MOTOFEEDER INSTRUCTIONS

MOTOFEEDER INSTRUCTIONS
MOTOFEEDER OPERATOR’S MANUAL
NX100 INSTRUCTIONS
NX100 OPERATOR’S MANUAL FOR PAINTING APPLICATION
NX100 MAINTENANCE MANUAL
MOTOMAN-EPX1250 INSTRUCTIONS
MOTOMAN-EPX1250 INSTRUCTIONS SUPPLEMENT
MOTOMAN-EPX2050 INSTRUCTIONS

The NX100 operator’s manuals above correspond to specific usage. Be sure to use the appropriate manual.

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

- This manual describes the precautions for operation, required items for maintenance or inspections, and maintenance procedures, for proper maintenance or inspections of mechanical part of the MOTOFEEDER. Read this manual carefully and be sure to understand its contents before handling the MOTOFEEDER.

- General items related to safety are listed in Chapter 1: Safety of the NX100 Instructions. To ensure correct and safe operation, carefully read the NX100 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 and maintenance 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.
We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338  
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment. NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the NX100.
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.

 назначен “CAUTION” and “WARNING.”
• Before maintenance, inspection and wiring, make sure to turn OFF the primary power supply, and put up a warning sign. (ex. DO NOT TURN ON THE POWER)

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

• After completing the maintenance inspection, make sure where is the home position before operating the MOTOFEEDER.

Failure to observe this warning may cause unexpected MOTOFEEDER motion, resulting in collision or injury.

• Before operating the MOTOFEEDER, check that servo power is turned OFF when the emergency stop buttons on the front door of the NX100, operation BOX and programming pendant are pressed. 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 MOTOFEEDER during an emergency.

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 MOTOFEEDER motion.

Release of Emergency Stop

• Always set the Teach Lock before entering the robot work envelope to teach a job.

Injury may result if someone besides the operator starts the manipulator from playback panel.

• Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:

- View the MOTOFEEDER from the front whenever possible.
- Always follow the predetermined operating procedure.
- Always follow the predetermined operating procedure.
- Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended MOTOFEEDER operation may result in injury.
WARNING

- Confirm that no persons are present in the P-point maximum envelope of the MOTOFEEDER and that you are in a safe location before:
  - Turning ON the NX100 power
  - Moving the MOTOFEEDER 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 MOTOFEEDER during operation. Always press an emergency stop button immediately if there are problems. The emergency stop buttons are located on the right of the front door of the NX100, operation BOX and the programming pendant.
Perform maintenance inspection with the specific person who took the maintenance training course in Yaskawa.

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

When the maintenance inspection is performed, be sure to mount the battery pack before removing the motor encoder connector.

Failure to observe this caution may result in disappearance of the home position data.

Perform the following inspection procedures prior to conducting MOTOFEEDER teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.

- Check for problems in MOTOFEEDER movement.
- Check for damage to insulation and sheathing of external wires.

Always return the programming pendant to the hook on the NX100 cabinet after use.

The programming pendant can be damaged if it is left in the P-point maximum envelope of MOTOFEEDER, on the floor, or near fixtures.

Read and understand the Explanation of the Warning Labels in the NX100 Instructions before operating the MOTOFEEDER.

Definition of Terms Used Often in This Manual

The MOTOFEEDER is the product of YASKAWA industrial robot workpiece supplying system. The MOTOFEEDER usually consists of the MOTOFEEDER (the main body of workpiece supplying system), the controller, the programming pendant, and the manipulator cables. In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX100 controller</td>
<td>NX100</td>
</tr>
<tr>
<td>NX100 programming pendant</td>
<td>Programming Pendant</td>
</tr>
<tr>
<td>Cable between the workpiece delivery system and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>
Explanation of Warning Labels

The following warning labels are attached to the MOTOFEEDER. Always follow the warnings on the labels. Also, an identification label with important information is placed on the body of the MOTOFEEDER. Prior to operating the manipulator, confirm the contents.
1 Structure

1.1 Structure of the MOTOFEEDER ................................................................. 1-1
1.2 MOTOFEEDER Home Position Mark Point ............................................ 1-2
1.3 Double Spindle Unit Structure ................................................................. 1-4

2 Maintenance and Inspection

2.1 Inspection Schedule .................................................................................. 2-1
2.2 Battery Pack Replacement (Applicable for Japanese Standard only) ........ 2-6
2.3 Grease Replenishment/Exchange for S1-Axis Speed Reducer
   ■ Grease Replenishment ........................................................................... 2-9
   ■ Grease Exchange ................................................................................... 2-9
2.4 Grease Replenishment/Exchange for Grease Bus in Main Body
   ■ Grease Replenishment ........................................................................... 2-11
   ■ Grease Exchange ................................................................................... 2-11
2.5 Grease Replenishment/Exchange for the End of S2-Axis Speed Reducer
   ■ Grease Replenishment ........................................................................... 2-13
   ■ Grease Exchange ................................................................................... 2-13
2.6 Double Spindle Unit (Optional) Grease Replenishment of Tensioner Part
   ■ Grease Replenishment ........................................................................... 2-14
2.7 Double Spindle Unit (Optional) Grease Replenishment of Bearing Unit Part
   ■ Grease Replenishment ........................................................................... 2-15
2.8 Inspection of Air Sealing for Internal Air Pressure
   ■ Gasket for Cover Part .............................................................................. 2-16
2.9 S1 Motor Replacement Procedures
   ■ Removal Procedures ............................................................................... 2-20
   ■ Mounting Procedures ............................................................................ 2-20
2.10 S1 Speed Reducer Replacement Procedure
   ■ Removal Procedures ............................................................................... 2-23
   ■ Mounting Procedures ............................................................................ 2-23
2.11 S1 Backlash Adjustment Procedure
   - Adjustment Procedure ................................................................. 2-26
2.12 S1 Home Position Registration Method
   - Home Position Registration Method .............................................. 2-28
2.13 S2 Motor Replacement Procedure
   - Removal Procedures ................................................................. 2-29
   - Mounting Procedures .............................................................. 2-29
2.14 S2 Speed Reducer Replacement Procedure
   - Removal Procedures ................................................................. 2-32
   - Mounting Procedures .............................................................. 2-32
2.15 S2 Pulley Replacement Procedure
   - S2 Pulley Replacement Procedure ............................................. 2-37
2.16 S2 Timing Belt Adjustment and Replacement Procedure
   - Replacement Procedure ............................................................. 2-40
2.17 S2 Drag Turning Gear Engaging Adjustment Procedure
   - Adjustment Procedure ............................................................... 2-43
2.18 S1 Home Position Registration Method
   - Home Position Registration Method ........................................... 2-44
2.19 Double Spindle Unit Belt Tension Adjustment Method
   - Adjustment Procedure ............................................................... 2-45
2.20 Double Spindle Unit Belt Replacement Method
   - Removal Procedures ................................................................. 2-47
   - Mounting Procedures .............................................................. 2-47
2.21 Recovery Method when the Home Position is Moved
   - S1 Axis .................................................................................. 2-50
   - S2 Axis .................................................................................. 2-50
   - Double Spindle Unit ................................................................. 2-50
3 Recommended Spare Parts ...................................................... 3-1
1 Structure

1.1 Structure of the MOTOFEEDER

The MOTOFEEDER is the revolving table type workpiece supplier with 2 external axes. The MOTOFEEDER transports a workpiece set on the workset side to the painting side by the larger rotation device. Rotate the smaller rotation device at the painting side to which the workpiece is transported, and then have the workpiece painted by a robot. The smaller rotation device has the following features.
- Calculation for positioning
- Spindle

![Diagram of MOTOFEEDER structure]

Fig. 1 Structure of the MOTOFEEDER
1.2 MOTOFEEDER Home Position Mark Point

S1 home position point and S2 home position point are indicated below.

