MOTOMAN-MPX3500 INSTRUCTIONS
FOR MANIPULATOR OPTIONAL SPECIFICATIONS

TYPE
YR-MPX3500-***

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

MOTOMAN INSTRUCTIONS
MOTOMAN-MPX3500 INSTRUCTIONS
MOTOMAN-MPX3500 INSTRUCTIONS FOR EXPLOSION-PROOF SPECIFICATIONS
MOTOMAN-MPX3500 MAINTENANCE MANUAL
MOTOMAN-MPX3500 INSTRUCTIONS FOR MANIPULATOR OPTIONAL SPECIFICATIONS
DX200 INSTRUCTIONS
DX200 OPERATOR’S MANUAL (for each purpose)
DX200 MAINTENANCE MANUAL
DX200 INSTRUCTIONS FOR EXPLOSION-PROOF SPECIFICATIONS

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

Part Number: 174684-1CD
Revision: 1
Copyright © 2016, 2015 YASKAWA America, Inc.

Terms of Use and Copyright Notice
All rights reserved. This manual is freely available as a service to YASKAWA customers to assist in the operation of Motoman robots, related equipment and software. This manual is copyrighted property of YASKAWA and may not be sold or redistributed in any way. You are welcome to copy this document to your computer or mobile device for easy access but you may not copy the PDF files to another website, blog, cloud storage site or any other means of storing or distributing online content.

Printed in the United States of America

First Printing, 2016

YASKAWA America, Inc.
Motoman Robotics Division
100 Automation Way
Miamisburg, OH 45342
Phone: 937-847-6200

www.motoman.com
MANDATORY

• This instruction manual is intended to explain mainly on the mechanical part of the MOTOMAN-MPX3500 for the application to the actual operation and for proper maintenance and inspection. It describes on safety and handling, details on specifications, necessary items on maintenance and inspection, to explain operating instructions and maintenance procedures. Be sure to read and understand this instruction manual thoroughly before installing and operating the manipulator.

• General items related to safety are listed in the Chapter 1: Safety of the DX200 instructions. To ensure correct and safe operation, carefully read the DX200 instructions before reading this manual.

CAUTION

• Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.

• The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

• YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.

• If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product’s warranty.
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 MOTOMAN-MPX3500.

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

- **DANGER**: Indicates an imminent hazardous situation which, if not avoided, could result in death or serious injury to personnel.

- **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.

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

---

**DANGER**

- Maintenance and inspection must be performed by specified personnel.
- Failure to observe this caution may result in electric shock or injury.
- For disassembly or repair, contact your Yaskawa representative.
- Do not remove the motor, and do not release the brake.
- Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the manipulator's arm.
WARNING

- Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX200 and the programming pendant. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

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

*Fig. : Emergency Stop Button*

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

Injury may result from unintentional or unexpected manipulator motion.

*Fig. : Release of Emergency Stop*

- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  - Be sure to use a lockout device to the safeguarding when going inside. Also, display the sign that the operation is being performed inside the safeguarding and make sure no one closes the safeguarding.
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Keep in mind the emergency response measures against the manipulator’s unexpected motion toward you.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning ON the power for the DX200.
  - Moving the manipulator with the programming pendant.
  - Running the system in the check mode.
  - Performing automatic operations.

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

The emergency stop buttons are located on the right of front door of the DX200 and the programming pendant.
CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the cabinet of the DX200 after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.
- Read and understand the Explanation of Warning Labels in the DX200 Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

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

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200 controller</td>
<td>DX200</td>
</tr>
<tr>
<td>DX200 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>

Description of the Operation Procedure

In the explanation of the operation procedure, the expression “Select • • •” means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or bland names for each company or corporation. The indications of (R) and TM are omitted.
Explanation of Warning Labels

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

<table>
<thead>
<tr>
<th>Nameplate</th>
<th>AA**</th>
<th>B**</th>
<th>C**,F**</th>
</tr>
</thead>
</table>

**Battery Warning Label**

- **WARNING**
  - When replacing battery instruction manual details are to be followed. Battery only to be replaced when the area is known to be safe.

**Pressure Switch Unit Warning Label**

- **WARNING**
  - Explosion-proof safety Device
  - Do not change any Parameters.

**Electrostatic Charging Label**

- **WARNING**
  - Potential electrostatic charging hazard
  - See INSTRUCTIONS (4. Connection)

**Warning Label A**

- **WARNING**
  - Do not enter robot work area.

**Warning Label B**

- **WARNING**
  - Moving parts may cause injury
  - Les parties mobiles peuvent causer des blessures.
Safeguarding Tips

All operators, programmers, maintenance personnel, supervisors, and anyone working near the system must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this equipment, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this equipment.
- Improper connections can damage the equipment. All connections must be made within the standard voltage and current ratings of the equipment.
- The system must be placed in Emergency Stop (E-Stop) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06-2012, section 4.2.5, Sources of Energy, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

Mechanical Safety Devices

The safe operation of this equipment is ultimately the users responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06-2012 safety standards, and other local codes that may pertain to the installation and use of this equipment.

Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety equipment is provided as standard:

- Safety barriers
- Door interlocks
- Emergency stop palm buttons located on operator station

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.
Programming, Operation, and Maintenance Safety

All operators, programmers, maintenance personnel, supervisors, and anyone working near the system must become familiar with the operation of this equipment. Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this equipment should be permitted to program, or maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the equipment to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place. Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Check the E-Stop button on the operator station for proper operation before programming. The equipment must be placed in Emergency Stop (E-Stop) mode whenever it is not in use.
- Back up all programs and jobs onto suitable media before program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- Any modifications to the controller unit can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the controller unit. Making any changes without the written permission from YASKAWA will void the warranty.
- Some operations require a standard passwords and some require special passwords.
- The equipment allows modifications of the software for maximum performance. Care must be taken when making these modifications. All modifications made to the software will change the way the equipment operates and can cause severe personal injury or death, as well as damage parts of the system. Double check all modifications under every mode of operation to ensure that the changes have not created hazards or dangerous situations.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Use proper replacement parts.
- Improper connections can damage the equipment. All connections must be made within the standard voltage and current ratings of the equipment.
Maintenance Safety

Turn the power OFF and disconnect and lockout/tagout all electrical circuits before making any modifications or connections.

Perform only the maintenance described in this manual. Maintenance other than specified in this manual should be performed only by YASKAWA-trained, qualified personnel.

Summary of Warning Information

This manual is provided to help users establish safe conditions for operating the equipment. Specific considerations and precautions are also described in the manual, but appear in the form of Dangers, Warnings, Cautions, and Notes.

It is important that users operate the equipment in accordance with this instruction manual and any additional information which may be provided by YASKAWA. Address any questions regarding the safe and proper operation of the equipment to YASKAWA Customer Support.
Customer Support Information

If you need assistance with any aspect of your MPX3500 system, please contact YASKAWA Customer Support at the following 24-hour telephone number:

(937) 847-3200

For routine technical inquiries, you can also contact YASKAWA Customer Support at the following e-mail address:

technicalsupport@motoman.com

When using e-mail to contact YASKAWA Customer Support, please provide a detailed description of your issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to your inquiry.

Please use e-mail for routine inquiries only. If you have an urgent or emergency need for service, replacement parts, or information, you must contact YASKAWA Customer Support at the telephone number shown above.

Please have the following information ready before you call Customer Support:

- **System**
  - MPX3500

- **Primary Application**

- **Controller**
  - DX200

- **Software Version**
  - Access this information on the Programming Pendant's LCD display screen by selecting {MAIN MENU} - {SYSTEM INFO} - {VERSION}

- **Robot Serial Number**
  - Located on the robot data plate

- **Robot Sales Order Number**
  - Located on the DX200 controller data plate
# Table of Contents

1 Manipulator Installation ................................................................................................................... 1-1
   1.1 Mounting Procedures for Manipulator Base ................................................................. 1-1
   1.2 Mounting Types ................................................................................................................. 1-1
      1.2.1 Servo Track Incorporated Type ............................................................................ 1-2
      1.2.2 Wall-mounted Type ............................................................................................... 1-3
      1.2.3 Ceiling-mounted Type ........................................................................................... 1-4
   1.3 Transport ............................................................................................................................ 1-5
      1.3.1 Transporting Method ............................................................................................. 1-5
         1.3.1.1 Shipping Bolts and Brackets .................................................................... 1-5
         1.3.1.2 Using a Crane ......................................................................................... 1-5
         1.3.1.3 Using a Forklift ......................................................................................... 1-8
   1.4 Location ............................................................................................................................. 1-9

2 Pump-axis ....................................................................................................................................... 2-1
   2.1 Pump-axis in Optional Specification .................................................................................. 2-1
   2.2 Basic Specifications ..................................................................................................... 2-1
   2.3 Details on Pump-axis ..................................................................................................... 2-2

3 Pressure Switch Unit....................................................................................................................... 3-1
   3.1 Mounting Position .............................................................................................................. 3-1
      3.1.1 Opposite Side of L-arm ......................................................................................... 3-1
      3.1.2 Installing the Switch Away From Manipulator ....................................................... 3-2

4 Manipulator Cable ........................................................................................................................ 4-1
   4.1 Connecting Position ...................................................................................................... 4-1

5 U-arm Cover.................................................................................................................................... 5-1
   5.1 Disassembly and Reassembly the Cover ........................................................................ 5-1
   5.2 Mounting a Device on the U-arm ....................................................................................... 5-2

6 External Cabling.......................................................................................................................... 6-1
   6.1 Basic Specification .......................................................................................................... 6-1
      6.1.1 Flexible Hose Specification ................................................................................ 6-1
         6.1.1.1 Mounting a Flexible Hose ................................................................... 6-1
      6.1.2 Cable Carrier Specification ............................................................................... 6-3
   6.2 Internal Tube ...................................................................................................................... 6-3
6.3 Types of External Cabling.................................................................................................. 6-5
   6.3.1 Flexible Hose Specification .................................................................................. 6-5
   6.3.2 Cable Carrier ........................................................................................................ 6-9

