

MOTOMAN-MPL160 II SUPPLEMENTAL INSTRUCTIONS

TYPE:

YR-MPL0160-JF0 (FOR FOOD GRADE GREASE (DX200))

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

MOTOMAN INSTRUCTIONS

MOTOMAN-MPL160 II INSTRUCTIONS (172536-1CD)
MOTOMAN-MPL160 II SUPPLEMENTAL INSTRUCTIONS

DX200 INSTRUCTIONS
DX200 OPERATOR'S MANUAL (for each purpose)
DX200 MAINTENANCE MANUAL

The DX200 operator's manual above corresponds to specific usage. Be sure to use the appropriate manual.

Part Number: 173321-1CD

Revision: 1

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Introduction

This supplementary instruction manual describes how YR-MPL0160-JF0(Food grade grease specification) is different from the YR-MPL0160-J00(Standard).

In case of using YR-MPL0160-JF0, read this supplementary instruction manual thoroughly with: "MOTOMAN-MPL160 II INSTRUCTIONS" (172536-1CD).

Point of Difference

YR-MPL0160-JF0 differ from the YR-MPL0160-J00 in the following point:

(1)Food grade grease specification

- 3.4 Location (Page 3-4)
- 5.1 Basic Specifications (Page 5-1)
- 6.1 Allowable Wrist Load (Page 6-1)
- 9.1 Inspection Schedule (Page 9-2 to 9-3)
- 9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)
- 10 Recommended Spare Parts (Page 10-1)

The differences are described based on "MOTOMAN-MPL160 II INSTRUCTIONS" (172536-1CD). Read this manual thoroughly replacing the subject matters for changes with this supplementary instruction manual.

3.4 Location (Page 3-4)

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

- Ambient temperature: +15 to + 45°C
- Humidity: 20 to 80%RH (non-condensing)
- Free from dust, soot, or water
- Free from corrosive gas or liquid, or explosive gas or liquid
- Free from excessive vibration
(Vibration acceleration: 4.9 m/s^2 [0.5G] or less)
- Free from large electrical noise (plasma)
- Flatness for installation: 0.5 mm or less



During winter or when the ambient temperature is around 15 degrees break-in the S-, and T-axes in turn for about five minutes each at 40% of the maximum speed until it is warmed up before the actual operation.

5 Basic Specifications

5.1 Basic Specifications (Page 5-1)

Table 5-1: Basic Specifications¹⁾

Item	Type	MOTOMAN-MPL160II YR-MPL0160-JF0
Structure		Vertically Articulated
Degree of Freedom		4
Payload		160 kg
Repeatability ²⁾		±0.5 mm
Range of Motion	S-Axis (turning)	-180° – +180°
	L-Axis (lower arm)	-45° – +90°
	U-Axis (upper arm)	-120° – +15.5°
	T-Axis (wrist twist)	-360° – +360°
Maximum Speed	S-Axis	2.44 rad/s, 140°/s
	L-Axis	2.44 rad/s, 140°/s
	U-Axis	2.44 rad/s, 140°/s
	T-Axis	5.32 rad/s, 305°/s
T-Axis Allowable Inertia (GD ² /4) ³⁾		80 kg•m ²
Approx. Mass		1700 kg
Protective Structure		Main part of the manipulator: IP54 or equivalent Wrist axis only: IP67 or equivalent
Ambient Conditions	Temperature	+15 to 45°C
	Humidity	20 to 80% RH (non-condensing)
	Vibration	4.9 m/s ² (0.5G) or less
	Others	Free from corrosive gas or liquid, or explosive gas or liquid Free from exposure to dust, soot, or oil Free from excessive electrical noise (plasma)
Power Requirements		9.5 kVA
Noise ⁴⁾		73 dB

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

2 Conformed to ISO9283

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

4 Conformed to ISO6926

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 1.2m and 1.5m above the ground.
- 400mm away from the P-point maximum envelope.

6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load (Page 6-1)

The allowable wrist load including the weight of the mount/gripper is 160 kg maximum.

1. The total moment of inertia ($GD^2/4$) of T-axis should be within the value shown in *Table 6-1 "Allowable Total Inertia"*.