![Diagram showing S1 and S2 home position points](image)

**Fig. 2 S1 home position key point**

- **S1 Table Home Position**
  Confirm if an 8 dia. pin can be inserted into the home position key matching point of S1 table.
S2 Table Home Position

Note that the home position key matching point of S2 table can be adjusted only at the A side (the table that is located at the painting side when S1 indicates the pulse "0"). Confirm the home position point of the B side (the table that is located at the receiving side when S1 indicates the pulse "0") after rotating S1 by 180°.
1.3 Double Spindle Unit Structure

Fig. 4 Double Spindle Unit Structure

* Each number in Fig. 4 corresponds to each number in "Table 12 Double Spindle Unit Parts Reference Table for Belt Exchange".
2 Maintenance and Inspection

WARNING

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

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

CAUTION

- Maintenance and inspection must be performed by the specified personnel.

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

- For disassembly or repair, contact your Yaskawa representative.

2.1 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 displayed in the levels shown in "Table 1 Inspection Schedule". Conduct periodical inspections according to the inspection schedule in "Table 1". In "Table 1", the inspection items are classified into three types of operation: operations which can be performed by personnel authorized of the user, operations which can be performed by personnel being trained, and operations which can be performed by service company personnel. Only specified personnel are to do inspection work.

NOTE
- The inspection interval must be based on the servo power supply ON time.
<table>
<thead>
<tr>
<th>Item</th>
<th>Schedule</th>
<th>Method</th>
<th>Operation</th>
<th>Inspection Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000H Cycle</td>
<td>6000H Cycle</td>
<td>12000H Cycle</td>
<td>24000H Cycle</td>
</tr>
<tr>
<td>① S1-axis motor</td>
<td>O</td>
<td>Visual</td>
<td>Check for grease leakage.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>② S2-axis motor</td>
<td>O</td>
<td>Visual</td>
<td>Check for grease leakage.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>③ Base mounting bolts</td>
<td>O</td>
<td>Spanner Wrench</td>
<td>Check for loose bolts. Replace if necessary.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>④ Cover mounting screws</td>
<td>O</td>
<td>Screw-driver Wrench</td>
<td>Check for loose bolts. Replace if necessary.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>⑤ Connectors</td>
<td>O</td>
<td>Manual</td>
<td>Check for loose connectors. Replace if necessary.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>⑥ Air hose</td>
<td>O</td>
<td>Hearing</td>
<td>Check for air leak.</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>⑦ Gasket for internal pressure</td>
<td>O</td>
<td>Visual</td>
<td>Exchange at the time of degradation.</td>
<td>○ ○</td>
</tr>
<tr>
<td>⑧ Wire harness in the power supply</td>
<td>O</td>
<td></td>
<td>Check for conduction between the main connector of base and the intermediate connector with manually shaking the cable.</td>
<td>○ ○</td>
</tr>
<tr>
<td>⑨ Battery in MOTOFEEDER</td>
<td>O</td>
<td></td>
<td>Replace the battery unit when the battery alarm occurs or the manipulator drove for 36000H. (See Chap. 2.1.)</td>
<td>○ ○</td>
</tr>
</tbody>
</table>
### Table 2 Maintenance and Inspection

<table>
<thead>
<tr>
<th>Axis Description</th>
<th>Grease Gun</th>
<th>Grease Gun</th>
<th>Grease Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1-axis speed reducer</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>S2-axis speed reducer</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Grease-up of main body</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Overhaul</td>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 When checking for conduction with multimeter, remove connectors on detector side for each axis from the motor.
*2 For the grease, refer to Table 2 Inspection Parts and Grease Used.
*3 Inspection No. correspond to the numbers in Fig. 5 Inspection Parts and Inspection Numbers.
*4 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.
Fig. 5 Inspection Parts and Inspection Numbers

Table 2  Inspection Parts and Grease Used

<table>
<thead>
<tr>
<th>No.</th>
<th>Grease Used</th>
<th>Inspected Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑩ ⑪ ⑫</td>
<td>VIGO grease RE No. 0</td>
<td>Speed reducers for all axes, and the main body</td>
</tr>
</tbody>
</table>

The work No. correspond to the inspection No. described in Table 1  Inspection Schedule.
# Table 3  Double Spindle Unit (Optional) Inspection Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Schedule</th>
<th>Method</th>
<th>Operation</th>
<th>Inspection Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td></td>
<td></td>
<td>Specified personnel</td>
</tr>
<tr>
<td></td>
<td>1000H Cycle</td>
<td>6000H Cycle</td>
<td>12000H Cycle</td>
<td>24000H</td>
</tr>
<tr>
<td>⑭ Gasket</td>
<td>O</td>
<td>Visual</td>
<td>Exchange at the time of degradation. (See Chap. 2.9)</td>
<td>O</td>
</tr>
<tr>
<td>⑮ Bolt of case</td>
<td>O</td>
<td>Spanner Wrench</td>
<td>Check for loose bolts. Replace if necessary.</td>
<td>O</td>
</tr>
<tr>
<td>⑮ Cover mounting screws</td>
<td>O</td>
<td>Screwdriver Wrench</td>
<td>Check for loose bolts. Replace if necessary.</td>
<td>O</td>
</tr>
<tr>
<td>⑰ Grease-up of tensioner</td>
<td>O</td>
<td>Grease Gun</td>
<td>Check for malfunction. (Replace if necessary.) Replenish grease*2 (6000H cycle). (See Chap. 2.7)</td>
<td>O</td>
</tr>
<tr>
<td>⑱ Grease-up of bearing unit</td>
<td>O</td>
<td>Grease Gun</td>
<td>Check for malfunction. (Replace if necessary.) Replenish grease*2 (6000H cycle). (See Chap. 2.8)</td>
<td>O</td>
</tr>
</tbody>
</table>

*2 For the grease, refer to Table 4  Inspection Parts and Grease Used.
*3 Inspection No. correspond to the numbers in Fig. 6  Inspection Parts and Inspection Numbers.

