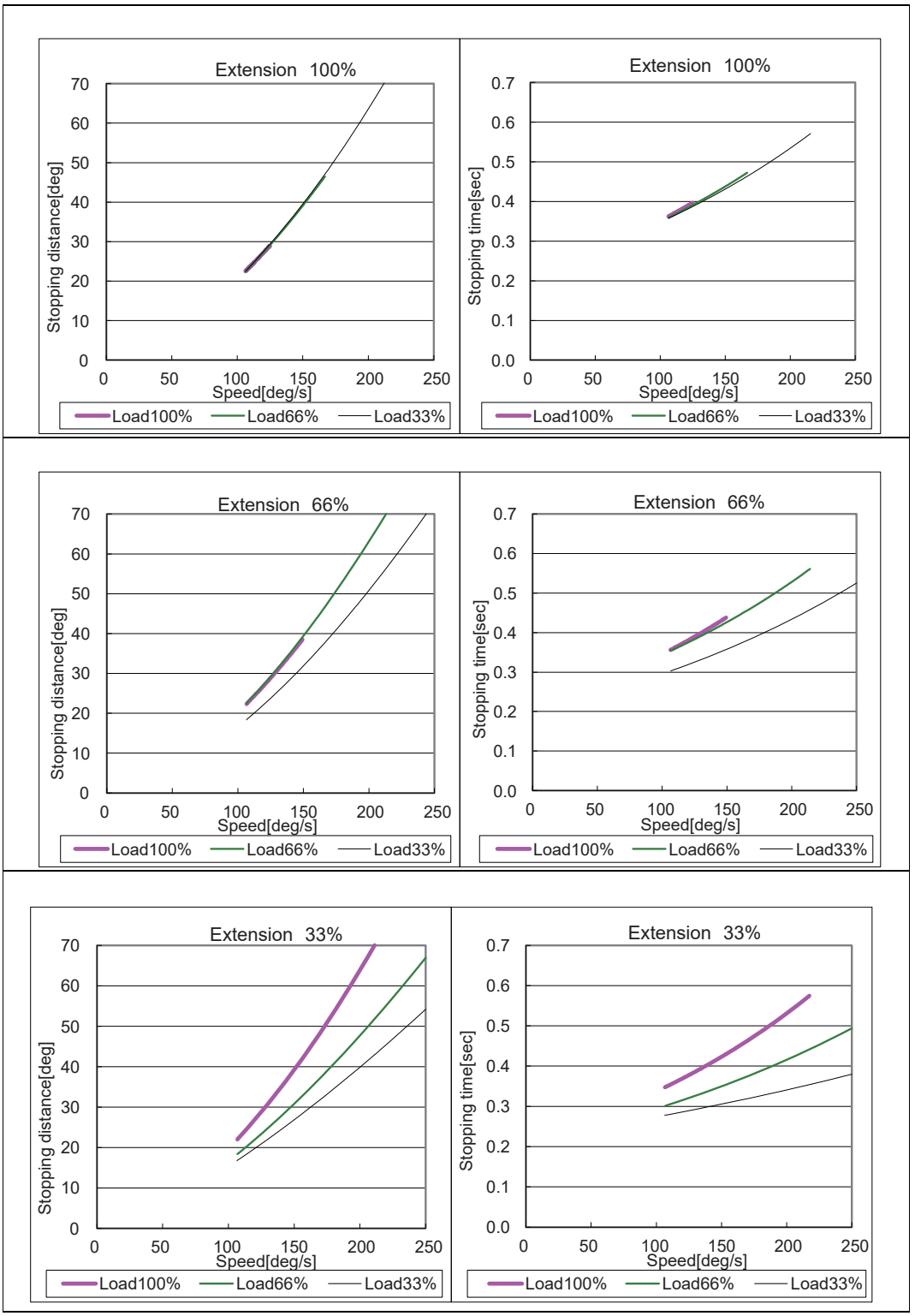


* U-axis has only one posture for its structure. (* The extension 100% data only)

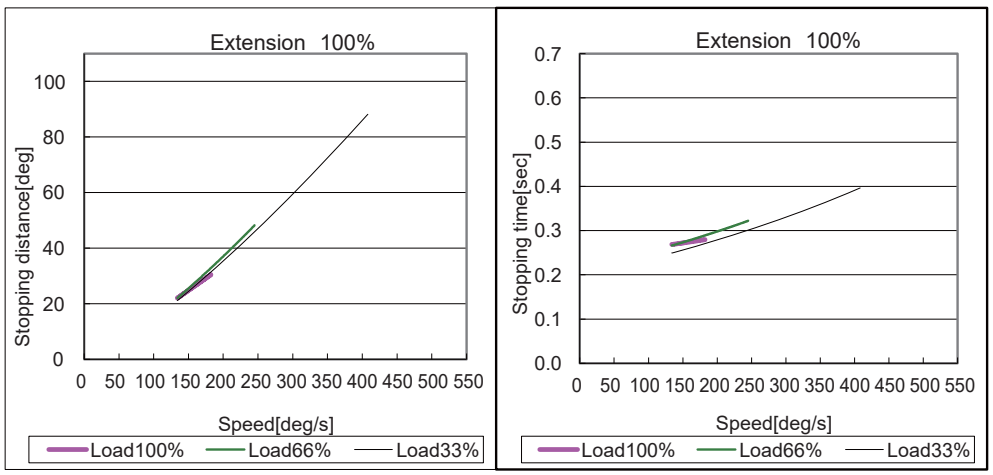
5.5.4.5 Stopping Distance and Time for Stop Category 1: S-Axis (GP7)



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



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



* U-axis has only one posture for its structure. (* The extension 100% data only)

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, GP7)"* . If alteration is necessary, contact your YASKAWA representative in advance.

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

Item	Specifications
S-Axis Operating Range	-170° - +170°(standard) -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 (HW1306659-3) (2 plates)

(2) Block (HW2400907-1) (1 block)

(3) Block (HW2400907-2) (1 block)

(4) Hexagon socket head cap screw M6
High strength stainless (length: 40 mm) (4 screws)
(Tensile strength: 1000 N/mm^2 or more)

(5) Hexagon socket head cap screw M6
High strength stainless (length: 25 mm) (4 screws)
(Tensile strength: 1000 N/mm^2 or more)

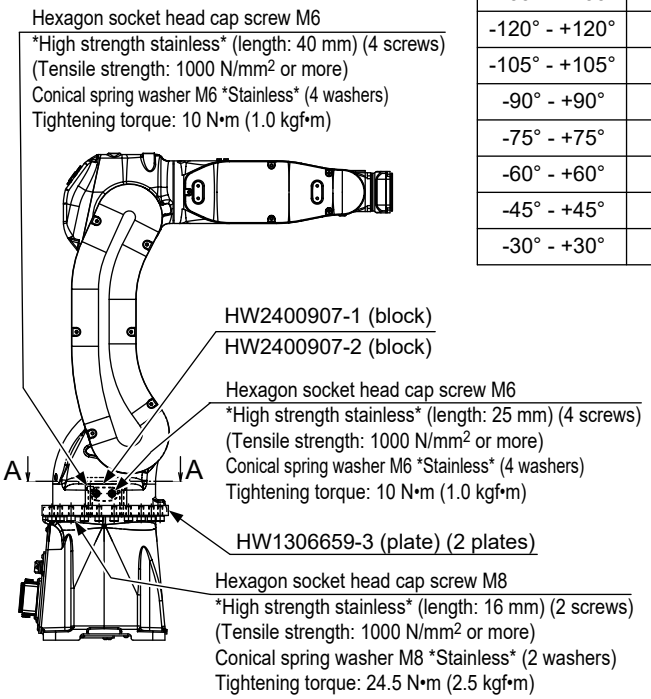
(6) Conical spring washer M6 *Stainless* (8 washers)

(7) Hexagon socket head cap screw M8
High strength stainless (length: 16 mm) (2 screws)
(Tensile strength: 1000 N/mm^2 or more)

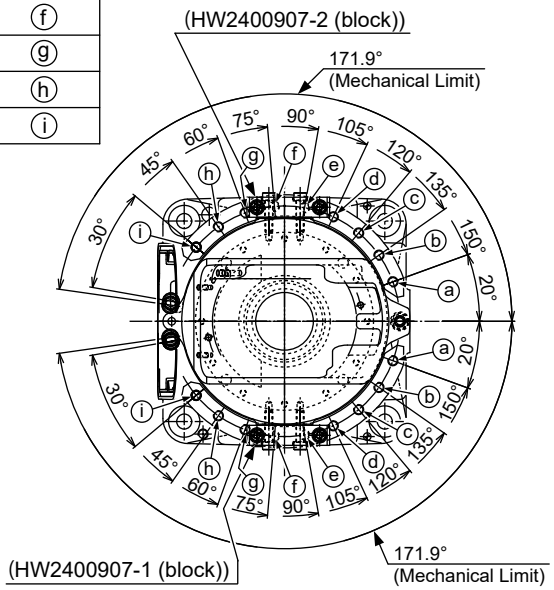
(8) Conical spring washer M8 *Stainless* (2 washers)

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

S-axis operating range	Stopper position
-170° - +170°	
-150° - +150°	ⓐ
-135° - +135°	ⓑ
-120° - +120°	ⓒ
-105° - +105°	ⓓ
-90° - +90°	ⓔ
-75° - +75°	ⓕ
-60° - +60°	ⓖ
-45° - +45°	ⓗ
-30° - +30°	ⓘ



Mounting Example: GP8
* Same for GP7



Section A-A Plate Mouting 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 HW1306659-3 (2 plates) and the HW2400907-1, HW2400907-2 (blocks) on the S-head (2 places) by using the screws specified in the *fig. 5-8*.

If the operating angle is ±170° (standard), the mechanical stopper is not necessary.

The mechanical stopper can be set at 15° pitch intervals from ±30° to ±150° range. For the settable angles, refer to *table 5-4 "The Settable Angle for S-Axis Stopper"* .

NOTE

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		±30°	±45°	±60°	±75°	±90°
Pulse	**GP8**	±30720	±46080	±61440	±76800	±92160
	GP7	±37236	±55855	±74473	±93091	±111709

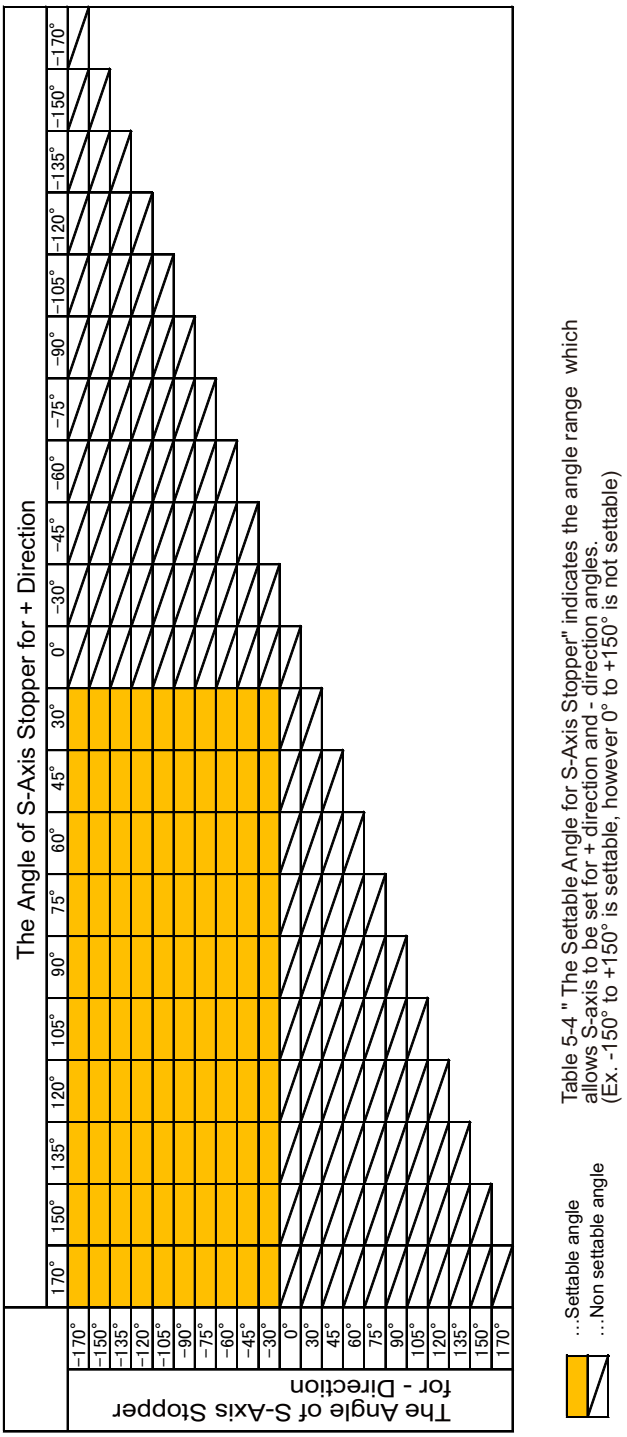
Degree		±105°	±120°	±135°	±150°	±170°
Pulse	**GP8**	±107520	±122880	±138240	±153600	±174080
	GP7	±130327	±148945	±167564	±186182	±211007

NOTE

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

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



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, GP7)"* .

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

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

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.

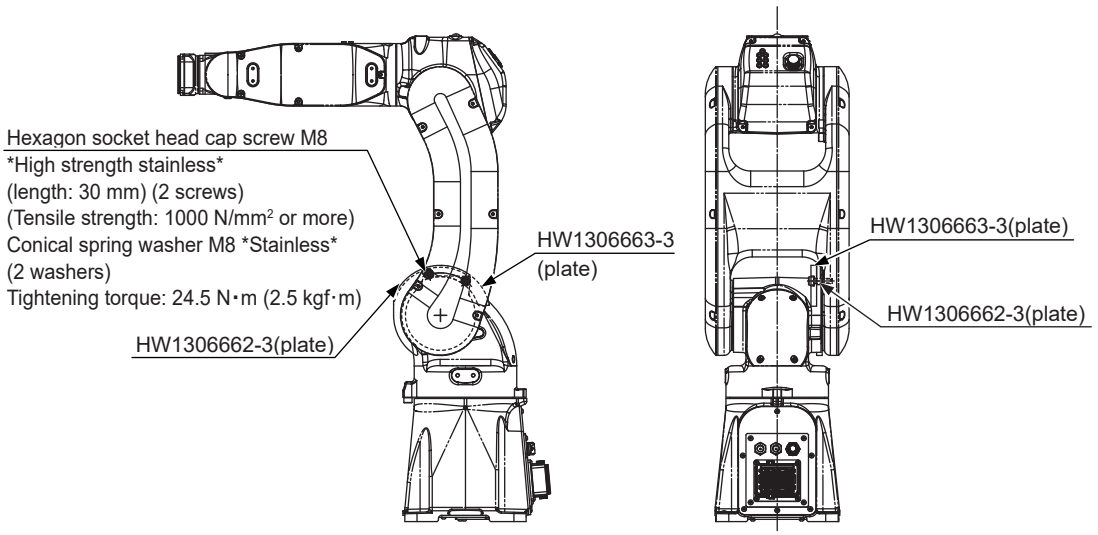
(1) Plate (HW1306662-3) (1 plate)

(2) Plate (HW1306663-3) (1 plate)

(3) Hexagon socket head cap screw M8
High strength stainless (length: 30 mm) (2 screws)
(Tensile strength: 1000 N/mm^2 or more)

(4) Conical spring washer M8 *Stainless* (2 washers)

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



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 HW1306662-3 and HW1306663-3 (plates) 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"* .

NOTE

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**	-78886	-36408	+109227	+175977
	GP7	-98608	-45511	+136533	+219971

NOTE

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

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

…Settable angle
…Non settable angle

"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.)

5.8 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, GP7)"* .

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

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

Item	Specifications
U-axis operating range	- 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 U-axis.