6.4 Disassembly and Reassembly External Cabling Parts.............................................. 6-10

7 Zeroing...................................................................................................................... 7-1
   7.1 Zeroing Function......................................................................................................... 7-1
   7.2 Mounting Zeroing Parts ............................................................................................ 7-2
      7.2.1 Mounting S-axis Zeroing Parts ............................................................................. 7-2
      7.2.2 Mounting L-axis Zeroing Parts ............................................................................. 7-3
      7.2.3 Mounting U-axis Zeroing Parts ............................................................................. 7-5

8 O-ring for Outside the Wrist ......................................................................................... 8-1
   8.1 Exchange Procedure ................................................................................................. 8-1

9 Maintenance and Inspection.......................................................................................... 9-1
   9.1 Inspection Schedule .................................................................................................... 9-1

10 Recommended Spare Parts............................................................................................ 10-1
1 Manipulator Installation

1.1 Mounting Procedures for Manipulator Base

The manipulator should be firmly mounted on a baseplate or foundation strong enough to support the manipulator and withstand repulsion forces during acceleration and deceleration.

Construct a solid wall, ceiling, and servo track with the appropriate thickness or strength to withstand maximum repulsion force of the manipulator in each mounting type.

A baseplate flatness must be kept at 0.5 mm or less: insufficient flatness or straightness of installation surface may deform the manipulator shape and affect its functional abilities.

1.2 Mounting Types

Followings are the mounting types in optional specifications.

- Servo track incorporated type (Refer to section 1.2.1 “Servo Track Incorporated Type”.)
- Wall-mounted type (Refer to section 1.2.2 “Wall-mounted Type”.)
- Ceiling-mounted type (Refer to section 1.2.3 “Ceiling-mounted Type”.)
1.2.1 Servo Track Incorporated Type

Fig. 1-1: Mounting the Servo Track Incorporated Type

Table 1-1: Maximum Repulsion Force for the Servo Track Incorporated Type

<table>
<thead>
<tr>
<th></th>
<th>Horizontal rotation</th>
<th>Vertical rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Repulsion force (F_H)</td>
<td>Torque (M_H)</td>
</tr>
<tr>
<td>Emergency stop</td>
<td>17200 N (1800 kgf)</td>
<td>31400 N•m (3250 kgf•m)</td>
</tr>
<tr>
<td>Acceleration/ deceleration</td>
<td>8600 N (900 kgf)</td>
<td>15700 N•m (1650 kgf•m)</td>
</tr>
</tbody>
</table>
1.2.2 Wall-mounted Type

Fig. 1-2: Mounting the Wall-mounted Type

- Hexagon socket head cap screw M20 (6 screws)
- Spring washer M20 (6 washers)
- Washer M20 (6 washers)
- Tightening torque: 402 N-m (41 kgf·m)

Table 1-2: Maximum Repulsion Force for the Wall-mounted Type

<table>
<thead>
<tr>
<th></th>
<th>Horizontal rotation</th>
<th>Vertical rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Repulsion force $F_H$</td>
<td>Torque $M_H$</td>
</tr>
<tr>
<td>Emergency stop</td>
<td>25500 N (2600 kgf)</td>
<td>46500 N-m (4800 kgf·m)</td>
</tr>
<tr>
<td>Acceleration/</td>
<td>17000 N (1700 kgf)</td>
<td>30500 N-m (3200 kgf·m)</td>
</tr>
<tr>
<td>deceleration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.2.3 Ceiling-mounted Type

**Fig. 1-3: Mounting the Ceiling-mounted Type**

- 12H7 dia. hole (2 places)
- 15dia.1
- 116dia.1
- 17.5 dia. hole (8 places)
- 25dia.1
- 277dia.1
- 325dia.1
- 130
- 130
- 130
- Hexagon socket head cap screw M16 (8 screws)
- Spring washer M16 (8 washers)
- Washer M16 (8 washers)
- Tightening torque: 206 N·m (21kgf·m)

**Table 1-3: Maximum Repulsion Force for the Ceiling-mounted Type**

<table>
<thead>
<tr>
<th></th>
<th>Horizontal rotation</th>
<th>Vertical rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repulsion force F_H</td>
<td>Torque M_H</td>
<td>Repulsion force F_V</td>
</tr>
<tr>
<td>Emergency stop</td>
<td>17200 N (1800 kgf)</td>
<td>31400 N·m (3250 kgf·m)</td>
</tr>
<tr>
<td>Acceleration/</td>
<td>8600 N (900 kgf)</td>
<td>15700 N·m (1650 kgf·m)</td>
</tr>
<tr>
<td>deceleration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.3 Transport

CAUTION

- Sling and crane or forklift operations must be performed by authorized personnel only.
  Failure to observe this caution may result in injury or damage.
- Avoid excessive vibration or shock during transport.
  The system consists of precision components. Failure to observe this caution may adversely affect performance.

