MOTOMAN-MH50
INSTRUCTIONS

TYPE: YR-MH00050-A00 (STANDARD SPECIFICATION)
YR-MH00050-A01 (WITH LIMIT SWITCHES FOR S-, L-, U-AXES)

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

MOTOMAN INSTRUCTIONS

MOTOMAN-MH50 INSTRUCTIONS
DX 100 INSTRUCTIONS
DX 100 OPERATOR'S MANUAL
DX100 MAINTENANCE MANUAL

The DX 100 operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 156228-1CD
Revision: 0

YASKAWA

MANUAL NO.
HW0485217

MANDATORY

- This instruction manual is intended to explain mainly on the mechanical part of the MOTOMAN-MH50 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.
- General items related to safety are listed in the Chapter 1: Safety of the DX 100 instructions. To ensure correct and safe operation, carefully read the DX 100 instructions before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.
  If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the MOTOMAN-MH50.

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

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

MANDATORY

Always be sure to follow explicitly the items listed under this heading.

PROHIBITED

Must never be performed.

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

At any rate, be sure to follow these important items

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

WARNING

- Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX100 and the programming pendant.
  When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

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

Fig. : Emergency Stop Button

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

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of Emergency Stop

- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Keep in mind the emergency response measures against the manipulator's unexpected motion toward you.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning ON the power for the DX100.
  - Moving the manipulator with the programming pendant.
  - Running the system in the check mode.
  - Performing automatic operations.

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem.

The emergency stop buttons are located on the right of front door of the DX100 and the programming pendant.

CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately,
  and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the cabinet of the DX100 after use.

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

- Read and understand the Explanation of Warning Labels in the DX100 Instructions before operating the manipulator:

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

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

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
DX100 controller	DX100
DX100 programming pendant	Programming pendant
Cable between the manipulator and the controller	Manipulator cable

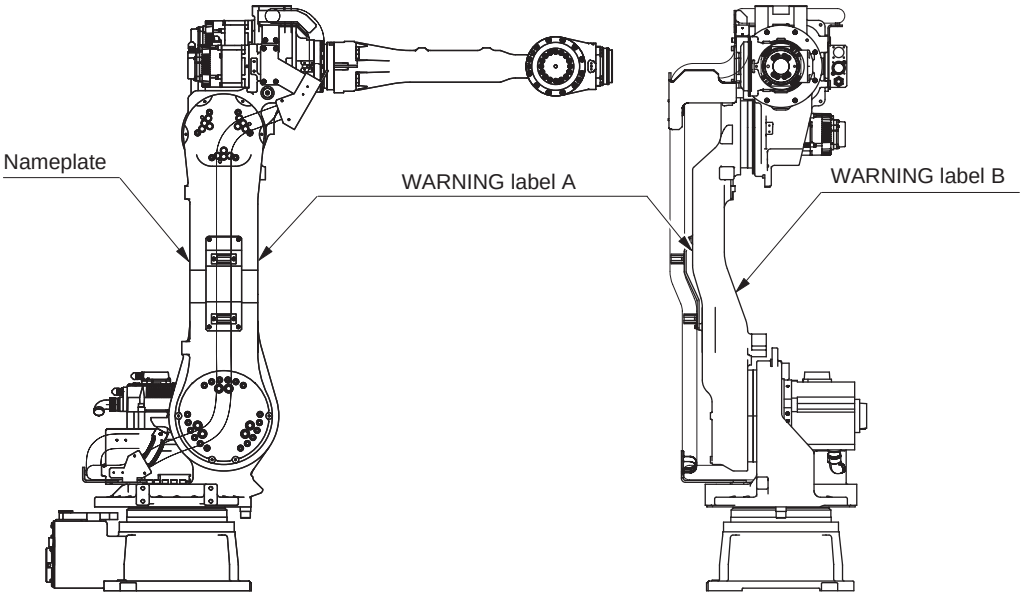
Explanation of Warning Labels

The following warning labels are attached to the manipulator.

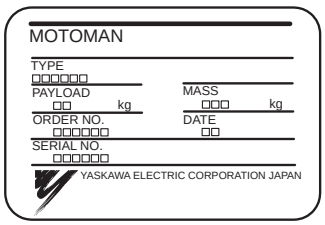
Always follow the warnings on the labels.

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

Fig. : Warning Label Locations



Nameplate:



WARNING Label A:

WARNING Label B:

1 Product Confirmation

CAUTION

- Confirm that the manipulator and the DX 100 have the same order number. Special care must be taken when more than one manipulator is to be installed.

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

1.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

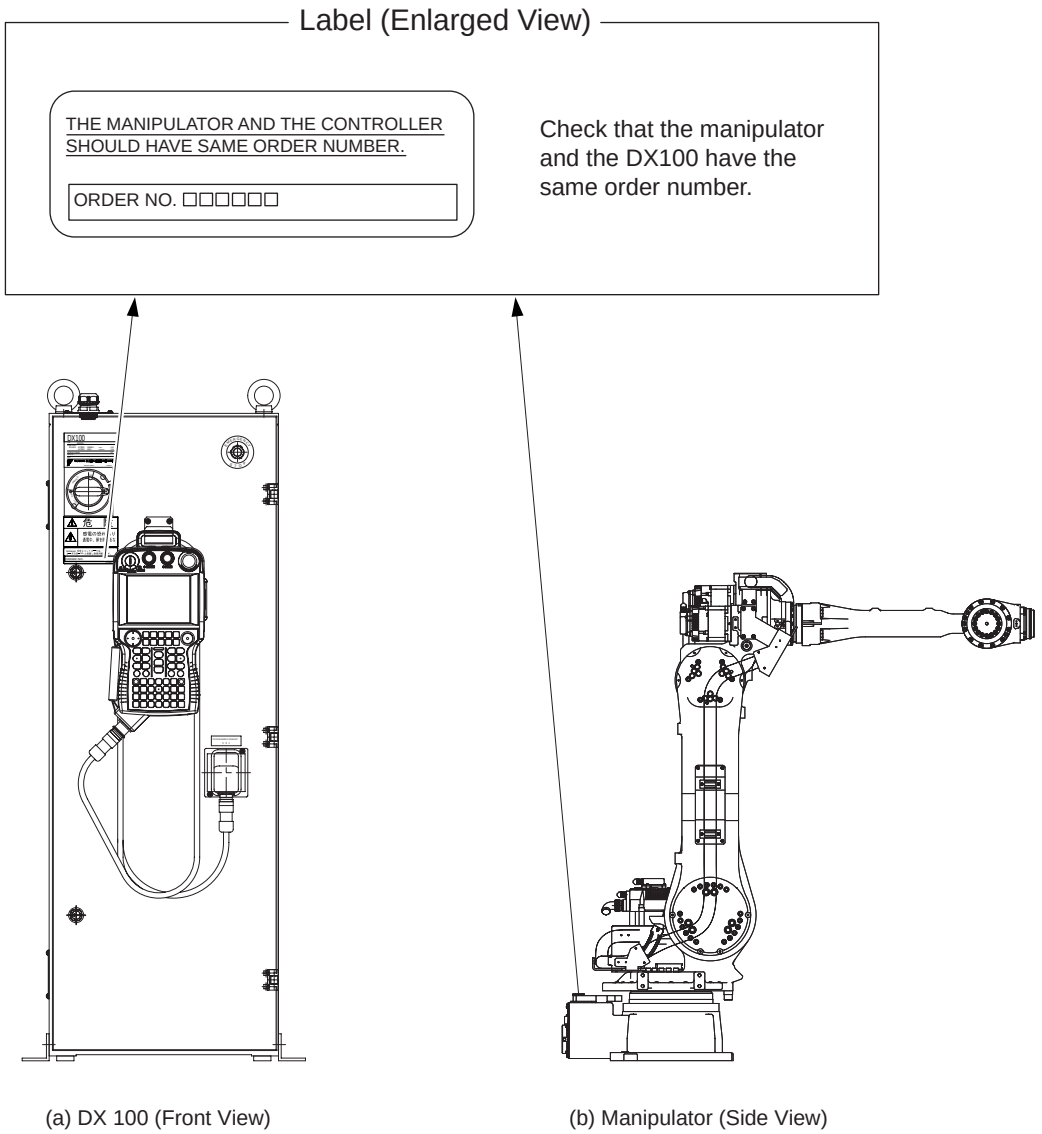
Standard delivery includes the following four items (Information for the content of optional goods is given separately):

- Manipulator
- DX 100
- Programing Pendant
- Manipulator Cable (between the DX 100 and the Manipulator)

1.2 Order Number Confirmation

Check that the order number of the manipulator corresponds to the DX 100. The order number is located on a label as shown below.

Fig. 1-1: Location of Order Number Labels



(a) DX 100 (Front View)

(b) Manipulator (Side View)

2 Transport

CAUTION

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

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

- Avoid excessive vibration or shock during transport.

The system consists of precision components. Failure to observe this caution may adversely affect performance.

2.1 Transport Method

NOTE

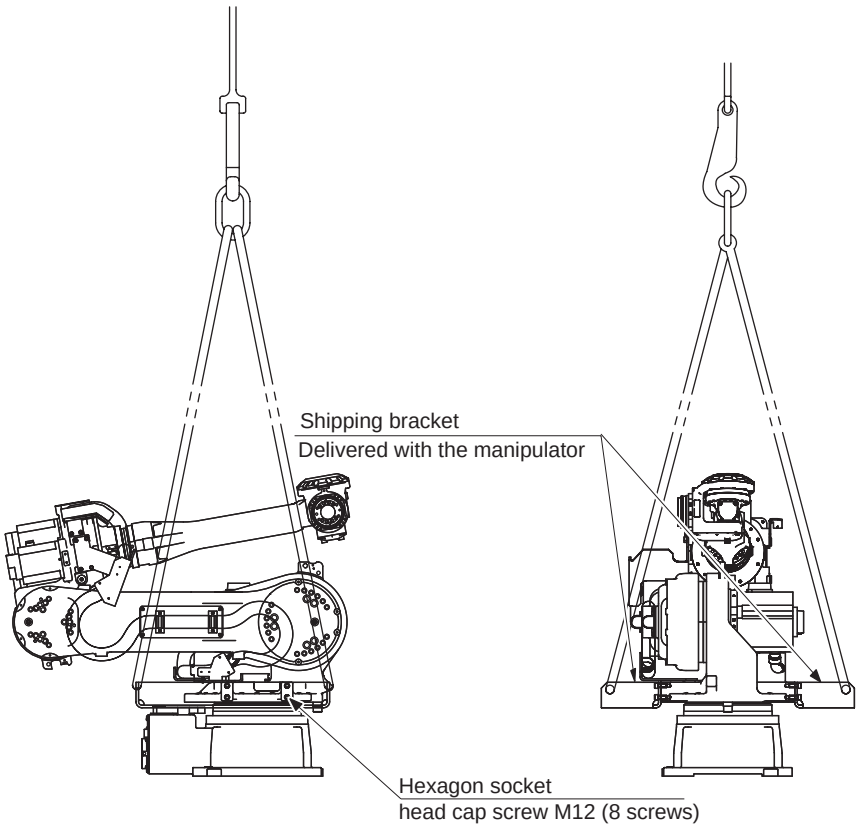
- Check that the eyebolts are securely fastened.
- The weight of the manipulator is approximately 550 kg including the shipping bolts and brackets. Use a wire rope strong enough to withstand the weight.
- Attached eyebolts are designed to support the manipulator weight. Do not use them for anything other than transporting the manipulator.
- Mount the shipping bolts and brackets for transporting the manipulator.
- Avoid putting external force on the arm or motor unit when transporting by a crane, forklift, or other equipment. Failure to observe this instruction may result in injury.

2.1.1 Using a Crane

As a rule, the manipulator should be lifted by a crane with a four-leg brindle sling using the attached eyebolts when removing it from the package and moving it.

Be sure that the manipulator is fixed with the shipping bolts and brackets before transport, and lift it in the posture as shown in *fig. 2-1 “Transporting Position”* .

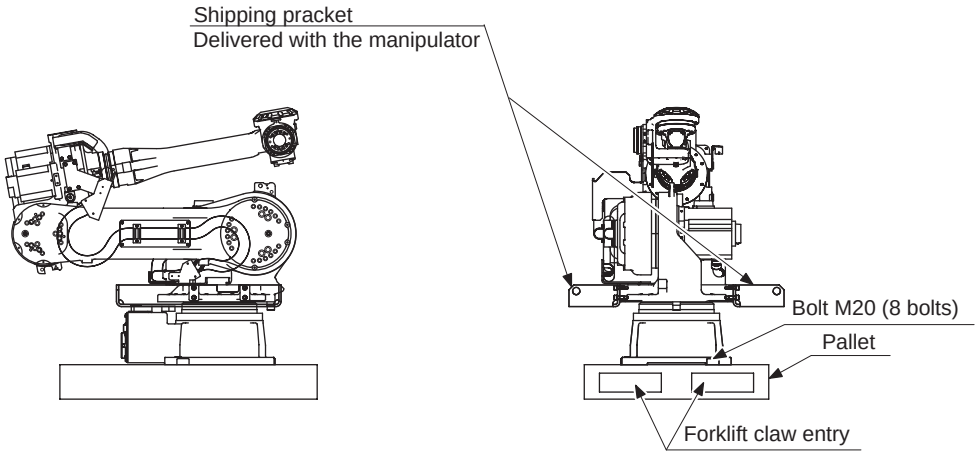
Fig. 2-1: Transporting Position



2.1.2 Using a Forklift

When using a forklift, the manipulator should be fixed on a pallet with bolts as shown in *fig. 2-2 “Using a Forklift”* . Insert claws under the pallet and lift it. The pallet must be strong enough to support the manipulator. Transport the manipulator slowly with due caution in order to avoid overturning or slippage.

Fig. 2-2: Using a Forklift



2.2 Shipping Bolts and Brackets

The manipulator is provided with shipping bolts and a shipping brackets.

(See *fig. 2-1 “Transporting Position” at page 2-2*.)

- The shipping bolts and bracket are painted yellow.

NOTE

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

3 Installation

WARNING

- Install the safeguarding.

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

- Install the manipulator in a location where the tool or the workpiece held by its fully extended arm will not reach the wall, safeguarding, or controller.

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

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

The manipulator may overturn and cause injury or damage.

CAUTION

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

Failure to observe this caution may cause injury or damage.

- Before turning ON the power, check to be sure that the shipping bolts and brackets are removed.

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

3.1 Installation of the Safeguarding

To insure safety, be sure to install safeguarding. 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 safeguarding is 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 repulsion forces during acceleration and deceleration.

Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the manipulator referring to *table 3-1 "Maximum Repulsion Forces of the Manipulator at Emergency Stop"* and *table 3-2 "Endurance Torque in Operation"* .

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: Maximum Repulsion Forces of the Manipulator at Emergency Stop

Maximum torque in horizontal rotation (S-axis moving direction)	24500 N•m (2500 kgf•m)
Maximum torque in vertical rotation (L-, U-axes moving direction)	45080 N•m (4600 kgf•m)

Table 3-2: Endurance Torque in Operation

Endurance torque in horizontal operation (S-axis moving direction)	6125 N•m (625 kgf•m)
Endurance torque in vertical operation (L-, U-axes moving direction)	11270 N•m (1150 kgf•m)

3.2.1 Mounting Example

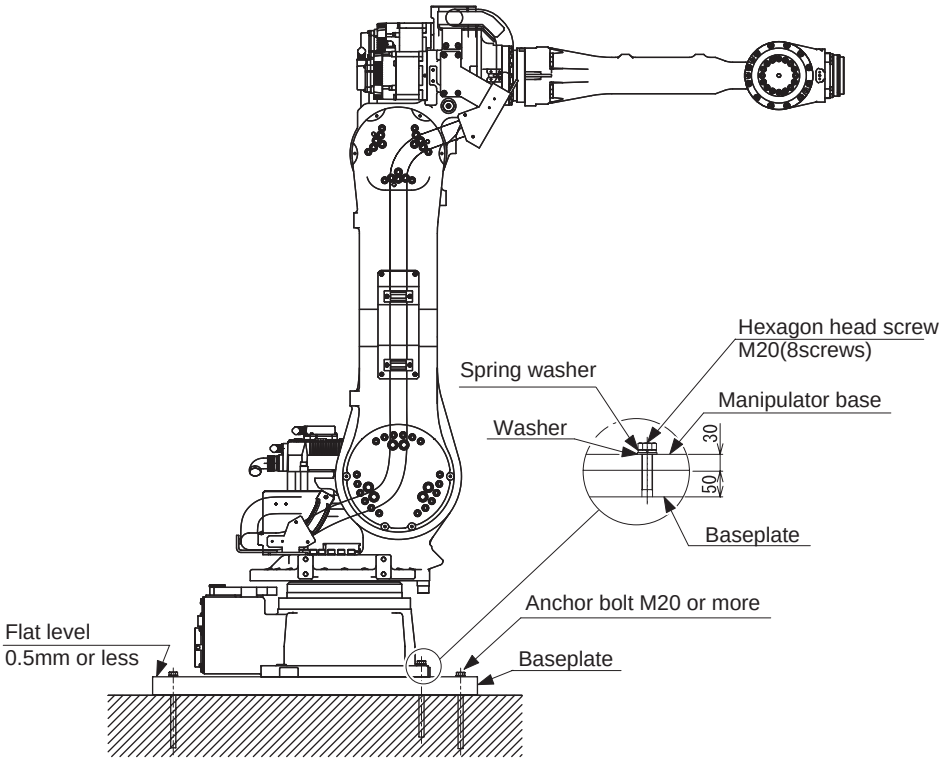
For the first process, anchor the baseplate firmly to the ground. The baseplate should be rugged and durable to prevent shifting of the manipulator or the mounting fixture. It is recommend to prepare a baseplate of 50 mm or more thick, and anchor bolts of M20 or larger size.