(1) Plate (HW2300724-1) (1 plate)

(2) Plate (HW1306661-3) (1 plate)

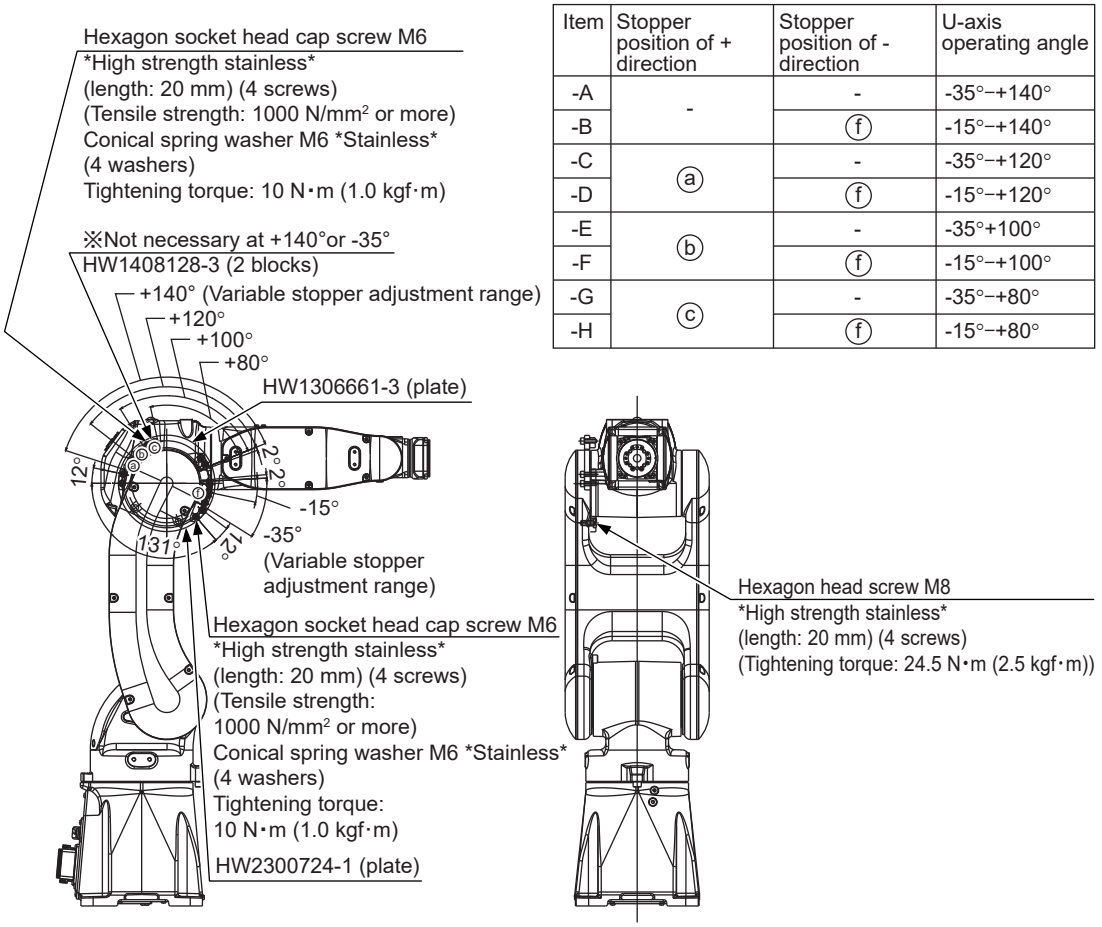
(3) Block (HW1408128-3) (2 blocks)

(4) Hexagon socket head cap screw M6
High strength stainless (length: 20 mm) (8 screws)
(Tensile strength: 1000 N/mm^2 or more)

(5) Conical spring washer M6 *Stainless* (8 washers)

(6) Hexagon head screw M8
High strength stainless (length: 20 mm) (2 screws)
(Tensile strength: 1000 N/mm^2 or more)

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		ⓕ	-15°–+140°
-C	ⓐ	-	-35°–+120°
-D		ⓕ	-15°–+120°
-E	ⓑ	-	-35°+100°
-F		ⓕ	-15°–+100°
-G	ⓒ	-	-35°–+80°
-H		ⓕ	-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 HW2300724-1, HW1306661-3 (plates) and the HW1408128-3 (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"* .

NOTE

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**	-63716	-31858	-13653	+72818	+91022
	GP7	-79645	-39822	-17066	+91022	+113777

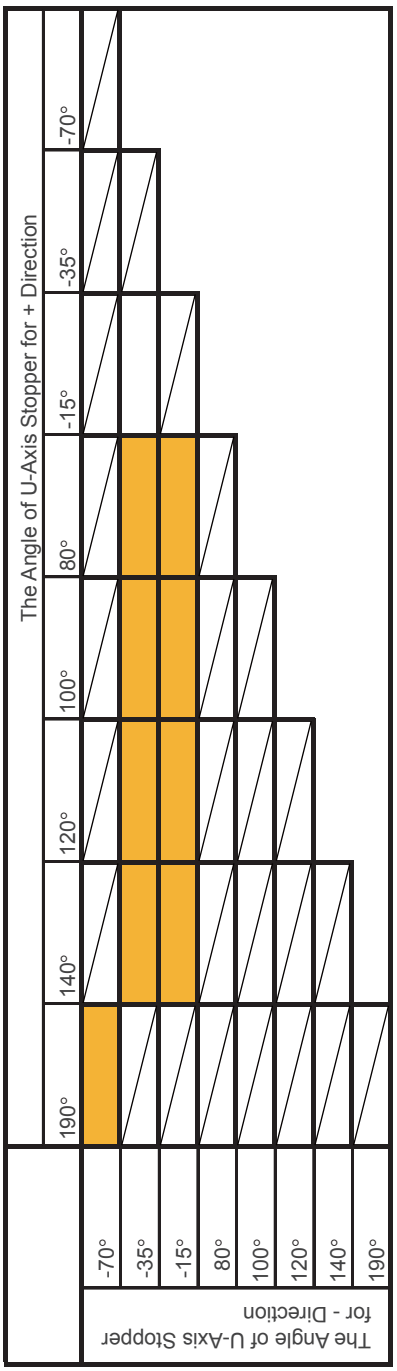
Degree		+120°	+140°	+190°
Pulse	**GP8**	+109227	+127431	+172943
	GP7	+136533	+159289	+216178

NOTE

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

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



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 and 7 kg maximum for GP7. However, the requirements listed in *table 6-1 "Allowable Wrist Load (GP8, GP7)"* 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, GP7)

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

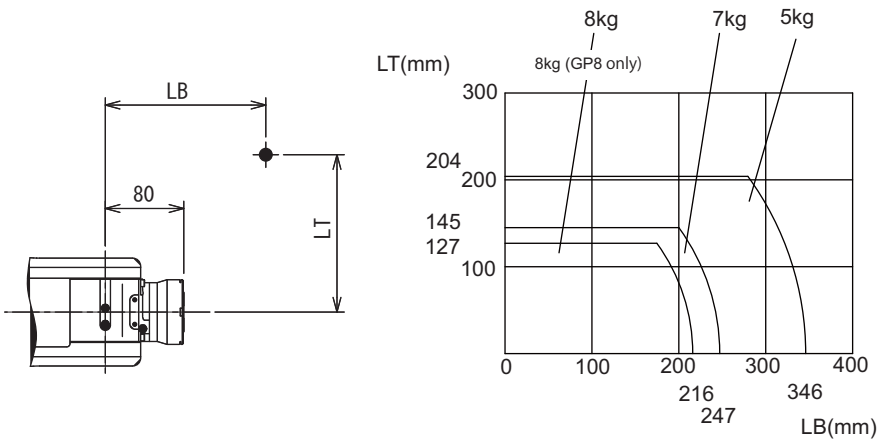
1 ( ): Gravitational unit

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 "YRC1000INSTRUCTIONS (RE-CTO-A221)/ YRC1000micro INSTRUCTIONS (RE-CTO-A222)".

Fig. 6-1: Moment Arm Rating

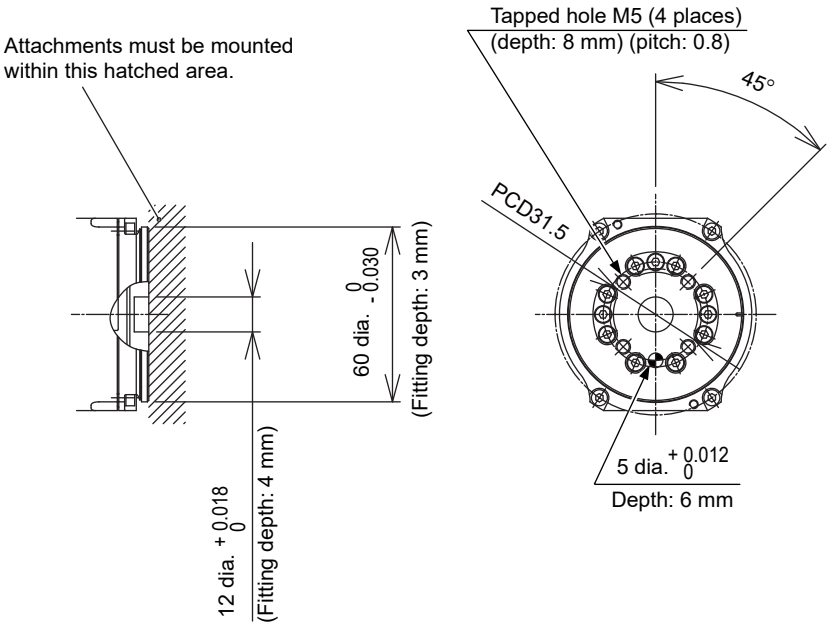


6.2 Wrist Flange

The wrist flange dimensions are shown in *fig. 6-2 "Wrist Flange (GP8, GP7)"* .

It is recommended that the attachment be mounted inside the fitting in order to identify the alignment marks. Fitting depth shall be 4 mm or less.

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



NOTE 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.

The peripheral equipment mounts are provided on the U-axis 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 and 8kg for the GP7, including the wrist load. For instance, when the mass installed in the wrist point is 8 kg for the GP8, 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) ".

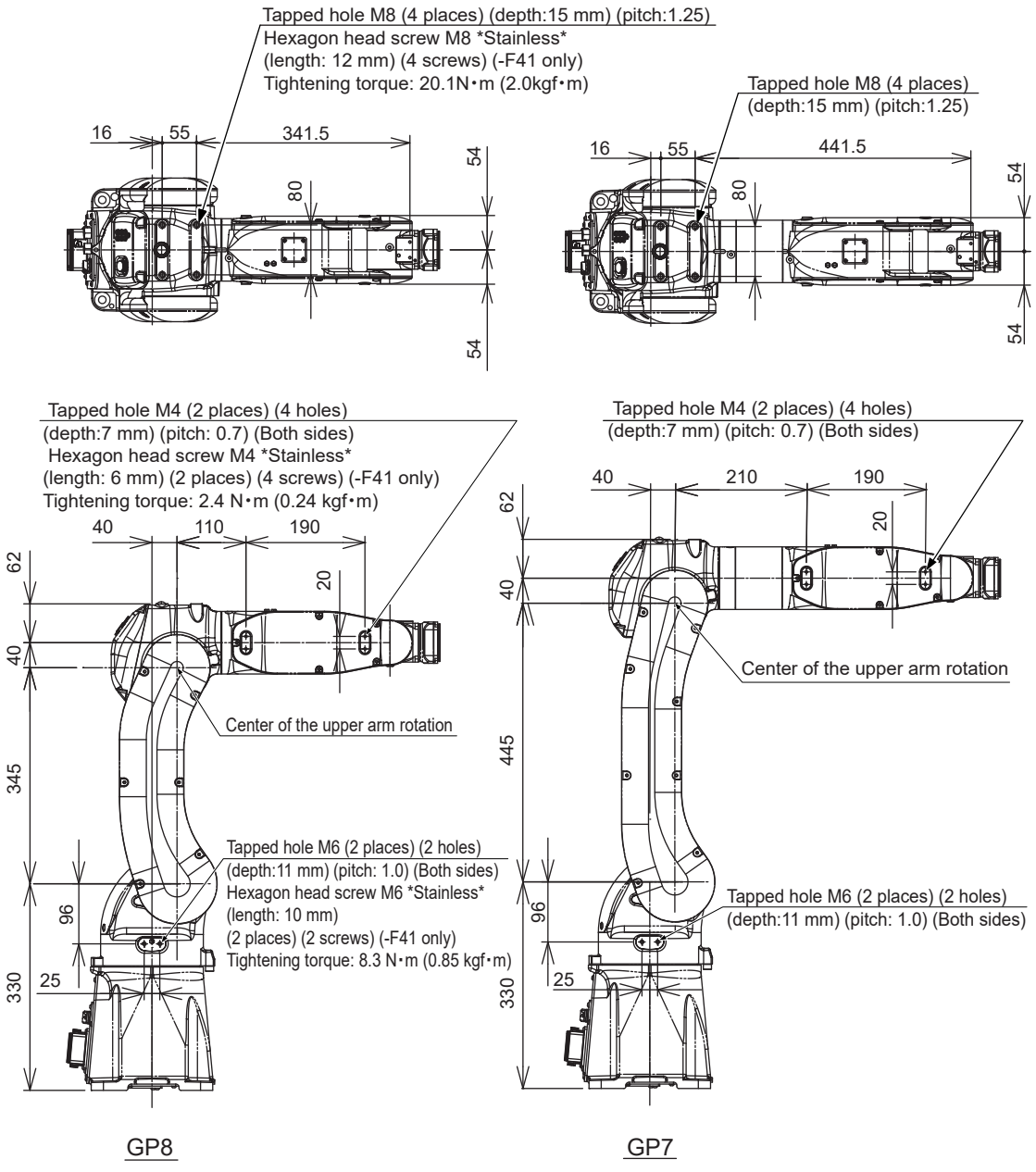
7.1.2 Installation Position

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

YR-1-06VX8-F41 (special surface treatment for food specification) has bolts attached to the user tap shown in *fig. 7-1 "Installing Peripheral Equipment"* to prevent water and other liquids from stagnating or building up in the user tap.

Remove bolts when using the user tap.

Fig. 7-1: Installing Peripheral Equipment



7.2 Internal User I/O Wiring Harness and Air Hose

Internal user I/O wiring harness (18 wires: 0.2 mm^2) and two air hoses 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 Hose"* .

The connector pins 1 to 18 are assigned as shown in *fig. 7-3 "Details of the Connector Pin Numbers"* .

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 Hose (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 Hose (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 Hose (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 hose	490 kPa (5 kgf/cm^2) or less Inside diameter of air hoses 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 hose	0°C to +45°C