![Fig. 6 Inspection Parts and Inspection Numbers](image)

# Table 4  Inspection Parts and Grease Used

<table>
<thead>
<tr>
<th>No.</th>
<th>Grease Used</th>
<th>Inspected Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑭</td>
<td>VIGO grease RE No. 0</td>
<td>Double spindle unit</td>
</tr>
</tbody>
</table>

"No." described in Table 4 corresponds to "Item" described in Table 3  Double Spindle Unit (Optional) Inspection Schedule.
2.2 Battery Pack Replacement
(Applicable for Japanese Standard only)

Two battery packs are installed in the locations shown in “Fig. 7 Battery Pack Location”. If a battery alarm occurs in the NX100, replace the battery pack in the following procedure:

**Fig. 7 Battery Pack Location**

**Fig. 8 Battery Pack Connection**

- **See step 5 below**
- **Battery pack before replacement**
- **Wire harness in the manipulator**
- **See step 4**
- **New battery pack**

a: Crimped contact-pin (pin)
b: Crimped contact-pin (socket)
1. Turn OFF the power to the NX100.

2. Detach and pull out the connector base from the base.

3. Remove the battery pack mounting screws.

4. Connect two new battery pack.

5. Remove the old battery pack.

   **NOTE**
   Be sure to connect the new battery pack before disconnecting the old one so that the encoder absolute data does not disappear.

6. Mount the battery pack with screws and reinstall the cover.

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

The FM standard battery unit is stored in the NX100. Please refer to the manual and the NX100 INSTRUCTIONS SULLEMENTARY FOR NORTH AMERICAN STANDARD (ANSI/RIA) (Manual No.:RE-CTO-A213).
2.3 Grease Replenishment/Exchange for S1-Axis Speed Reducer

Fig. 9 S1-Axis Speed Reducer
## Grease Replenishment (Refer to “Fig. 9  S1-Axis Speed Reducer”)

1. Remove the motor cover.
2. Rotate S1-axis to the position where the exhaust port can be checked.
3. Remove the plug from the grease exhaust port.

**NOTE**

If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

4. Inject grease into the grease inlet port.
   - Grease type: VIGO grease RE No. 0
   - Amount of Grease to be injected: approx. 315 cc
     (Approx. 630 cc for the 1st supply)

5. Move S1-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port.
6. Wipe off the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)
7. Return S1-axis to the home position or the 180° position.
8. Reinstall the motor cover.

## Grease Exchange (Refer to “Fig. 9  S1-Axis Speed Reducer”)

1. Remove the motor cover.
2. Rotate S1-axis to the position where the exhaust port can be checked.
3. Remove the plug from the grease exhaust port.

**NOTE**

If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

4. Inject grease into the grease inlet port.
   - Grease type: VIGO grease RE No. 0
   - Amount of Grease to be injected: approx. 840 cc

5. The grease exchange is completed when new grease appears from the grease exhaust port. (The new grease is distinguished from the old grease by color.)
6. Move S1-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port. (Return S1-axis to the home position or the 180° position.)
7. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)
2.4 Grease Replenishment/Exchange for Grease Bus in Main Body

Fig. 10 Grease Bus in Main Body
- **Grease Replenishment (Refer to “Fig. 10 Grease Bus in Main Body”)**

1. Remove the plug from the grease exhaust port.

   **NOTE**
   If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

2. Inject grease into the grease inlet port.

   **Grease type:** VIGO grease RE No. 0
   **Amount of Grease to be injected:** approx. 2250 cc
   *(Approx. 4500 cc for the 1st supply)*

3. Move S1-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port.
4. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. *(Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)*

- **Grease Exchange (Refer to “Fig. 10 Grease Bus in Main Body”)**

1. Remove the plug from the grease exhaust port.

   **NOTE**
   If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

2. Inject grease into the grease inlet port.

   **Grease type:** VIGO grease RE No. 0
   **Amount of Grease to be injected:** approx. 6000 cc

3. The grease exchange is completed when new grease appears from the grease exhaust port. *(The new grease is distinguished from the old grease by color.)*
4. Move the table for a few minutes to discharge the excess grease before stoppering the grease exhaust port.
5. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. *(Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)*
2.5 Grease Replenishment/Exchange for the End of S2-Axis Speed Reducer

Fig. 11 End of S2-Axis

Grease inlet ports
(Hexagon socket head plug PT1/8)

Grease exhaust ports
(Hexagon socket head plug PT1/8)
Grease Replenishment (Refer to “Fig. 11  End of S2-Axis”)

1. Remove the plug from the grease exhaust port.

   **NOTE**
   If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

2. Inject grease into the grease inlet port.

   Grease type: VIGO grease RE No. 0
   Amount of Grease to be injected: approx. 30 cc
   (Approx. 60 cc for the 1st supply)

3. Move S2-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port.
4. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)

Grease Exchange (Refer to “Fig. 11  End of S2-Axis”)

1. Remove the plug from the grease exhaust port.

   **NOTE**
   If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

2. Inject grease into the grease inlet port.

   Grease type: VIGO grease RE No. 0
   Amount of Grease to be injected: approx. 75 cc

3. The grease exchange is completed when new grease appears from the grease exhaust port. (The new grease is distinguished from the old grease by color.)
4. Move S2-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port.
5. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)
2.6 Double Spindle Unit (Optional) Grease Replenishment of Tensioner Part

- Grease Replenishment (Refer to “Fig. 12 Double Spindle Unit”)

1. Inject grease into the grease inlet port.

   **Grease type:** VIGO grease RE No. 0  
   **Amount of Grease to be injected:** approx. 6 cc  
   (Approx. 12 cc for the 1st supply)

2. Move S2-axis for a few minutes.
3. If the grease overflows from the grease inlet port, wipe it off with a cloth, and reinstall the plug. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)
2.7 Double Spindle Unit (Optional) Grease Replenishment of Bearing Unit Part

- **Grease Replenishment (Refer to “Fig. 13 Double Spindle Unit”)**

1. Remove the plug from the grease exhaust port.

   **NOTE** If grease is added without removing the plug from the grease exhaust port, the grease will go inside a motor, which results in damage to the motor. Make sure to remove the plug.

2. Inject grease into the grease inlet port.

   - Grease type: VIGO grease RE No. 0
   - Amount of Grease to be injected: approx. 35 cc
   - (Approx. 70 cc for the 1st supply)

3. Move S2-axis for a few minutes to discharge the excess grease before stoppering the grease exhaust port.

4. Wipe the discharged grease with a cloth, and reinstall the plug on the grease exhaust port. (Before reinstalling the plug, apply silicon caulk to the threaded portion of the plug.)
2.8 Inspection of Air Sealing for Internal Air Pressure

- Gasket for Cover Part

Check the gasket. When checking the gasket, remove the mounting bolts and the cover. Excessive oil contained in the air used to keep the internal pressure can damage the gasket, which result in air leakage. Replace the gasket if air leakage is found.

a) Arm Part

![Diagram of gasket check for arm part]

Fig. 14 Gasket Check (Arm Part)
b) Table (S2) Part

Fig. 15 Gasket Check (Table Part)
c) Arm (S1) Axis, Table (S2) Axis Part

Fig. 16 Gasket Check (Arm Axis, Table Axis)

d) Base Part

Fig. 17 Gasket Check (Base Part)
e) Double Spindle Unit (Optional)