The manipulator base is tapped for eight mounting holes; securely fix the manipulator base to the baseplate with hexagon head screws M20 (70 mm long is recommended).

Next, fix the manipulator base to the baseplate. Tighten the hexagon head screws and anchor bolts firmly so that they will not work loose during the operation.

Refer to *fig. 3-1 “Mounting the Manipulator Baseplate” at page 3-3*.

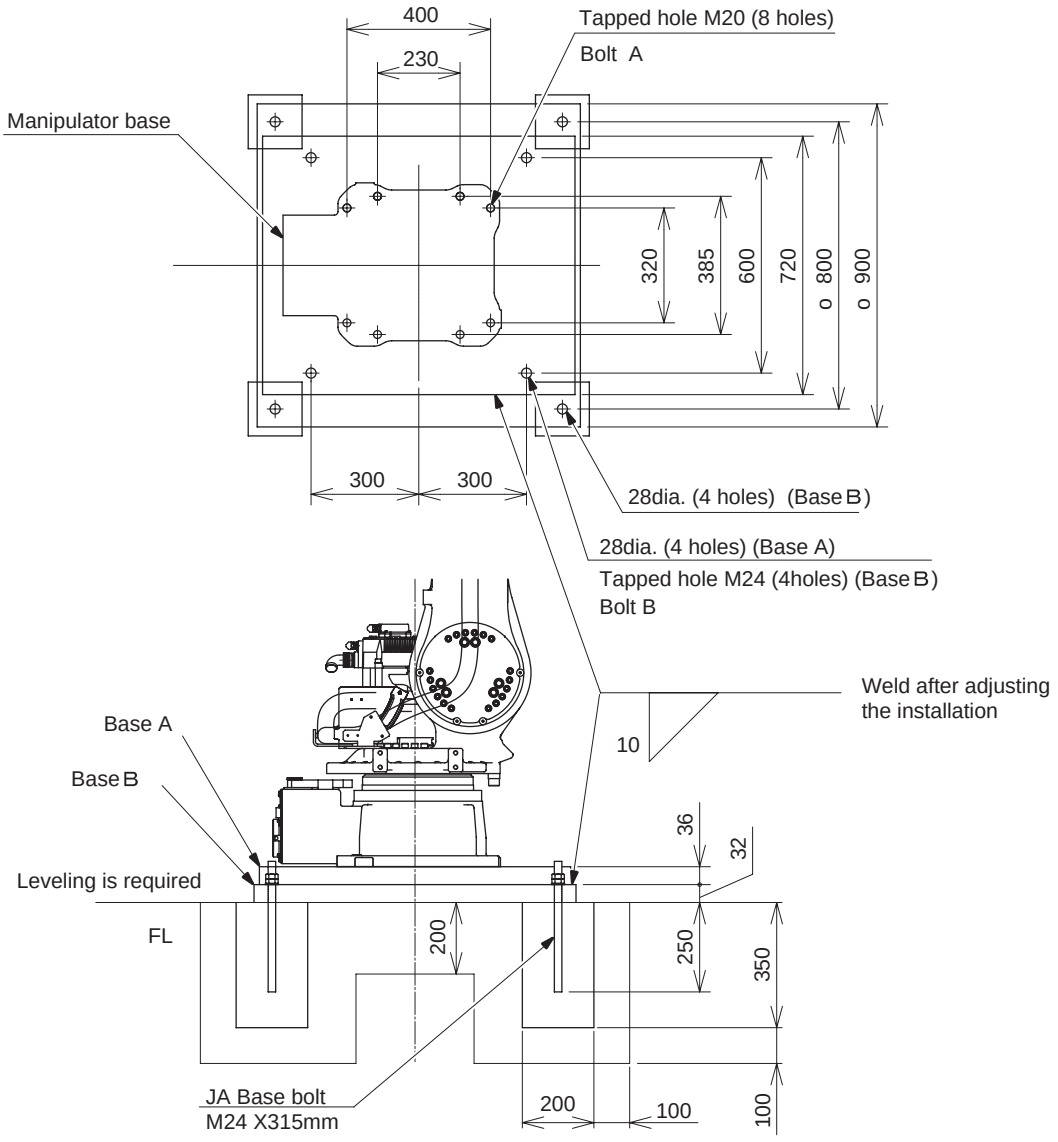
Fig. 3-1: Mounting the Manipulator Baseplate



3.2.2 When the Manipulator is Mounted Directly on the Floor

The floor should be strong enough to support the manipulator. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the manipulator. As a rough standard, when there is a concrete thickness (floor) is 200 mm or more, the manipulator base can be fixed directly to the floor with M 20 anchor bolts. Before mounting the manipulator, however, check that the floor is level and that all cracks, etc. are repaired. Any thickness less than 200 mm is insufficient for mounting, even if the floor is concrete.

Fig. 3-2: Direct Mounting on the Floor



Units: mm

Bolt A: Bolt M20 X 70 mm（8 bolts),Spring Washer, Flat Washer
Bolt B: Bolt M24 X 70 mm（4 bolts),Spring Washer, Flat Washer
Tightening bolts or bases are prepared by the customer.

3.3 Protection Class

The protection class at the main part conforms to IP54 and that of wrist part is IP67.

3.4 Location

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

- Ambient Temperature: 0° to +45°C
- Humidity: 20 to 80%RH (non-condensing)
- Free from dust, soot, oil, or water
- Free from corrosive gas or liquid, or explosive gas or liquid.
- Free from excessive vibration (4.9 m/s^2 [0.5G] or less)
- Free from large electrical noise (plasma)
- The flatness for installation is 0.5 mm or less

4 Wiring

WARNING

- Ground resistance must be 100 Ω or less.

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

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

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

CAUTION

- Wiring must be performed by authorized or certified personnel.

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

4.1 Grounding

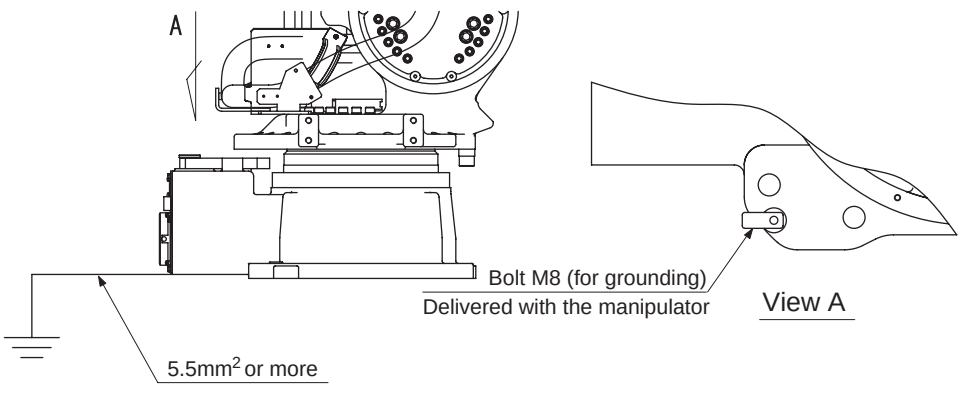
Follow the local regulations and electrical installation standards for grounding. A wire of 5.5 mm^2 or more is recommended.

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

NOTE

- Never use this wire sharing with other ground lines or grounding electrodes for other electric power, motor power, welding devices, etc.
- Where metal ducts, metallic conduits, or distributing racks are used for cable laying, ground in accordance with electrical installation standards.

Fig. 4-1: Grounding Method



4.2 Cable Connection

Two manipulator cables are delivered with the manipulator; an encoder cable (1BC) and a power cable (2BC). (Refer to *fig. 4-2 "Manipulator Cables" at page 4-3*.)

Connect these cables to the manipulator base connectors and to the DX 100. Refer to *fig. 4-3(a) "Manipulator Cable Connectors (Manipulator Side)" at page 4-4*" and *fig. 4-3(b) "Manipulator Cable Connectors (DX 100 Side)" at page 4-4*.

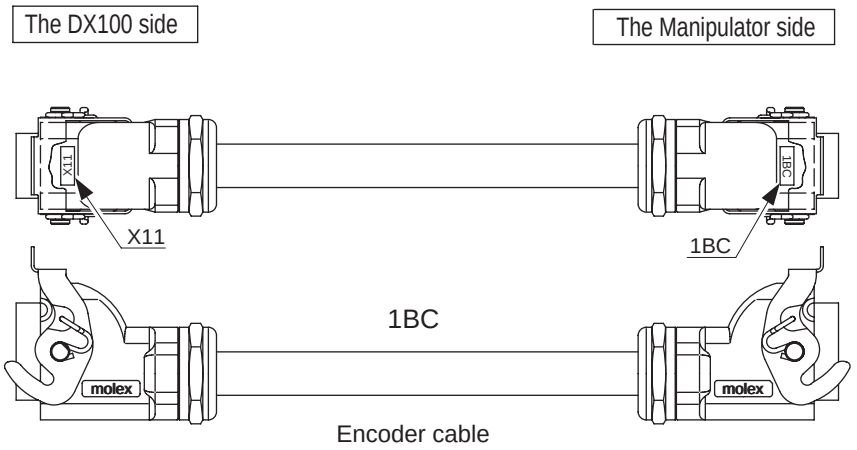
4.2.1 Connection to the Manipulator

Before connecting cables to the manipulator, verify the numbers on both manipulator cables and the connectors on the connector base of the manipulator. When connecting, adjust the cable connector positions to the main key positions of the manipulator, and insert cables in the order of 2BC, then 1BC. After inserting the cables, depress the lever until it clicks.

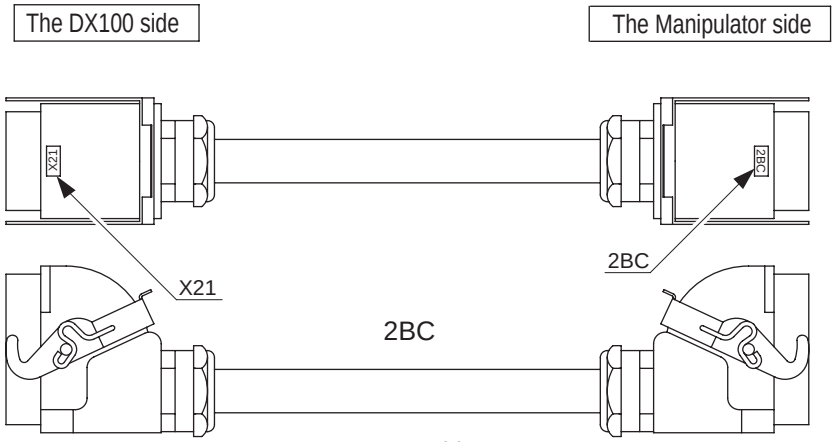
4.2.2 Connection to the DX100

Before connecting cables to the DX100, verify the numbers on both manipulator cables and the connectors on the DX100. When connecting, insert the cables in the order of X21, then X11, and depress each lever low until it clicks.

Fig. 4-2: Manipulator Cables



Encoder cable



Power cable

Fig. 4-3(a): Manipulator Cable Connectors (Manipulator Side)

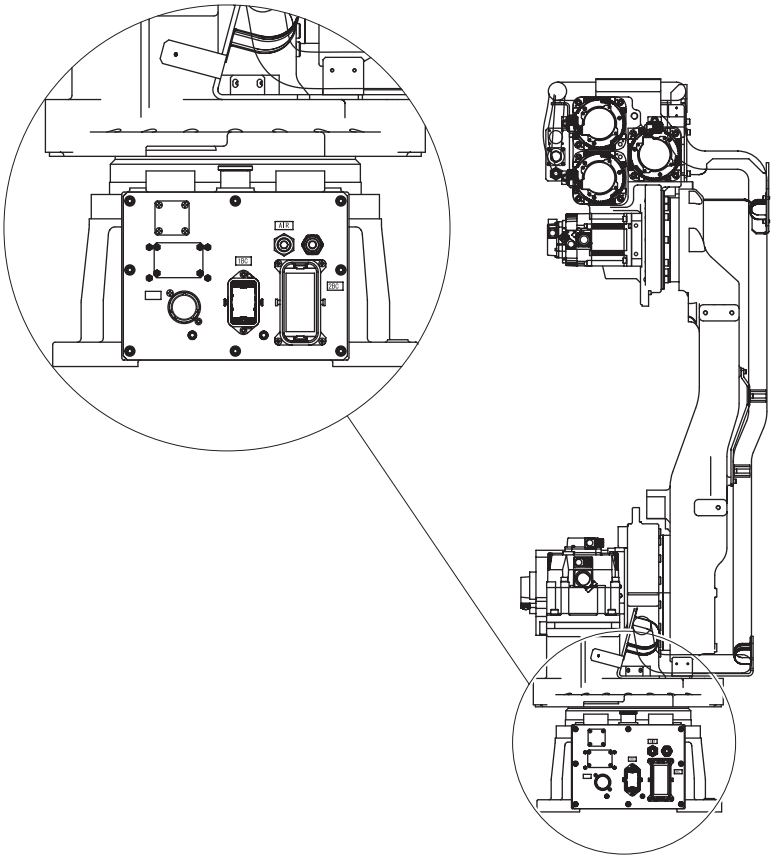
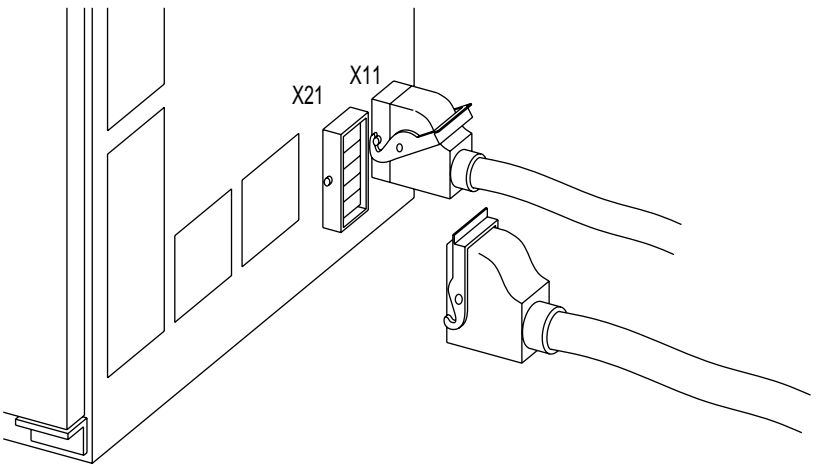


Fig. 4-3(b): Manipulator Cable Connectors (DX 100 Side)



5 Basic Specifications

5.1 Basic Specifications

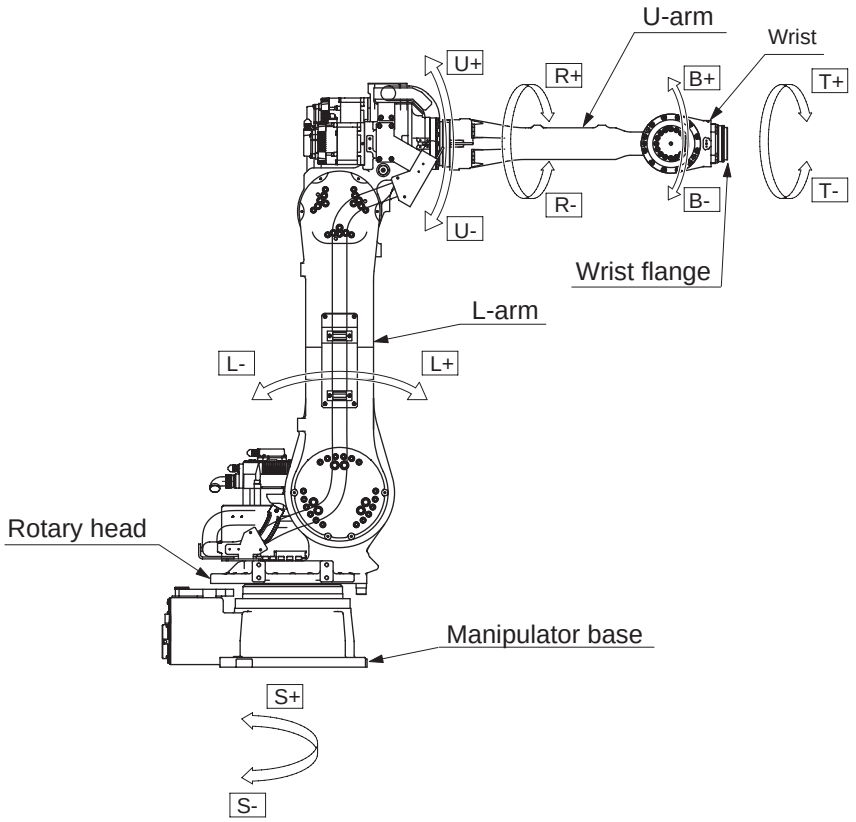
Table 5-1: Basic Specifications[1)]