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

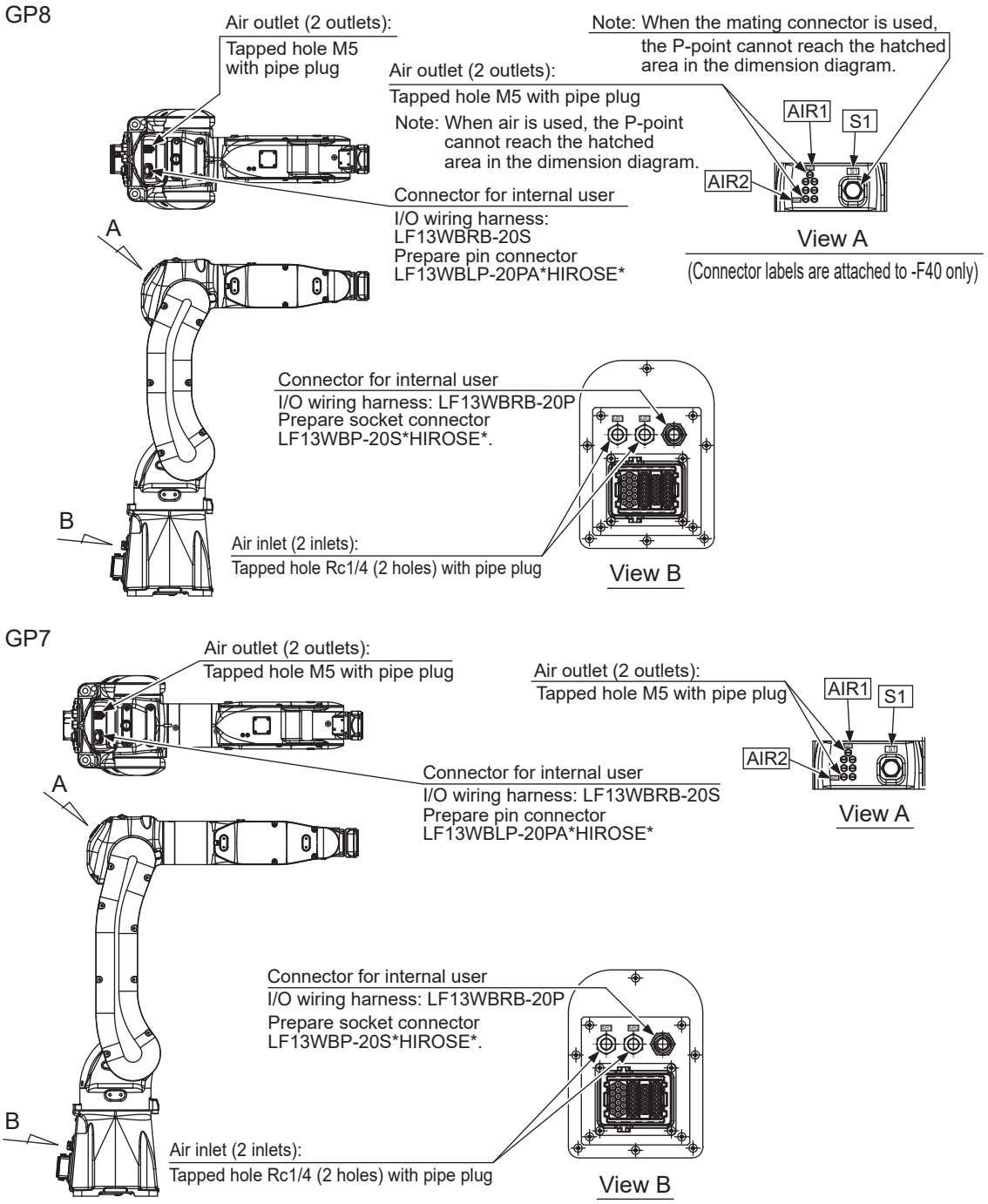


Fig. 7-3: Details of the Connector Pin Numbers

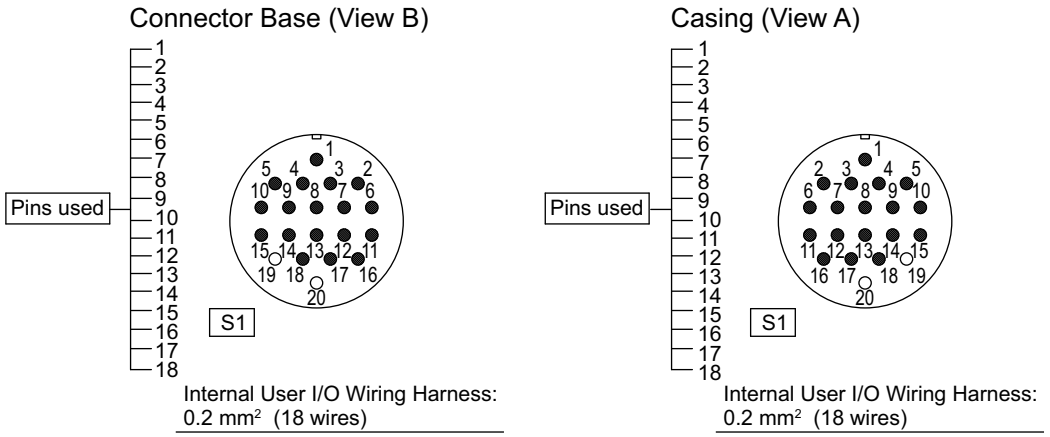


Fig. 7-4: Connectors for Internal User I/O Wiring Harness and Air Hose (When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)

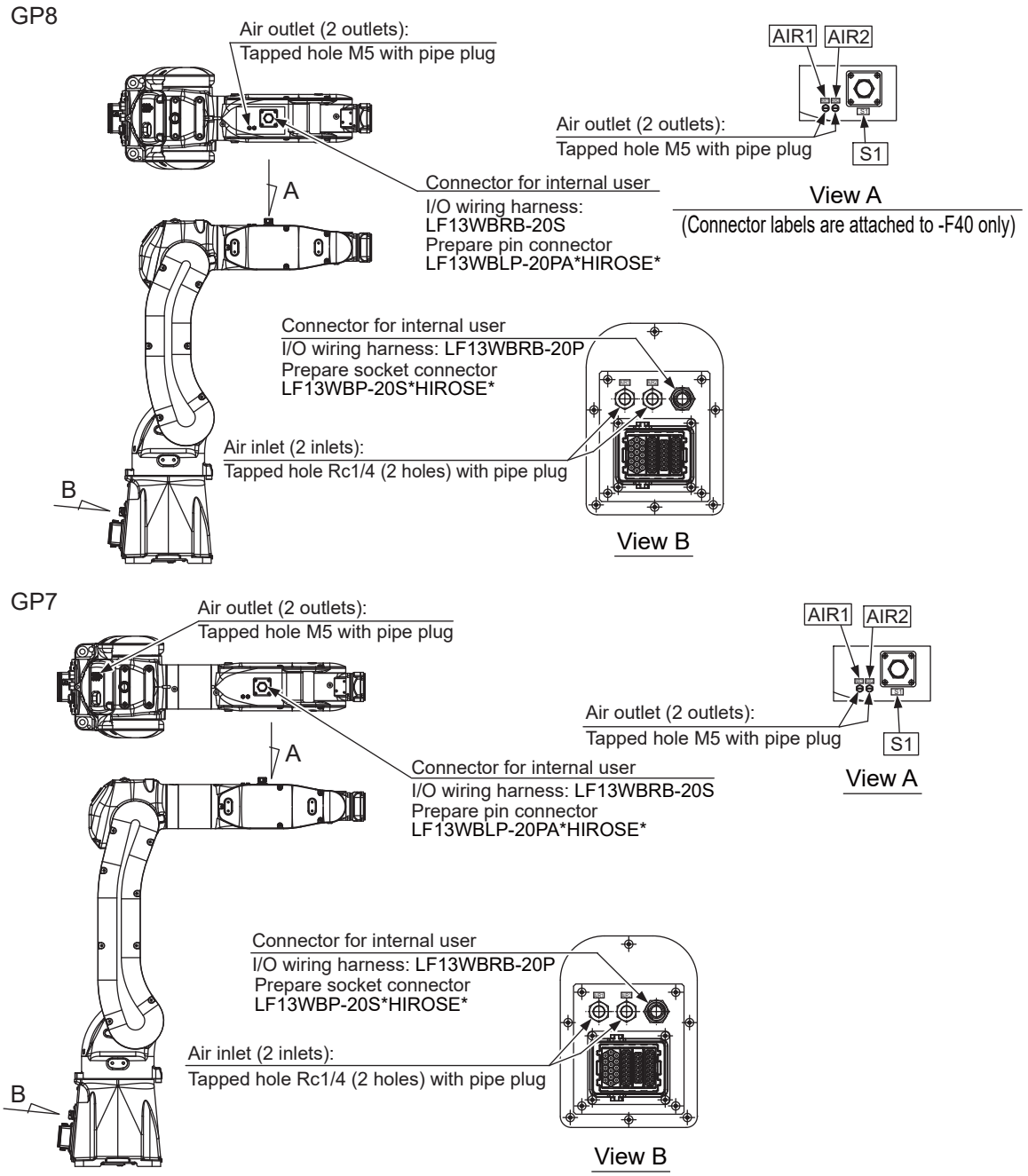


Fig. 7-5: Details of the Connector Pin Numbers
(When the Connector for Internal User I/O Wiring Harness Is on the U-Arm)

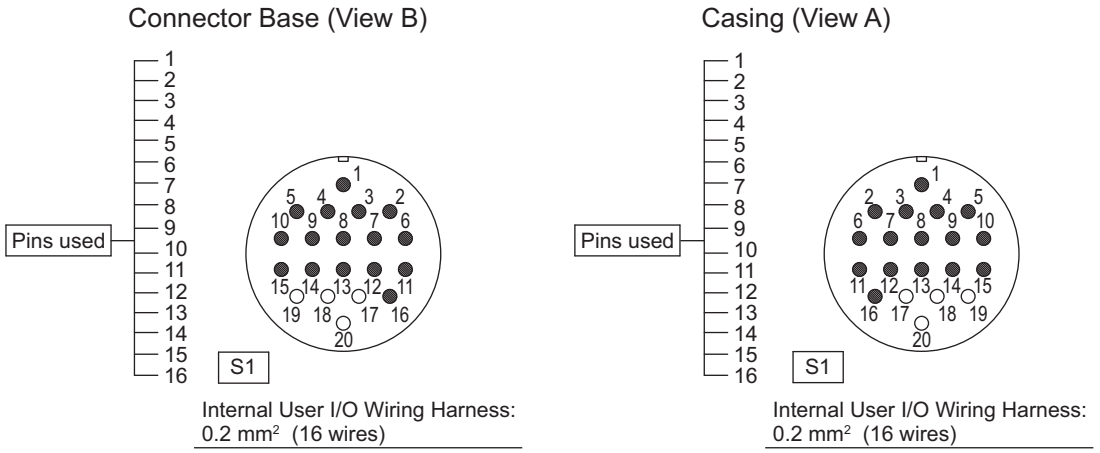


Fig. 7-6: Connectors for Internal User I/O Wiring Harness and Air Hose (with the Manipulator Cable on the Bottom)

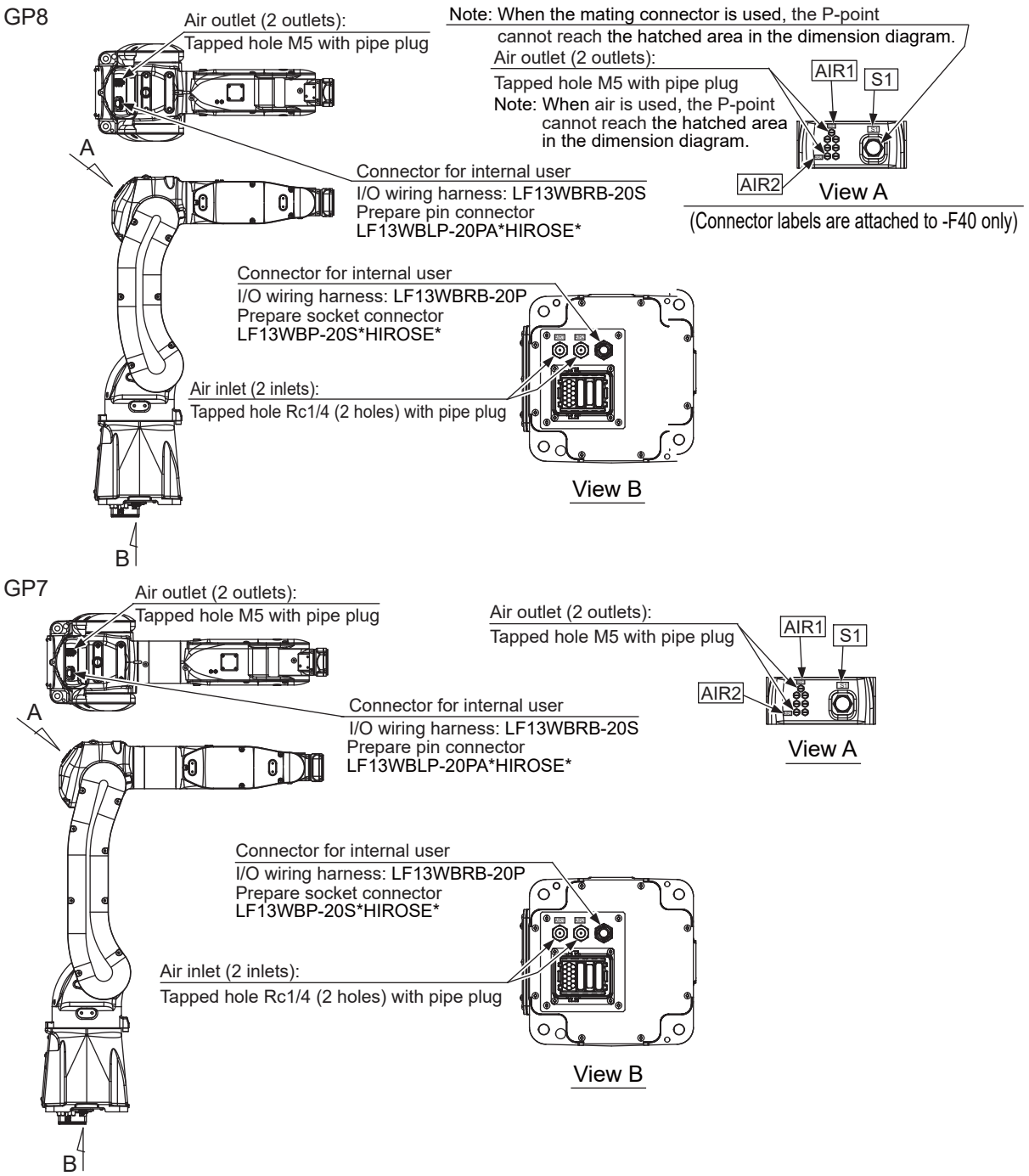


Fig. 7-7: Details of the Connector Pin Numbers (with the Manipulator Cable on the Bottom)

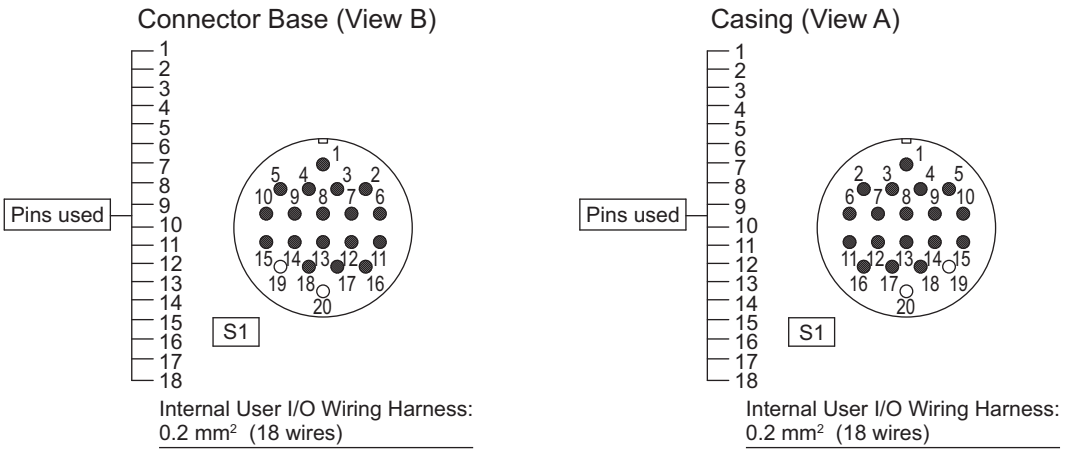
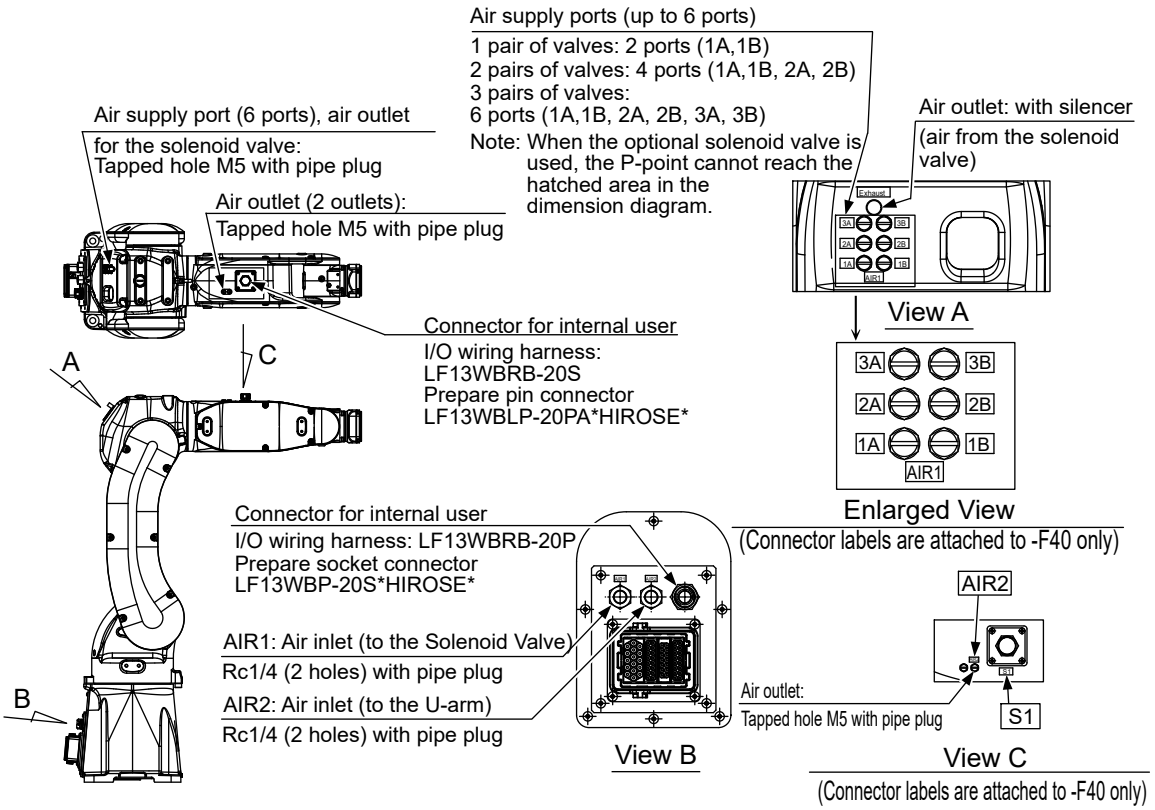