Table 6-1: Allowable Total Inertia

T- Axis Total Moment of Inertia ($GD^2/4$) $kg\cdot m^2$
80 $kg\cdot m^2$

2. When the inertia of the volume load on the flange is small, the eccentricity of load center measured from T-axis flange rotation center is in the range shown in *Fig. 6-1 "Moment Arm Rating for MPL 160 II"*. When the inertia of the volume load on the flange (J_i) is large, use the following formula to calculate the eccentricity L_T .

Formula:

$$J = J_i + WL_T^2$$

J : Total inertia ($GD^2/4$) of the T-axis ($kg\cdot m^2$)

J_i : Inertia of the volume load on the flange ($kg\cdot m^2$)

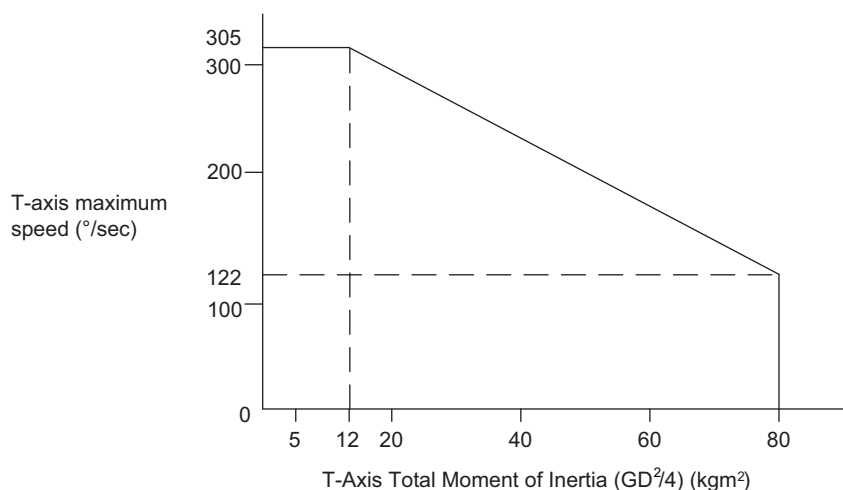
W : Payload (kg)

L_T : Eccentricity (mm)

3. Regarding T-axis maximum speed

The maximum speed of T-axis varies depending on the total moment of inertia ($GD^2/4$) of T-axis. The total moment of inertia ($GD^2/4$) of T-axis is set to the value of T-Axis Allowable Inertia ($GD^2/4$) as factory setting.

Before operating the manipulator, refer to *section 8.3 "Tool Data Setting"* and *section 8.4.3 "Tool Load Information Setting"* of the "DX200 INSTRUCTIONS" (165292-1CD), and set the proper information of tool and load. If the tool information setting is incorrect, T-axis's speed may slow down.



9.1 Inspection Schedule (Page 9-2 to 9-3)

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

Items ¹⁾		Schedule					Method	Operation	Inspection Charge		
		Daily	1000H Cycle	3000H Cycle	9000H Cycle	18000H Cycle			Specified Person	Licensee	Service Company
1	Alignment mark	●					Visual	Check alignment 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	Motors for L- and U-axes	●					Visual	Check for grease leakage. ²⁾	●	●	●
5	Baseplate mounting bolts		●				Spanner Wrench	Tighten loose bolts. Replace if necessary.	●	●	●
6	Connector base		●				Manual	Check for loose connectors and tighten if necessary.	●	●	●
7	LU-axis connectors		●				Manual	Check for loose connectors and tighten if necessary.	●	●	●
8	Connectors in S-head			●			Manual	Check for loose connectors.	●	●	●
9	L-axis balancer			●			Grease Gun, Visual	Supply grease. Check for loose screw nuts and shafts, and tighten if necessary.		●	●
10	Wire harness in manipulator (Wires for S-, L-, and U-axes) (Wires for T-axis)				●		Multimeter, Visual	Check for conduction between the main connector of base and intermediate connector with manually shaking the wire. Check for wear of protective spring ³⁾		●	●
						●		Replace ⁴⁾			●
11	Links/Connections				●		Visual, Manual	Move the L- and U-axes back and forth, up and down to check any backlash. Replenish grease ⁵⁾ See <i>section 9.3.7</i> .		●	●
12	Battery pack in manipulator					●	Screwdriver, Wrench	Replace the battery pack when the battery alarm occurs or the manipulator drove for 18000H. See <i>section 9.2.1</i> .		●	●
13	S-axis speed reducer			●	●		Grease Gun	Check for malfunction. (Replace if necessary.) Exchange grease ⁵⁾ (3000H cycle). See <i>section 9.3.2</i> .		●	●