1.3.1 Transporting Method

- Check that the eyebolts are securely fastened.
- The mass of the manipulator is approximately 730 kg including the shipping bolts and brackets. Use a wire rope strong enough to withstand the mass.
- Attached eyebolts are designed to support the manipulator mass. Do not use them for anything other than transporting the manipulator.
- Mount the shipping bolts and brackets for transporting the manipulator.
- Avoid putting external force on the arm or motor unit when transporting by a crane, forklift, or other equipment. Failure to observe this instruction may result in injury.
- Before turning ON the power, make sure that the shipping bolts and brackets are removed. The shipping bolts and brackets then must be stored for future use, in the event that the manipulator must be moved again.

1.3.1.1 Shipping Bolts and Brackets

To protect the mechanical part of the manipulator from the external force during the transportation, shipping bolts and brackets are mounted.

- Shipping bolts and brackets are painted yellow.

1.3.1.2 Using a Crane

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

Be sure to lift the manipulator with wire ropes, using attached eyebolts in the posture as shown in Fig. 1-4 “Transporting the Wall-mounted Type by a Crane” and Fig. 1-5 “Transporting the Ceiling-mounted Type by a Crane” .

When using a crane for the servo track incorporated specification, perform the same procedure as the standard specification. Refer to section 2.1.1 “Using a Crane” of the MOTOMAN-MPX3500 INSTRUCTIONS (174110-1CD).
Fig. 1-4: Transporting the Wall-mounted Type by a Crane

**Factory setting for angle and pulse of each axis**

<table>
<thead>
<tr>
<th>Axis</th>
<th>S</th>
<th>L</th>
<th>U</th>
<th>R</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle</td>
<td>0°</td>
<td>0°</td>
<td>-55°</td>
<td>0°</td>
<td>0°</td>
<td>0°</td>
</tr>
<tr>
<td>Pulse</td>
<td>0</td>
<td>0</td>
<td>133760</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Fig. 1-5: Transporting the Ceiling-mounted Type by a Crane

Factory setting for angle and pulse of each axis

<table>
<thead>
<tr>
<th>Axis</th>
<th>S</th>
<th>L</th>
<th>U</th>
<th>R</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle</td>
<td>0°</td>
<td>-42°</td>
<td>-64.15°</td>
<td>0°</td>
<td>0°</td>
<td>0°</td>
</tr>
<tr>
<td>Pulse</td>
<td>0</td>
<td>-110625</td>
<td>-1566000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
1.3.1.3 Using a Forklift

When using a forklift, the manipulator should be fixed on a pallet with shipping bolts and bracket as shown in Fig. 1-6 “Transporting the Wall-mounted Type by a Forklift” and Fig. 1-7 “Transporting the Ceiling-mounted Type by a Forklift”.

Insert claws under the pallet and lift it. The pallet must be strong enough to support the manipulator.

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

When using a forklift for the servo track incorporated specification, perform the same procedure as the standard specification. Refer to section 2.1.2 “Using a Forklift” of the MOTOMAN-MPX3500 INSTRUCTIONS (174110-1CD).

Fig. 1-6: Transporting the Wall-mounted Type by a Forklift
1.4 Location

When installing the manipulator, satisfy the following environmental conditions.

- Ambient temperature: 0° to 40°C
- Humidity: 20 to 80%RH at constant temperature
- Free from exposure to water, oil, or dust
- Free from excessive vibration (Vibration: 0.5 G or less)
- Free from large electrical noise (plasma)
- Flatness for installation is 0.5 mm or less
2 Pump-axis

2.1 Pump-axis in Optional Specification

In the optional specification, the pump-axis which is at the bottom part in the standard specification (YR-MPX3500-**1 (one axis)) is changed to the upper part. (For the position, refer to Fig. 2-1 “Detail View of Pump-axis”.) Check the contents of MOTOMAN-MPX3500 IINSTRUCTIONS (174110-1CD) as well.

2.2 Basic Specifications

Table 2-1: Basic Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>/ Type</th>
<th>YR-MPX3500-**1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotational frequency</td>
<td>Rating</td>
<td>142 min⁻¹</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>285 min⁻¹</td>
</tr>
<tr>
<td></td>
<td>Torque</td>
<td>13.4 N·m</td>
</tr>
<tr>
<td>Weight (1 axis)</td>
<td></td>
<td>5.5 kg (motor + M-base + speed reducer + output axis)</td>
</tr>
</tbody>
</table>

1 SI units are used in this table.
2.3 Details on Pump-axis

The pump-axis in the optional specification is configured as shown in Fig. 2-1 “Detail View of Pump-axis”.

Fig. 2-1: Detail View of Pump-axis
3 Pressure Switch Unit

3.1 Mounting Position

3.1.1 Opposite Side of L-arm

The switch is mounted right under the L-arm in the standard specification. It is mounted in the opposite side of the standard specification in the type of the opposite side of L-arm.

However, the switch cannot be mounted at the same position as the manipulator cable.

Refer to section 4.1 “Connecting Position”.

Consider the mounting condition and be careful about the position.

Fig. 3-1: Opposite side of L-arm
3.1.2 Installing the Switch Away From Manipulator

The pressure switch unit can be installed away from the manipulator. In this case, a pneumatics hose to be needed should be prepared by the customer.