Fig. 7-8: Connectors for Internal User I/O Wiring Harness and Air Hose (with the Built-In Solenoid Valve)

GP8



GP7

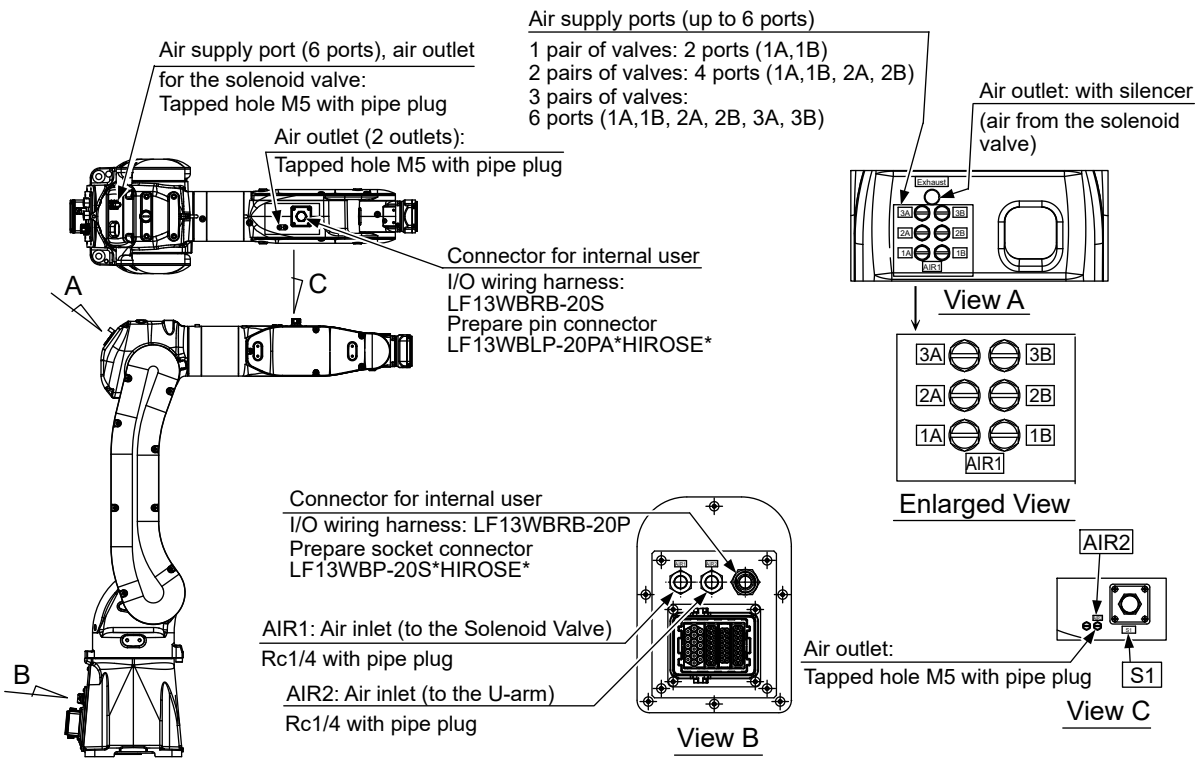


Fig. 7-9: Details of the Connector Pin Numbers (with the Built-In Solenoid Valve)

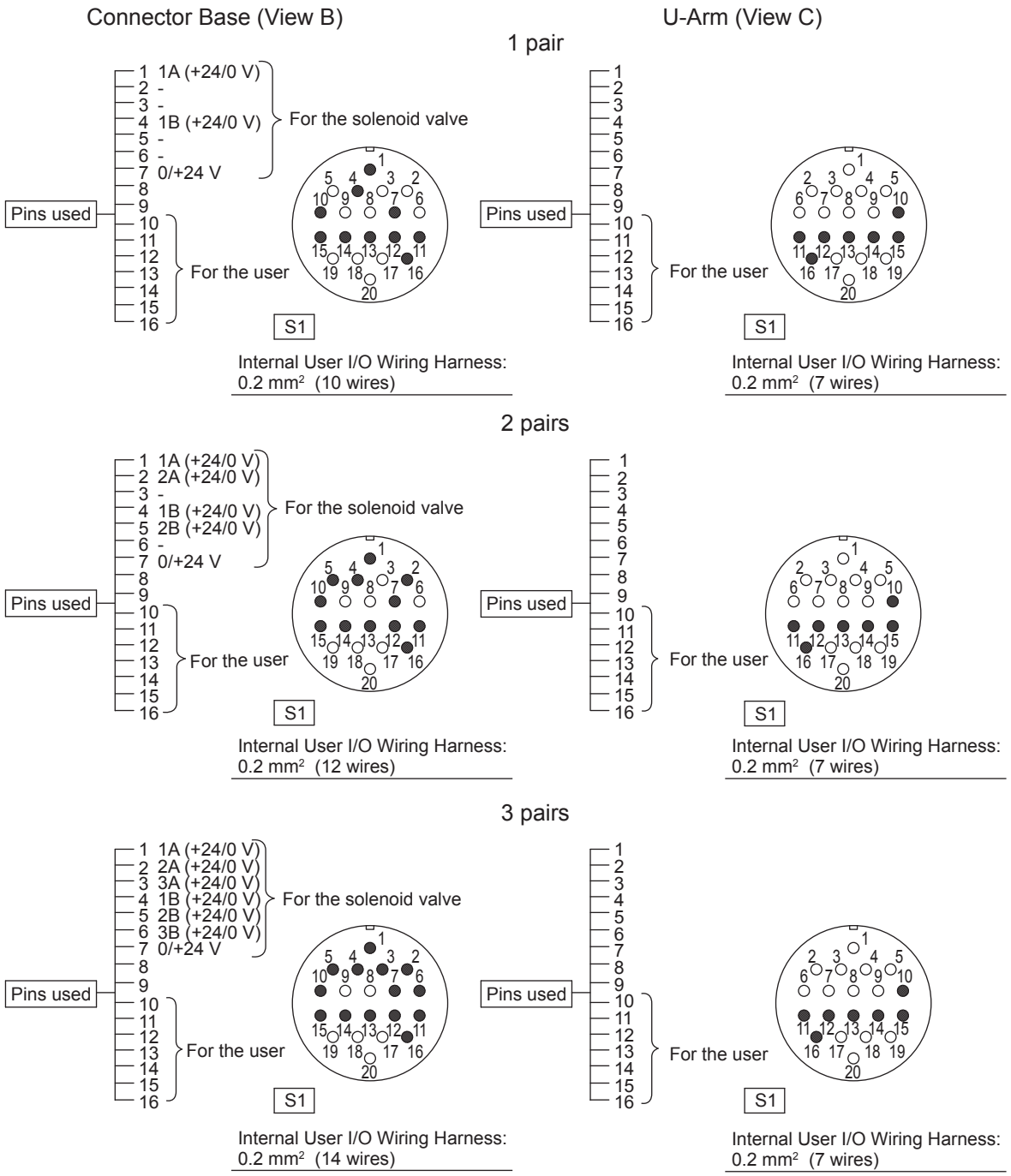
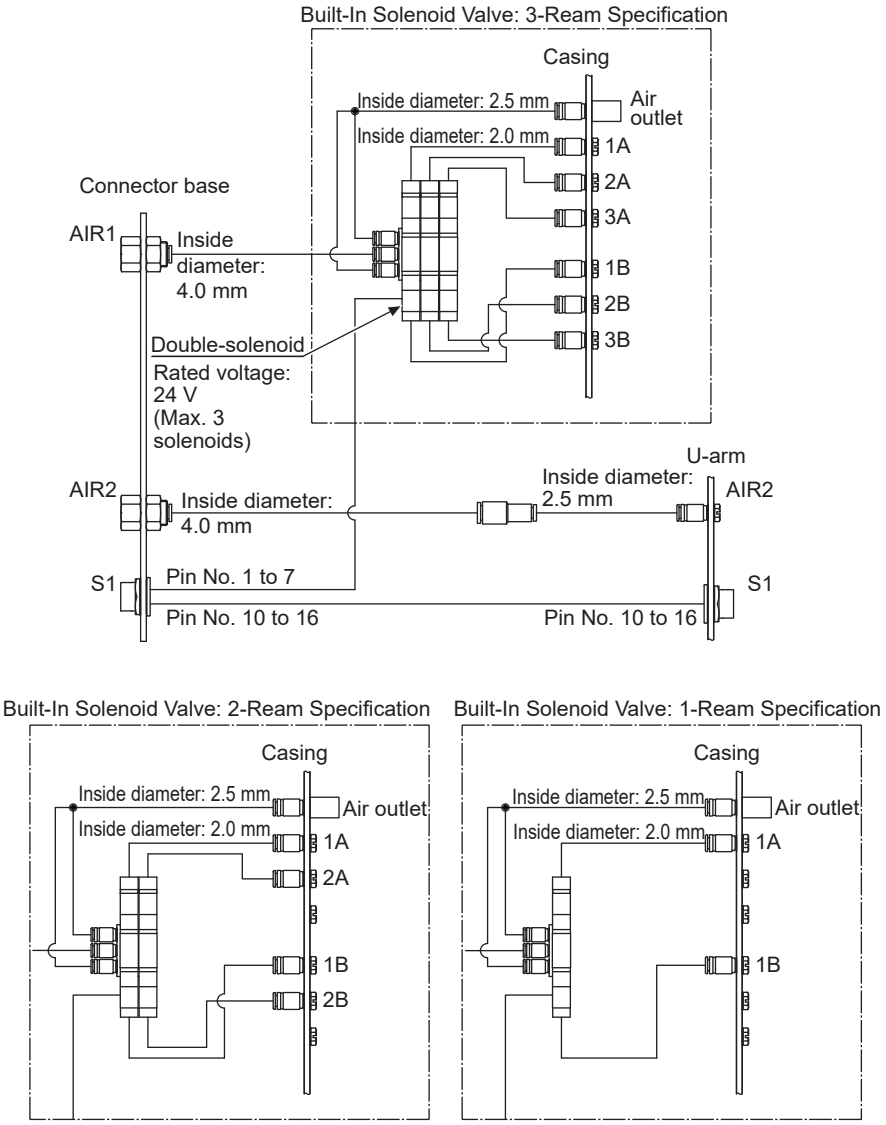


Fig. 7-10: Internal Piping Diagram (With the Built-In Solenoid Valve)



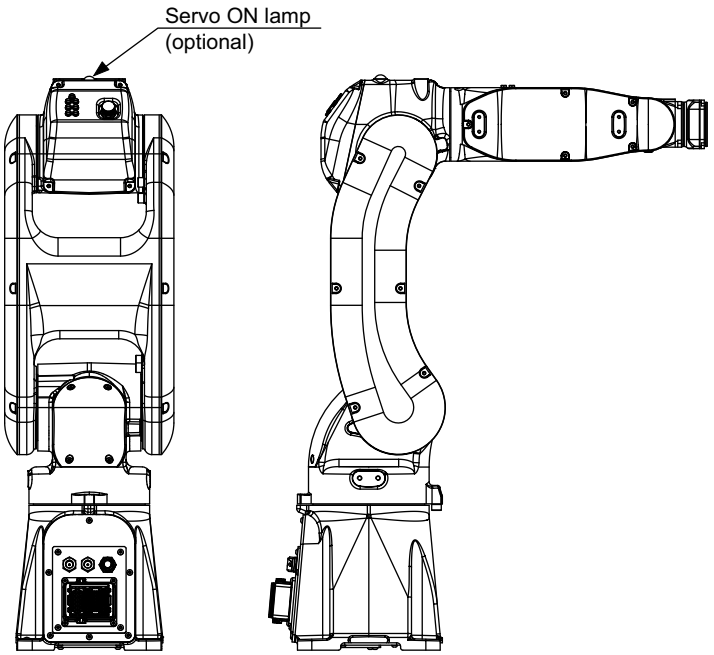
Type of the solenoid valve: M4SA020-M3--3or the equivalent
(Manufacturer: CKD Corporation)
(nonpolarity surge suppressor is mounted.)

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



8.2 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, GP7)"* , *fig. 8-2(b) "Internal Connection Diagram for YRC1000 / YRC1000micro (GP8, GP7)"*