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

Items ¹⁾	Schedule					Method	Operation	Inspection Charge			
	Daily	1000H Cycle	3000H Cycle	9000H Cycle	18000H Cycle			Specified Person	Licensee	Service Company	
14	Speed reducers for L- and U-axes			●	●		Grease Gun	Check for malfunction. (Replace if necessary.) Exchange grease ⁵⁾ (3000H cycle). See <i>section 9.3.3</i> and <i>section 9.3.4</i> .		●	●
15	T-axis speed reducer			●	●		Grease Gun	Check for malfunction. (Replace if necessary.) Exchange grease ⁵⁾ (3000H cycle). See <i>section 9.3.5</i> .		●	●
16	Bearing			●			Grease Gun	Replenish grease ^{5) 6)}		●	●
17	Motor cooling fan			●			Visual	Check for damage and operation.		●	●
18	Overhaul					●					●

∞

- 1 Inspection item numbers correspond to the numbers in *Fig. 9-1 "Inspection Items"* .
- 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 *section 9.3.7 "Grease Replenishment for Links"* .
- 4 Wire harness in manipulator to be replaced at 18000H inspection.
- 5 For the grease, refer to *Table 9-2 "Inspection Parts and Grease Used"* .
- 6 Replenish grease to the U-axis cross-roller bearing at 3000 H or after a year, whichever comes first.

Table 9-2: Inspection Parts and Grease Used

No.	Grease Used	Inspected Parts
13, 14, 15	Cassida Grease EPS 00	Speed reducers for S-, L-, U- and T-axes
9, 16	Cassida Grease EPS 2	L-axis balancer, bearings

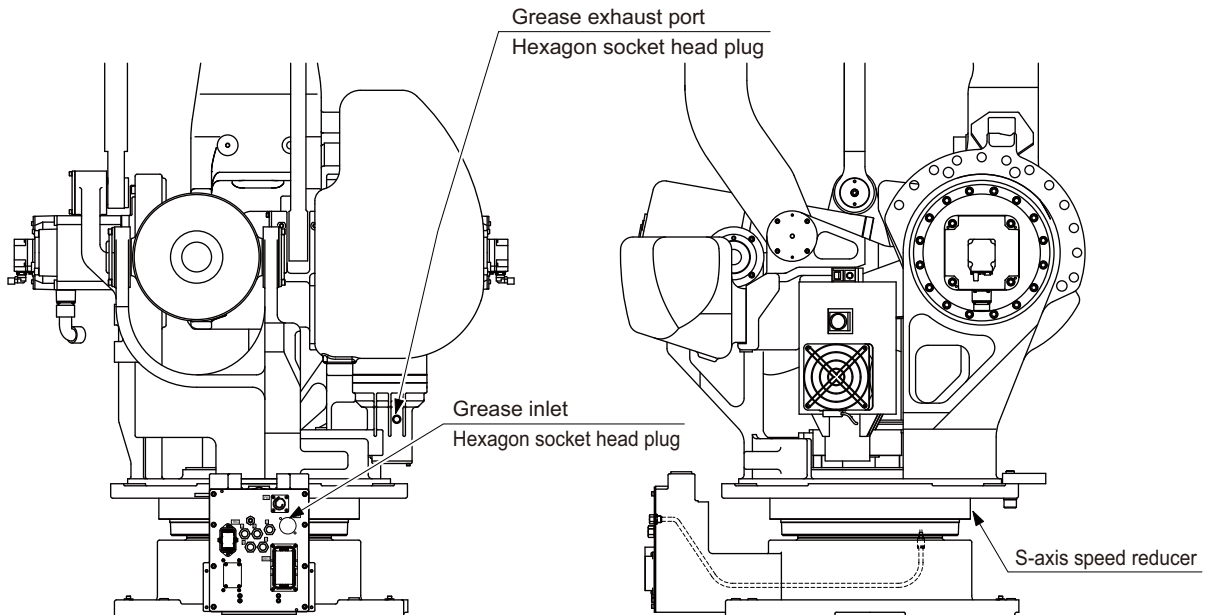
The numbers in the above table correspond to the numbers in *Table 9-1 "Inspection Items"*