Item \ Model		MOTOMAN-MH50
Structure		Vertically Articulated
Degree of Freedom		6
Payload		50 kg
Repeatability[*2)]		±0.07 mm
Range of Motion[3)]	S-Axis (turning)	±180°
	L-Axis (lower arm)	+135°, -90°
	U-Axis (upper arm)	+251°, -170°
	R-Axis (wrist roll)	±360°
	B-Axis (wrist pitch/yaw)	+125°
	T-Axis (wrist twist)	±360°
Maximum Speed	S-Axis	3.14rad/s, 180°/s
	L-Axis	3.11 rad/s, 178°/s
	U-Axis	3.11 rad/s, 178°/s
	R-Axis	4.36 rad/s, 250°/s
	B-Axis	4.36 rad/s, 250°/s
	T-Axis	6.28 rad/s, 360°/s
Allowable Moment[4)]	R-Axis	216 N•m (22 kgf•m)
	B-Axis	216 N•m (22 kgf•m)
	T-Axis	147N•m (15 kgf•m)
Allowable Inertia ($GD^2/4$)	R-Axis	28 kg•m^2
	B-Axis	28 kg•m^2
	T-Axis	11 kg•m^2
Approx. Mass		550 kg
Ambient Conditions	Temperature	0° to 45°C
	Humidity	20 to 80% RH at constant temperature
	Vibration Acceleration	Less than 4.9 m/s^2 (0.5 G)
	Others	Free from corrosive gas or liquid, or explosive gas. Free from water, oil, or dust. Free from excessive electrical noise (plasma).
Power Capacity		4.0 kVA

1 SI units are used in this table. However, gravitational unit is used in ( ).
2 Conformed to ISO9283
3 The range of motion of type:MH00050-A01 is limited with the limit switch before shipment.
4 Refer to *chapter 6.1 "Allowable Wrist Load" at page 6-1* for details on the allowable inertia.

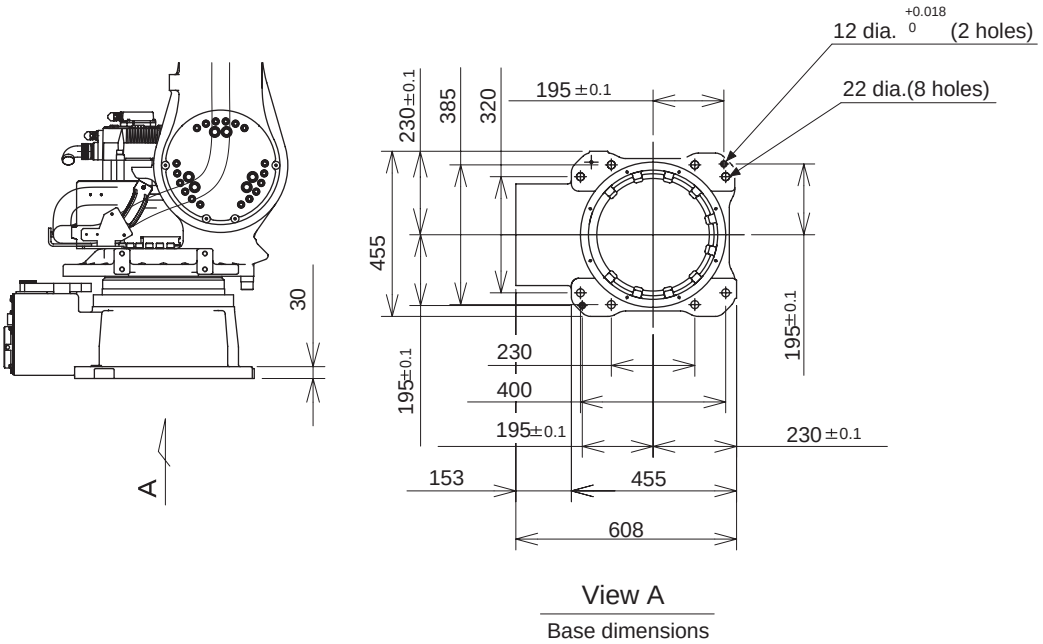
5.2 Part Names and Working Axes

Fig. 5-1: Part Names and Working Axes



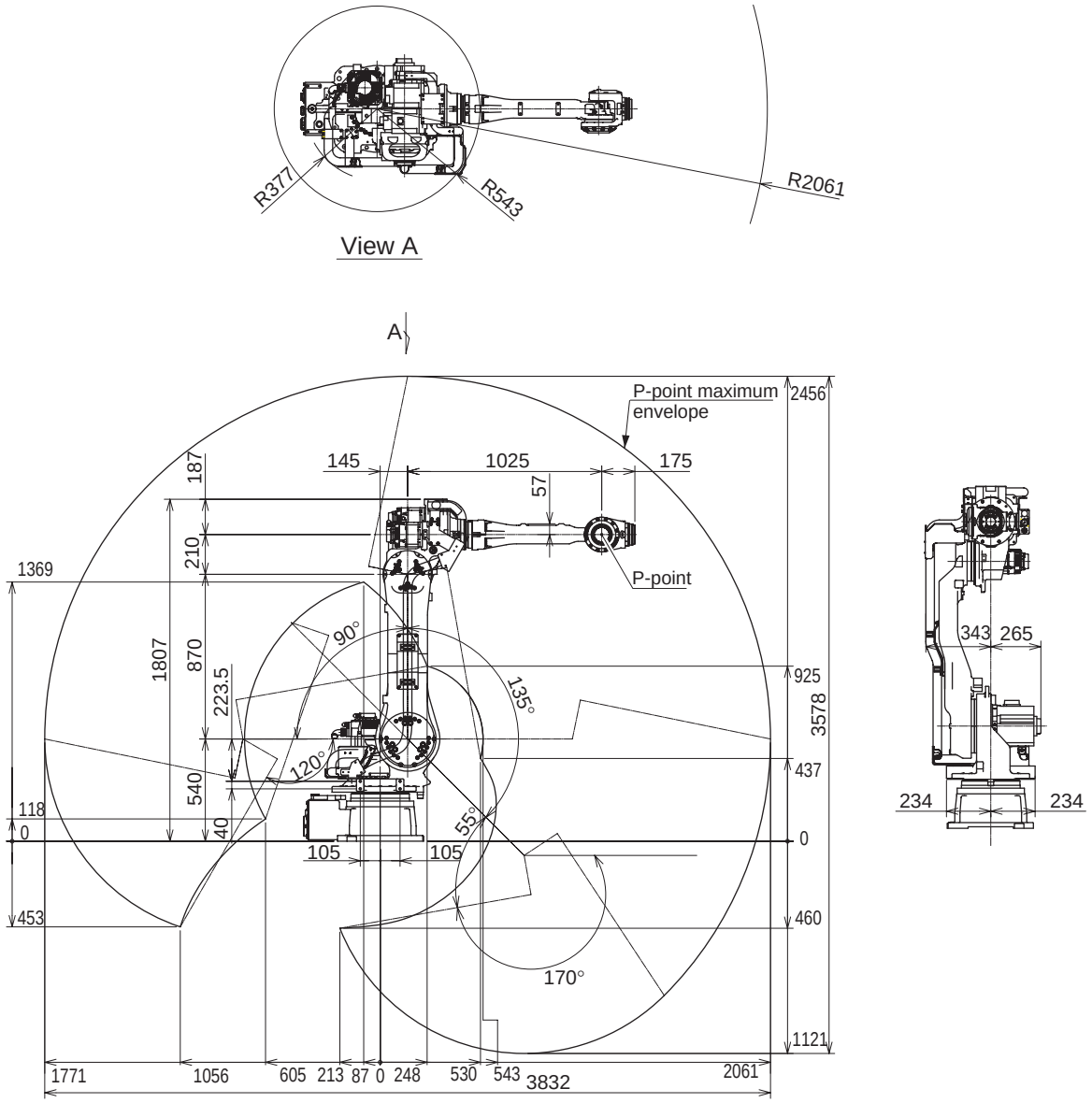
5.3 Baseplate Dimensions

Fig. 5-2: Baseplate Dimensions



5.4 Dimensions and P-Point Maximum Envelope

Fig. 5-3: Dimensions and P-Point Maximum Envelope



5.5 Alterable Operating Range

The operating range of the S-axis can be altered in accordance with the operating conditions as shown in *table 5-2 "S-Axis Operating Range"* . If alteration is necessary, contact your Yaskawa representative in advance.

Table 5-2: S-Axis Operating Range

Item	Specifications
S-Axis Operating Range	±180°(standard) ±165° ±150° ±135° ±120° ± 105° ± 90° ± 75° ± 60° ± 45° ± 30° ± 15°

6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load

The allowable wrist load is 50 kg. If force is applied to the wrist instead of the load, force on R-, B-, and T-axes should be within the value shown in *table 6-1 "Allowable Wrist Load"* . Contact your Yaskawa representative for further information or assistance.

Table 6-1: Allowable Wrist Load

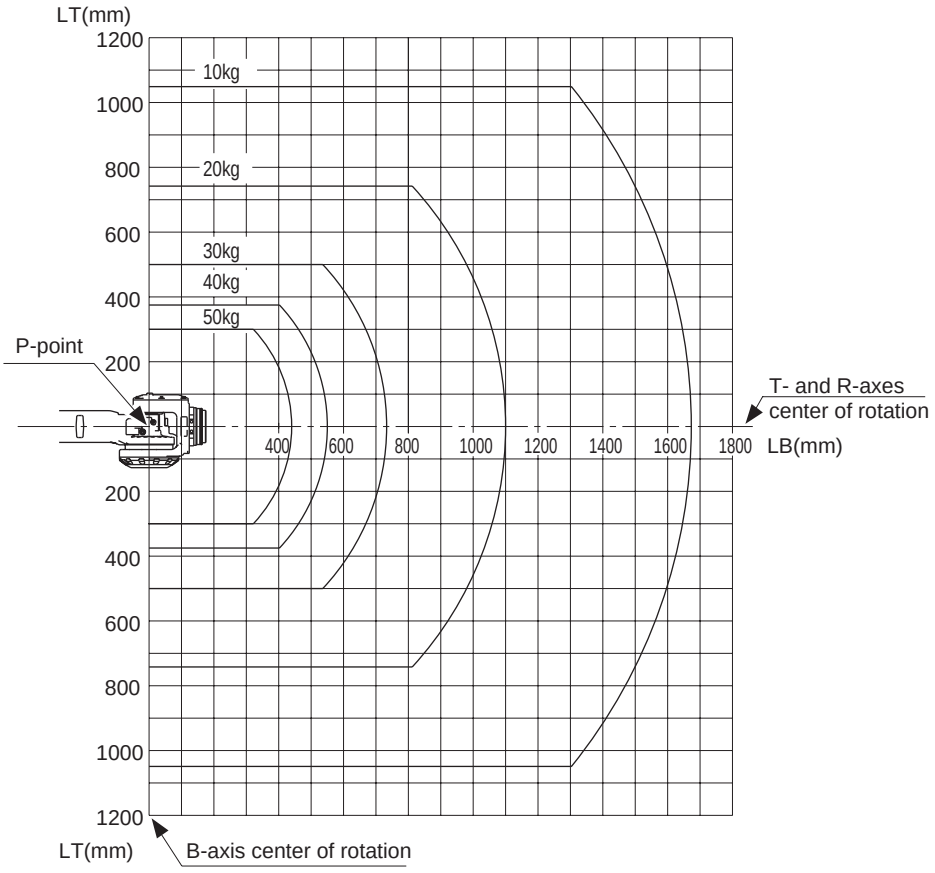
Axis	Moment N•m (kgf•m)[1)]	$GD^2/4$ Total Moment of Inertia kg•m^2
R-Axis	216 (22)	28
B-Axis	216 (22)	28
T-Axis	147(15)	11

1 ( ): Gravitational unit

When the volume load is small, refer to the moment arm rating shown in *fig. 6-1 "Moment Arm Rating"* .

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

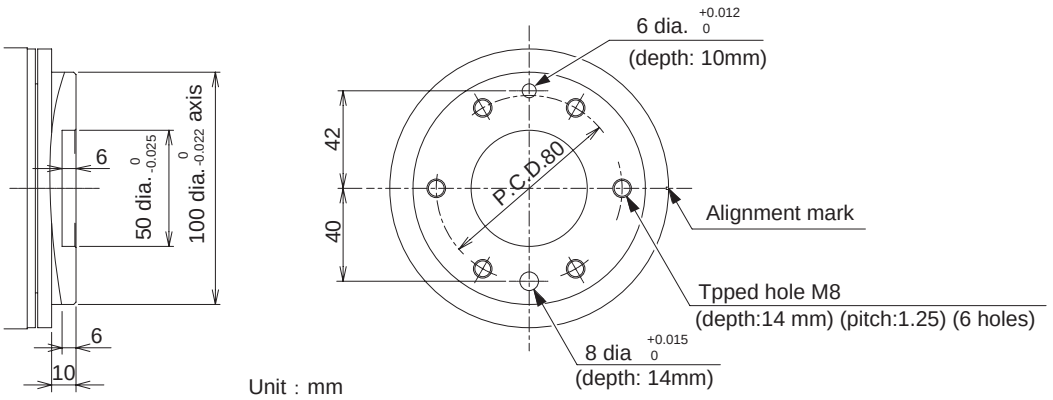
Fig. 6-1: Moment Arm Rating



6.2 Wrist Flange

The wrist flange dimensions are shown in *fig. 6-2 "Wrist Flange"* . In order to see the alignment marks, it is recommended that the attachment be mounted inside the fitting. Fitting depth of inside and outside fittings must be 5 mm or less.

Fig. 6-2: Wrist Flange



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

7 System Application

7.1 Peripheral Equipment Mounts

The peripheral equipment mounts are provided on the U-axis (upper arm) and S-axis (rotary head) as shown in *fig. 7-1 "Installing Peripheral Equipment"* for easier installation of the users' system applications. The following conditions should be observed to attach or install peripheral equipment.