- **Hose Condition**
  - External dimension: 16mm
  - Internal diameter: 12mm or 13mm
  - Material: nylon or urethane

- **Installing Condition**
  - Location: Able to be installed in both hazardous locations and non-hazardous locations.
  - Direction: Able to be installed in all directions

---

**NOTE**

The hose between the pressure switch unit and the manipulator should be 20mm or less.

---

*Fig. 3-2: Detail View of Pressure Switch Unit*
4 Manipulator Cable

4.1 Connecting Position

Manipulator cable in the optional specification can be connected in right and left sides. However, the cable cannot be connected in the same position as the pressure switch unit.

*Fig. 4-1: Connecting Direction*

There are conditions for installing the manipulator cable. Refer to section 4.2 “Cable Connection” of MOTOMAN-MPX3500 INSTRUCTIONS (174110-1CD).
5 U-arm Cover

5.1 Disassembly and Reassembly the Cover

Fig. 5-1: Disassembly and Reassembly the Cover

1. Remove the knob ① from the arm tip side.
2. Remove the knob ③ on the casing side when its cover hole is the long type and loosen it when its cover hole is the notch type.
3. Remove the U-arm cover ④. Be careful if the knob ③ on the casing side is only loosened. Forcible removal may lead to damage of the U-arm cover ④.

For reassembly, perform the reverse order.

Table 5-1: U-arm Cover Parts Checklist

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>U-arm cover HW1200352-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>U-arm HW1100668-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Knob A-176-S-1</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
5.2 Mounting a Device on the U-arm

When mounting a device on the U-arm, refer to Fig. 5.2 “Mounting a Device on the U-arm”, confirm the inside dimension of the U-arm cover before selecting a device.

Fig. 5-2: Recommended Device Size

Available space to mount a device (side view)

Available space to mount a device (top view)

Recommended size of support to mount a device

Thickness of support: 20mm or less

Unit:mm
According to the purpose, a flexible hose or a cable carrier can be selected for external cabling tube protection.

- In the case of using a flexible hose:
  When inserting a tube in a flexible hose, prevent twist or knot. (example: applying Vaseline)
  Also, prevent the flexible hose from interfering with the manipulator, being pressed or bent. This may cause dust and deteriorate the application quality.

- In the case of using a cable carrier type:
  when changing the tube arrangement inside the carrier or adding tubes, arrange those so that they are not overlapped each other when the cable carrier operates.

### 6.1 Basic Specification

#### 6.1.1 Flexible Hose Specification

Followings are the flexible hoses to be used.

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIHG-95B</td>
<td>dia. 106 mm</td>
</tr>
<tr>
<td>PIHG-56B</td>
<td>dia. 67.2 mm</td>
</tr>
</tbody>
</table>

#### 6.1.1.1 Mounting a Flexible Hose

There are two types of fixing methods: fixing with a round flexible hose and with a saddle.
6 External Cabling

6.1 Basic Specification

**Fig. 6-1: Flexible Hose Fixing Part**

- Third convex part
- Gasket
- Round flexible hose
- Flexible hose
- Saddle
- Parts for fixing
6 External Cabling
6.2 Internal Tube

- **Fixing with a Round Flexible Hose**
  Insert a flexible hose in a round flexible hose deeply and fix the flexible hose with fixing jigs.
  At this time, fix the flexible hose at the third convex part of the round flexible hose.

- **Fixing with a Saddle**
  When fixing a flexible hose with a saddle, make the two parallel. If the hose is fixed in the oblique state, it may loosen and come off after the manipulator operates.
  Tightening torque for the fixing bolt: 10 N·m (1.0kgf·m)

### 6.1.2 Cable Carrier Specification

Following is the cable carrier to be used.
Yaskawa number: HW1383877-A

### 6.2 Internal Tube

Following is the size and maximum quantity of each internal tube for the flexible hose or cable carrier which Yaskawa selects.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Painting side (PIHG-95B)</th>
<th>Air side (PIHG-56B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>8 dia. × 40</td>
<td></td>
</tr>
<tr>
<td>Cleaning air, thinner</td>
<td>8 dia. × 1</td>
<td>8 dia. × 1</td>
</tr>
<tr>
<td>Cup cleaning air, thinner</td>
<td>8 dia. × 1</td>
<td>8 dia. × 1</td>
</tr>
<tr>
<td>Bearing air</td>
<td></td>
<td>8 dia. × 1</td>
</tr>
<tr>
<td>Discharge setting air operation regulator</td>
<td>10 dia. × 1</td>
<td></td>
</tr>
<tr>
<td>Shape 1</td>
<td></td>
<td>10 dia. × 2</td>
</tr>
<tr>
<td>Shape 2</td>
<td></td>
<td>10 dia. × 1</td>
</tr>
<tr>
<td>Turbine</td>
<td></td>
<td>10 dia. × 1</td>
</tr>
<tr>
<td>Dump</td>
<td>12 dia. × 2</td>
<td></td>
</tr>
<tr>
<td>LV cable</td>
<td></td>
<td>10 dia. × 1</td>
</tr>
<tr>
<td>Fiber cable</td>
<td></td>
<td>8 dia. × 1</td>
</tr>
</tbody>
</table>
Fig. 6-2: Flexible Hose