9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)

S-,L-,U- and T-axis speed reducer do not grease replenishment.
It is grease exchange only.

9.3.2 Grease Exchange for S-Axis Speed Reducer and Gear

Fig. 9-4: S-Axis Speed Reducer and Gear Diagram

**9.3.2.1 Grease Exchange**

(Refer to Fig. 9-4 "S-Axis Speed Reducer and Gear Diagram".)

1. Remove the hexagon socket head plugs from the grease inlet and grease exhaust port.



- If grease is injected with the plug on, 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 the 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 a grease zerk A-PT1/4 to the grease inlet.
(The grease zerk is delivered with the manipulator.)
3. Inject grease through the grease inlet using a grease gun.

– Grease type:	Cassida Grease EPS 00
– Amount of grease:	approx. 10400 cc
– Air supply pressure of grease pump:	0.3 MPa or less
– Grease injection rate:	8 g/s or less

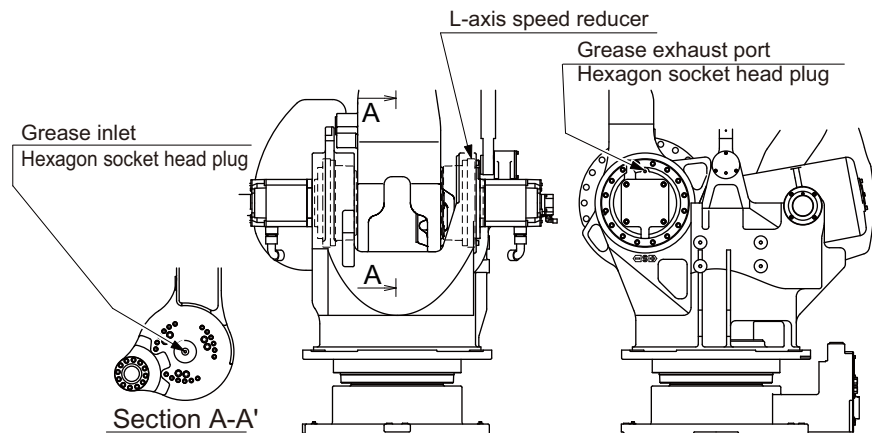
9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)

4. The grease exchange is completed when new grease appears in the grease 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 excess grease.
6. Wipe the discharged grease with a cloth, and reinstall the plug. Before installing the plug, apply Three Bond 1206C on the thread part of the plug. Then tighten the plug with a tightening torque of 24.5 N•m (2.5 kgf•m).



If the plug is installed while grease is being exhausted, grease will leak inside the motor and may cause a damage. Make sure to install the plug when the grease exhaust is completed.

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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.3 Grease Exchange for L-Axis Speed Reducer*Fig. 9-5: L-Axis Speed Reducer Diagram***9.3.3.1 Grease Exchange**

(Refer to Fig. 9-5(a) "L-Axis Speed Reducer Diagram".)