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

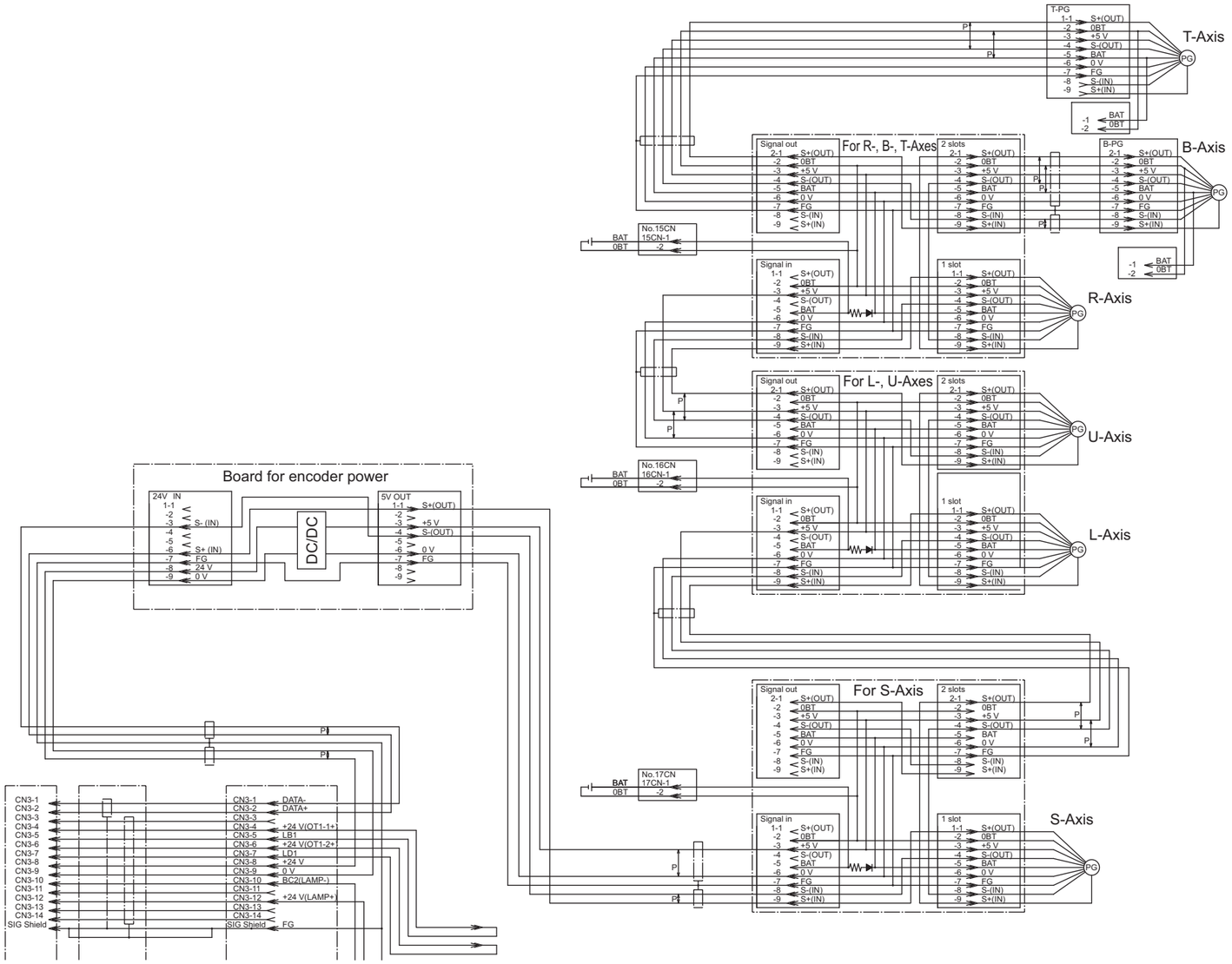
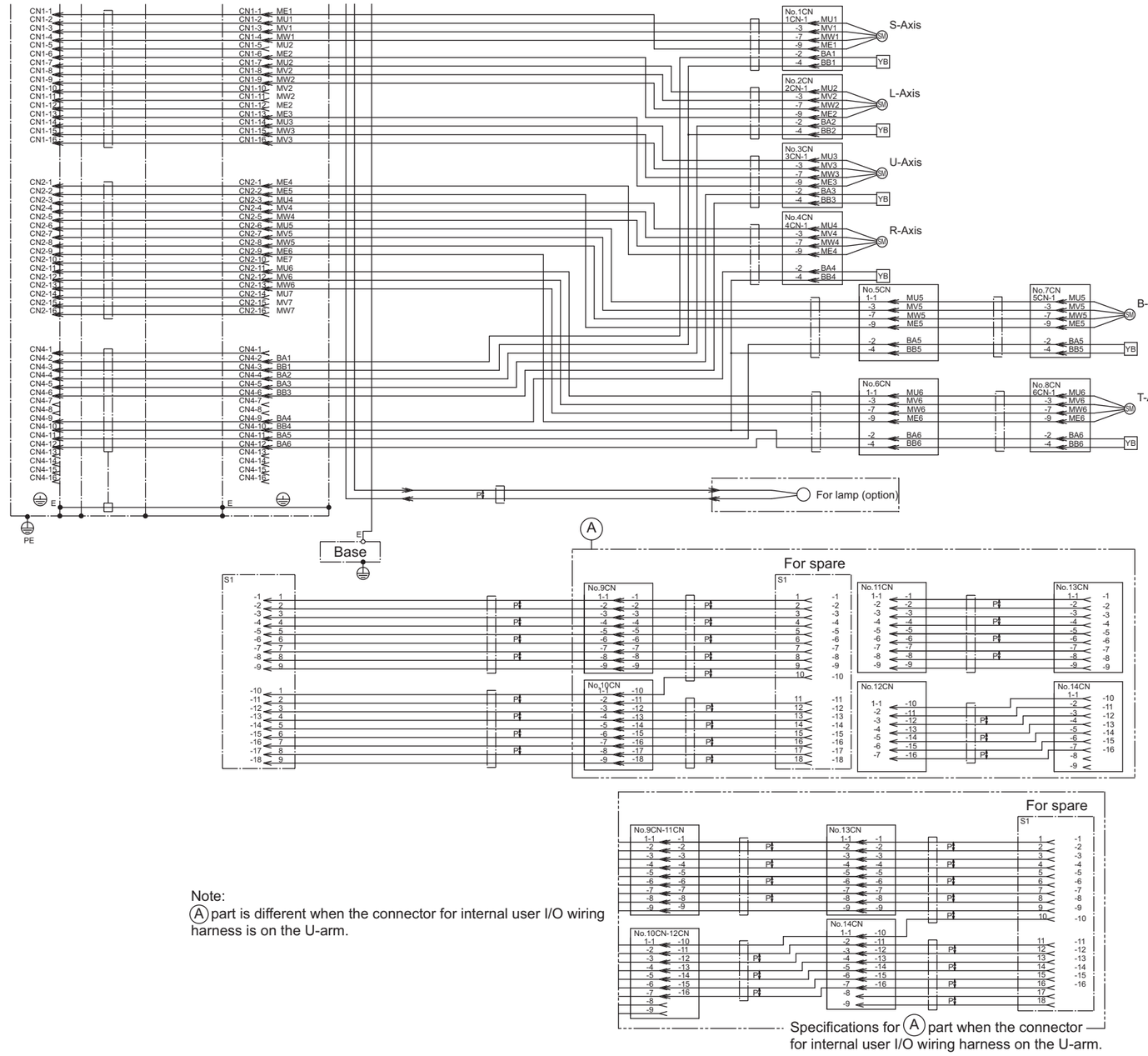


Fig. 8-2(b): Internal Connection Diagram for YRC1000 / YRC1000micro (GP8, GP7)



Note:
(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, GP7 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.

NOTE

- The inspection interval must be based on the servo power supply on time.
- The following inspection schedule is based on the case where the manipulator is used for arc welding application. If the manipulator is used for other application or if it is used under special conditions, a case-by-case examination is required.
  The inspection may be conducted at shorter intervals if the manipulator is used very frequently for the application such as handling, in this case, contact your YASKAWA representative.

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

Items[1]		Schedule				Method	Operation	Inspection Charge		
		Daily	1000HCycle	9000HCycle	18000H			Specified Personnel	Licensee	Your YASKAWA representative
1	Alignment mark	●				Visual	Check alignment mark accordance at the home position. Check for damage (Only for YR-1-06VX8-F40 and YR-1-06VX7-F40).	●	●	●
2	Working area and manipulator	●				Visual	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 connecter 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 on YRC1000/ YRC1000micro or the manipulator drove for 18000H.		●	●
10	S-axis speed reducer S-axis gear			●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease [4] (9000H cycle). See *chapter 9.4.1*		●	●
11	LU-axes speed reducers			●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease[4] (9000H cycle). See *chapter 9.4.3* and *chapter 9.4.4* .		●	●

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

Items[1]		Schedule				Method	Operation	Inspection Charge		
		Daily	1000HCycle	9000HCycle	18000H			Specified Personnel	Licensee	Your YASKAWA representative
12	R-axis speed reducer			●		Injection Syringe	Check for malfunction. (Replace if necessary.) Supply grease[4] (9000H 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] (9000H cycle). See *chapter 9.4.6*		●	●
14	Overhaul				●					●

1 Inspection No. correspond to the numbers in *fig. 9-1(a) "GP8: Inspection Items"* and *fig. 9-1(b) "GP7: 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 18000H inspection.
4 For the grease, refer to *table 9-2 "Inspection Parts and Grease Used (GP8, GP7)"* .

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

No.	Grease Used	Inspected Parts
10, 11, 12, 13	Harmonic Grease HFL-1	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, GP7 Inspection Items"* .

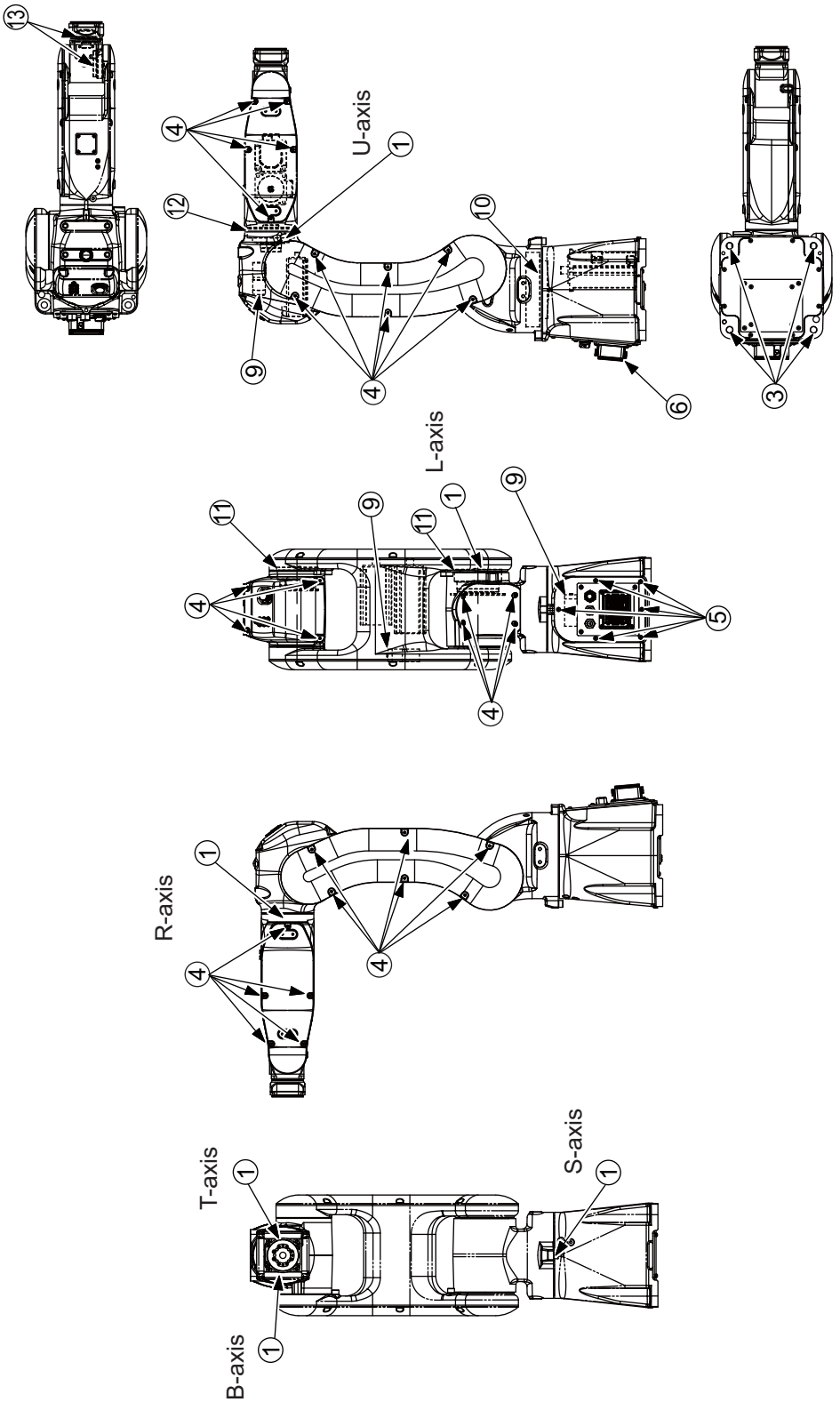


Fig. 9-1(a): GP8: Inspection Items

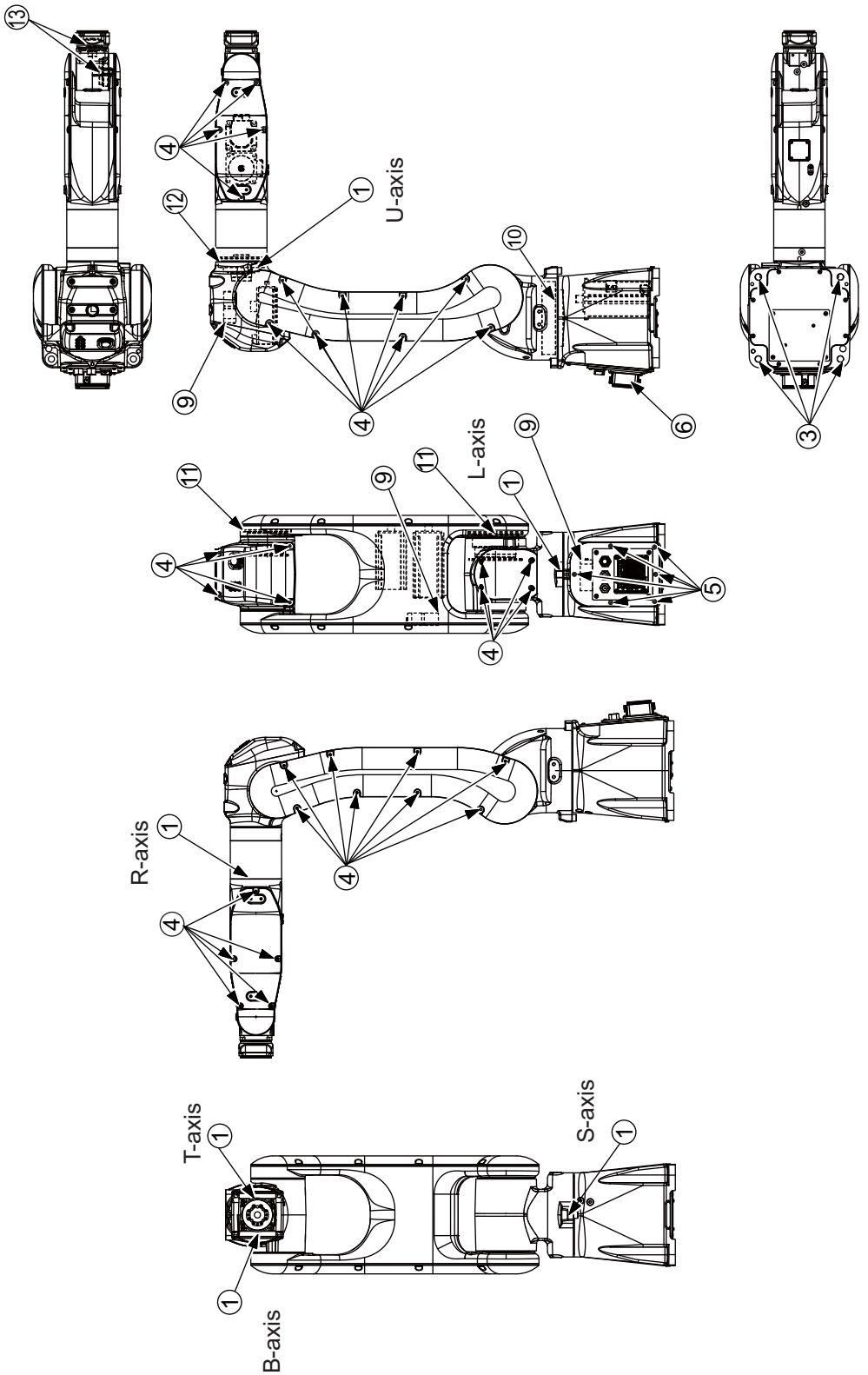


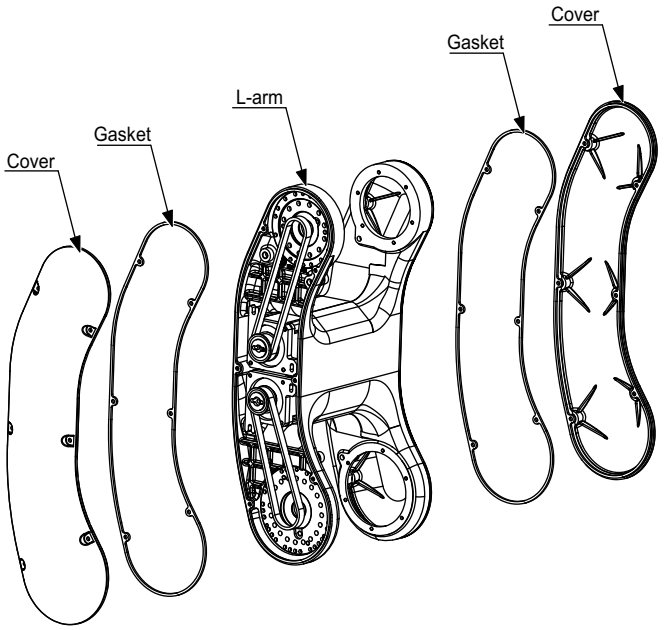
Fig. 9-1(b): GP7: Inspection Items

9.2 Notes for Maintenance

9.2.1 Figure of Arm

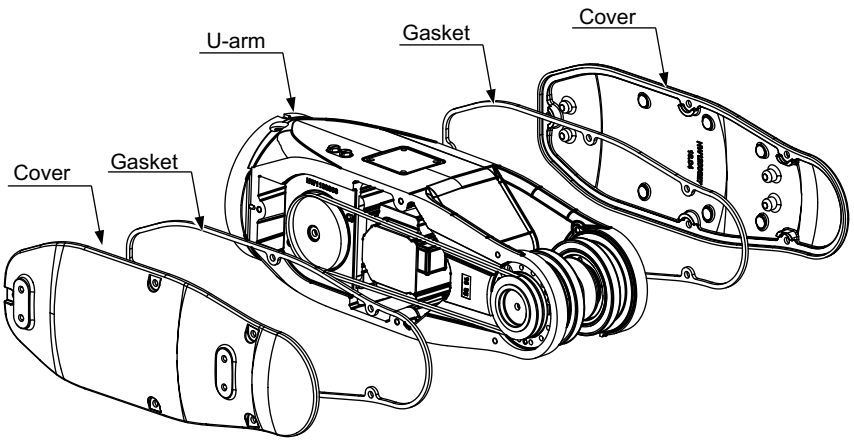
The motor, the battery pack and the belt drive part are located in the L-arm and the U-arm. To protect from cleaning fluids and other liquids, the mating surfaces of the arm covers are sealed with a gasket.
If the cover is removed during the maintenance operation, make sure to replace the gasket.(Refer to *table 10-1 "Spare Parts for the YR-1-06VX8-F4*"*)