![Flexible Hose Diagram](image)

1: φ8 (Paint) ×42
2: φ12 (Paint) ×2

Fig. 6-3: Cable Carrier

![Cable Carrier Diagram](image)

1: φ8 (Paint) ×42
2: φ8 (air) ×3
3: φ10 (air) ×5
4: φ10 (Cable) ×1
5: φ8 (Cable) ×1
6: φ10 (Cable) ×1

For paint

1: φ8 (Paint) ×42
2: φ8 (air) ×3
3: φ8 (Cable) ×1

4: φ10 (air) ×5
5: φ10 (Cable) ×1
6: φ12 (Paint) ×2
6.3 Types of External Cabling

A flexible hose and a cable carrier are used in the following specifications.

- **Flexible hose**
  Available in floor-, ceiling- and wall-mounted types and servo track incorporated type.

- **Cable carrier**
  Available in floor-mounted type and servo track incorporated type.

### 6.3.1 Flexible Hose Specification

The type YR-MPX3500-C** is the anti-static specification.

#### Floor-mounted Type

<table>
<thead>
<tr>
<th>Internal tube length between A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIHG-56B:5100 mm</td>
</tr>
<tr>
<td>PIHG-95B:5000 mm</td>
</tr>
</tbody>
</table>

*Bolts, conical spring washers and washers are trivalent chromium products.*

S-axis motion range: -120° to +60°
6 External Cabling
6.3 Types of External Cabling

- Wall-mounted Type

Internal tube length between A and B
PIHG-56B: 4900 mm
PIHG-95B: 5700 mm

S-axis motion range: -30° to +100°

* Bolts, conical spring washers and washers are trivalent chromium products.
6 External Cabling
6.3 Types of External Cabling

- Ceiling-mounted Type

Internal tube length between A and B
PIHG-56B: 4500 mm
PIHG-95B: 5100 mm

S-axis motion range: -90° to +90°
L-axis motion range: -65° to +45°
U-axis motion range: -65° to +90°

However, U-axis motion range is -45° to +90° when L-axis motion limit range is -90° to +90°.

* Bolts, conical spring washers and washers are trivalent chromium products.
6 External Cabling

6.3 Types of External Cabling

Servo Track Incorporated Type

**Internal tube length between A and B**
PIHG-56B: 5200 mm
PIHG-95B: 5500 mm

---

*Bolts, conical spring washers and washers are trivalent chromium products.*

S-axis motion range: -120° to +120°
6.3.2 Cable Carrier

In the type YR-MPX3500-C**, the hose parts between the S-head and the base is the anti-static specification.

- **Floor-mounted Type**

  Internal tube length between A and B
  PIHG-56B: 4600 mm
  PIHG-95B: 4600 mm

* Bolts, conical spring washers and washers are trivalent chromium products.

S-axis motion range: -120° to +60°
L-axis motion range: -50° to +140°
6 External Cabling

6.4 Disassembly and Reassembly External Cabling Parts

Servo Track Incorporated Type

- Internal tube length between A and B
  - PIHG-56B: 4600 mm
  - PIHG-95B: 4700 mm

- Bolts, conical spring washers and washers are trivalent chromium products.

Before disassembling and reassembling external cabling parts, refer to section 6.1 “Basic Specification” and section 6.3 “Types of External Cabling” to confirm the mounting method and components.

S-axis motion range: -120° to +120°
L-axis motion range: -50° to +140°
7 Zeroing

7.1 Zeroing Function

Zeroing function automatically allows for the restoration of the home position data when the manipulator’s home position data disappear.

- **Outline**
  The DX200 stores the manipulator home position based on the pulse value of each axis encoder. Since the home position is already set and registered before shipment, zeroing operation does not need to be performed at the normal operation. However, zeroing operation needs to be performed to restore the home position since the home position data disappear when performing the following operations, or the followings occur:
  - Replacement of Motors
  - Replacement of Encoders
  - Backup Battery Exhaustion in the Manipulator

- **NOTE**
  - The home position data is stored by the backup battery. If the battery is exhausted, the home position data disappear again when turning OFF the DX200 power even when the zeroing operation is performed. Be sure to replace the battery periodically. For the battery replacement, refer to "Maintenance and Inspection" of "MOTOMAN-MPX3500 INSTRUCTIONS"
  - The home positioning cannot be performed accurately by the zeroing operation if the combination of the manipulator and the DX200 are changed.

*Fig. 7-1: Zeroing Adjustable Axes*
7.2 Mounting Zeroing Parts

7.2.1 Mounting S-axis Zeroing Parts

Refer to Fig. 7-2 “Mounting S-axis Zeroing Parts” and Table 7-1 “S-axis Zeroing Parts Checklist”.

1. Turn OFF the DX200.
2. Glue the gasket 2 to the cover 1.
3. After attaching washers to the cross recessed pan-head screws 1, mount the cover 1 and the gasket 2 on the S-head 4 with the cross recessed pan-head screws 1.
4. Insert the pin 6 in the base 5 and mount the block 7 on the pin 6.
5. Attach conical spring washers to the hexagon socket head cap screws 8 and fix the block 7 on the base 5.
7. Mount the plug 9 and the gasket 10 on the block 7.