1. Remove the hexagon socket head plugs from the grease inlet and grease exhaust port.



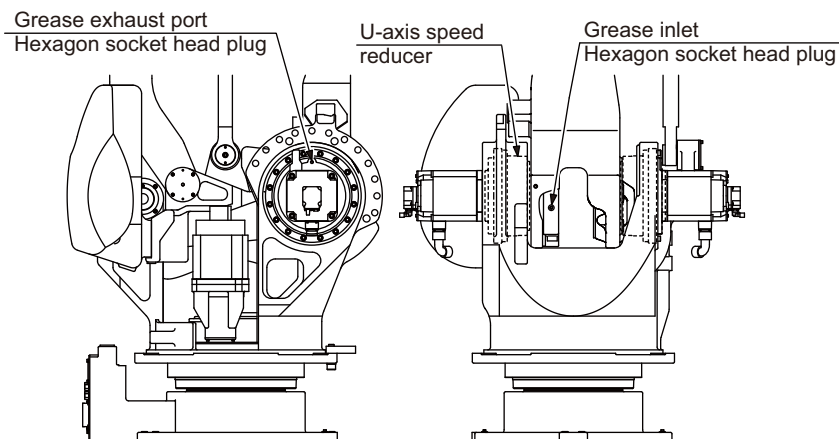
- If grease is injected with the plug on, grease will leak inside the motor and may cause a damage. Make sure to remove the plug before the grease injection.
- Do not install a joint, a hose, etc. to the grease exhaust port. Failure to observe this instruction may result in damage to the motor due to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

2. Install a grease zerk A-PT1/8 to the grease inlet.
(The grease zerk is delivered with the manipulator.)
3. Inject grease through the grease inlet using a grease gun.
 - Grease type: Cassida Grease EPS 00
 - Amount of grease: approx. 1800 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 completed when new grease appears in the grease exhaust port. (The new grease can be distinguished from the old grease by color.)
5. Move the L-axis for a few minutes to discharge excess grease.
6. Wipe the discharged grease with a cloth, and reinstall the plug. Before installing the plug, apply Three Bond 1206C on the thread part of the plug. Then tighten the plug with a tightening torque of 24.5 N•m (2.5 kgf•m).



If the plug is installed while grease is being exhausted, grease will leak inside the motor and may cause a damage. Make sure to install the plug when the grease exhaust is completed.

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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.4 Grease Exchange for U-Axis Speed Reducer*Fig. 9-6: U-Axis Speed Reducer Diagram***9.3.4.1 Grease Exchange**

(Refer to Fig. 9-6 “U-Axis Speed Reducer Diagram”.)

1. Remove the hexagon socket head plugs from the grease inlet and grease exhaust port.



- If grease is injected with the plug on, 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 the grease exhaust port. Failure to observe this instruction may result in damage to the motor due to coming off of an oil seal.

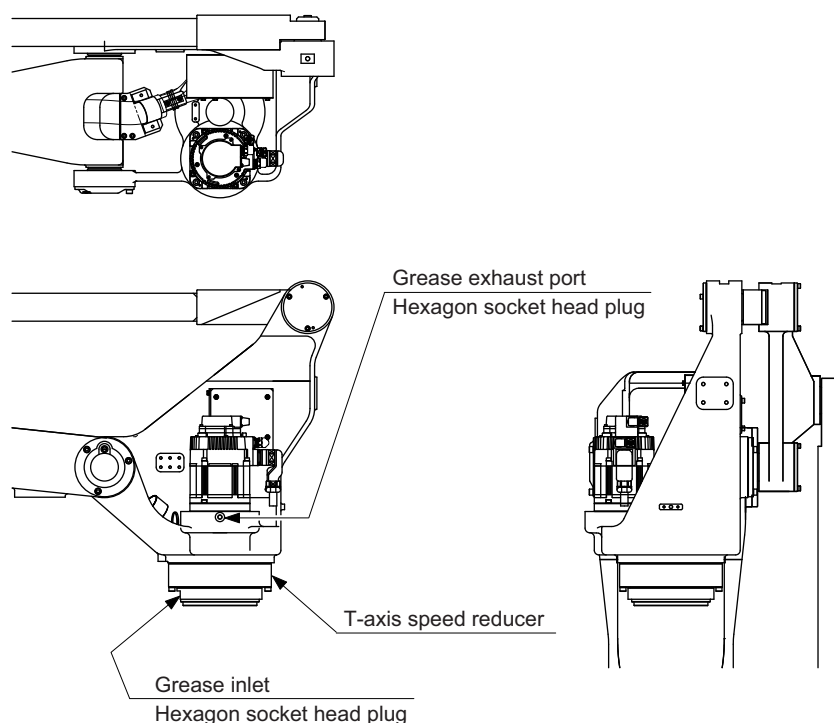
2. Install a grease zerk A-PT1/8 to the grease inlet. (The grease zerk is delivered with the manipulator.)
3. Inject grease through the grease inlet using a grease gun.
 - Grease type: Cassida Grease EPS 00
 - Amount of grease: approx. 1600 cc
 - Air supply pressure of grease pump: 0.3 MPa or less
 - Grease injection rate: 8 g/s or less
4. The grease exchange is completed when new grease appears in the grease exhaust port. (The new grease can be distinguished from the old grease by color.)
5. Move the U-axis for a few minutes to discharge excess grease.
6. Wipe the discharged grease with a cloth, and reinstall the plug. Before installing the plug, apply Three Bond 1206C on the thread part of the plug. Then tighten the plug with a tightening torque of 24.5 N•m (2.5 kgf•m).