Fig. 7-1: Installing Peripheral Equipment

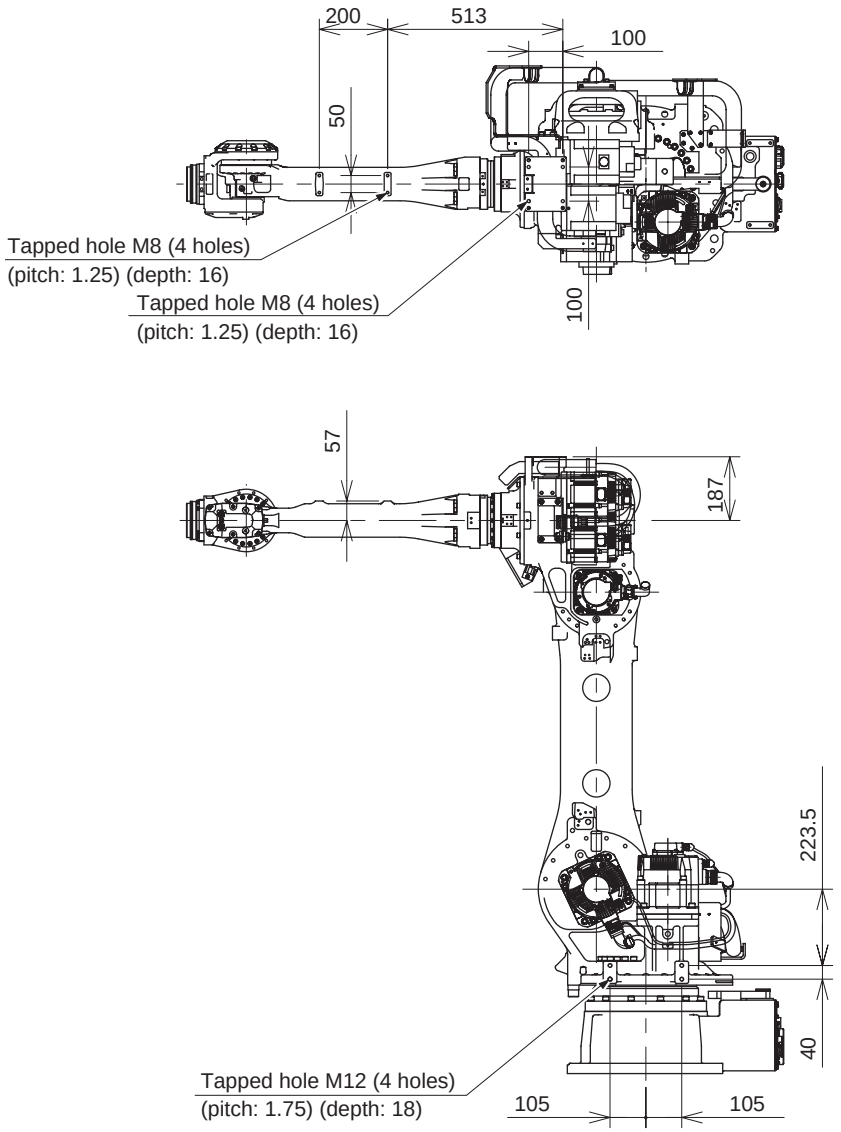


Table 7-1: Constraint for Attaching

Section	Application	Note
A	Cable processing	Up to 50 kg for attaching load mass including wrist load.
B	Cable processing and valve load	Up to 10 kg. 49 N•m (5 kgf•m) max. for increased moment amount of upper arm

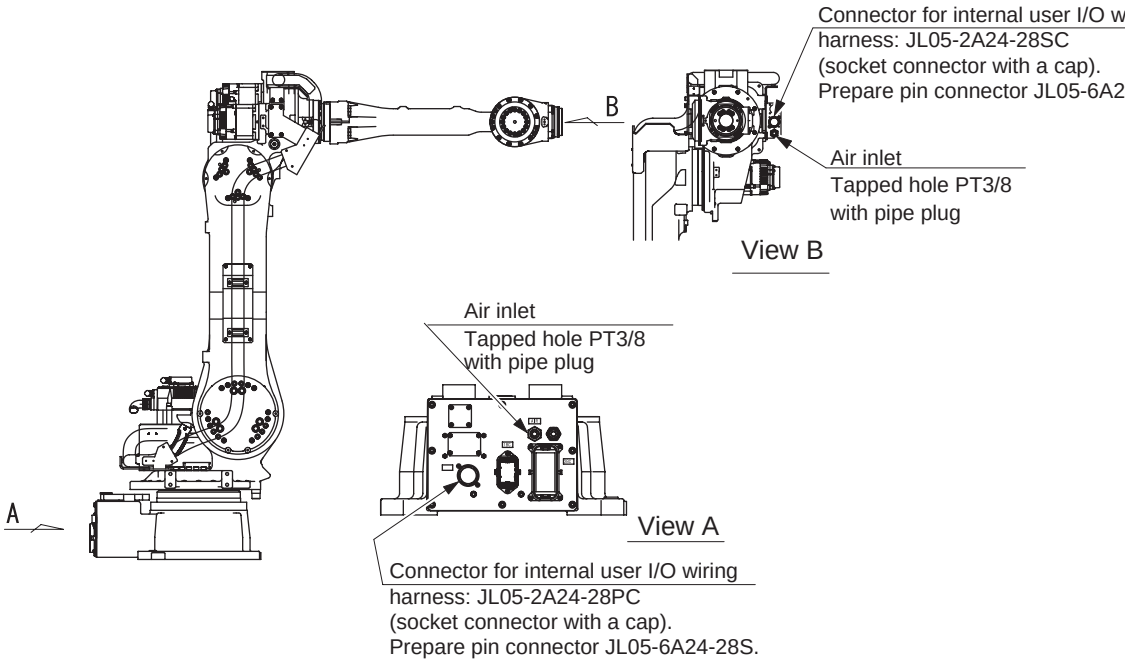
7.2 Internal User I/O Wiring Harness and Air Line

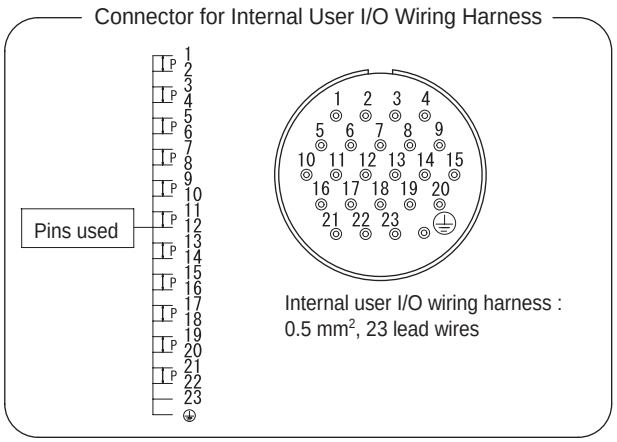
Internal user I/O wiring harness (0.5 mm^2 x 23,) and an air line are incorporated in the manipulator for the drive of peripheral device mounted on the upper arm as shown in *fig. 7-2 “Connectors for Internal User I/O Wiring Harness and Air Line” at page 7-3*.

The connector pins 1 to 23 are assigned as shown in *fig. 7-2*. Wiring must be performed by users.

The allowable current for internal user I/O wiring harness	5.1 A or less for each wire (The total current value for pins 1 to 23 must be 34.5A or less.)
The maximum pressure for the air line	490 kPa (5 kgf/cm^2) or less (The air line inside diameter: 8.0mm.)

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





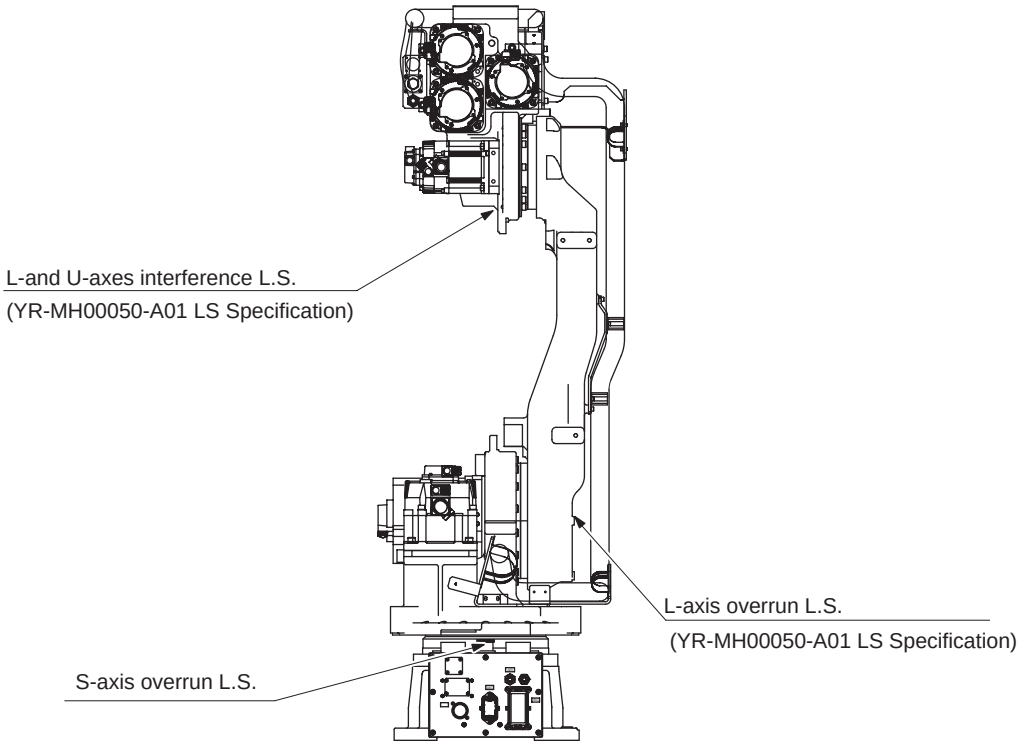
The same pin-number connectors (1 to 23) at both connector base part and arm part are connected with the single wire lead of 0.5 mm^2.

8 Electrical Equipment Specification

8.1 Location of Limit Switch

The limit switches are optional. See *fig. 8-1 "Location of Limit Switches"* . The overrun limit switches (the S- and L-axis overrun limit switches and the LU-axes interference limit switch) are mounted only if the manipulator type is : YR-MH00050-A01.

Fig. 8-1: Location of Limit Switches



8.2 Internal Connections

Highly reliable connectors are equipped on each connection part of the manipulator to enable easy removal and installation for maintenance and inspection. For the number and location of connectors, see *fig. 8-2 “Location and Numbers of Connectors”* and *table 8-1 “List of Connector Types”* .

Diagrams for internal connections of the manipulator are shown in " *fig. 8-3(a) “Internal Connection Diagram” at page 8-3* and *fig. 8-3(b) “Internal Connection Diagram” at page 8-4* .

Fig. 8-2: Location and Numbers of Connectors

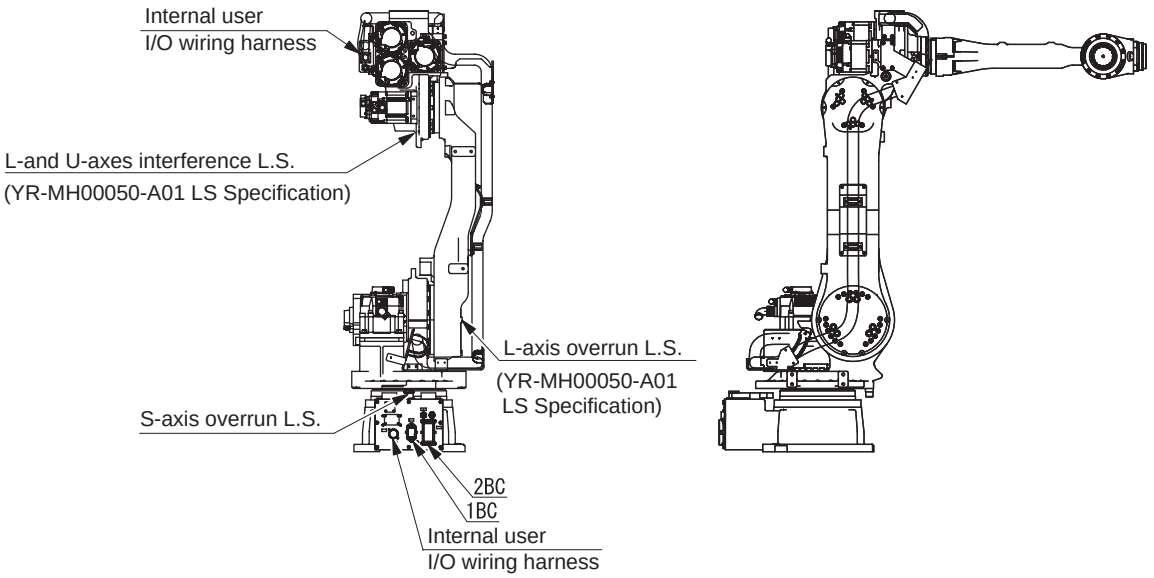


Table 8-1: List of Connector Types

Name	Type of Connector
Connector for the internal user I/O wiring harness on the connector base	JL05-2A24-28PC (JL05-6A24-28S: Optional)
Connector for the internal user I/O wiring harness on the U-arm	JL05-2A24-28SC (JL05-6A24-28P: Optional)

Fig. 8-3(a): Internal Connection Diagram

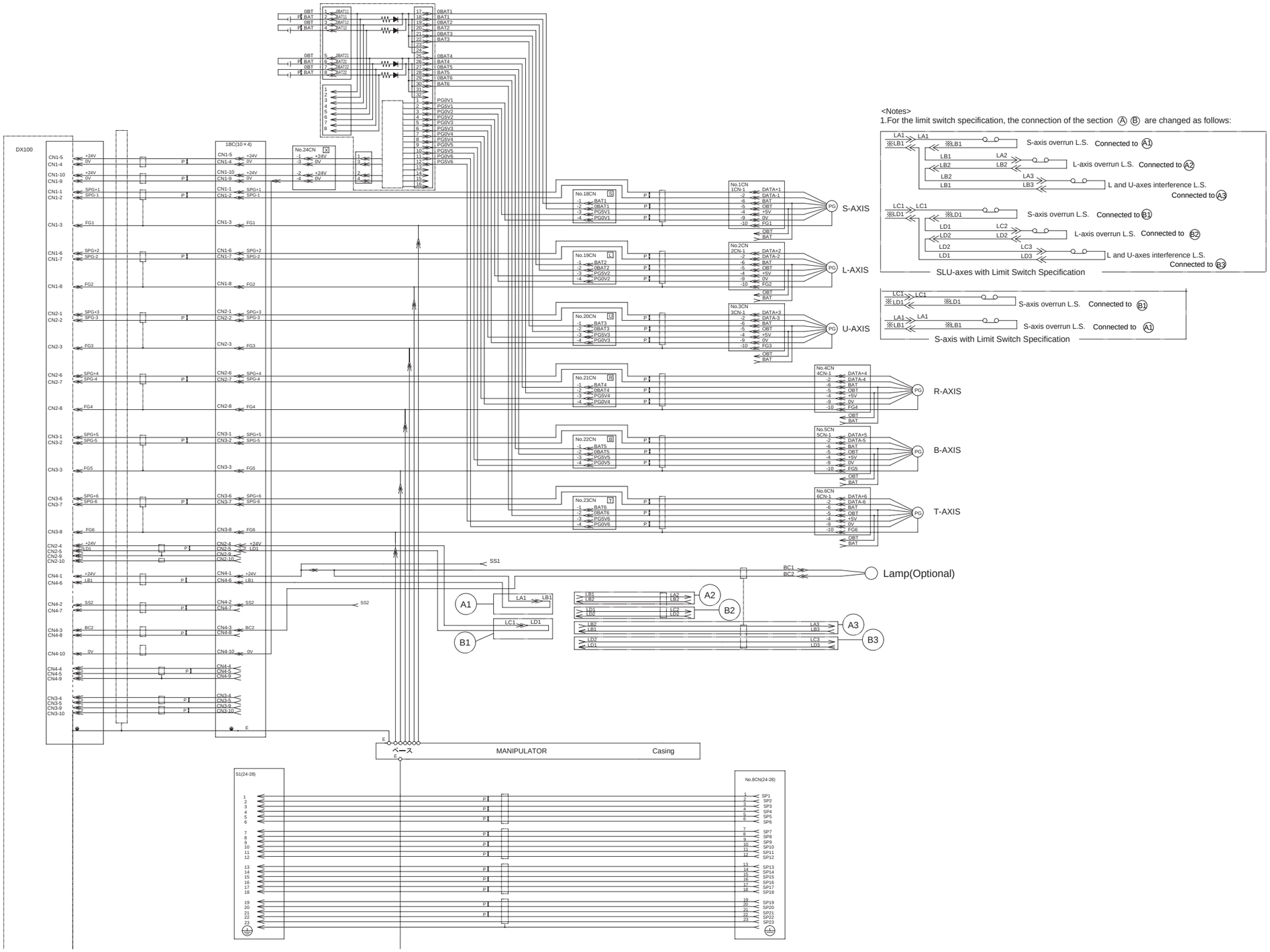
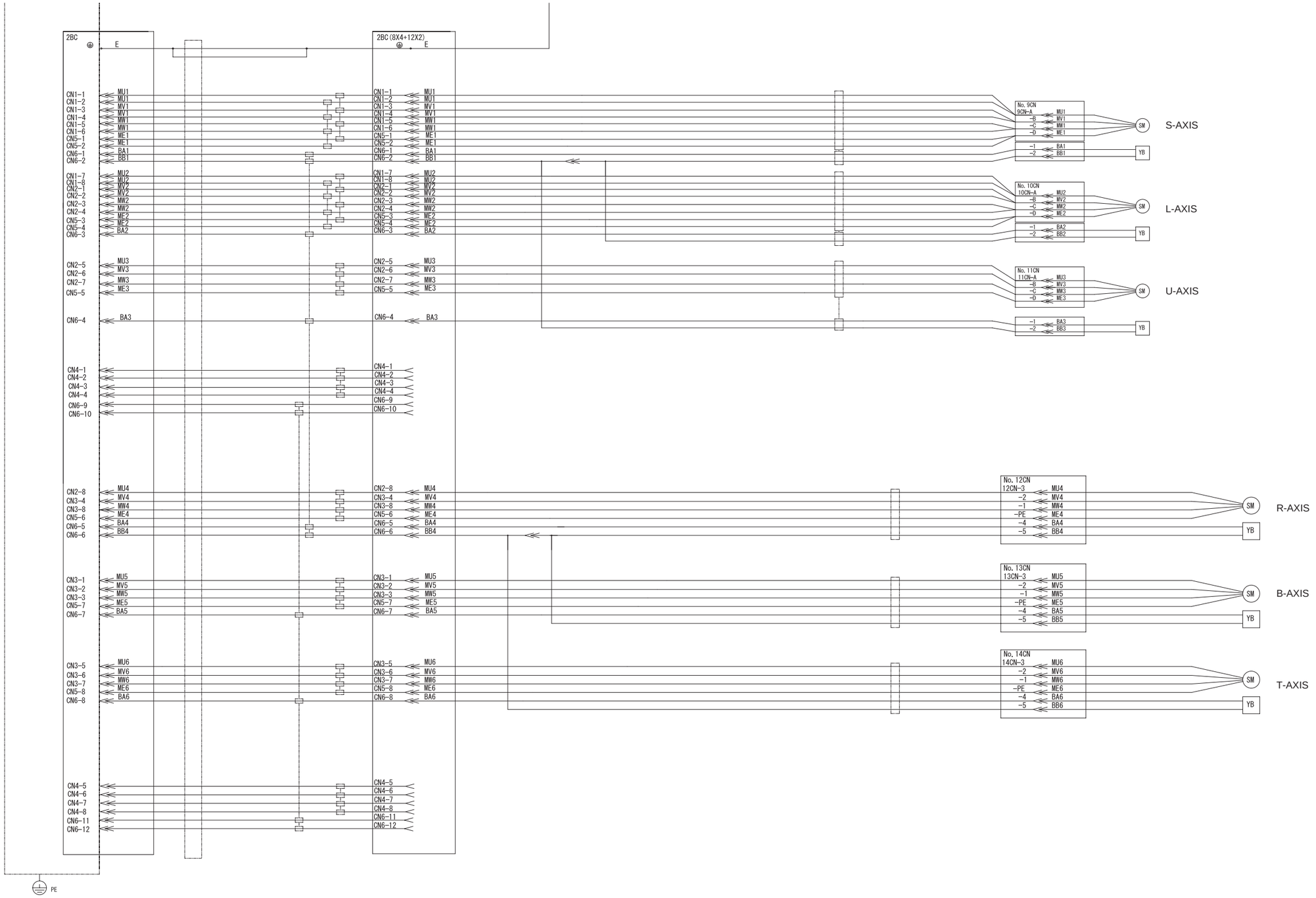


Fig. 8-3(b): Internal Connection Diagram



9 Maintenance and Inspection

WARNING

- Before maintenance or inspection, be sure to turn the main power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)

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

CAUTION

- Maintenance and inspection must be performed by specified personnel.