Mounting a Sensor

1. Remove the parts marked * in Fig. 7-2 “Mounting S-axis Zeroing Parts”.
2. Mount the sensor 11 on the block 7.

Fig. 7-2: Mounting S-axis Zeroing Parts

**NOTE**
Mounting screws for the pin and the plate are small. Be careful not to lose them in the procedure.
7 Zeroing

7.2 Mounting Zeroing Parts

Table 7-1: S-axis Zeroing Parts Checklist

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover HW1405958-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gasket HW1405959-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cross recessed pan-head screw M4 (length: 6 mm)</td>
<td>2 each</td>
<td>Washer M4</td>
</tr>
<tr>
<td>4</td>
<td>S-head HW1100665-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Base HW1100664-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pin HW1405946-4-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Block HW1402000-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hexagon socket head cap screw M5 (length: 35 mm)</td>
<td>2 each</td>
<td>Conical spring washer 2H-5</td>
</tr>
<tr>
<td>9</td>
<td>Plug HW0405202-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Gasket HW0405203-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

7.2.2 Mounting L-axis Zeroing Parts

Refer to Fig. 7-3 “Mounting L-axis Zeroing Parts” and Table 7-2 “L-axis Zeroing Parts Checklist”.

1. Turn OFF the DX200.
2. Glue the gasket to the cover.
3. After attaching washers to the cross recessed pan-head screws, mount the cover and the gasket on the S-head with the cross recessed pan-head screws.
4. Insert the pin in the L-arm and mount the block on the pin.
5. Attach conical spring washers to the hexagon socket head cap screws and fix the block on the L-arm.
6. Mount the gasket on the plug.
7. Mount the plug and the gasket on the block.

Mounting a Sensor

1. Remove the parts marked * in Fig. 7-3 “Mounting L-axis Zeroing Parts”.
2. Mount the sensor on the block.
When the sensor is mounted

**NOTE**

Mounting screws for the pin and the plate are small. Be careful not to lose them in the procedure.

### Table 7-2: L-axis Zeroing Parts Checklist

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover HW1405958-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gasket HW1405959-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cross recessed pan-head screw M4 (length: 6 mm) Washer M4</td>
<td>2 each</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S-head HW1100665-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>L-arm HW1100666-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pin HW1405946-4-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Block HW1402000-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hexagon socket head cap screw M5 (length: 35 mm) Conical spring washer 2H-5</td>
<td>2 each</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Plug HW0405202-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Gasket HW0405203-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
7.2 Mounting Zeroing Parts

7.2.3 Mounting U-axis Zeroing Parts
Refer to Fig. 7-4 “Mounting U-axis Zeroing Parts” and Table 7-3 “U-axis Zeroing Parts Checklist”.

1. Turn OFF the DX200.
2. Glue the gasket (2) to the cover (1).
3. After attaching washers to the cross recessed pan-head screws (1), mount the cover (1) and the gasket (2) on the L-arm (4) with the cross recessed pan-head screws (1).
4. Insert the pin (5) in the casing (5) and mount the block (7) on the casing (6).
5. Attach conical spring washers to the hexagon socket head cap screws (8) and fix the block (7) on the casing (6).
6. Mount the gasket (10) on the plug (9).
7. Mount the plug (9) and the gasket (10) on the block (7).

■ Mounting a Sensor
1. Remove the parts marked * in Fig. 7-4 “Mounting U-axis Zeroing Parts”.
2. Mount the sensor (11) on the block (7).

*Fig. 7-4: Mounting U-axis Zeroing Parts*

**NOTE**
Mounting screws for the pin and the plate are small. Be careful not to lose them in the procedure.
## 7 Zeroing

### 7.2 Mounting Zeroing Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover HW1405958-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gasket HW1405959-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cross recessed pan-head screw M4 (length: 6 mm) Washer M4</td>
<td>2 each</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L-arm HW1100666-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Casing HW1100667-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pin HW1405946-4-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Block HW1402000-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hexagon socket head cap screw M5 (length: 35 mm) Conical spring washer 2H-5</td>
<td>2 each</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Plug HW0405202-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Gasket HW0405203-1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
8 O-ring for Outside the Wrist

The O-ring attached to the external parts on the arm tip side is optional.

8.1 Exchange Procedure

When the paint gun is so big that the O-ring cannot be removed, remove the paint gun before the exchange procedure. Forcible attachment may damage the O-ring.

Apply Vaseline to the O-ring before the attachment.

Fig. 8-1: Removing the O-ring
9 Maintenance and Inspection

9.1 Inspection Schedule

Conduct daily and periodic inspections to ensure the long life of the robot and its performance.

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 given in the levels shown in Table 9-1 “Inspection Parts and Inspection Numbers (MPX3500-*1*)”.

In Table 9-1, 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.