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



Example: GP8
*Same for GP7

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



Example: GP8
*Same for GP7

9.2.2 Multi-Port Connector

Three multi-port connectors (refer to *fig. 9-4 "Multi-Port Connector"*) for the motor signals are mounted on each part of the manipulator. (For the locations, refer to *fig. 9-7 "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.(Refer to *fig. 9-5 "Wiring of Multi-port Connector Part"*)

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

Fig. 9-4: Multi-Port Connector

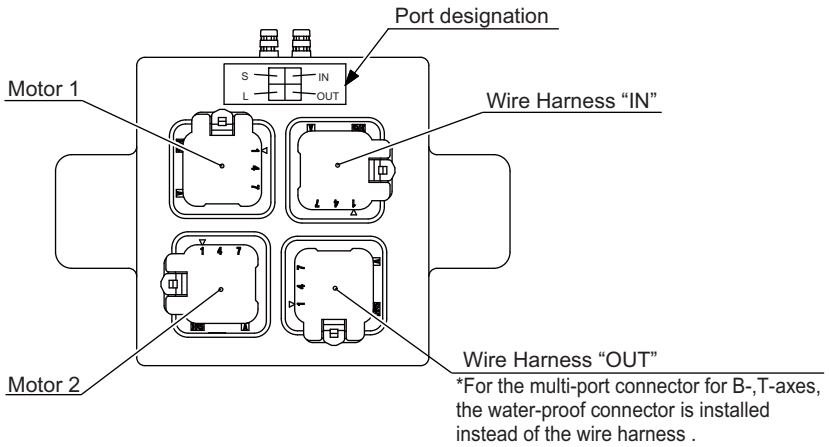
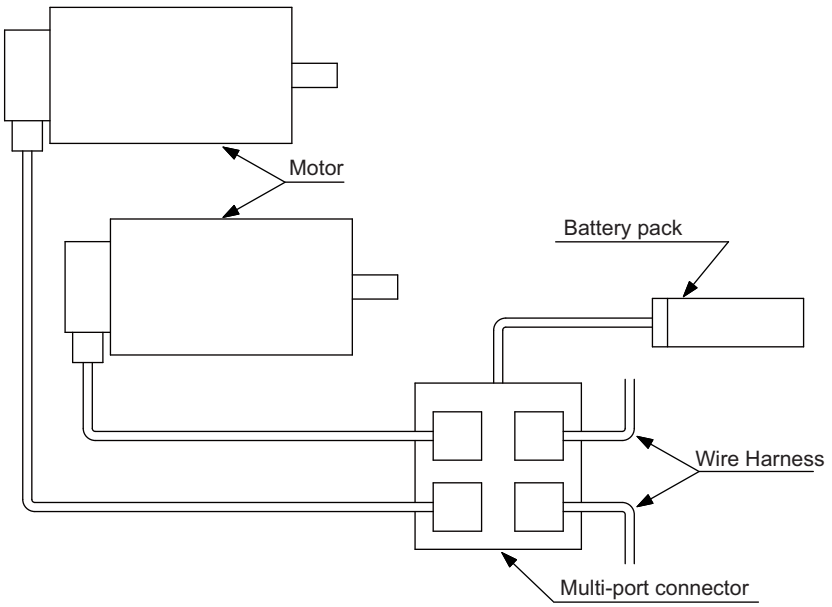


Fig. 9-5: Wiring of Multi-port Connector Part



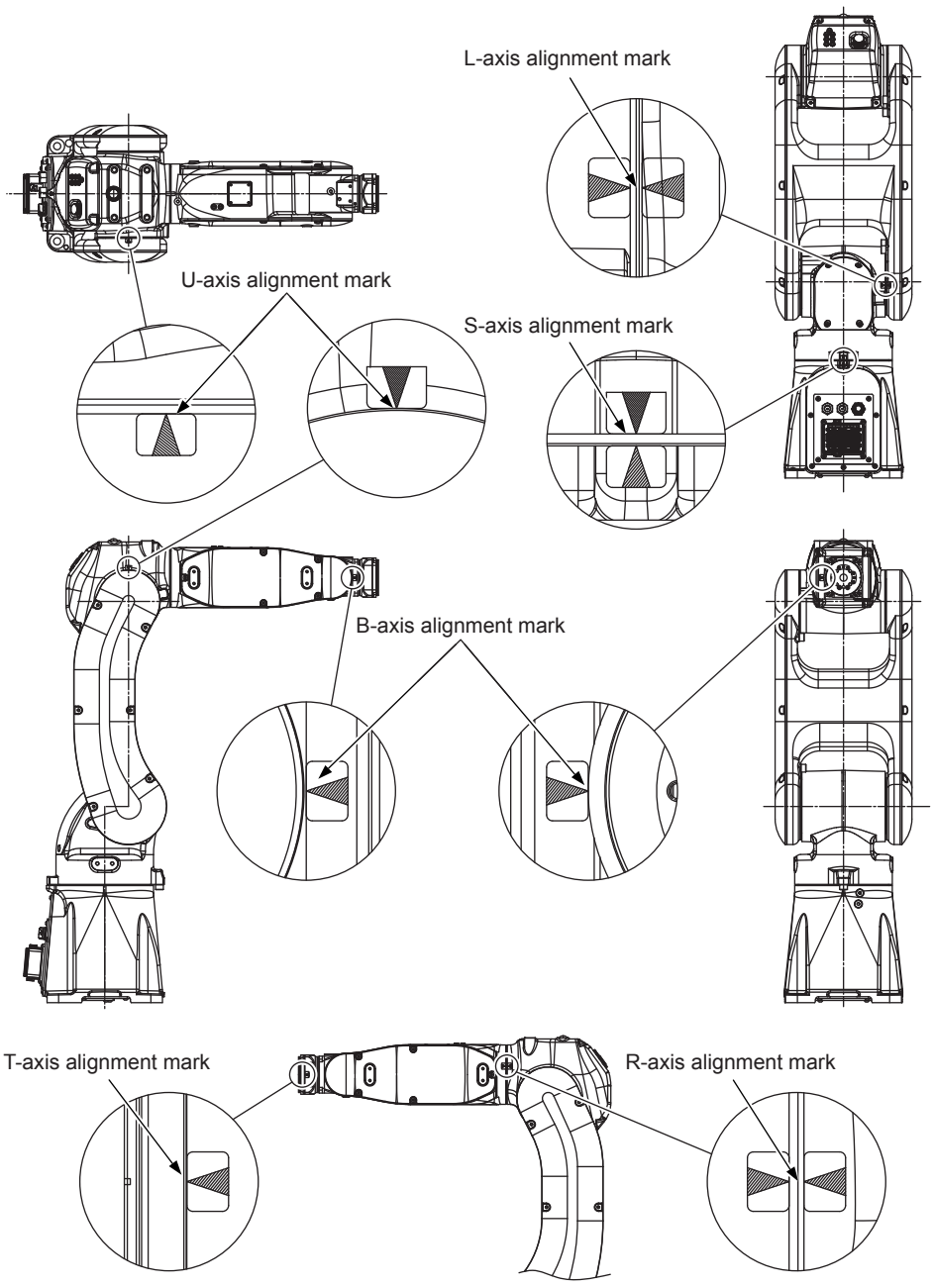
9.3 Notes on Maintenance Procedures

9.3.1 Home Position Check

To confirm the origin position, YR-1-06VX8-F40 (food-grade grease specification) and YR-1-06VX7-F40 (food-grade grease specification) have a matching mark mounted to each axis of the manipulator (*fig. 9-6 "Alignment Mark Check (YR-1-06VX8-F40, YR-1-06VX7-F40)"*).

With those alignment marks, periodically check for home position deviation. When home position is disappeared or deviated, contact your YASKAWA representative.

Fig. 9-6: Alignment Mark Check (YR-1-06VX8-F40, YR-1-06VX7-F40)

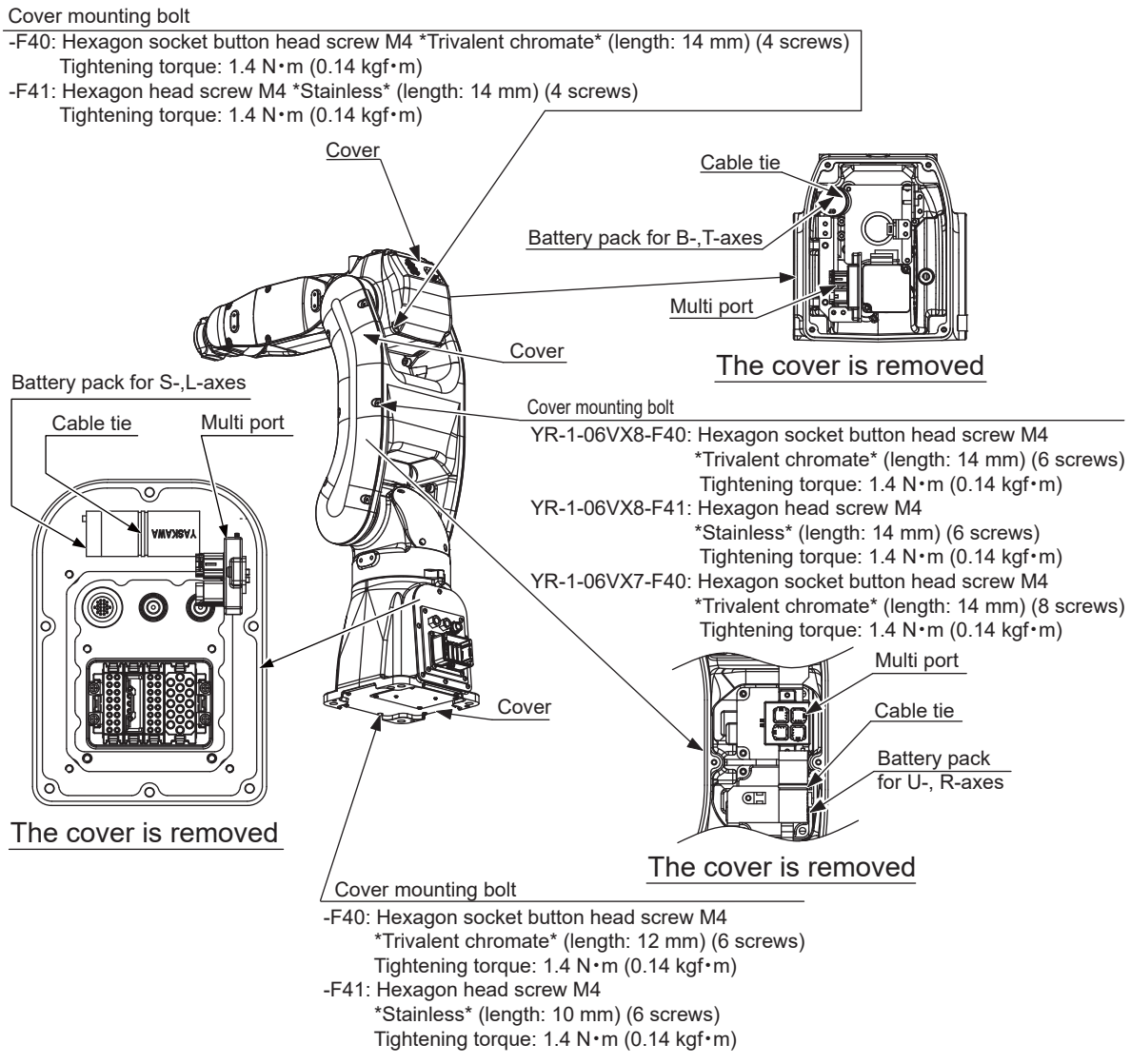


9.3.2 Battery Pack Replacement

Each of the three battery packs are located in the positions shown in *fig. 9-7 "Locations of the Battery and Multi-port Connector"* with the multi-port connector connectors.

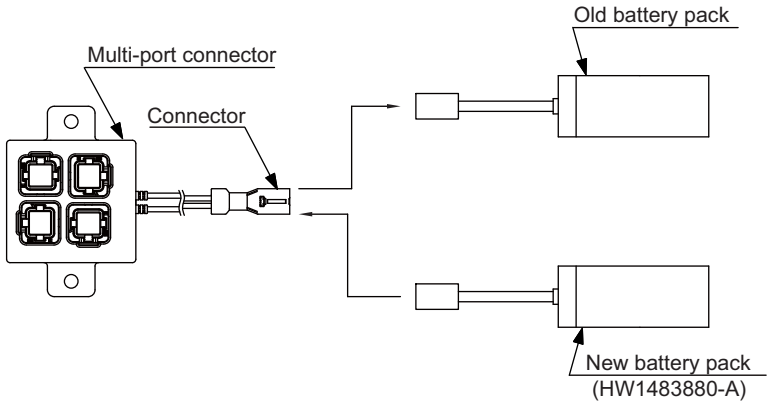
When the battery alarm message is shown on the programming pendant, replace the battery pack in accordance with the following two methods. Perform the replacement by referring to *chapter 9.2 "Notes for Maintenance"* .

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



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

Fig. 9-8: 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.

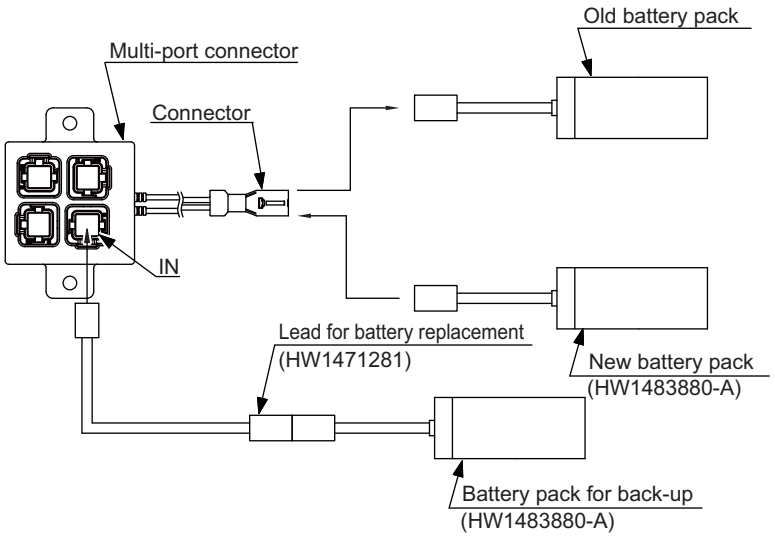
2. Loosen the cover mounting bolt and remove the cover.
3. The old battery pack is fixed with the protective tube and the cable tie. Cut the cable tie to remove the old battery pack from the protective tube.
4. Remove the old battery pack from the multi-port connector and mount the new battery pack.
5. After placing the new battery pack into the protective tube, fix it with the cable tie (-F40: T18R, -F41: MCTS100-BLU).
6. Tighten the cover mounting bolt by using the tightening torque shown in *fig. 9-7 "Locations of the Battery and Multi-port Connector"* to reinstall the cover.

NOTE

- When reinstalling the cover, be careful not to get caught the cable.
- Observe the tightening torque.
- Tighten the bolt in a criss-cross pattern.

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

Fig. 9-9: 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 the protective tube and the cable tie. Cut the cable tie to remove the old battery pack from the protective tube.

NOTE 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. After placing the new battery pack into the protective tube, fix it with the cable tie (-F40: T18R, -F41: MCTS100-BLU).
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. 9-7 “Locations of the Battery and Multi-port Connector”* to reinstall the cover.

NOTE
- When reinstalling the cover, be careful not to get caught the cable.
- Observe the tightening torque.
- Tighten the bolt in a criss-cross pattern.