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

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

Failure to observe this caution may result in injury from unexpected turning of the manipulator's arm.

- 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 "Inspection Items" at page 9-2*.

In *table 9-1 "Inspection Items" at page 9-2*, the inspection items are classified into three types of operation: operations which can be performed by personnel authorized by the user, operations to be performed by trained personnel, and operations to be performed by service company personnel. Only specified personnel shall perform the inspection work.

NOTE

- The inspection interval depends on the total servo operation time.
- 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: Inspection Items (Sheet 1 of 2)

Items[1]		Schedule						Method	Operation	Inspection Charge		
		Daily	1000HCycle	6000HCycle	12000HCycle	24000HCycle	36000HCycle			Specified	License	Service
1	Alignment mark	●						Visual	Check tram mark accordance and damage at the home position.	●	●	●
2	External lead	●						Visual	Check for damage and deterioration of leads.	●	●	●
3	Working area and manipulator	●						Visual	Clean the work area if dust or spatter is present. Check for damage and outside cracks.	●	●	●
4	S,L,U,R,B,T-axes motor	●						Visual	Check for grease leakage.[2]	●	●	●
5	Baseplate mounting bolts		●					Spanner Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
6	Cover mounting screws		●					Screwdriver, Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
7	S,L,U,R,B,T-axes motor connector		●					Manual	Tighten loose bolts.	●	●	●
8	Connector base		●					Manual	Check for loose connectors.	●	●	●
9	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[3]		●	●
						●			Replace it 24000H intervals.			●
10	Limit switches and dogs (S,L,U-axes)			●				Screwdriver, Wrench, Multimeter	Tighten loose bolts. Replace if necessary.		●	●
11	Battery pack in manipulator						●		Replace the battery pack when the battery alarm occurs or the manipulator drove for 36000H.		●	●
12	S-axis speed reducer			●	●			Grease Gun	Check for malfunction. (Replace if necessary.)[4] Supply grease (6000H cycle)[5] Replace grease. (12000H cycle) [5]See *chapter 9.3.1 at page 9-8.*		●	●

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

Items[1]		Schedule							Method	Operation	Inspection Charge		
		Daily	1000HCycle	6000HCycle	12000HCycle	24000HCycle	36000HCycle				Specified	License	Service
13	LU-axes speed reducers			●	●				Grease Gun	Check for malfunction. (Replace if necessary.)[4] Supply grease (6000H cycle)[5]. Replace grease (12000H cycle)[5]. See *chapter 9.3.2 at page 9-11*, *chapter 9.3.3 at page 9-13*.		●	●
14	R-axis speed reducers			●	●				Grease Gun	Check for malfunction. (Replace if necessary.)[4] Supply grease (6000H cycle)[5]. Replace grease (612000H cycle)[5]. See *chapter 9.3.4 at page 9-15*		●	●
15	B,T-axes speed reducers B,T-axes gears			●	●				Grease Gun	Check for malfunction. (Replace if necessary.)[4] Supply grease(6000H cycle)[5]. Replace grease(12000H cycle)[5]. See *chapter 9.3.5 at page 9-17*.		●	●
16	Overhaul						●						●

1 Inspection No. correspond to the numbers in *fig. 9-1 "Inspection Items" at page 9-4*.
2 The occurrence of a grease leakage indicates the possibility that grease has seeped into the motor. This can cause a motor breakdown. Contact your Yaskawa representative.
3 When checking for conduction with multimeter, connect the battery to "BAT" and "OBT" of connectors on the motor side for each axis, and then remove connectors on detector side for each axis from the motor. Otherwise, the home position may be lost. (Refer to *chapter 9.3.6 at page 9-19*.)
4 The grease might leak out from the air breather or the internal pressure might rise in case the manipulator is used very frequently for the application such as handling.
5 For the grease, refer to *table 9-2 "Inspection Parts and Grease Used" at page 9-5*.

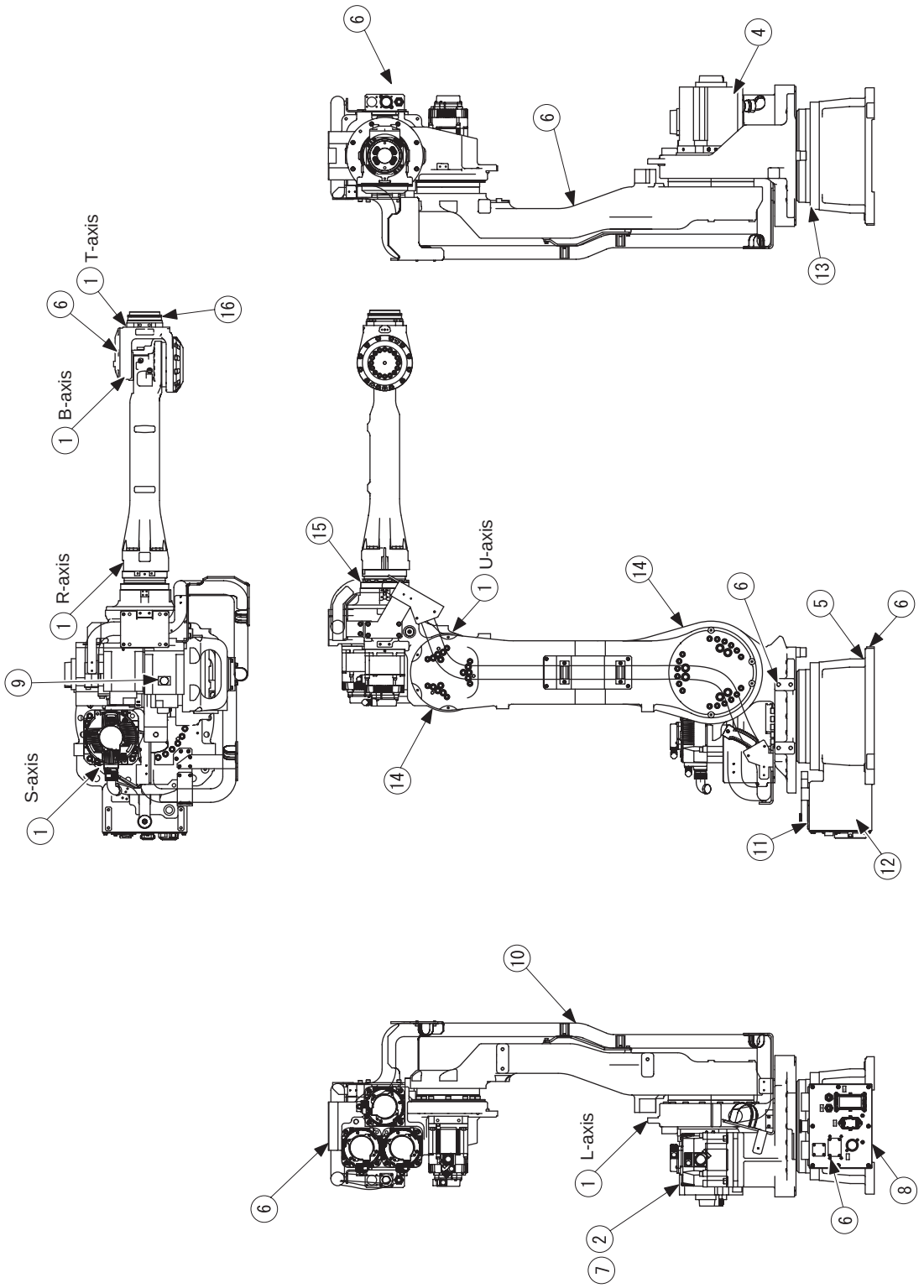


Fig. 9-1: Inspection Items

Table 9-2: Inspection Parts and Grease Used

No.	Grease Used	Inspected Parts
13,14,15,16	VIGO Grease RE No.0	Speed reducers for all axes B,T-axes gears

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

9.2 Notes on Maintenance Procedures

9.2.1 Battery Pack Replacement

The battery packs are installed in the position shown in *fig. 9-2 “Battery Location”* .

- Battery Type: HW0470360-A

Fig. 9-2: Battery Location

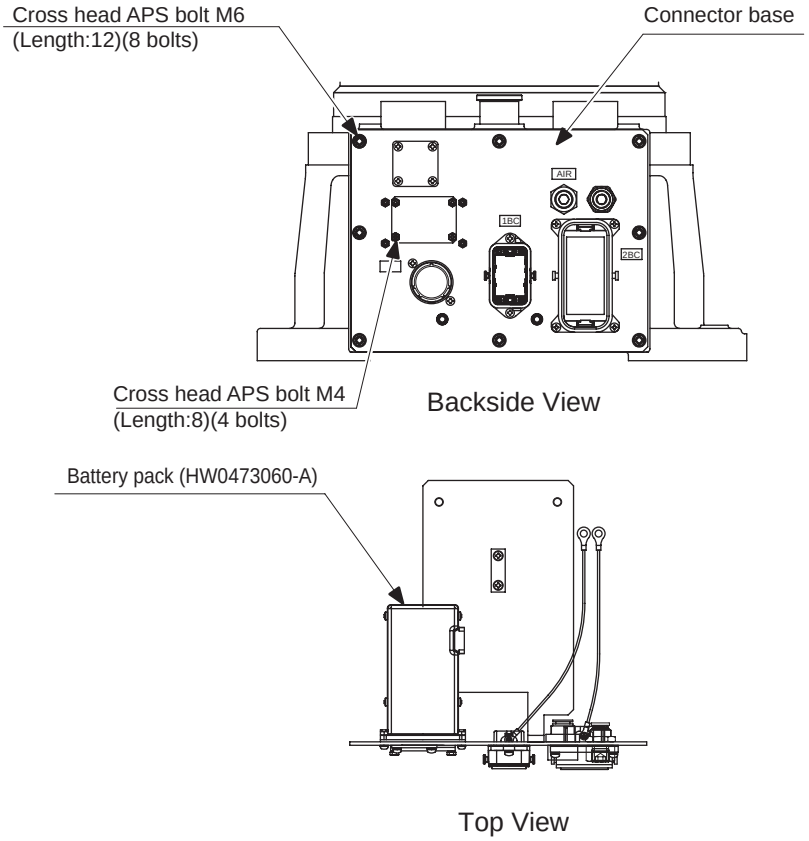
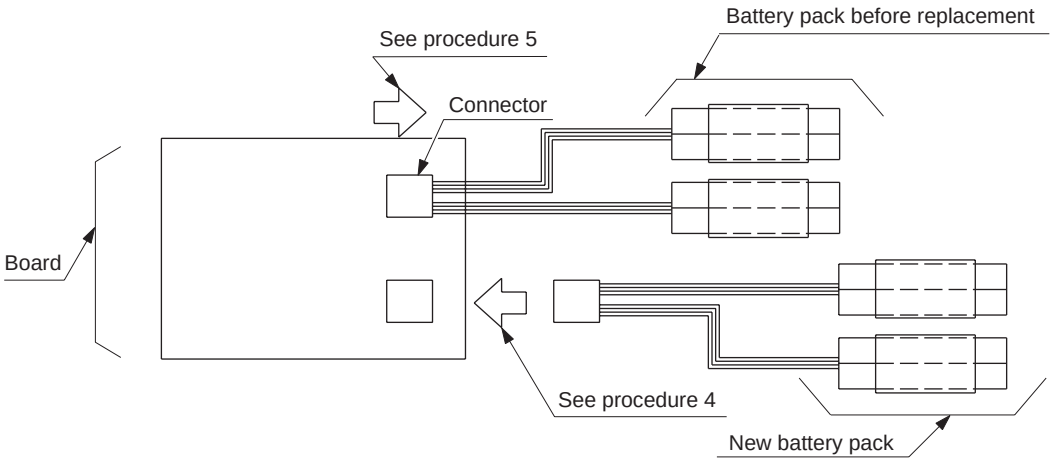


Fig. 9-3: Battery Connection



1. Turn OFF the DX 100 main power supply.
2. Remove the plate fixing screws and the plate on the connector base, then pull the battery pack out to replace it with the new one.
3. Remove the battery pack from the battery holder.
4. Connect the new battery pack to the unoccupied connectors on the board.
5. Remove the old battery pack from the board.

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

6. Mount the new battery pack on the battery holder.
7. Reinstall the plate.

NOTE Do not allow plate to pinch the cables when reinstalling the plate.

9.3 Notes on Grease Replenishment/Exchange Procedures

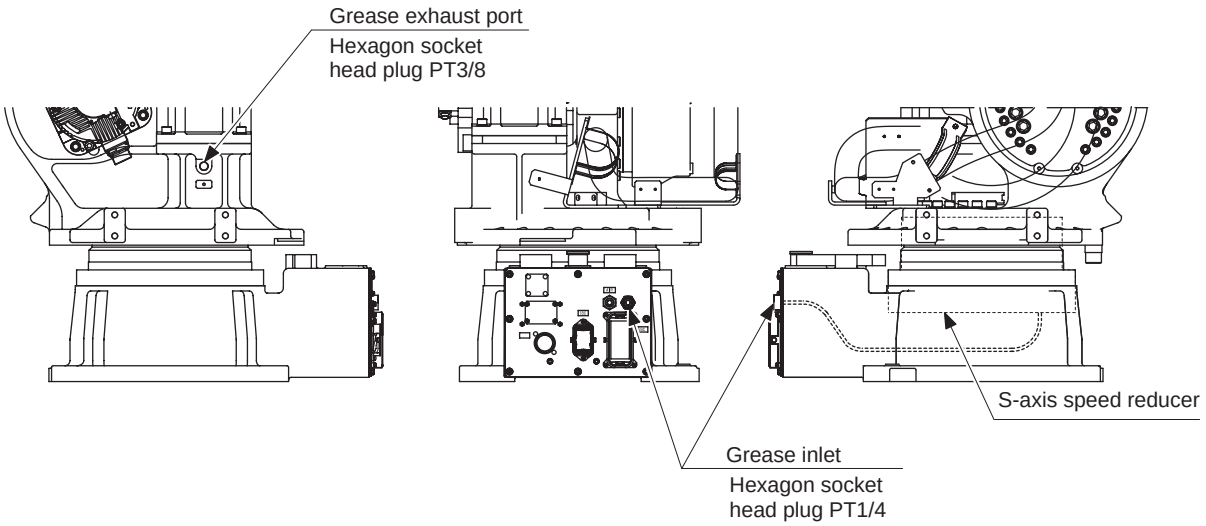
Make sure to follow the instructions listed below at grease replenishment/ exchange. Failure to observe the following instructions may result in damage to a motor and a speed reducer.

NOTE

- If grease is injected without removing the plug/screw from the grease exhaust port, the grease will leak inside a motor or an oil seal of a speed reducer will come off, which may result in damage to the motor. Make sure to remove the plug/screw.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.
- Make sure to use a grease pump to inject grease. Set air supply pressure to the grease pump at 0.3 MPa or less, and the grease injection rate at 8 g/s or less.
- Make sure to fill a hose on the grease inlet with grease to keep air from entering into the speed reducer.