Fig. 18 Gasket Check (Double Spindle Unit Part)
### 2.9 S1 Motor Replacement Procedures

#### Removal Procedures
1. Turn OFF the control power of the robot.
2. Remove the power supply cable ① from the motor ④. The structure of the power supply cable is indicated in Fig. 19-2. Remove "HW1270460" and "HW1470554-A" from the motor.
3. Remove the cover ②.
4. Remove the motor case ③.
5. Remove the motor ④. When removing the motor, the motor may fall from the main body of the MOTOFEEDER. Therefore, carefully conduct the removing operation to prevent the falling by setting a liner to the bottom using a removal tap (M6). When removing the motor, grease may leak. To deal with the leakage, prepare a receiver, and then carefully conduct the removing operation to prevent the grease from contacting eyes (by wearing protective goggles). Also, since the input gear falls together with the motor, be careful not to hurt the oil seal.
6. Press the motor in even force using a removal tap, and then remove the motor straightly.
7. When the motor ④ is removed, remove the input gear ⑤, the collar ⑥, and the key ⑦.
8. When removing the input gear ⑤, loosen the bolt M6 (length: 65 mm) at the center.

#### Mounting Procedures
1. Attach the input gear ⑤, the collar ⑥, and the key ⑦ to the motor ④. At that time, as indicated in Fig. 19-2, apply ThreeBond 1206C to the attaching surface of the collar, the input gear, and the motor shaft, and apply the Loctite 242 to the attaching bolt of the input gear ⑤.
2. Attach the motor ④. The motor should be attached straightly not to hurt the oil seal. Regarding the direction of the motor, the connection part of the encoder cable should face the direction of the arrow A.
3. Attach the motor case ③. Attach the motor case while adjusting the direction so that the opening faces the direction of the arrow A.
4. Connect the power supply cable to the motor ④.
5. Replenish grease referring to chapter 2.3 "Grease Replenishment/Exchange for S1-Axis Speed Reducer".
6. Make sure to replenish grease by the same amount it would leak.
7. Replacing the motor causes data deletion of the encoder. Therefore, re-reregister the deleted data referring to chapter 2.12 "S1 Home Position Registration Method".
Table 5  Parts Checklist for S1 Motor

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manipulator cable HW1270460+HW1470554-A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 20 mm) (dacroitized)</td>
<td>6</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6 (dacroitized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cover HW1302243-A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 12 mm)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Motor case HW1200122-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 20 mm) (dacroitized)</td>
<td>8</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6 (dacroitized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Motor HW0382155-A</td>
<td>1</td>
<td>SGMZS-12A2B-YR11</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M8 (length: 25 mm)</td>
<td>4</td>
<td>Tightening torque: 24.5 N·m</td>
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<tr>
<td></td>
<td>Conical spring washer 2H-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input gear HW1302179-1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 65 mm)</td>
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<td>Tightening torque: 16.5 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6</td>
<td></td>
<td>LOCTITE 242 applied</td>
</tr>
<tr>
<td>6</td>
<td>Collar HW1402221-1</td>
<td>1</td>
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</tr>
<tr>
<td>7</td>
<td>Key 5 x 5 x 25</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 19-1  S1 Motor Replacement Procedure-1
Apply ThreeBond 1206C to the front and back surfaces (the shaded area) where the collar is attached.

Fig. 19-2  S1 Motor Replacement Procedure-2

Detailed figure of power supply cable
2.10 S1 Speed Reducer Replacement Procedure

**Removal Procedures**

1. Turn OFF the control power of the robot.
2. Remove the power supply cable ①.
3. Remove the cover ②.
4. Loosen the bolts (③ and ④), and then remove the bolts of the block ⑤.
5. Remove the attaching bolt of the spacer ⑥, and then remove the motor unit itself from the main body of the MOTOFEEDER. When removing the unit, place it on a flat surface to avoid overturning. Also, because the unit is heavy, make sure not to put a hand between the unit and the flat surface.
6. Remove the plug ⑦.
7. Remove the gear ⑧. At that time, grease may leak. Therefore, carefully conduct the operation by protecting the motor connector, etc. from the entry of the grease.
8. Remove the speed reducer ⑨ and the O-ring ⑩. When removing the speed reducer, remove it straightly not to hurt the input gear.

**Mounting Procedures**

1. Attach the O-ring ⑩ to the speed reducer. When attaching the O-ring, confirm that the O-ring is not hurt, and then attach the O-ring.
2. Attach the gear ⑧. When attaching the gear, apply ThreeBond 1206C as indicated in Fig. 20. Before applying ThreeBond 1206C, remove the old sealant applied to the flange and wipe the grease off, and then apply the new sealant. When ThreeBond 1206C is insufficiently applied, grease leakage may occur. Therefore, definitely apply the sealant. After attaching the gear ⑨, attach the plug ⑧ with a seal tape.
3. Attach S1 motor unit to the main body of the MOTOFEEDER. At that time, temporarily fasten the bolt for the spacer ⑥ so that the bolt can slide.
4. Attach the block ⑤, and then adjust it with the bolts (③ and ④).
5. Adjust backlash (0.65 to 0.85 mm) referring to chapter 2.11 "S1 Backlash Adjustment Procedure", and then apply the torque management (142 N·m).
6. Attach the cover ③.
7. Attach the encoder cable and power cable of the power supply cable ①.
8. Attach the power supply cable ① to the main body of the MOTOFEEDER.
9. Replenish grease referring to chapter 2.3 "Grease Replenishment/Exchange for S1-Axis Speed Reducer".
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manipulator cable HW1270460+HW1470554-A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 20 mm) (dacroitzed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6 (dacroitzed)</td>
<td>6</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td>2</td>
<td>Cover HW1302243-A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 12 mm)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hexagon socket head cap screw M8 (length: 50 mm) (dacroitzed)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(full threaded screw)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nut M8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hexagon socket head cap screw M8 (length: 35 mm) (dacroitzed)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(full threaded screw)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nut M8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Block HW1302199-1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M8 (length: 35 mm) (dacroitzed)</td>
<td>4</td>
<td>Tightening torque: 40 N·m</td>
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<tr>
<td></td>
<td>Conical spring washer 2H-8 (dacroitzed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spacer HW1302198-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M12 (length: 45 mm) (dacroitzed)</td>
<td>4</td>
<td>Tightening torque: 142 N·m</td>
</tr>
<tr>
<td></td>
<td>Flat washer M12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-12 (dacroitzed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Hexagon socket head plug PT 3/8 (dacroitzed)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gear HW1302180-1</td>
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</tr>
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<td></td>
<td>Hexagon socket head cap screw M8 (length: 30 mm) (dacroitzed)</td>
<td>18</td>
<td>Tightening torque: 40 N·m</td>
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<td></td>
<td>Conical spring washer 2H-8 (dacroitzed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Speed reducer HW9380961-E</td>
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<td>RV80E-81</td>
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<tr>
<td></td>
<td>Hexagon socket head cap screw M8 (length: 35 mm) (dacroitzed)</td>
<td>16</td>
<td>Tightening torque: 40 N·m</td>
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<td>Conical spring washer 2H-8 (dacroitzed)</td>
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<td></td>
</tr>
<tr>
<td>10</td>
<td>O-ring APR568-263</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Apply ThreeBond 1206C to the seal surface (the shaded area) where the speed reducer is attached.