9.4 Notes on Grease Replenishment Procedures

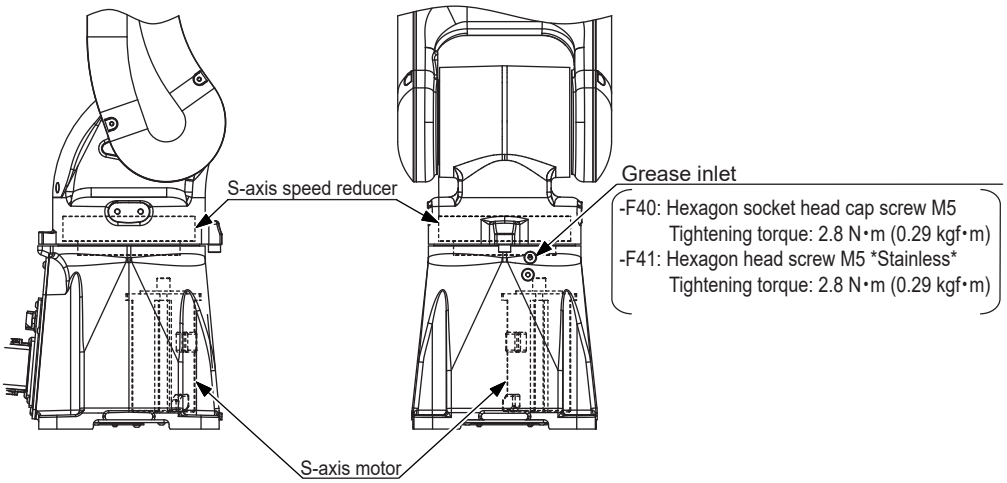
Make sure to follow the instructions listed below at grease replenishment. Failure to observe the following notes may result in damage to motor and speed reducer.

NOTE

- 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. 9-10: S-Axis Speed Reducer Diagram (GP8, GP7)



9.4.1.1 Grease Replenishment

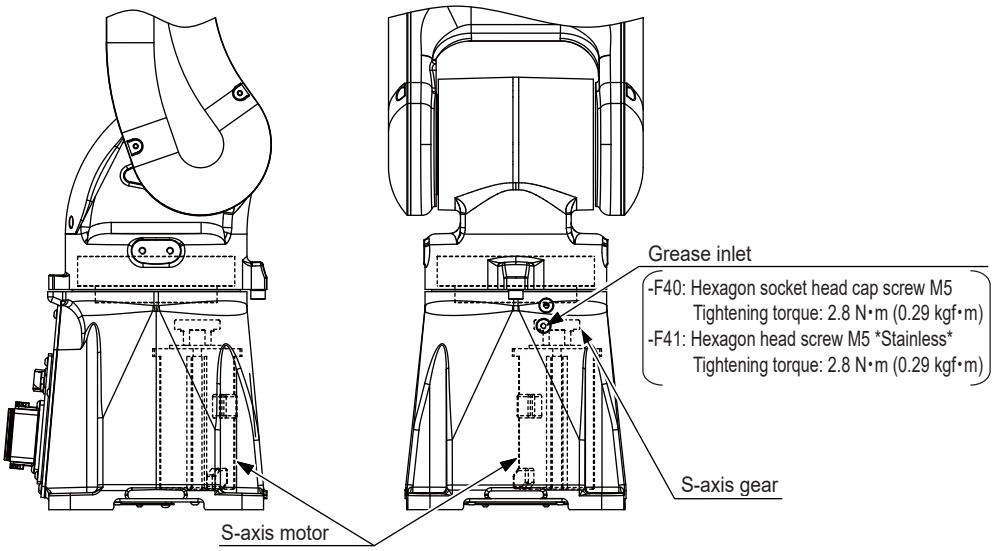
(Refer to *fig. 9-10 "S-Axis Speed Reducer Diagram (GP8, GP7)"* .)

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 (-F40), or hexagon head screw M5 *Stainless* (-F41) 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 HFL-1
   - Amount of grease: 3 g
5. Remove the injection syringe for replenishment from the grease inlet. Install the hexagon socket head cap screw M5 (-F40), or hexagon head screw M5 *Stainless* (-F41) to the grease inlet. When installing the bolts, apply ThreeBond 1206C to the threading part of the screw.

9.4.2 Grease Replenishment for S-Axis Gear

Fig. 9-11: S-Axis Gear Diagram



9.4.2.1 Grease Replenishment

(Refer to *fig. 9-11 "S-Axis Gear 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 (-F40), or hexagon head screw M5 *Stainless* (-F41) 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 HFL-1
   - Amount of grease: 3 g
5. Remove the injection syringe for replenishment from the grease inlet. Install the hexagon socket head cap screw M5 (-F40), or hexagon head screw M5 *Stainless* (-F41) to the grease inlet. When installing the bolts, apply ThreeBond 1206C to the threading part of the screw.

9.4.3 Grease Replenishment for L-Axis Speed Reducer

Fig. 9-12(a): L-Axis Speed Reducer Diagram (GP8)

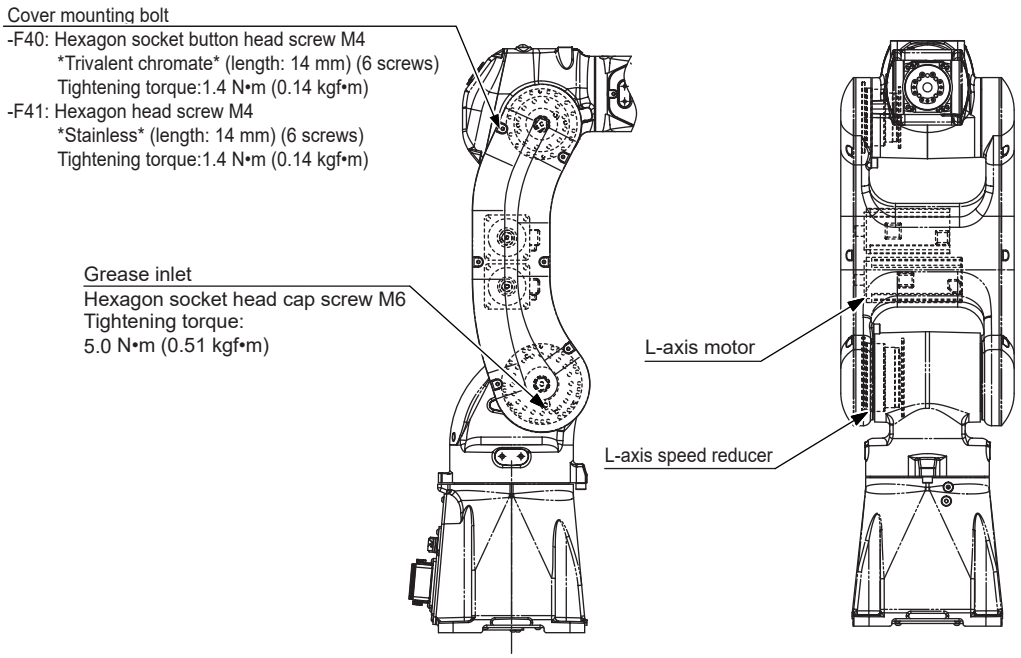
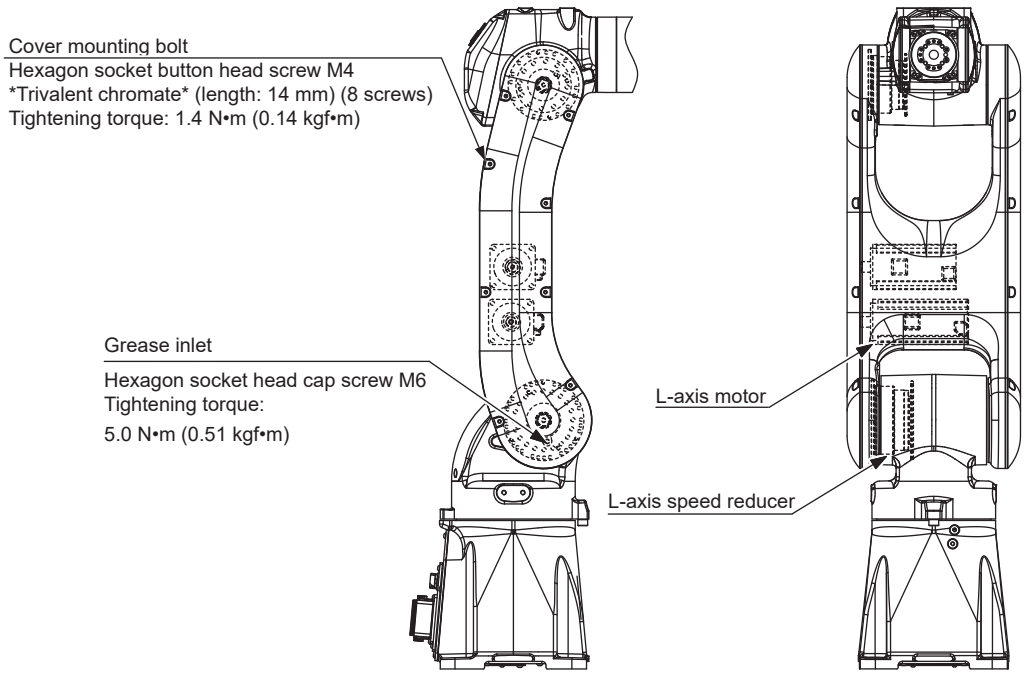


Fig. 9-12(b): L-Axis Speed Reducer Diagram (GP7)



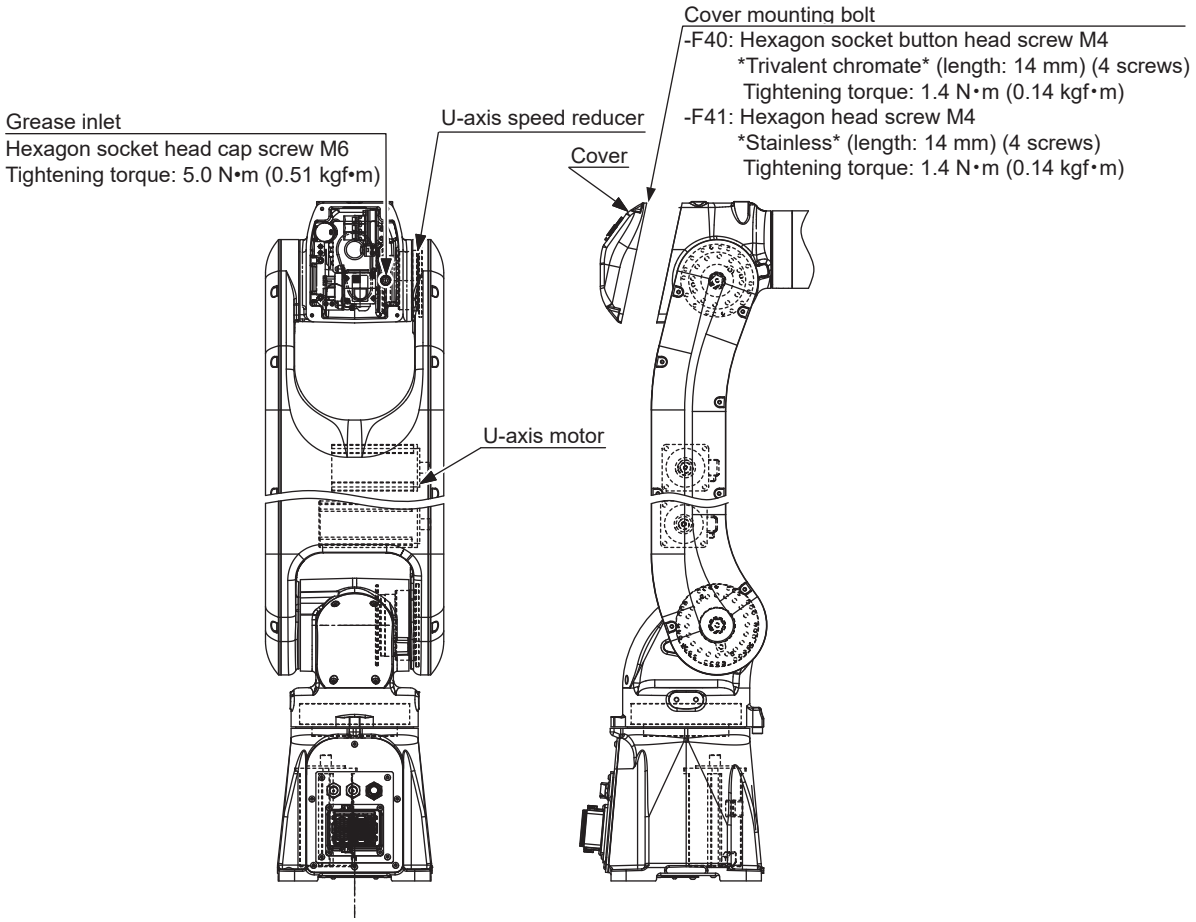
9.4.3.1 Grease Replenishment (GP8, GP7)

(Refer to *fig. 9-12(a) "L-Axis Speed Reducer Diagram (GP8)"* , *fig. 9-12(b) "L-Axis Speed Reducer Diagram (GP7)"* .)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Take off the cover to remove the hexagon socket head cap screw M6 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 HFL-1
   - Amount of grease: 3 g
5. Remove the injection syringe for replenishment from the grease inlet. Install the hexagon socket head cap screw M6 to the grease inlet. When installing the bolts, apply ThreeBond 1206C to the threading part of the screw.

9.4.4 Grease Replenishment for U-Axis Speed Reducer

Fig. 9-13: U-Axis Speed Reducer Diagram (GP8, GP7)



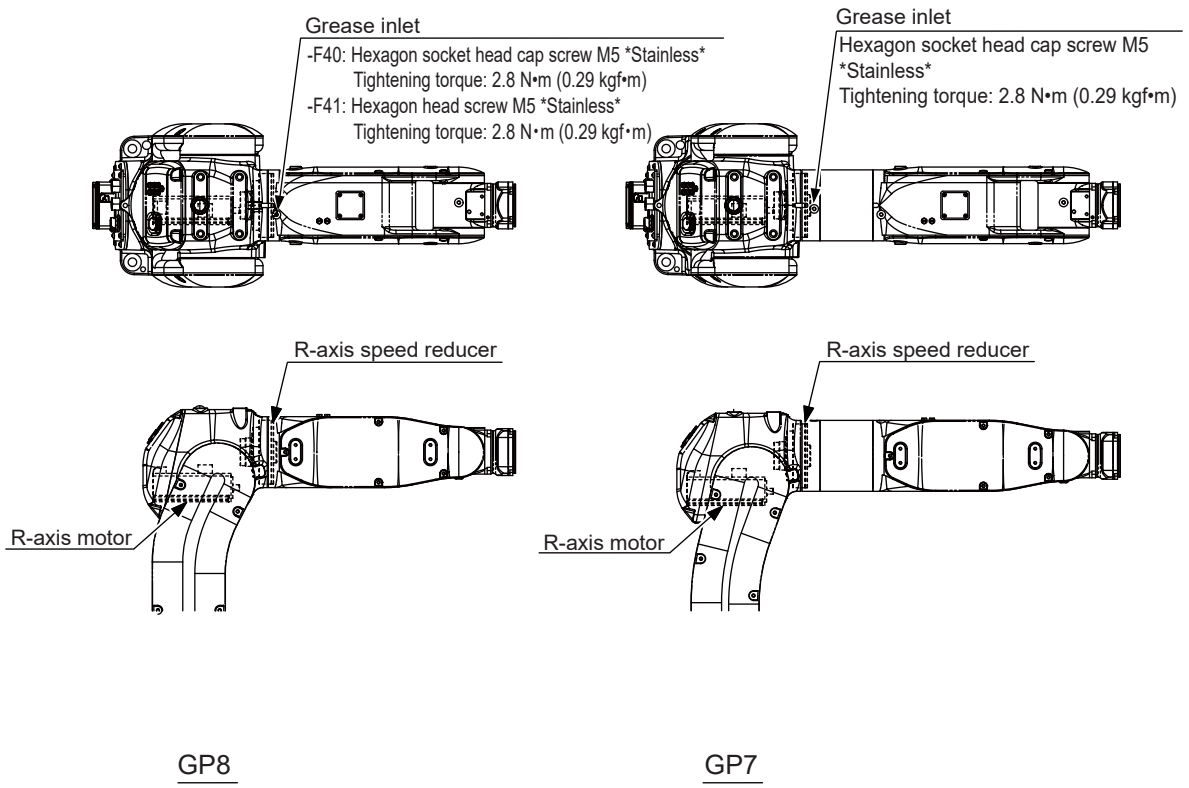
9.4.4.1 Grease Replenishment

(Refer to *fig. 9-13 "U-Axis Speed Reducer Diagram (GP8, GP7)"* .)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Take off the cover to remove the hexagon socket head cap screw M6 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 HFL-1
   - Amount of grease: 1.5 g
5. Remove the injection syringe for replenishment from the grease inlet. Install the hexagon socket head cap screw M6 to the grease inlet. When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