If the plug is installed while grease is being exhausted, grease will leak inside the motor and may cause a damage. Make sure to install the plug when the grease exhaust is completed.

9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)

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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.5 Grease Exchange for T-Axis Speed Reducer*Fig. 9-7: T-Axis Speed Reducer Diagram***9.3.5.1 Grease Exchange**

(Refer to Fig. 9-7 “T-Axis Speed Reducer Diagram”).

1. Remove the hexagon socket head plugs from the grease inlet and grease exhaust port.



- If grease is injected with the plug on, 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 the 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 a grease zerk A-PT1/8 to the grease inlet.
(The grease zerk is delivered with the manipulator.)
3. Inject grease through the grease inlet using a grease gun.

– Grease type:	Cassida Grease EPS 00
– Amount of grease:	approx. 900 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 completed when new grease appears in the grease exhaust port. (The new grease can be distinguished from the old grease by color.)
5. Move the T-axis for a few minutes to discharge excess grease.

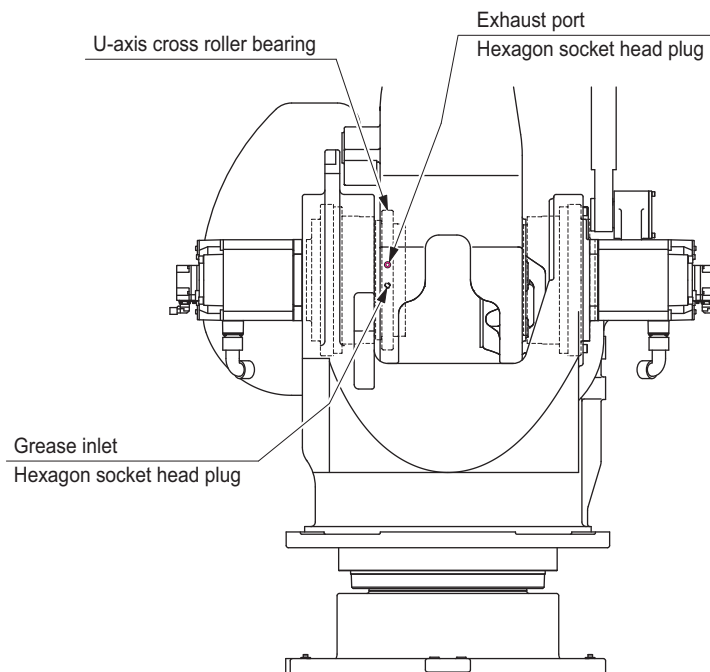
9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)

6. Wipe the discharged grease with a cloth, and reinstall the plug. Before installing the plug, apply Three Bond 1206C on the thread part of the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).



If the plug is installed while grease is being exhausted, grease will leak inside the motor and may cause a damage. Make sure to install the plug when the grease exhaust is completed.