Fig. 20  S1 Speed Reducer Replacement Procedure
2.11 S1 Backlash Adjustment Procedure

**Adjustment Procedure**

1. Adjust backlash by adjusting the engaging position of S1 gear. First, loosen the bolt of the spacer (①).
2. Adjust the position of S1 gear. Adjust it with the bolts (② and ③).
3. Once the position is adjusted properly, loosen the bolt (①).
4. Measure backlash. Measure backlash using a dial gauge referring to Fig. 21.
5. Pull the arm towards the direction where the dial gauge is attached (direction A) and remove its load, and then reset the value of the dial gauge to "0".
6. Pull the arm towards the direction B and remove its load, and then measure the value.
7. The value of the dial gauge should be in the range of 0.65 to 0.85 mm.
8. (Example) After measuring the backlash at the both tables, if either of the values is not in the range, set that value to 0.65 mm.
9. When the value of the backlash settles in the range, lock S1 gear by fastening the bolts (② and ③).

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Spacer HW1302198-1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M12 (length: 45 mm) (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flat washer M12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-8 (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Tightening torque: 142 N m</td>
</tr>
<tr>
<td>②</td>
<td>Hexagon socket head cap screw M8 (length: 35 mm) (dacrotized)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(full threaded screw)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nut M8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Hexagon socket head cap screw M8 (length: 50 mm) (dacrotized)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(full threaded screw)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nut M8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 21  S1 Backlash Adjustment Procedure
2.12 S1 Home Position Registration Method

- Home Position Registration Method

Adjust the home position by inserting a dia. 8 pin in the home position key matching point of S1 table.

Fig. 22  S1 Home Position Registration Method
2.13 S2 Motor Replacement Procedure

■ Removal Procedures
1. Turn OFF the control power of the robot.
2. Remove the power supply cable ① from the motor ⑨. The structure of the power supply cable is indicated in Fig. 19-2. Remove "HW1270460" and "HW1470554-A" from the motor.
3. Remove the motor case ②.
4. Remove the flange ③. When removing the motor, the motor may fall from the main body of the MOTOFEEDER. Therefore, carefully conduct the removing operation to prevent the falling by setting a liner to the bottom using a removal tap (M6). When removing the motor, grease may leak. To deal with the leakage, prepare a receiver, and then carefully conduct the removing operation to prevent the grease from contacting eyes.
5. When the motor is removed from the main body of the MOTOFEEDER, remove the retaining ring ④ and the bearing ⑤.
6. Remove the input gear ⑥, the collar ⑦, and the key ⑧.
7. Remove the motor ⑨ from the flange ③.
8. Loosen the bolt M6 (length: 65 mm) at the center, and then remove the input gear ⑥.

■ Mounting Procedures
1. Attach the motor ⑨ to the flange ③. The encoder cable connector direction of the motor is same as that of the grounding attached to the flange. Therefore, attach the motor referring to the direction of the grounding.
2. Attach the key ⑧, the collar ⑦, and the input gear ⑥ to the motor ⑨. At that time, as indicated in Fig. 23, apply ThreeBond 1206C to the attaching surface of the collar, the input gear, and the motor shaft, and apply the Loctite 242 to the attaching bolt of the input gear ⑥.
3. Attach the bearing ⑤ and the retaining ring ④ to the input gear ⑥.
4. Attach the flange ③ to the main body of the MOTOFEEDER. Regarding the flange attaching direction, attach the flange referring to the direction of the grounding attached to the flange. Also, as indicated in Fig. 23, apply ThreeBond 1206C. Before applying ThreeBond 1206C, remove the old sealant applied to the flange and the main body of the MOTOFEEDER, and wipe the grease off, and then apply the new sealant. When ThreeBond 1206C is insufficiently applied, grease leakage may occur. Therefore, definitely apply the sealant.
5. Attach the motor case ②.
6. Connect the power supply cable ① to the motor ⑨, and then attach the motor to the main body of the MOTOFEEDER.
7. Replenish grease referring to chapter 2.4 "Grease Replenishment/Exchange for Grease Bus in Main Body".
8. Make sure to replenish grease by the same amount it would leak.
9. Replacing the motor causes data deletion of the encoder. Therefore, re-reregister the deleted data referring to chapter 2.18 "S2 Home Position Registration Method".
### Table 8  Parts Checklist for S2 Motor

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Manipulator cable HW1270460+HW1470554-A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 20 mm) (dacrotized)</td>
<td>6</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6 (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>Motor case HW1200122-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 20 mm) (dacrotized)</td>
<td>8</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6 (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Flange 1100344-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M12 (length: 50 mm) (dacrotized)</td>
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<td>Tightening torque: 84 N·m</td>
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<td>Conical spring washer 2H-12 (dacrotized)</td>
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<td></td>
</tr>
<tr>
<td>④</td>
<td>Retaining ring STW-45</td>
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</tr>
<tr>
<td>⑤</td>
<td>Bearing 6209</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑥</td>
<td>Input gear HW1302182-1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 65 mm)</td>
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<td>Tightening torque: 16.5 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6</td>
<td></td>
<td>LOCTITE 242 applied</td>
</tr>
<tr>
<td>⑦</td>
<td>Collar HW1402221-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑧</td>
<td>Key 5 x 5 x 25</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑨</td>
<td>Motor HW0382155-A</td>
<td>1</td>
<td>SGMZS-12A2B-YR11</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M8 (length: 25 mm)</td>
<td>4</td>
<td>Tightening torque: 24.5 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Apply ThreeBond 1206C to the front and back surfaces (the shaded area) where the collar is attached.

Apply ThreeBond 1206C to the seal surface (the shaded area) where the flange is attached. (the main body side of the MOTOFEEDER)

Fig. 23  S2 Motor Replacement Procedure
2.14  S2 Speed Reducer Replacement Procedure

**Removal Procedures**

1. Turn OFF the control power of the robot.
2. Remove the covers (① and ②), which is a preparation for loosening the timing belt ⑥.
3. Loosen the bolts (③, ④, and ⑤), and then remove the bracket (idler unit) ⑤.
4. When the bracket ⑤ is removed, carefully loosen the belt so that the timing belt does not touch the teeth of the pulley ⑦.
5. Remove the cover ⑧ attached to the flange ⑨.
6. Remove the flange ⑨.
7. Remove the socket ⑩.
8. Remove the bolt from the speed reducer ⑪.
9. Remove the speed reducer ⑪ from the arm. When it is difficult to remove the speed reducer from the arm, as indicated in Fig. 24-2, place square timbers (10 x 10 mm or more) between the flange ⑨ and the arm, and then jack up the speed reducer using the flange ⑨.
10. When the speed reducer ⑪ is removed, pull it out from the arm in the same state as when it was removed, and then isolate the speed reducer ⑪ and the housing ⑫.