9.3.1 Grease Replenishment/Exchange for S-axis Speed Reducer

Fig. 9-4: S-axis Speed Reducer Diagram



9.3.1.1 Grease Replenishment (Refer to *fig. 9-4 "S-axis Speed Reducer Diagram"* .)

Replenish the grease according to the following procedure:

1. Remove the hexagon socket head plug PT1/4 from the grease inlet and the hexagon socket head plug PT3/8 from the grease exhaust port.

NOTE
- If grease is injected with the plugs on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

2. Install the grease zerk PT1/4 to the grease inlet. (The grease zerk is delivered with the manipulator.)
3. Inject the grease through the inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: 520 cc (1040 cc for 1st supply)
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
4. Move the S-axis for a few minutes to discharge the excess grease.
5. Wipe the discharged grease with a cloth. Remove the grease zerk from the grease inlet, and reinstall the plugs to the grease inlet and grease exhaust port.
   Before installing the plugs, apply Three Bond 1206C on the thread part of each plug, then tighten the plugs with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.1.2 Grease Exchange (Refer to *fig. 9-4 "S-axis Speed Reducer Diagram" at page 9-8*.)

1. Remove the hexagon socket head plug PT1/4 from the grease inlet and the hexagon socket head plug PT3/8 from the grease exhaust port.

NOTE
- If grease is injected with the plugs on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

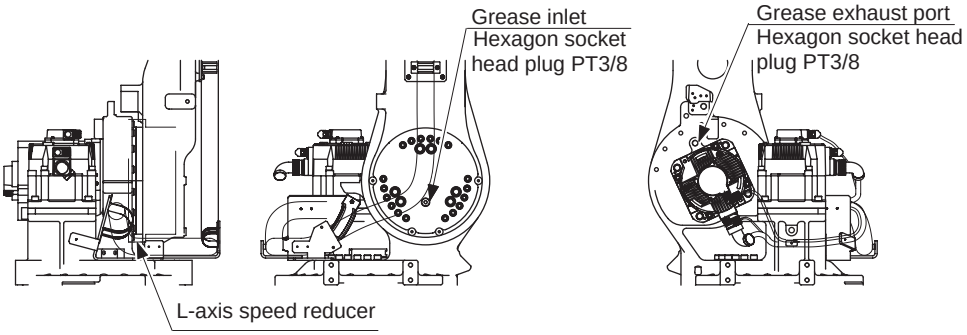
2. Install the grease zerk PT1/4 to the grease inlet.
   (The grease zerk is delivered with the manipulator.)
3. Inject the grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx. 2600 cc
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less

4. The grease exchange is complete when new grease appears from the exhaust port. (The new grease can be distinguished from the old grease by color.)
5. Move the S-axis for a few minutes to discharge the excess grease.
6. Wipe the discharged grease with a cloth. Remove the grease zerk from the grease inlet, then reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of the plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).

NOTE If grease is injected with the plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection

9.3.2 Grease Replenishment/Exchange for L-axis Speed Reducer

Fig. 9-5: L-axis Speed Reducer Diagram



NOTE

- If grease is injected with the plugs on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

9.3.2.1 Grease Replenishment (Refer to *fig. 9-5 "L-axis Speed Reducer Diagram"* .)

1. Make the L-arm vertical to the ground.
2. Remove the hexagon socket head plug PT 3/8 from the grease exhaust port.
3. Remove the hexagon socket head plug PT 3/8 from the grease inlet.

NOTE

- If grease is injected with the exhaust plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

4. Install the grease zerk PT3/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
5. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: 250 cc (500 cc for 1st supply)
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
6. Move the L-axis for a few minutes to discharge the excess grease.
7. Remove the grease zerk from the grease inlet and reinstall the plug. Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).
8. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port. Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.2.2 Grease Exchange (Refer to *fig. 9-5 "L-axis Speed Reducer Diagram" at page 9-11*.)

1. Make the L-arm vertical to the ground.
2. Remove the hexagon socket head plug PT 3/8 from the grease exhaust port.
3. Remove the hexagon socket head plug PT 3/8 from the grease inlet.

NOTE

- If grease is injected with the exhaust plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

4. Install the grease zerk PT3/8 to the grease inlet.
(The grease zerk is delivered with the manipulator.)
5. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx. 1650 cc
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
6. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
7. Move the L-axis for a few minutes to discharge the excess grease.
8. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 3/8 to the grease inlet.
Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 10 N•m (1.0 kgf•m).
9. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
Before installing the plugs, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).

NOTE

If grease is injected with the plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection

9.3.3 Grease Replenishment/Exchange for U-axis Speed Reducer

Fig. 9-6: U-Arm Posture

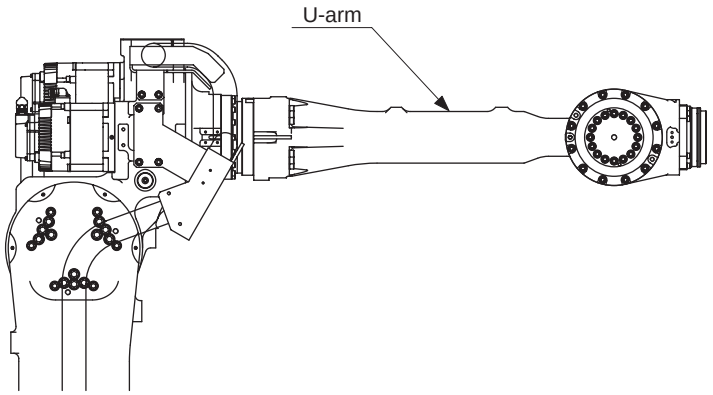
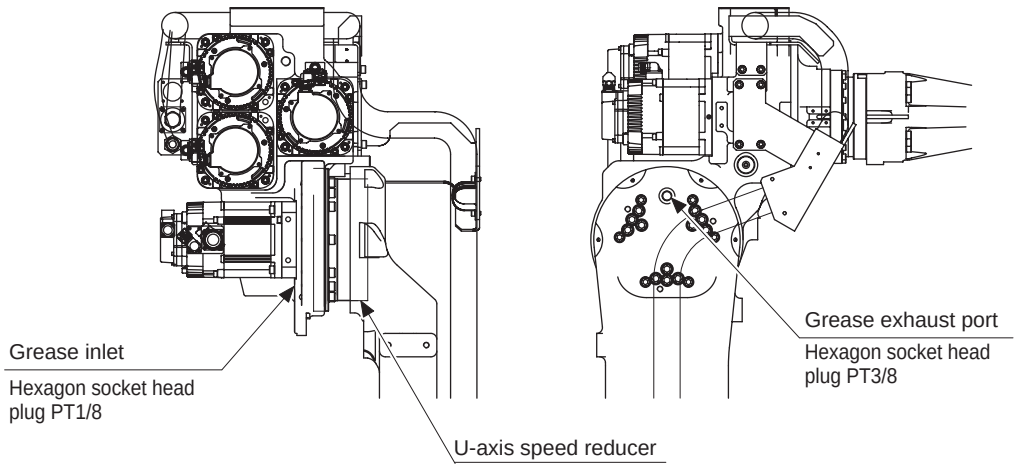


Fig. 9-7: U-axis Speed Reducer Diagram



9.3.3.1 Grease Replenishment (Refer to *fig. 9-7 "U-axis Speed Reducer Diagram"* .)

1. Make the U-arm horizontal to the ground.
2. Remove the hexagon socket head plug PT 3/8 from the grease exhaust port.
3. Remove the hexagon socket head plug PT 1/8 from the grease inlet.

NOTE

- If grease is injected with the bolt on, the grease will leak inside the motor and may cause a damage. Make sure to remove the bolt before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

4. Install the grease zerk PT1/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
5. Inject grease through the grease inlet using a grease gun.
   – Grease type: VIGO Grease RE No. 0

– Amount of grease: 140 cc (280 cc for 1st supply)
– Air supply pressure of grease pump: 0.3 MPa or less
– Grease injection rate: 8 g/s or less

6. Move the U-axis for a few minutes to discharge the excess grease.
7. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m)
8. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
   Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m)

9.3.3.2 Grease Exchange (Refer to *fig. 9-7 "U-axis Speed Reducer Diagram" at page 9-13*.)

1. Make the U-arm horizontal to the ground.
2. Remove the hexagon socket head plug PT 3/8 from the grease exhaust port.
3. Remove the hexagon socket head plug PT 1/8 from the grease inlet.

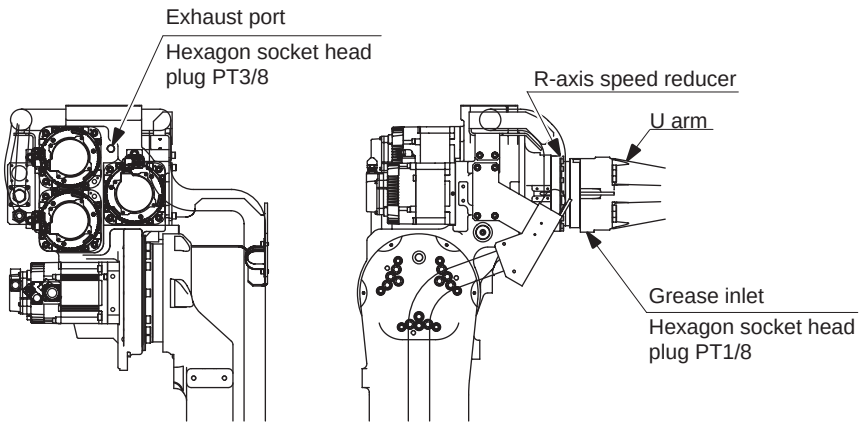
NOTE
- If grease is injected with the bolt on, the grease will leak inside the motor and may cause a damage. Make sure to remove the bolt before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

4. Install the grease zerk PT1/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
5. Inject grease through the grease inlet using a grease gun.
   – Grease type: VIGO Grease RE No. 0
   – Amount of grease: approx.700 cc
   – Air supply pressure of grease pump: 0.3 MPa or less
   – Grease injection rate: 8 g/s or less
6. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
7. Move the U-axes for a few minutes to discharge the excess grease.
8. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
9. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).

NOTE If grease is injected with the plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection

9.3.4 Grease Replenishment for R-axis Speed Reducer

Fig. 9-8: R-axis Speed Reducer Diagram



9.3.4.1 Grease Replenishment (Refer to *fig. 9-8 "R-axis Speed Reducer Diagram" at page 9-15*.)

1. Remove the hexagon socket head plug PT 3/8 from the exhaust port.
2. Remove the hexagon socket head plug PT 1/8.
3. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx.700 cc (1400 cc for 1st supply)
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
4. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
5. Move the R-axes for a few minutes to discharge the excess grease.
6. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
7. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).

9.3.4.2 Grease Exchange (Refer to *fig. 9-8 "R-axis Speed Reducer Diagram" at page 9-15*.)

1. Remove the hexagon socket head plug PT 3/8 from the grease exhaust port.
2. Remove the hexagon socket head plug PT 1/8 from the grease inlet.

NOTE

- If grease is injected with the bolt on, the grease will leak inside the motor and may cause a damage. Make sure to remove the bolt before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

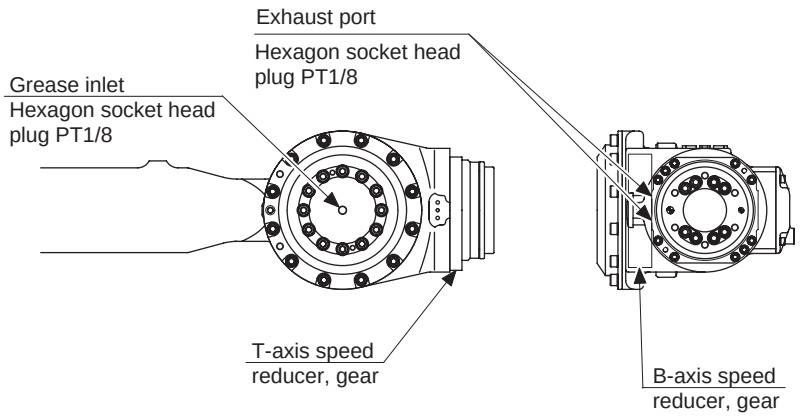
3. Install the grease zerk PT1/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
4. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx.3500 cc
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
5. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
6. Move the R-axes for a few minutes to discharge the excess grease.
7. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
8. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 3/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 23 N•m (2.3 kgf•m).

NOTE

If grease is injected with the plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection

9.3.5 Grease Replenishment for B- and T-axes Speed Reducer and Gear Parts

Fig. 9-9: B- and T-axes Speed Reducer and Gear Parts



9.3.5.1 Grease Replenishment (Refer to *fig. 9-9 "B- and T-axes Speed Reducer and Gear Parts" at page 9-17*.)

1. Remove the hexagon socket head plug PT 1/8 from the exhaust port.

NOTE

- If grease is injected with the bolt on, the grease will leak inside the motor and may cause a damage. Make sure to remove the bolt before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

2. Remove the hexagon socket head plug PT 1/8.
3. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx.300 cc (600 cc for 1st supply)
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
4. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
5. Move the B-axes for a few minutes to discharge the excess grease.
6. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
7. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 1/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.5.2 Grease Exchange (Refer to *fig. 9-9 "B- and T-axes Speed Reducer and Gear Parts" at page 9-17*.)

1. Remove the hexagon socket head plug PT 1/8 from the grease exhaust port.
2. Remove the hexagon socket head plug PT 1/8 from the grease inlet.

NOTE

- If grease is injected with the bolt on, the grease will leak inside the motor and may cause a damage. Make sure to remove the bolt before the grease injection.
- Do not install a joint, a hose, etc. to a grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

3. Install the grease zerk PT1/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
4. Inject grease through the grease inlet using a grease gun.
   - Grease type: VIGO Grease RE No. 0
   - Amount of grease: approx.1500 cc
   - Air supply pressure of grease pump: 0.3 MPa or less
   - Grease injection rate: 8 g/s or less
5. The grease discharge is complete when new grease appears from the exhaust port. The new grease can be distinguished from the old grease by color.
6. Move the B-axes for a few minutes to discharge the excess grease.
7. Remove the grease zerk from the grease inlet and reinstall the hexagon socket head plug PT 1/8.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
8. Wipe the discharged grease with a cloth and reinstall the hexagon socket head plug PT 1/8 to the exhaust port.
   Before installing the plug, apply Three Bond 1206C on the thread part of each plug, then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

NOTE

If grease is injected with the plug on, the grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection

9.3.6 Notes for Maintenance

When performing maintenance such as replacement of a wire harness in the manipulator, the encoder connector may be necessary to be removed. In this case, be sure to connect the battery pack to the battery backup connector before removing the encoder connector.
Removing the encoder connector without connecting the battery pack leads to disappearance of the encoder absolute data.

For the battery pack connection, refer to *fig. 9-10 "Battery Pack Connection"* .

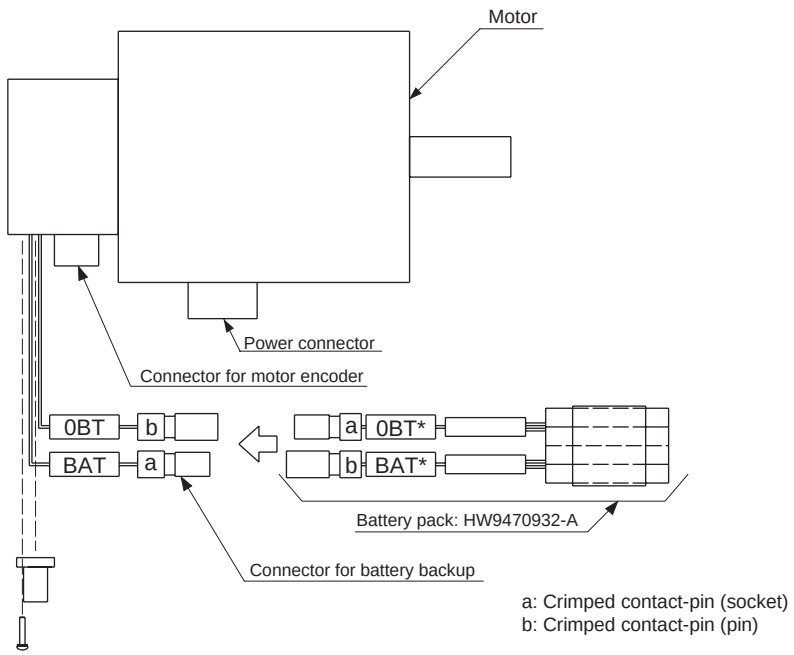
9.3.6.1 Battery Pack Connection

The connectors (crimped contact-pin) for the battery backup are installed at the end point of the motors (BAT and OBT are marked). Connect the battery packs according to the following procedure.

1. Removed the cap attached to the battery backup connector of the motors.
2. Connect the battery packs (HW9470932-A) with the battery backup connectors (BAT and OBT are marked) located at the end point of the cables for the encoder. (Under this condition, remove the encoder connector and carry out the maintenance checks).
3. Confirm all connectors connected after the maintenance check, and remove the battery packs. Install the caps attached to the battery backup connectors of the motors.