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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.6 Grease Replenishment for U-axis Cross Roller Bearing*Fig. 9-8: U-Axis Cross Roller Bearing Diagram*

1. Remove the hexagon socket head plug of the exhaust port. (Refer to Fig. 9-8 "U-Axis Cross Roller Bearing Diagram".)
2. Remove the hexagon socket head plug of the grease inlet and install the grease zerk A-PT1/8. Inject grease through the grease inlet using a grease gun. (The grease zerk is delivered with the manipulator.)
 - Grease type: Cassida Grease EPS 2
 - Amount of grease: approx. 60 cc
 - Air supply pressure of grease pump: 0.3 MPa or less
 - Grease injection rate: 8 g/s or less
3. Reinstall the plug into 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 4.9 N•m (0.5 kgf•m).

NOTE

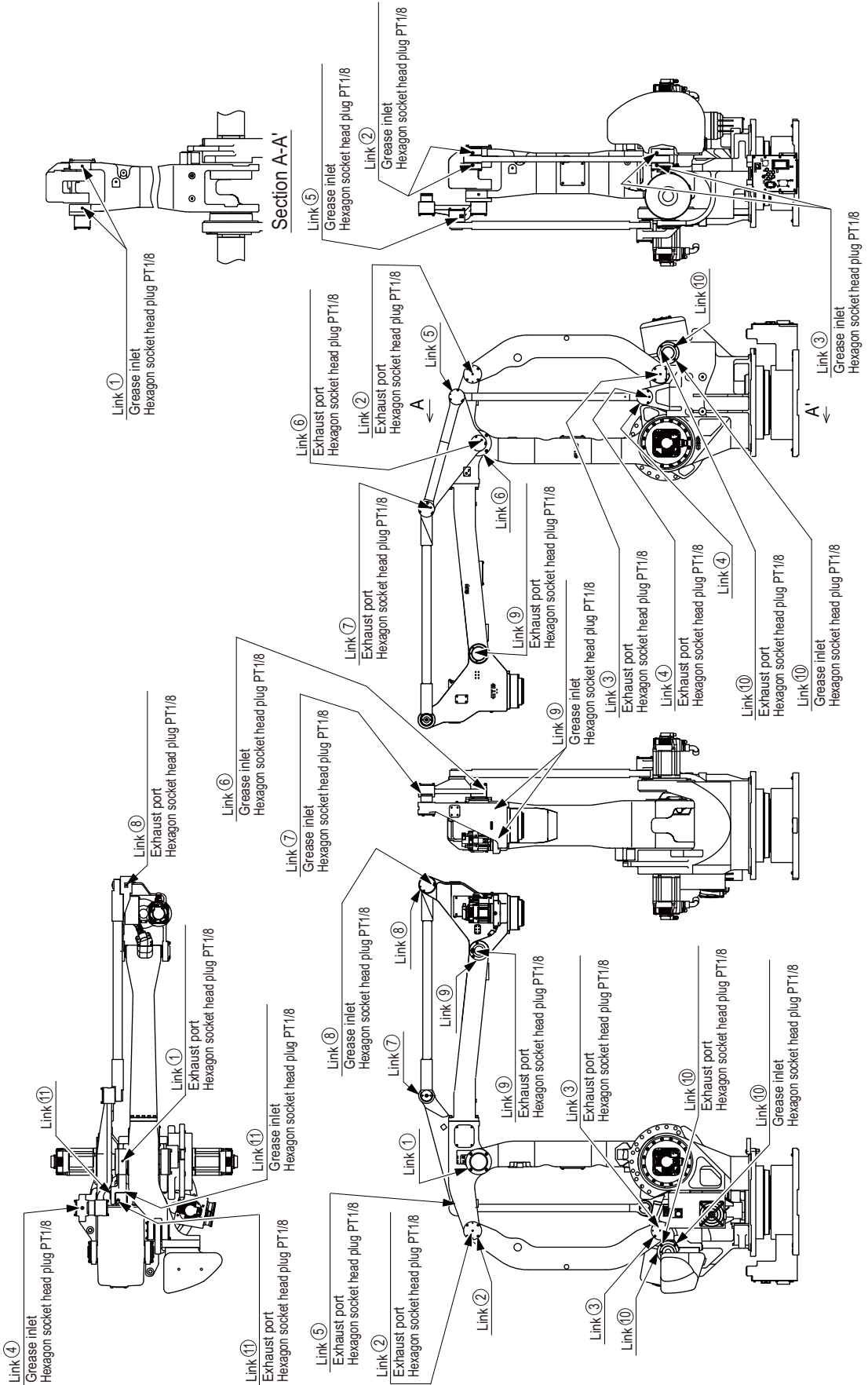
The exhaust port is for AIR flow: Grease is not exhausted from the exhaust port.