**Mounting Procedures**

1. Attach the speed reducer ⑪ and the housing ⑫. At that time, apply ThreeBond 1206C referring to Fig. 24-1. Before applying ThreeBond 1206C, remove the old sealant applied to the flange and wipe the grease off, and then apply the new sealant. When ThreeBond 1206C is insufficiently applied, grease leakage may occur. Therefore, definitely apply the sealant.
2. Attach the speed reducer unit to the arm. To match the socket ⑩ attaching position, adjust the direction so that the direction of the arm hole and the flange ⑫ grease hole match, and then attach the speed reducer unit.
3. Attach the socket ⑩. At that time, apply ThreeBond 1206C to threads of the socket ⑩.
4. Attach the flange ⑨.
5. Hang the timing belt ⑥ on the pulley ⑦. At that time, to set the table to the home position point, insert the key into the key slot referring to chapter 2.18 "S2 Home Position Registration Method", and then hang the belt keeping that state.
6. Attach the idler unit ⑤. Adjust tension referring to chapter 2.16 "S2 Timing Belt Adjustment and Replacement Procedure". When the adjustment finished, remove the key.
7. Attach the covers (⑧, ①, and ②).
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
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</thead>
<tbody>
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<td>Gasket HW1402807-1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M4 (length: 15 mm)</td>
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<td></td>
</tr>
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<td>2</td>
<td>Cover HW1402812-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gasket HW1402811-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M4 (length: 12 mm)</td>
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</tr>
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<td>3</td>
<td>STBB5-25</td>
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<td></td>
<td>Nut M5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hexagon socket head cap screw M5 (length: 16 mm)</td>
<td>1</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washer M5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bracket HW1302206-A</td>
<td>1</td>
<td>Idler unit part</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M5 (length: 16 mm)</td>
<td>1</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washer M5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Timing belt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Pulley</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cover HW1402814-1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 16 mm)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Flange HW1302210-1</td>
<td>6</td>
<td>Tightening torque: 37.2 N·m</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M8 (length: 20 mm) (dacrotized)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-8 (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Socket HW1402843-1</td>
<td>2</td>
<td>ThreeBond 1206C applied</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head plug PT 3/8 (dacrotized)</td>
<td>2</td>
<td>ThreeBond 1206C applied</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tightening torque: 4.9 N·m</td>
</tr>
<tr>
<td>11</td>
<td>Speed reducer HW1381691-A</td>
<td>1</td>
<td>HPG-32A-5-F0</td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M10 (length: 35 mm) (dacrotized)</td>
<td>4</td>
<td>Tightening torque: 51.5 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-10 (dacrotized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Housing HW1302209-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M5 (length: 65 mm)</td>
<td>8</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Apply ThreeBond 1206C to the seal surface (the shaded area) where the flange is attached.

Flat gasket which is the attachment of the speed reducer.

Fig. 24-1  S2 Speed Reducer Replacement Procedure-1
Square timber (approximately 10 x 10 mm or more in surface area, and 200 mm in length)

Jack up with a bolt (2 x M8 x 20 mm or more in length)

Square timber (10 x 10 mm or more in surface area)

Fig. 24-2  S2 Speed Reducer Replacement Procedure-2
2.15 S2 Pulley Replacement Procedure

Regard the table which is transferred to S2 motor side when S1 home position indicates the pulse "0" as "Table A". Regard the table which is transferred to S2 motor side after rotating S1 by 180˚ as "Table B".

* Notes
  - Conduct the replacement on the A table side, because the home position point of S2 table is adjusted on the A side.
  - When fastening or loosening the bolt of the pulley, make sure to move S1 and not to conduct those operations at S2 home position point. (This is because S2 motor may result in malfunction due to a tightening torque.)
**S2 Pulley Replacement Procedure**

1. Loosen the bolt of the pulley.
   Remove the cover, and then follow the procedure below.
   Move S1 by approximately 25 degrees from the home position point to avoid S2 gear position, and then loosen the bolt.

   ![Diagram of pulley and drive unit](image)

   - The bolt to fix the pulley

2. Remove the tensioner.
   Remove the cover at the bottom of the arm, and then pull out the tensioner.
   At that time, the belt tension is stretched. Therefore, loosen it, and then remove the tensioner.

   ![Diagram of tensioner and belt](image)

   - The tensioner of the belt

3. Pull out the pulley.
   Loosen the bolt of the pulley, and then set S1 to the home position.
   (Make sure that S2 is also set to the home position, and then conduct the following operation.)
   Remove the pulley after confirming that the belt is loosen.

   ![Diagram of pulley and pulley bolt](image)

   - The positioning pin point of the pulley

   * Remove the pulley while taking care of the positioning pin point of the pulley.
4. Attach a new pulley.
As the pulley has the positioning pin, adjust the pulley to that position to attach the belt, and then insert the pulley.

* Notes
Make sure that the positioning pin of S2 table is inserted.
Make sure that the positioning pin point of the pulley is not moved.

When the pulley is inserted, insert the positioning pin of the pulley, and then move S1 by approximately 25°.
Fasten the bolt with the specified tightening torque.

5. Attach the tensioner, and then stretch the belt tension.
Set the value to the specified frequency, and then adjust the belt tension.

- 1400 mm: 54 to 62 Hz
- 1600 mm: 42 to 48 Hz
- 1800 mm: 39 to 45 Hz

6. Check if S1 and S2 axis gear well by rotating S1.

* In case that interference sound occurred in the gearing system of S2, refer to chapter 2.18 "S2 Home Position Registration Method".
2.16 S2 Timing Belt Adjustment and Replacement Procedure

Regard the table which is transferred to S2 motor side when S1 home position indicates the pulse "0" as "Table A". Regard the table which is transferred to S2 motor side after rotating S1 by 180˚ as "Table B".

* Notes
  - Conduct the replacement on the A table side, because the home position point of S2 table is adjusted on the A side.
  - When fastening or loosening the bolt of the pulley, make sure to move S1 and not to conduct those operations at S2 home position point. (This is because S2 motor may result in malfunction due to a tightening torque.)
Replacement Procedure

1. Loosen the bolt of the pulley.
   Remove the cover, and then follow the procedure below.
   Move S1 by approximately 25° from the home position point to avoid S2 gear position,
   and then loosen the bolt.

2. Remove the tensioner.
   Remove the cover at the bottom of the arm, and then pull out the tensioner.
   At that time, the belt tension is stretched. Therefore, loosen it, and then remove the
   tensioner.
3. Pull out the pulley.
Loosen the bolt of the pulley, and then set S1 to the home position.
(Make sure that S2 is also set to the home position, and then conduct the following operation.)
Remove the pulley after confirming that the belt is loosen.

* Remove the pulley while taking care of the positioning pin point of the pulley.

* Notes
Set S1 to the home position (Table A) or to the 180° (Table B) rotating point, insert the positioning pin into the pin hole of S2, and then conduct the following operation.

If the pulley is not attached in this condition, the home position of S2 table moves. Make sure to keep the positioning pin in.