NOTE Do not remove the battery pack in the connector base.

Fig. 9-10: Battery Pack Connection



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-MH50. 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 YR-MH00050-A00, -A01 (Sheet 1 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	VIGO Grease RE No.0	Yaskawa Electric Corporation	16 kg	-	For speed reducers in each axis
A	2	Liquid Gasket	Three Bond 1206C	Three Bond Co., Ltd.	-	-	
A	3	Battery Pack	HW9470932-A	Yaskawa Electric Corporation	1	1	For internal wire harness replacement
A	4	Battery Pack	HW0470360-A	Yaskawa Electric Corporation	1	1	
B	5	S-axis Speed Reducer	HW0387752-A	Yaskawa Electric Corporation	1	1	
B	6	S-axis Input Gear	HW0313741-1	Yaskawa Electric Corporation	1	1	
B	7	L-axis Speed Reducer	HW09381465-B	Yaskawa Electric Corporation	1	1	
B	8	L-axis Input Gear	HW9482771-A	Yaskawa Electric Corporation	1	1	
B	9	U-axis Speed Reducer	HW0387753-A	Yaskawa Electric Corporation	1	1	
B	10	U-axis Input Gear	HW0313740-1	Yaskawa Electric Corporation	1	1	
B	11	R-axis Speed Reducer	HW0387754-A	Yaskawa Electric Corporation	1	1	

Table 10-1: Spare Parts for YR-MH00050-A00, -A01 (Sheet 2 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
B	12	B-axis Speed Reducer	HW0387737-B	Yaskawa Electric Corporation	1	1	
B	13	T-axis Speed Reducer	HW037738-A	Yaskawa Electric Corporation	1	1	
C	14	S-axIs AC Servomotor	SGMRV-30ANA-YR11 HW0388669-A	Yaskawa Electric Corporation	1	1	
C	15	L-axis AC Servomotor	SGMRV-37ANA-YR11 HW0388670-A	Yaskawa Electric Corporation	1	1	
C	16	U-axis AC Servomotor	SGMRV-13ANA-YR11 HW0388666-A	Yaskawa Electric Corporation	1	1	
C	17	R-,B-,T-axes AC Servomotor	SGMRV-09ANA-YR11 HW0388665-A	Yaskawa Electric Corporation	1	3	
C	18	Internal Wire Harness	HW0174688-A	Yaskawa Electric Corporation	1	1	
C	19	Connector Base	HW0374034-B	Yaskawa Electric Corporation	1	1	

11 Parts List

11.1 S-Axis Unit

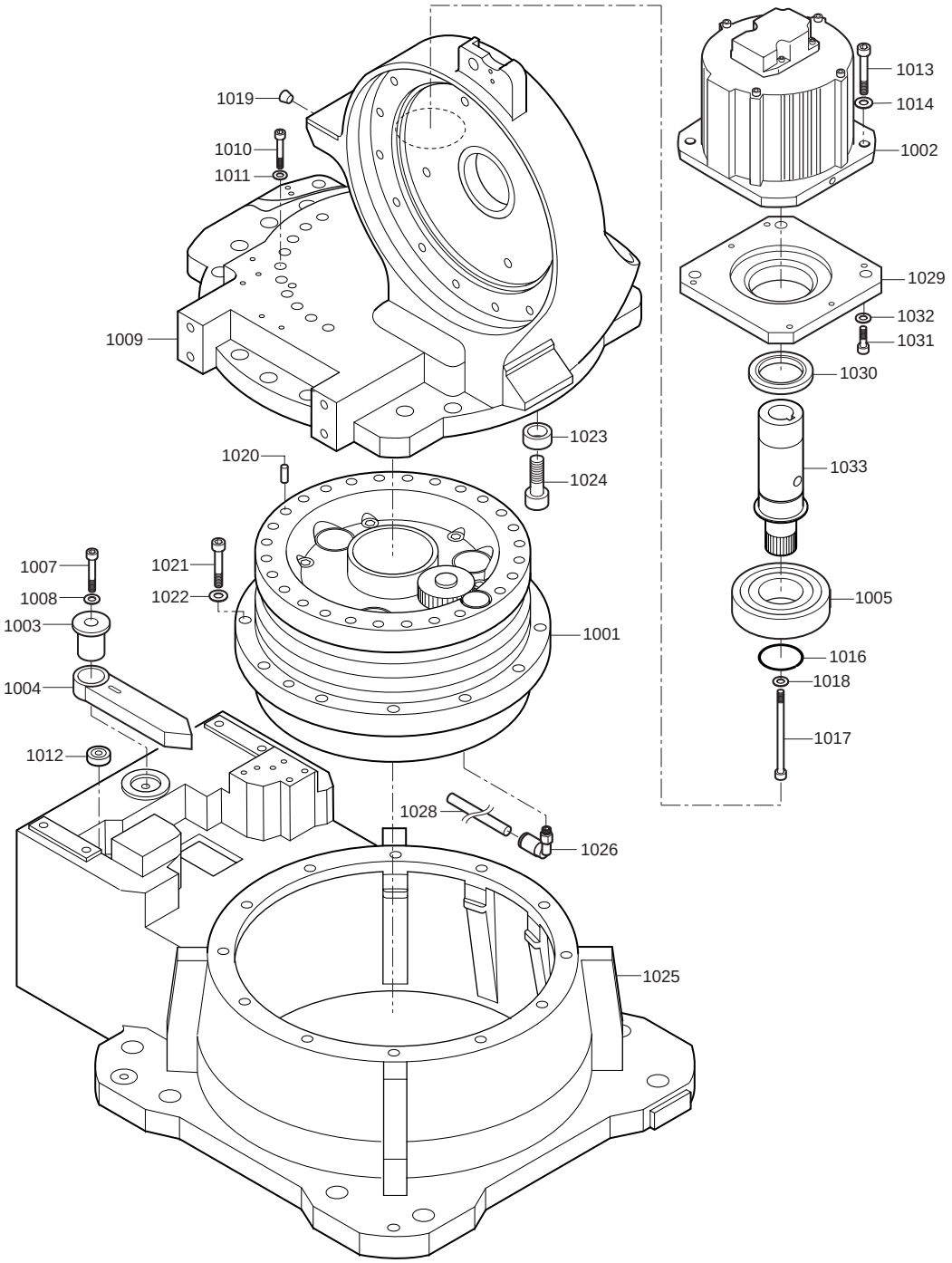


Table 11-1: S-Axis Unit

No.	DWG No.	Name	Pcs
1001	HW0387752-A	Speed reducer	1
1002	SGMRV-30ANA-YR1*	Motor	1
1003	HW9404486-1	Shaft	1
1004	HW0400405-1	Stopper	1
1005	6310	Bearing	1
1007	M8X45	Socket screw	1
1008	2H-8	Spring washer	1
1009	HW0102237-2	S head	1
1010	M12X45	Socket screw	15
1011	2H-12	Spring washer	15
1012	C-30-SG-22A	Glomet	1
1013	M12X55	Socket screw	3
1014	2H-12	Spring washer	3
1015	HW0312836-1	Gear	1
1016	STW-50	Retaining Ring-C type	1
1017	M8X100	Socket screw	1
1018	2H-8	Spring washer	1
1019	PT3/8 (STAINLESS coating)	Plug	1
1020	MSTH10-25	Parallel pin	1
1021	M12X55	Socket screw	12
1022	2H-12	Spring washer	12
1023	HW9405875-1	Coller	1
1024	M20X40	Socket screw	1
1025	HW0102236-1	Base	1
1026	KQ2L10-01S	Elbow	1
1028	NB-1075-0.43	Tube	1
1029	HW0314010-1	M base	1
1030	Y507212.5	Oil seal	1
1031	M6X20	Socket screw	2
1032	2H-6	Spring washer	2
1033	HW0313741-1	Gear	1
1034	PT1/8 (STAINLESS coating)	Plug	1

11.2 L-Axis Unit

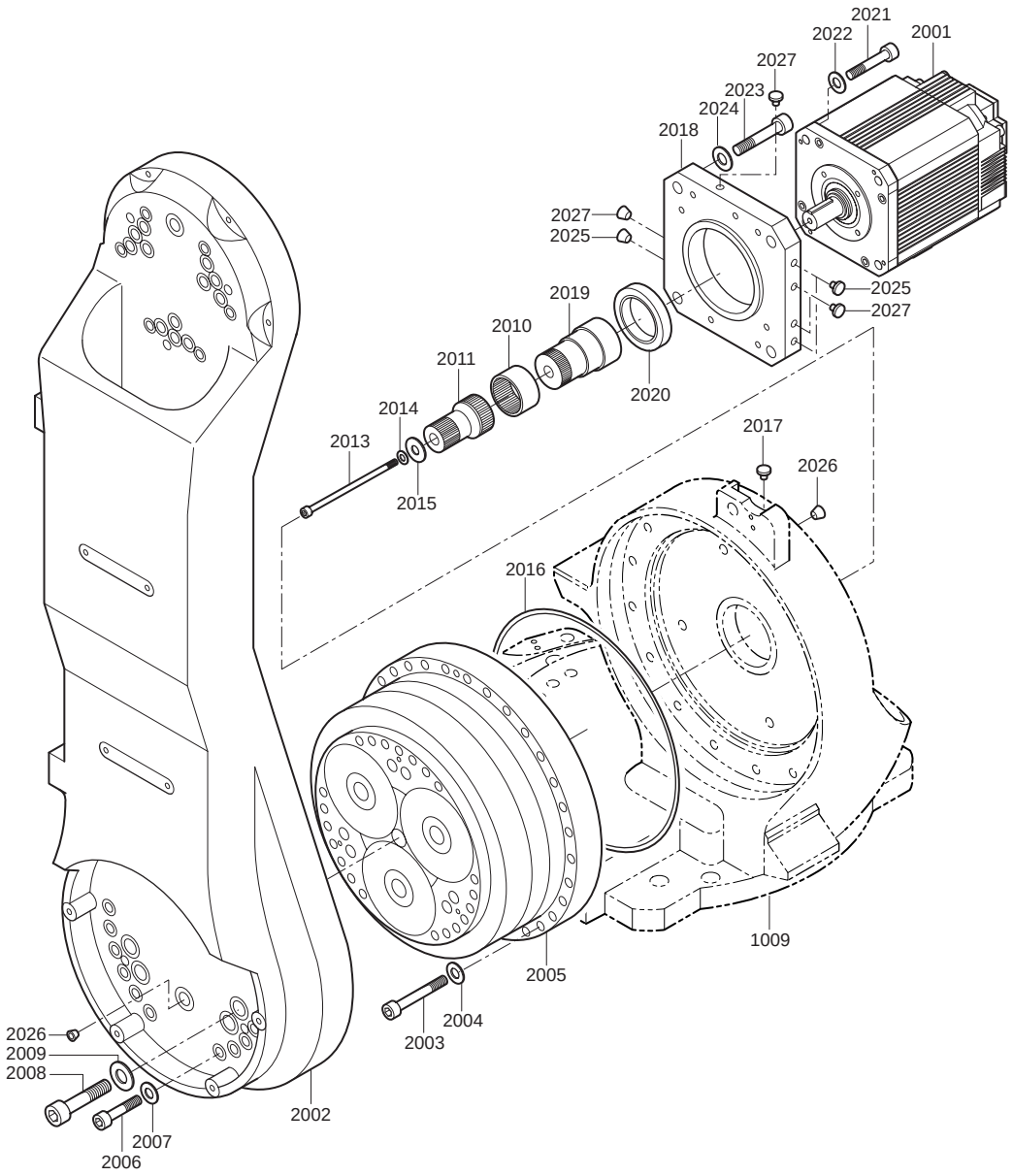


Table 11-2: L-Axis Unit

No.	DWG No.	Name	Pcs
2001	SGMRV-37ANA-YR1*	Motor	1
2002	HW0102425-1	L arm	1
2003	M12X55	Socket screw	16
2004	SW-2H-12	Spring washer	16
2005	HW9381465-B	Speed reducer	1
2006	M10X40	Socket screw	18
2007	2H-10	Spring washer	18
2008	M16X45	Socket screw	6
2009	2H-16	Spring washer	6
2010	HW9481343-A	Shaft	1
2011	HW9482771-A	Gear	1
2012	HW9405902-1	Pipe	1
2013	M8X130	Socket screw	1
2014	2H-8	Spring washer	1
2015	M8	Washer	1
2016	G270	O ring	1
2017	EZ0094-A0	Air breather	1
2018	HW0314011-1	M base	1
2019	HW0312815-2	Gear	1
2020	Y507212.5	Oil seal	1
2021	M12X65	Socket screw	4
2022	2H-12	Spring washer	4
2023	M6X30	Socket screw	2
2024	2H-6	Spring washer	2
2025	EZ5002A0	Cap	3
2026	PT3/8 (STAINLESS coating)	Plug	2
2027	PT1/8 (STAINLESS coating)	Plug	4
1009	HW0102237-2	S head	1

11.3 U-Axis Unit

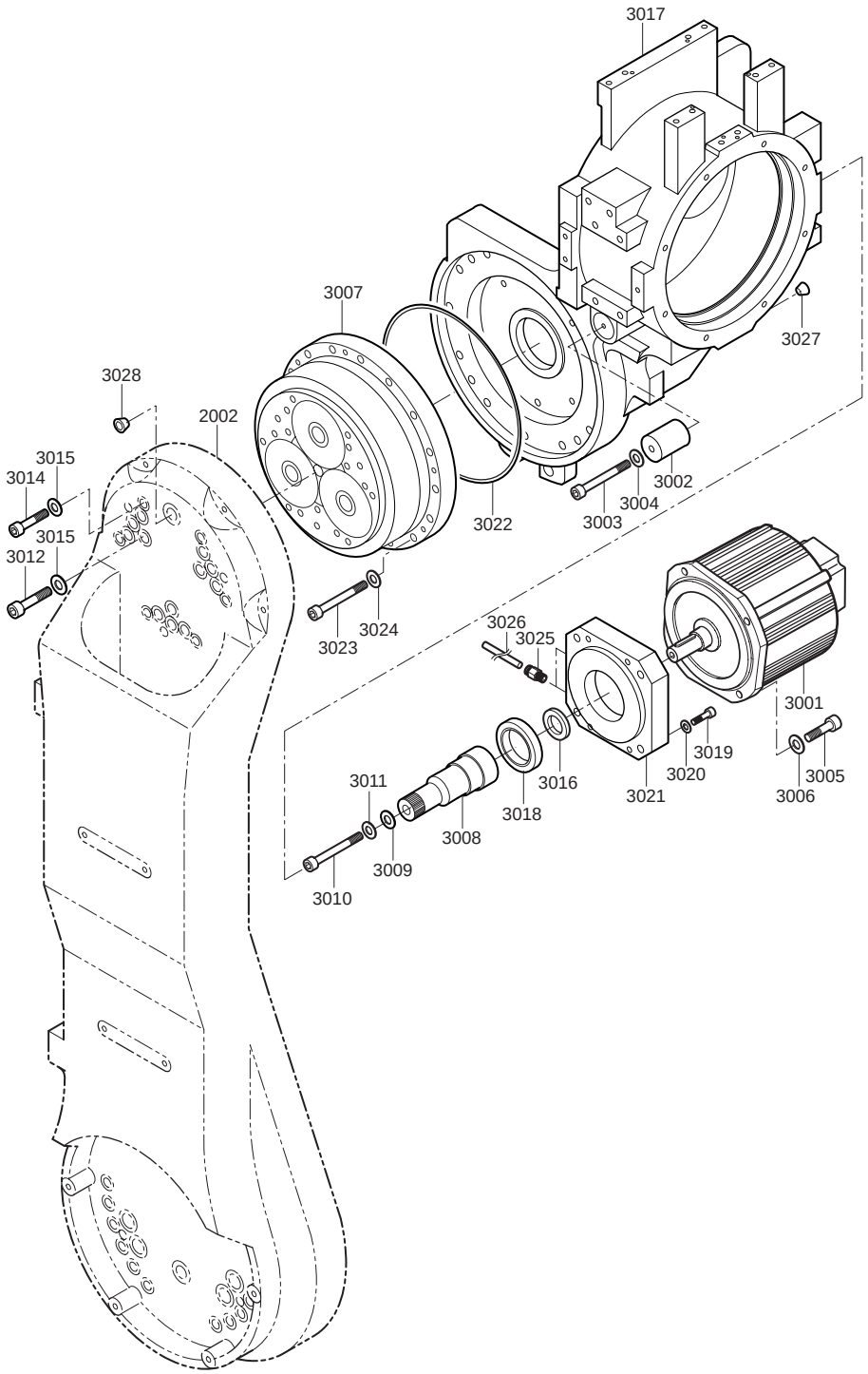


Table 11-3: U-Axis Unit

No.	DWG No.	Name	Pcs
3001	SGMRV-13ANA-YR1*	Motor	1
3002	HW0413914-1	Stopper	1
3003	M6X55	Socket screw	1
3004	2H-6	Spring washer	1
3005	M8X55	Socket screw	4
3006	2H-8	Spring washer	4
3007	HW0387753-A	Speed reducer	1
3008	HW0313740-1	Gear	1
3009	HW8411125-3	Washer	1
3010	M6X115	Socket screw	1
3011	2H-6	Spring washer	1
3012	M12X30	Socket screw	12
3013	2H-12	Spring washer	12
3014	M10X30	Socket screw	6
3015	2H-10	Spring washer	6
3016	HW9405257-1	Collar	1
3017	HW0102239-2	Casing	1
3018	Y426012.5	Oil seal	1
3019	M6X30	Socket screw	2
3020	2H-6	Spring washer	2
3021	HW0314012-1	M base	1
3022	G195	O ring	1
3023	M10X40	Socket screw	16
3024	2H-10	Spring washer	16
3025	TSH6-01M	Union	2
3026	UB-0640-0.1C	Tube	2
3027	PT1/8 (STAINLESS coating)	Plug	1
2028	PT3/8 (STAINLESS coating)	Plug	1
2002	HW0102425-1	L arm	1