The inspection interval must be based on the servo power supply ON time.
### Table 9-1: 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>1</td>
<td>Daily</td>
<td>Visual</td>
<td>Check for grease leakage. 2)</td>
<td>Specified Personnel (Customer)</td>
</tr>
<tr>
<td>2</td>
<td>6000H Cycle</td>
<td>Visual</td>
<td>Check for damage.</td>
<td>Licensee (person who is qualified by Yaskawa)</td>
</tr>
<tr>
<td>3</td>
<td>12000H Cycle</td>
<td>Wrench</td>
<td>Tighten loose bolts. Replace if necessary.</td>
<td>Service Company (Yaskawa)</td>
</tr>
<tr>
<td>4</td>
<td>24000H Cycle</td>
<td>Manual</td>
<td>Check for loose connectors.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>36000H Cycle</td>
<td>Manual</td>
<td>Check for loose and wear rings. (Replace if necessary.)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pump-axis speed reducer</td>
<td>Grease gun</td>
<td>Check for malfunction. (Replace if necessary.) Replenish grease 3) (6000H cycle).</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Pressure switch unit</td>
<td></td>
<td>Confirm that the pressure switch, flow switch, solenoid valve and the pressure reducing valve operate correctly. Contact your Yaskawa representatives.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Battery in manipulator</td>
<td></td>
<td>Replacement</td>
<td></td>
</tr>
</tbody>
</table>

1. Refer to Fig. 9-1 “Inspection Parts and Inspection Numbers (MPX3500-*1*)”.
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. For the grease, refer to Table 9-2 “Inspection Parts and Grease Used”.

---

**mpx3500**

9. Maintenance and Inspection

9.1 Inspection Schedule

50 of 55
**9 Maintenance and Inspection**

**9.1 Inspection Schedule**

*Fig. 9-1: Inspection Parts and Inspection Numbers (MPX3500-1*)

<table>
<thead>
<tr>
<th>No.</th>
<th>Grease Used</th>
<th>Inspected Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>VIGO grease RE No. 0</td>
<td>Pump-axis speed reducer</td>
</tr>
</tbody>
</table>
10 Recommended Spare Parts

Each optional specification has each spare part. Check the recommended spare parts according to the specification.

Product performance cannot be guaranteed when using spare parts from any company other than YASKAWA

Table 10-1: Spare Parts for the Floor-mounted Flexible Hose Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>3.9m</td>
</tr>
<tr>
<td>4</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>4.0m</td>
</tr>
</tbody>
</table>

Table 10-2: Spare Parts for the Servo Track Incorporated Flexible Hose Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Saddle</td>
<td>BGH-95</td>
<td>PMA</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Saddle</td>
<td>BGH-56</td>
<td>PMA</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>5.5m</td>
</tr>
<tr>
<td>6</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>5.15m</td>
</tr>
</tbody>
</table>

Table 10-3: Spare Parts for the Ceiling-mounted Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Saddle</td>
<td>BGH-95</td>
<td>PMA</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Saddle</td>
<td>BGH-56</td>
<td>PMA</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>4.2m</td>
</tr>
<tr>
<td>6</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1</td>
<td>1</td>
<td>3.6m</td>
</tr>
</tbody>
</table>
Table 10-4: Spare Parts for the Wall-mounted Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Saddle</td>
<td>BGH-95</td>
<td>PMA</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Saddle</td>
<td>BGH-56</td>
<td>PMA</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1 4.8m</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1 4.4m</td>
<td></td>
</tr>
</tbody>
</table>

Table 10-5: Spare Parts for the Floor-mounted Cable Carrier Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable carrier</td>
<td>HW1383877-A</td>
<td>Yaskawa</td>
<td>1</td>
<td>1.4m</td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Saddle</td>
<td>BGGV-95</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Saddle</td>
<td>BGGV-56</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1 1.3m</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1 1.3m</td>
<td></td>
</tr>
</tbody>
</table>

Table 10-6: Spare Parts for the Servo Track Incorporated Cable Carrier Type

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable carrier</td>
<td>HW1383877-A</td>
<td>Yaskawa</td>
<td>1</td>
<td>1.3m</td>
</tr>
<tr>
<td>2</td>
<td>Bracket</td>
<td>BGG-95</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bracket</td>
<td>BGG-56</td>
<td>PMA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Saddle</td>
<td>BGH-95</td>
<td>PMA</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Saddle</td>
<td>BGH-56</td>
<td>PMA</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hose</td>
<td>PIHG-95B</td>
<td>PMA</td>
<td>1 1.25m</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Hose</td>
<td>PIHG-56B</td>
<td>PMA</td>
<td>1 1.25m</td>
<td></td>
</tr>
</tbody>
</table>

Table 10-7: Spare Parts for the U-arm Cover

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bolt</td>
<td>A-176-S-1</td>
<td>TAKIGEN</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Table 10-8: Spare Parts for the O-ring in the Wrist Part

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O-ring</td>
<td>AS568-251</td>
<td>NOK</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>AS568-261</td>
<td>NOK</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
<td>AS568-264</td>
<td>NOK</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
MOTOMAN-MPX3500
INSTRUCTIONS
FOR MANIPULATOR OPTIONAL SPECIFICATIONS

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