4. Attach the pulley.
As the pulley has the positioning pin, adjust the pulley to that position to attach the belt, and then insert the pulley.

* Notes
- Make sure that the positioning pin of S2 table is inserted.
- Make sure that the positioning pin point of the pulley is not moved.
- Do not rotate S2 motor and the gear. When they were rotated, return them to the positioning pin point, and then conduct the operation.
5. Attach the tensioner, and then adjust the belt tension.
Set the value to the specified frequency, and then adjust the belt tension.

- 1400 mm: 54 to 62 Hz
- 1600 mm: 42 to 48 Hz
- 1800 mm: 39 to 45 Hz

Attach each of the removed covers.

6. Check if S1 and S2 axis gear well by rotating S1.

* In case that interference sound occurred in the gearing system of S2, refer to chapter 2.18 "S2 Home Position Registration Method".
2.17  S2 Drag Turning Gear Engaging Adjustment Procedure

■ Adjustment Procedure
When S1 is rotated after the gear, the motor, and the speed reducer are replaced, interference sound may occur in the gearing system of S2. In that case, conduct the following operations. Interference sound can be removed by changing the engaging of the gear on the motor side and S2 pulley side.

<<When interference sound occurs>>
Judge if interference sound is occurring at “Table A” or “Table B”. Set S2 to the home position (pulse “0”), and then move S1 by ± 185°. At that time, confirm if interference sound occurs. In case that interference sound occurred, conduct the following operation.

- If interference sound occurred when S1 moved towards the normal direction
  Reduce the pulse value of S2 by 20 to 50, and then register the home position point (a change of S2 absolute data).
  Operate S1 once more after setting S2 to the home position.
  In case that interference sound got bigger, adjust the sound by moving the pulse to the opposite direction.

- If interference sound occurred when S1 moved towards the opposite direction
  Increase the pulse value of S2 by 20 to 50, and then register the home position point (a change of S2 absolute data).
  Operate S1 once more after setting S2 to the home position.
  In case that interference sound got bigger, adjust the sound by moving the pulse to the opposite direction.

* “+” and “-” are eventually a tendency. Therefore, when interference sound got bigger, change absolute data to the opposite direction.
  In case that interference sound got smaller, adjust the sound by moving the pulse to the same direction until the sound die.

- After adjusting the engagement, register absolute data of S2.
  When the registration finished, operate the table at the opposite side, and then confirm that interference sound does not occur.
2.18 S2 Home Position Registration Method

- Home Position Registration Method

When the cover under the table is removed, the positioning mark appears. Adjust the home position by inserting the dedicated key into the table and the positioning mark.

![Fig. 27 S2 Home Position Registration Method](image)
2.19 Double Spindle Unit
Belt Tension Adjustment Method

**Adjustment Procedure**

1. First, remove the cover ① on the upper surface of the spindle and the cover ② of the belt tension measuring window (at 2 locations).
2. Loosen the bolt of the idler unit ③.
3. Adjust the tension of the bolt. When moving the idler to the direction where the belt is stretched to, loosen the nut ⑥, and then fasten the bolt ④ while holding the nut ⑤ with a wrench, etc. When moving the idler to the direction where the belt is loosen to, loosen the nut ⑥, and then loosen the bolt ④ while holding the nut ⑤ with a wrench, etc.
4. When the idler is adjusted to an arbitrary point, fix the idler unit ③, and then fasten the nut ⑥.
5. When adjusted, measure the tension with a tension meter at the belt tension measuring point. The belt specifications are indicated in "Table 11". Repeat the step 2 to 4 until the tension reaches in 54.6 to 63.5 Hz.
6. After adjusting the idler unit ③, adjust the idler unit ⑦ in the same way as the idler unit 1.
7. When all the belt adjustment has finished, attach the covers (① and ②).

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Cover HW1403256-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gasket HW1403259-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 10 mm)</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>Cover HW1403255-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gasket HW1403258-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M4 (length: 10 mm)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Idler unit 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 25 mm)</td>
<td>2</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>Hexagon socket head cap screw M6 (length: 60 mm) (full threaded screw)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Nut 1 M6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑥</td>
<td>Nut 2 M6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Idler unit 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 25 mm)</td>
<td>2</td>
<td>Tightening torque: 10 N·m</td>
</tr>
<tr>
<td></td>
<td>Conical spring washer 2H-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 11  Belt Specifications

<table>
<thead>
<tr>
<th>No.</th>
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<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer</td>
<td>TSUBAKIMOTO CHAIN Co.</td>
</tr>
<tr>
<td>2</td>
<td>Belt Type</td>
<td>BG1120-UP8M25HC</td>
</tr>
<tr>
<td>3</td>
<td>Perimeter</td>
<td>1120 mm</td>
</tr>
<tr>
<td>4</td>
<td>Span Length</td>
<td>300.0 mm</td>
</tr>
<tr>
<td>5</td>
<td>Unit Mass</td>
<td>0.127 kg/m</td>
</tr>
<tr>
<td>6</td>
<td>Tension</td>
<td>54.6 to 63.5 Hz</td>
</tr>
<tr>
<td>7</td>
<td>Width</td>
<td>25 mm</td>
</tr>
</tbody>
</table>

---

**Fig. 28  Double Spindle Unit**

Belt Tension Adjustment Method

View A  View B

Tension measuring point
2.20 Double Spindle Unit
Belt Replacement Method

■ Removal Procedures

1. Set S1 axis to the home position point or 180˚ point and S2 axis to the home position point, and then turn OFF the control power of the robot.

2. First, remove the cover ① on the upper surface of the spindle and the cover ② on the lower surface (at 2 locations), and then remove the cover ③ of the belt tension adjustment window (at 2 locations).

3. Loosen the bolt of the idler unit ⑦, and then remove the bolt ④ and the nuts ⑤ and ⑥.

   Remove the bolt of the idler unit ⑦, and then also remove the idler unit 1.

4. Remove the idler unit 2 ⑧ from the double spindle unit in the same way as the step 2 and 3.

5. The timing belt 1 ⑨ is loosened and can be removed, because the idler unit is removed. Therefore, confirm the current position where the timing belt is attached before removing the pulleys ⑩ and ⑪.

6. Regarding the timing belt 2 ⑫, in the same way as the step 5, confirm the current position where the timing belt is attached before removing the pulleys ⑬ and ⑭.

■ Mounting Procedures

1. Attach the timing belt 2 ⑫ to the pulleys ⑬ and ⑭. Attach it to the same positions as before removed.

   Set the teeth on the pulley ⑭.

2. Temporarily fix the idler unit 2 ⑧.

3. Attach the timing belt 1 ⑨ to the pulleys ⑩ and ⑪. At that time, hang the belt on the pulley ⑩ after adjusting the table direction.