11.4 R-,B-,T-Axis Unit

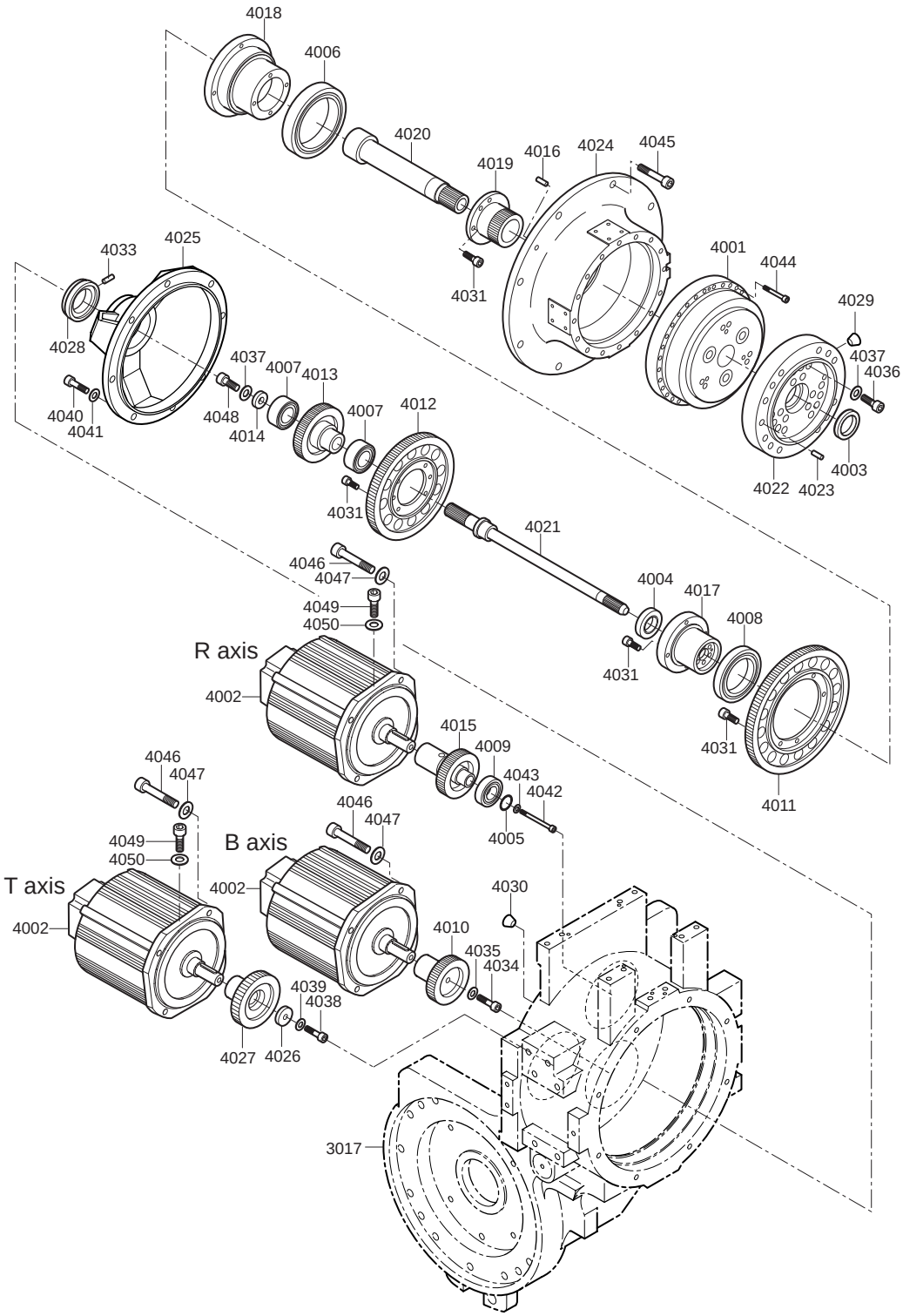


Table 11-4: R-,B-,T-Axis Unit (Sheet 1 of 2)

No.	DWG No.	Name	Pcs
4001	HW0387754-A	Speed reducer	1
4002	SGMRV-09ANA-YR1*	Motor	3
4003	AC1306-G00X6	Oil seal	1
4004	TC20367*FKM*	Oil seal	1
4005	ISTW-17	Retaining Ring	1
4006	HR32913J	Bearing	1
4007	HR32005XJ	Bearing	2
4008	HR32909J	Bearing	1
4009	6003	Bearing	1
4010	HW0313628-1	Gear	1
4011	HW0313627-1	Gear	1
4012	HW0313629-1	Gear	1
4013	HW0312826-1	Gear	1
4014	HW0404196-8	Washer	1
4015	HW0313626-1	Gear	1
4016	MSTH8-20	Parallel pin	1
4017	HW0312834-1	Shaft	1
4018	HW0312832-1	Shaft	1
4019	HW0312831-1	Gear	1
4020	HW0312833-1	Shaft	1
4021	HW0312835-1	Shaft	1
4022	HW0312838-1	Flange	1
4023	MSTH6-15	Parallel pin	1
4024	HW0200768-1	Shaft	1
4025	HW0312837-1	Housing	1
4026	HW9405662-1	Washer	1
4027	HW0312825-1	Gear	1
4028	HW0412720-1	B nut	1
4029	PT1/8	Plug	2
4030	PT3/8	Plug	1
4031	M5X16	GT-SA bolt	18
4033	M4X6	H set screw	1
4034	M6X25	Socket screw	1
4035	2H-6	Spring washer	1
4036	M8X25	Socket screw	18
4037	2H-8	Spring washer	19
4038	M6X20	Socket screw	1
4039	2H-6	Spring washer	1
4040	M6X25	Socket screw	6
4041	2H-6	Spring washer	6
4042	M6X50	Socket screw	1
4043	2H-6	Spring washer	1
4044	M6X35	GT-SA bolt	16

Table 11-4: R-,B-,T-Axis Unit (Sheet 2 of 2)

No.	DWG No.	Name	Pcs
4045	M8X30	GT-SA bolt	8
4046	M8X25	Socket screw	10
4047	2H-8	Spring washer	10
4048	M8X20	Socket screw	1
4049	M4X6	Socket screw	2
4050	2H-4	Spring washer	2
3017	HW0102239-2	Casing	1

11.5 Wrist Unit

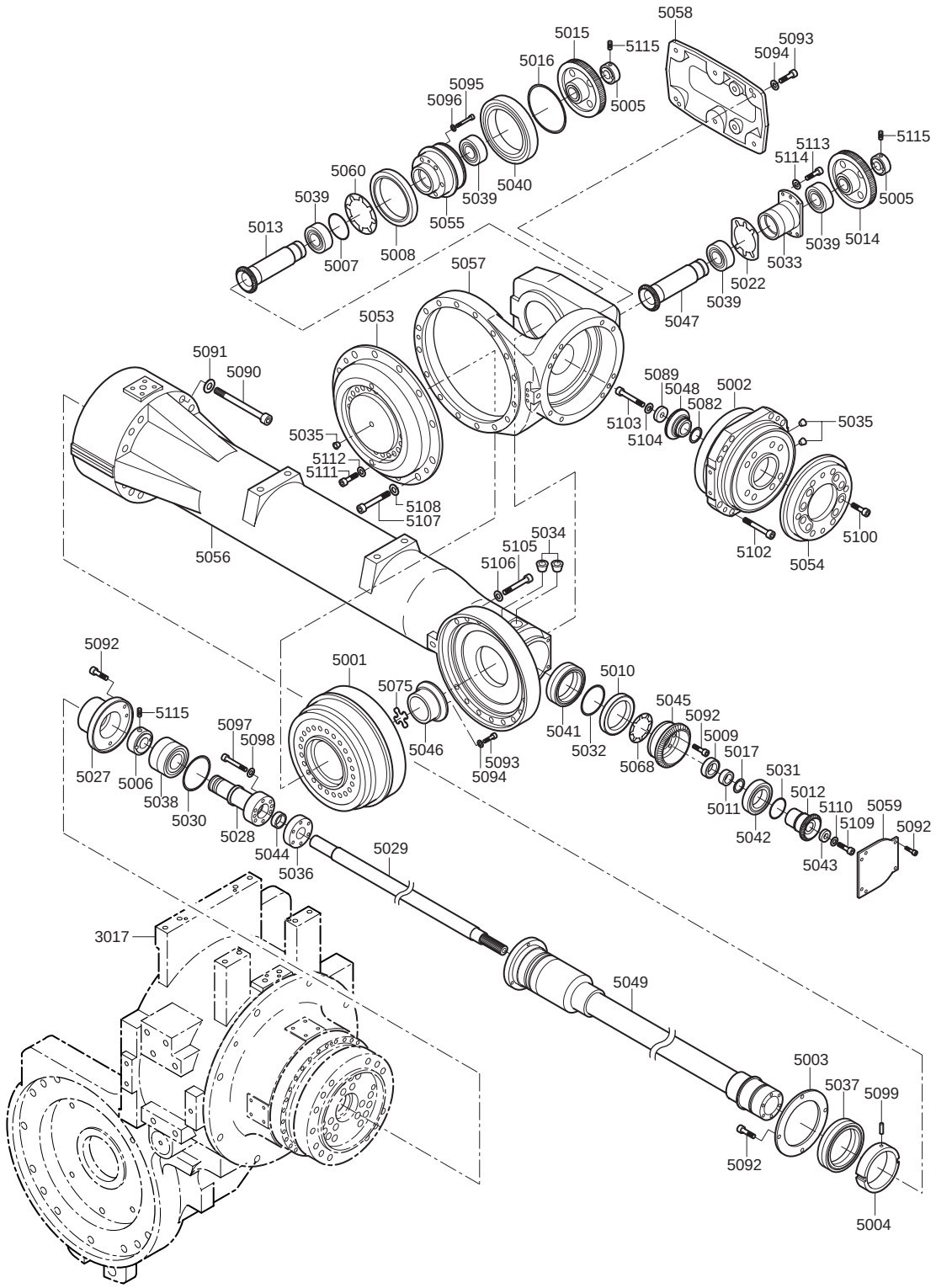


Table 11-5: Wrist Unit

No.	DWG No.	Name	Pcs
5001	HW0387737-B	Speed reducer	1
5002	HW0389043-A	Speed reducer	1
5003	HW9405880-1	B cover	1
5004	HW9405445-1	B nut	1
5005	HW9405881-1	B nut	2
5006	HW9405882-1	B nut	1
5007	S34	O ring	1
5008	AE3092E2	Oil seal	1
5009	SC15247F585	Oil seal	1
5010	SC39528F585	Oil seal	1
5011	HW9405883-1	Coller	1
5012	HW9381667-A	Gear	1
5013	HW9381668-A	Gear	1
5014	HW9381669-A	Gear	1
5015	HW9381672-A	Gear	1
5016	WR60	Sirclip	1
5017	HW9405888-*	Sim	*
5022	HW9405885-*	Sim	*
5027	HW9482772-A	Gear	1
5028	HW9482765-A	Shaft	1
5029	HW9381675-A	Shaft	1
5030	RTW42	Retaining Ring	1
5031	STW-25	Retaining Ring-C type	1
5032	ISTW40	Retaining Ring	1
5033	HW9405891-1	Housing	1
5034	PT3/8	Plug	2
5035	PT1/8(STAINLESS coating)	Plug	3
5036	HW9405892-1	Flange	1
5037	HW9481234-A	Bearing	1
5038	6004LBD2PX24V1	Bearing	1
5039	HW9480086-A	Bearing	4
5040	6912DU	Bearing	1
5041	6808LLU	Bearing	2
5042	6905	Bearing	1
5043	HW9405901-1	Washer	1
5044	BG3000-15X19	Ring	1
5045	HW0312827-1	Gear	1
5046	HW0312828-1	Gear	1
5047	HW0313631-1	Gear	1
5048	HW0312830-1	Gear	1
5049	HW0201159-A	Shaft	1
5053	HW0314090-1	Flange	1
5054	HW0312775-1	Flange	1

Table 11-5: Wrist Unit

No.	DWG No.	Name	Pcs
5055	HW9302630-3	Housing	1
5056	HW0102233-1	U arm	1
5057	HW0102232-1	Wrist	1
5058	HW0201158-1	Cover	1
5059	HW0412682-1	Cover	1
5060	HW0412694-*	Sim	*
5068	HW0412683-*	Sim	*
5075	HW0412695-*	Sim	*
5082	HW0412696-*	Sim	*
5089	HW9404651-1	Washer	1
5090	M8X85	Socket screw	12
5091	2H-8	Spring washer	12
5092	M4X12	GT-SA bolt	17
5093	M5X16	Socket screw	10
5094	2H-5	Spring washer	10
5095	M5X35	Socket screw	6
5096	2H-5	Spring washer	6
5097	M4X25	Socket screw	6
5098	2H-4	Spring washer	6
5099	M4X6	H set screw	2
5100	M8X18	GT-SA bolt	8
5102	M6X30	GT-SA bolt	10
5103	M6X20	Socket screw	1
5104	2H-6	Spring washer	1
5105	M6X25	Socket screw	16
5106	2H-6	Spring washer	16
5107	M8X25	Socket screw	12
5108	2H-8	Spring washer	12
5109	M6X16	Socket screw	1
5110	2H-6	Spring washer	1
5111	M8X20	Socket screw	16
5112	2H-8	Spring washer	16
5113	M4X14	Socket screw	4
5114	2H-4	Spring washer	4
5115	M5X7	Magic screw	6
3017	HW0102239-2	Casing	1

MOTOMAN-MH50
INSTRUCTIONS

HEAD OFFICE
2-1 Kurosaki-Shiroishi, Yahatanishi-ku, Kitakyusyu-shi, 806-0004, Japan
Phone +81-93-645-7745 Fax +81-93-645-7746

MOTOMAN INC. HEADQUARTERS
805 Liberty Lane, West Carrollton, OH 45449, U.S.A.
Phone +1-937-847-6200 Fax +1-937-847-6277

MOTOMAN ROBOTICS EUROPE AB
Franska Vagen 10, Box 4004, SE-390 04 Kalmar, Sweden
Phone +46-480-417800 Fax +46-480-417999

MOTOMAN ROBOTEC GmbH
Kammerfeld strasse 1, 85391 Allershausen, Germany
Phone +49-8166-90-100 Fax +49-8166-90-103

YASKAWA ELECTRIC KOREA CORPORATION
1F, Samyang Bldg. 89-1, Shinchun-dong, Donk-Ku, Daegu, Korea
Phone +82-53-382-7844 Fax +82-53-382-7845

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.
151 Lorong Chuan, #04-01, New Tech Park, Singapore 556741
Phone +65-6282-3003 Fax +65-6289-3003

YASKAWA ELECTRIC (MALAYSIA) SDN. BHD.
Unit 47-1 and 2. Jalan PJU 5/9, Dataran Sunway, Kota Damansara, 47810, Petailng Jaya Selangor, Malaysia
Phone +60-3614-08919 Fax +60-3614-08929

YASKAWA ELECTRIC (THAILAND) CO., LTD.
252/246, 4th Floor. Muang Thai-Phatra office Tower II Rechadapisek Road, Huaykwang Bangkok 10320, Thailand
Phone +66-2-693-2200 Fax +66-2-693-4200

SHOUGANG MOTOMAN ROBOT CO., LTD.
No.7,Yongchang-North Road, Beijing Economic and Technological and Development Area, Beijing 100076, China
Phone +86-10-6788-0541 Fax +86-10-6788-0542

MOTOMAN MOTHERSON ROBOTICS LTD.
Plot Number 195-196, First Floor, Imt Manesar -Sector 4, Gurgaon (Haryana),Pin-122050, India
Phone +91-124-475-8500 Fax +91-124-475-8542

YASKAWA ELECTRIC CORPORATION

YASKAWA

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

© Printed in Japan August 2009 09-08

MANUAL NO.
HW0485217