Do not inject excessive grease through the grease inlet.

4. 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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

9.3.7 Grease Replenishment for Links

Fig. 9-9: Grease Replenishment for Links



9.3 Grease Replenishment/Exchange (Page 9-8 to 9-19)

1. Remove the hexagon socket head plug PT1/8 from the exhaust port of each link. (Refer to *Fig. 9-9 "Grease Replenishment for Links"*)
2. Remove the hexagon socket head plug PT1/8 from the grease inlet of each link and install the grease zerk A-PT1/8. Inject grease through the grease inlet using a grease gun. (The grease zerk is delivered with the manipulator.)
 - Grease type: Cassida Grease EPS 2
 - Amount of grease for links 1, 2, 3, 6: 6 cc (12 cc for 1st supply)
 - Amount of grease for links 4, 5, 9: 12 cc (24 cc for 1st supply)
 - Amount of grease for links 7, 8: 3 cc (6 cc for 1st supply)
 - Amount of grease for links 10, 11: 5 cc (10 cc for 1st supply)
 - Air supply pressure of grease pump: 0.3 MPa or less
 - Grease injection rate: 8 g/s or less



The exhaust port is for AIR flow: Grease is not exhausted from the exhaust port.

Do not inject excessive grease through the grease inlet.

3. Reinstall the plug into the exhaust port of each link. Before installing the plug, apply Three Bond 1206C on the thread part of the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).
4. 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 the plug. Then tighten the plug with a tightening torque of 4.9 N•m (0.5 kgf•m).

10 Recommended Spare Parts (Page 10-1)

It is recommended to keep the parts and components in the following table in stock as spare parts for the MOTOMAN-MPL160 II. Product performance cannot be guaranteed when using spare parts from any company other than Yaskawa. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts.
- Rank B: Parts for which replacement may be necessary as a result of frequent operation.
- Rank C: Drive unit.



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

Table 10-1: Spare Parts for the YR-MPL0160-JF0

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	Cassida Grease EPS 00	Yaskawa	16kg	-	For speed reducers
A	2	Grease	Cassida Grease EPS 2	Showa Shell Sekiyu K.K.	16kg	-	For links and bearings
A	3	Battery Pack	HW0470360-A	Yaskawa	1	1	
A	4	Battery Pack	HW9470932-A	Yaskawa	1	1	For replacement of wire harness in manipulator
A	5	Liquid Gasket	Three Bond 1206C	ThreeBond Co., Ltd.	1	1	
B	6	Replacement Kit for S-Axis Speed Reducer	Y005C-MPL0160JF0S	Yaskawa	1	1	
B	7	Replacement Kit for L-Axis Speed Reducer	Y005C-MPL0160JF0L	Yaskawa	1	1	
B	8	Replacement Kit for U-Axis Speed Reducer	Y005C-MPL0160JF0U	Yaskawa	1	1	
B	9	Replacement Kit for T-Axis Speed Reducer	Y005C-MPL0160JF0T	Yaskawa	1	1	
B	10	U-axis Cross Roller Bearing	HW9482144-A	Yaskawa	1	1	
C	11	AC Servomotor for S-, L-, and U-axes	SGMRV-44ANA-YR1* HW0389698-A	Yaskawa	1	3	
C	12	AC Servomotor for T-axis	SGMRV-13ANA-YR1* HW0388666-A	Yaskawa	1	1	
C	13	Wire Harness in Manipulator	HW1172025-A	Yaskawa	1	1	
C	14	Wire Harness in Manipulator	HW1372054-A	Yaskawa	1	1	
C	15	Board	SGDR-EFBA02A	Yaskawa	1	1	

MOTOMAN-MPL160 II

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