4. Temporarily fix the idler unit 1 ⑦.

5. Adjust the belt tension referring to chapter 2.19 "Double Spindle Unit Belt Tension Adjustment Method".

6. Attach the covers ①, ②, and ③.
### Table 12  Parts Checklist for Double Spindle Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover HW1403256-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gasket HW1403259-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 10 mm)</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cover HW1403264-1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Gasket HW1403266-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M5 (length: 10 mm)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cover HW1403255-1</td>
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<td></td>
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<tr>
<td></td>
<td>Gasket HW1403258-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross head APS bolt M4 (length: 10 mm)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hexagon socket head cap screw M6 (length: 60 mm) (full threaded screw)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nut 1 M6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nut 2 M6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Idler unit 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 25 mm)</td>
<td>2</td>
<td>Tightening torque: 10 N·m</td>
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<tr>
<td></td>
<td>Conical spring washer 2H-6</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>Idler unit 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hexagon socket head cap screw M6 (length: 25 mm)</td>
<td>2</td>
<td>Tightening torque: 10 N·m</td>
</tr>
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<td>Conical spring washer 2H-6</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>Timing belt 1</td>
<td>1</td>
<td>BG1120-UP8M25HC</td>
</tr>
<tr>
<td>10</td>
<td>Pulley HW1302630-1</td>
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</tr>
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<td>11</td>
<td>Pulley HW1302628-1</td>
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</tr>
<tr>
<td>12</td>
<td>Timing belt 2</td>
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<td>BG1120-UP8M25HC</td>
</tr>
<tr>
<td>13</td>
<td>Pulley HW1302627-1</td>
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<tr>
<td>14</td>
<td>Pulley HW1302629-1</td>
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</table>
Fig. 29  Double Spindle Unit  Belt Replacement Method
2.21 Recovery Method when the Home Position is Moved

■ S1 Axis

1. When home position data are deleted or overwritten
   Refer to chapter 2.3 "S1 Home Position Registration Method".

■ S2 Axis

1. When home position data are deleted or overwritten
   Refer to chapter 2.18 "S2 Home Position Registration Method".
2. When interference sound occurs in the gearing system of S2
   Refer to chapter 2.17 "S2 Drag Turning Gear Engaging Adjustment Procedure".
3. When jumping phenomena of the belt's teeth occurs
   Adjust the position while inserting the positioning pin into the table referring to chapter
   2.16 "S2 Timing Belt Adjustment and Replacement Procedure".
   When the home position cannot be adjusted, make a fine adjustment by loosening the
   fixing bolt of the table.

■ Double Spindle Unit

1. When making phase adjustments between the two tables
   Adjust the phase between the tables by loosening the belt referring to chapter 2.20
   "Double Spindle Unit. Belt Replacement Method".
   When the home position cannot be adjusted, make a fine adjustment by loosening the
   fixing bolt of the table.
3 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the MOTOFEEDER. The spare parts list is shown below. Product performance cannot be guaranteed when using spare parts from any company other than Yaskawa.

- 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 units

To replace parts in Rank B or Rank C, contact your Yaskawa representative.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Part No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Grease</td>
<td>VIGO grease RE No.0</td>
<td>Yaskawa Electric Corporation</td>
<td>16 kg</td>
<td>For each axis speed reducer</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Grease</td>
<td>MP-1 grease</td>
<td></td>
<td>2.5 kg</td>
<td>For application to oil seal</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Battery</td>
<td>JARCR-XIS01</td>
<td>Yaskawa Electric Corporation</td>
<td>2</td>
<td>For Japanese standard type only</td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>Oil seal</td>
<td>Y426012.5</td>
<td>NOK</td>
<td>4</td>
<td>For S1, S2</td>
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<td></td>
<td></td>
<td></td>
<td>AE5205-E15X2 (NBR)</td>
<td>NOK</td>
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<td>For S1 (casing part)</td>
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<td></td>
<td></td>
<td>AC5133-E02X2 (NBR)</td>
<td>NOK</td>
<td>1</td>
<td>For S1 (S head part)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>AD6112-E01X0 (NBR)</td>
<td>NOK</td>
<td>1</td>
<td>For S1 (base part)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y355212.5* fluorine*</td>
<td>NOK</td>
<td>2</td>
<td>For S2 shaft gear</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y355212.5* fluorine*</td>
<td>NOK</td>
<td>2</td>
<td>For S2 speed reducer unit</td>
</tr>
</tbody>
</table>
## 3 Recommended Spare Parts

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>Gasket</td>
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<td>HW1402220-1</td>
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<td>HW1402807-1</td>
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<tr>
<td></td>
<td>HW1402811-1</td>
<td>Yaskawa Electric Corporation</td>
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<tr>
<td>B</td>
<td>6</td>
<td>Belt</td>
<td></td>
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<tr>
<td></td>
<td>250MTS5M1200G</td>
<td>Mitsuboshi Belting Ltd.</td>
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<td>1400-EV5GT-25</td>
<td>GATES UNITTA AJIA</td>
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<td>BG-1595-UP5M-25-HC</td>
<td>TSUBAKIMOTO CHAIN CO.</td>
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<td>B</td>
<td>7</td>
<td>Speed reducer</td>
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<td></td>
<td>HW9380961-E</td>
<td>Nabtesco Corporation</td>
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<td>HW1381691-A</td>
<td>Harmonic Drive Systems Inc.</td>
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<tr>
<td>C</td>
<td>8</td>
<td>AC servomotor</td>
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</tr>
<tr>
<td></td>
<td>SGMRS-12A2B-YRA1</td>
<td>Yaskawa Electric Corporation</td>
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<td>SGMRS-12A2B-YRA1</td>
<td>Yaskawa Electric Corporation</td>
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Table 14  Recommended Spare Parts for Double Spindle Unit (Optional)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Part No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Grease</td>
<td>VIGO grease RE No.0</td>
<td>Yaskawa Electric Corporation</td>
<td>16 kg</td>
<td>Bearing unit</td>
</tr>
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<td>A</td>
<td>2</td>
<td>Grease</td>
<td>MP-1 grease</td>
<td></td>
<td>2.5 kg</td>
<td>For application to oil seal</td>
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<td>A</td>
<td>3</td>
<td>Oil seal</td>
<td>Y567812.5</td>
<td>NOK</td>
<td>2</td>
<td>For bearing unit</td>
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<td>A</td>
<td>4</td>
<td>Oil seal</td>
<td>AE3932-A62x5 (NBR)</td>
<td>NOK</td>
<td>2</td>
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<tr>
<td>A</td>
<td>5</td>
<td>Gasket</td>
<td>HW403266-1</td>
<td>Yaskawa Electric Corporation</td>
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<td>For bearing unit inspection port</td>
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<tr>
<td>A</td>
<td>6</td>
<td>Gasket</td>
<td>HW1403259-1</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>For center pulley cover</td>
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<tr>
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<td>7</td>
<td>Gasket</td>
<td>HW1403258-1</td>
<td>Yaskawa Electric Corporation</td>
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<td>For tension inspection port</td>
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<tr>
<td>B</td>
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<td>Belt</td>
<td>BG1120-UP8M25HC</td>
<td>TSUBAKIMOTO CHAIN CO.</td>
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<td>Belt for spindle</td>
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</table>
Specifications are subject to change without notice for ongoing product modifications and improvements.

For details about the contents of this manual, contact a YASKAWA representative or the sales departments above.