9.4.5 Grease Replenishment for R-Axis Speed Reducer

Fig. 9-14: R-Axis Speed Reducer Diagram



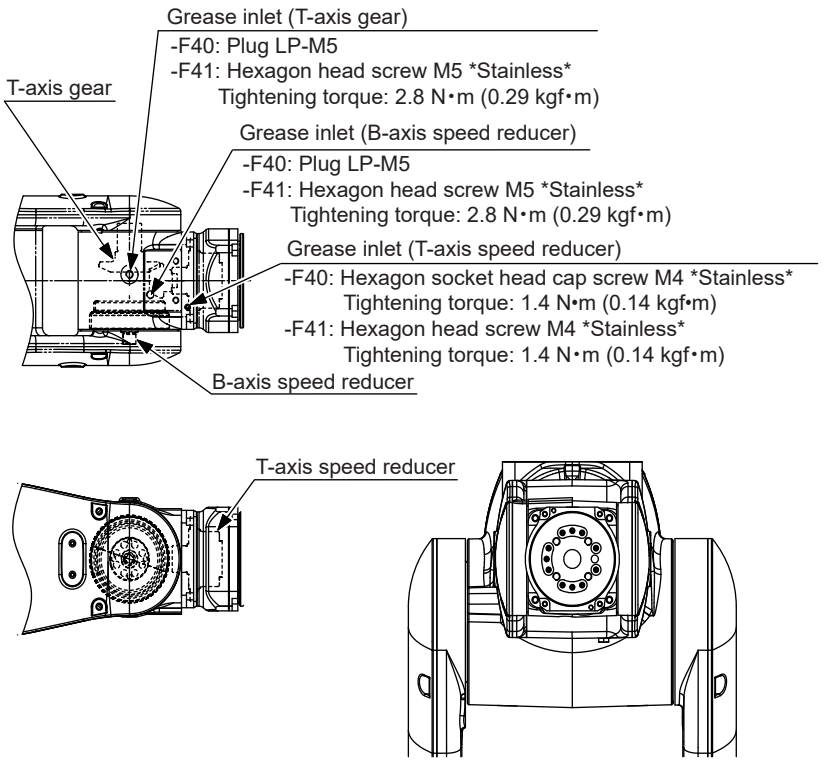
9.4.5.1 Grease Replenishment

(Refer to *fig. 9-14 "R-Axis Speed Reducer Diagram"* .)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M5 *Stainless* (-F40), or hexagon head screw M5 *Stainless* (-F41) from the grease inlet.
3. Inject grease into the grease inlet.
   - Grease type: Harmonic Grease HFL-1
   - Amount of grease: 1 g
4. Install the hexagon socket head cap screw M5 *Stainless* (-F40), or hexagon head screw M5 *Stainless* (-F41) 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. 9-15: B- and T-Axes Speed Reducers Diagram (GP8, GP7)



9.4.6.1 Grease Replenishment for B-Axis

(Refer to *fig. 9-15 "B- and T-Axes Speed Reducers Diagram (GP8, GP7)"* .)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the plug LP-M5 (-F40), or hexagon head screw M5 *Stainless* (-F41) 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 HFL-1
   - Amount of grease: 1 g
5. Install the plug (-F40), or hexagon head screw M5 *Stainless* (-F41) to the grease inlet.

9.4.6.2 Grease Replenishment for T-Axis

(Refer to *fig. 9-15 "B- and T-Axes Speed Reducers Diagram (GP8, GP7)"* .)

1. Adjust the posture of the manipulator to perform grease replenishment smoothly.
2. Remove the hexagon socket head cap screw M4 *Stainless* (-F40) and the plug LP-M5 (-F40), or hexagon head screw M4 *Stainless* (-F41) and hexagon head screw *Stainless* (-F41) 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 HFL-1
   - Amount of grease: 1 g
5. Remove the injection syringe for replenishment from the grease inlet. Install hexagon socket head cap screw and the plug (-F40), or hexagon head screw (-F41) to the grease inlet.
   When installing the bolts, apply Three Bond 1206C to the threading part of the screw.

9.5 Cleaning the Manipulator

When cleaning YR-1-06VX8-F41 (special surface treatment for food specification), it is recommended to drain the water after cleaning because water and other substances may collect in the gaps between the manipulator joints.

Refer to *table 9-3 "Water Drainage Method"* for the water drainage method for each axis.

Table 9-3: Water Drainage Method

Axis	Drainage method
S	Two drainage holes are provided on the S-head and two on the base. Use an air blower to fully dry from the drainage holes.
L	Provide a sufficient amount of time to dry.
U	Provide a sufficient amount of time to dry.
R	Change the orientation to drain. Provide a sufficient amount of time to dry.
B	Provide a sufficient amount of time to dry.
T	Provide a sufficient amount of time to dry.

9.5.1 Drainage Method by Drainage Holes

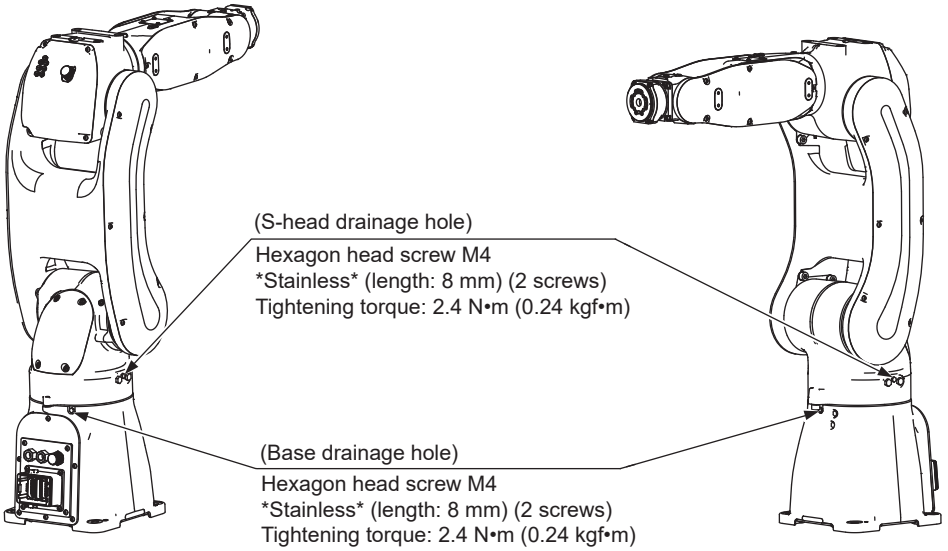
Drainage holes are provided for the S-axis - two on the S-head and two on the base. Select the method used based on how the manipulator is installed.

- Two base locations (when using floor-mounted)
- Two S-head locations (when using ceiling-mounted)

1. After cleaning the manipulator, drain the water by removing the two hexagon head screws M4 *Stainless* (length: 8 mm) that are mounted in the drain holes.
2. Apply air blow from one side of the drainage hole as necessary.
   It is recommended to apply air blow in order to drain water sufficiently.
   Time for using air blow: 2 to 3 minutes (approximate)
3. Dry for a sufficient time with hexagon head screw removed.
4. Install hexagon head screw M4 *Stainless* (length: 8 mm) with the tightening torque value shown in *fig. 9-16 "S-Axis Drainage Hole Position"* .

NOTE Before draining water from the base, protect the power supply connector from exposure to water.

Fig. 9-16: S-Axis Drainage Hole Position



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, -GP7.

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

NOTE For replacing parts in rank B or rank C, contact your YASKAWA representative.

Table 10-1: Spare Parts for the YR-1-06VX8-F4 (Sheet 1 of 3)*

Rank	Parts No.	Name	Inquiry Code	Manufacturer	Qty.	Qty. per Unit	Remarks
A	1	Grease	Harmonic Grease HFL-1	Harmonic Drive Systems Co., Ltd.	80 g		
A	2	Grease	CASSIDA Grease EPS02	YASKAWA Electric Corporation	380 g	-	
A	3	Adhesive	LOCTITE 243	Henkel Japan Ltd	1	-	
A	4	Adhesive	LOCTITE 518	Henkel Japan Ltd	1	-	
A	5	Liquid gasket	TB1206C	ThreeBond Co., Ltd.	1	-	
A	6	Battery pack	HW1483880-A	YASKAWA Electric Corporation	1	3	
A	7	Lead wire for battery replacement	HW1471281-A	YASKAWA Electric Corporation	1	1	
A	8	Gasket	HW1406930-1	YASKAWA Electric Corporation	1	1	For the S-head cover
A	9	Gasket	HW1305693-1	YASKAWA Electric Corporation	1	2	For the L-arm cover
A	10	Gasket	HW1406931-1	YASKAWA Electric Corporation	1	1	For the casing cover
A	11	Gasket	HW1305695-1	YASKAWA Electric Corporation	1	2	For the U-arm cover
A	12	Grease kit for replenishment	HW1484274-A	YASKAWA Electric Corporation	1	1	
B	13	L-axis timing belt	100S5M380	Mitsuboshi Belting Ltd.	1	1	
B	14	U-axis timing belt	100S5M415	Mitsuboshi Belting Ltd.	1	1	

Table 10-1: Spare Parts for the YR-1-06VX8-F4 (Sheet 2 of 3)*

Rank	Parts No.	Name	Inquiry Code	Manufacturer	Qty.	Qty. per Unit	Remarks
B	15	R-axis timing belt	BG222UP3M6-HC	Tsubakimoto Chain Co.	1	1	
B	16	B-axis timing belt	BG525UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	17	T-axis timing belt	BG354UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	18	Replacement Kit for S-axis Speed Reducer[1)]	HW2480521-A(-F40) HW2480521-B(-F41)	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384531-C (-F40) HW1384531-D (-F41) Gear: HW1306288-1/ HW1306289-1
B	19	Replacement Kit for L-axis Speed Reducer[1)]	HW2480522-A(-F40) HW2480522-B(-F41)	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384227-A (-F40) HW1384227-D (-F41)
B	20	Replacement Kit for U-axis Speed Reducer[1)]	HW2480523-A(-F40) HW2480523-B(-F41)	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384226-A (-F40) HW1384226-D (-F41)
B	21	Replacement Kit for R-axis Speed Reducer[1)]	HW2480524-A(-F40) HW2480524-B(-F41)	YASKAWA Electric Corporation	1	1	Speed reducer: HW0388708-C (-F40) HW0388708-D (-F41)
B	22	Replacement Kit for B-axis Speed Reducer[1)]	HW1484245-B	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384236-A
B	23	Replacement Kit for T-axis Speed Reducer[1)]	HW2480525-A(-F40) HW2480525-B(-F41)	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384235-A (-F40) HW1384235-B (-F41)
B	24	Wrist unit	HW1172783-F(-F40) HW1172783-G(-F41)	YASKAWA Electric Corporation	1	1	
B	25	Wire harness in manipulator	HW1173731-A	YASKAWA Electric Corporation	1	1	
B	26	Lead wire for B- and T-axis	HW1173729-A	YASKAWA Electric Corporation	1	1	
C	27	Bypass cable	HW1471212-A	YASKAWA Electric Corporation	1	-	Signal cable for temporary restoration in case of failure
C	28	S- and L-axis AC servomotor	SGM7J-04APK-YR1*	YASKAWA Electric Corporation	1	2	
C	29	U-axis AC servomotor	SGM7J-02APK-YR1*	YASKAWA Electric Corporation	1	1	
C	30	R-axis AC servomotor	SGM7J-01APK-YR1*	YASKAWA Electric Corporation	1	1	

Table 10-1: Spare Parts for the YR-1-06VX8-F4 (Sheet 3 of 3)*

Rank	Parts No.	Name	Inquiry Code	Manufacturer	Qty.	Qty. per Unit	Remarks
C	31	B- and T-axis AC servomotor	SGM7A-01APK-YR1*	YASKAWA Electric Corporation	1	2	
C	32	Lead wire for S-axis power	HW1372681-B	YASKAWA Electric Corporation	1	1	Lead wire between S-axis motor and the multi-port connector
C	33	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 multi-port connector
C	34	Lead wire for R-axis power	HW1372679-A	YASKAWA Electric Corporation	1	1	Lead wire between R-axis motor and the multi-port connector
C	35	Multi-port connector	HW1384619-A	YASKAWA Electric Corporation	1	3	
C	36	Power supply board	HW1384624-A JARCR-APU01-A	YASKAWA Electric Corporation	1	1	
C	37	Dummy connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For the axes detachment function

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.

Table 10-2: Spare Parts for the YR-1-06VX7-F40 (Sheet 1 of 2)

Rank	Parts No.	Name	Inquiry Code	Manufacturer	Qty.	Qty. per Unit	Remarks
A	1	Grease	Harmonic Grease SK-1A	Harmonic Drive Systems Co., Ltd.	80 g	-	
A	2	Grease	CASSIDA Grease EPS02	YASKAWA Electric Corporation	380 g	-	
A	3	Adhesive	LOCTITE 243	Henkel Japan Ltd	1	-	
A	4	Adhesive	LOCTITE 518	Henkel Japan Ltd	1	-	
A	5	Liquid gasket	TB1206C	ThreeBond Co., Ltd.	1	-	
A	6	Battery pack	HW1483880-A	YASKAWA Electric Corporation	1	3	
A	7	Lead wire for battery replacement	HW1471281-A	YASKAWA Electric Corporation	1	1	
A	8	Gasket	HW1406930-1	YASKAWA Electric Corporation	1	1	For the S-head cover
A	9	Gasket	HW1305694-1	YASKA WA Electric Corporation	1	2	For the L-arm cover
A	10	Gasket	HW1406931-1	YASKAWA Electric Corporation	1	1	For the casing cover
A	11	Gasket	HW1305695-1	YASKAWA Electric Corporation	1	2	For the U-arm cover
A	12	Grease kit for replenishment	HW1484274-A	YASKAWA Electric Corporation	1	1	
B	13	L-axis timing belt	100S5M380	Mitsuboshi Belting Ltd.	1	1	
B	14	U-axis timing belt	100S5M590	Mitsuboshi Belting Ltd.	1	1	
B	15	R-axis timing belt	BG222UP3M6-HC	Tsubakimoto Chain Co.	1	1	
B	16	B-axis timing belt	BG525UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	17	T-axis timing belt	BG354UP3M4-HY	Tsubakimoto Chain Co.	1	1	
B	18	Replacement Kit for S-axis Speed Reducer[1)]	HW2480521-C	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384531-C Gear: HW1306524-1/ HW1306525-1
B	19	Replacement Kit for L-axis Speed Reducer[1)]	HW2480639-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384227-B
B	20	Replacement Kit for U-axis Speed Reducer[1)]	HW2480640-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384226-B
B	21	Replacement Kit for R-axis Speed Reducer[1)]	HW2480524-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW0388708-A

Table 10-2: Spare Parts for the YR-1-06VX7-F40 (Sheet 2 of 2)

Rank	Parts No.	Name	Inquiry Code	Manufacturer	Qty.	Qty. per Unit	Remarks
B	22	Replacement Kit for B-axis Speed Reducer[1)]	HW1484245-B	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384236-A
B	23	Replacement Kit for T-axis Speed Reducer[1)]	HW2480525-A	YASKAWA Electric Corporation	1	1	Speed reducer: HW1384235-A
B	24	Wrist unit	HW1172783-F	YASKAWA Electric Corporation	1	1	
B	25	Wire harness in manipulator	HW1173731-B	YASKAWA Electric Corporation	1	1	
B	26	Lead wire for B- and T-axis	HW1173729-B	YASKAWA Electric Corporation	1	1	
C	27	Bypass cable	HW1471212-A	YASKAWA Electric Corporation	1	-	Signal cable for temporary restoration in case of failure
C	28	S-and L-axis AC servomotor	SGM7J-04APK-YR1*	YASKAWA Electric Corporation	1	2	
C	29	U-axis AC servomotor	SGM7J-02APK-YR1*	YASKAWA Electric Corporation	1	1	
C	30	R-axis AC servomotor	SGM7J-01APK-YR1*	YASKAWA Electric Corporation	1	1	
C	31	B- and T-axis AC servomotor	SGM7A-01APK-YR1*	YASKAWA Electric Corporation	1	2	
C	32	Lead wire for S-axis power	HW1372681-B	YASKAWA Electric Corporation	1	1	Lead wire between S-axis motor and the multi-port connector
C	33	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 multi-port connector
C	34	Lead wire for R-axis power	HW1372679-A	YASKAWA Electric Corporation	1	1	Lead wire between R-axis motor and the multi-port connector
C	35	Multi-port connector	HW1384619-A	YASKAWA Electric Corporation	1	3	
C	36	Power supply board	HW1384624-A JARCR-APU01-A	YASKAWA Electric Corporation	1	1	
C	37	Dummy connector	HW1471285-A	YASKAWA Electric Corporation	1	-	For the axes de-tachment function

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.

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