MOTOPOS-D700B POSITIONER INSTRUCTIONS

TYPE:
YR-MPD700B-A00
YR-MPD700B-A02 (FOR CC-LINK)
YR-MPD700B-B00 (WITH ROTARY JOINT)

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

MOTOPOS INSTRUCTIONS
MOTOPOS-D700B POSITIONER INSTRUCTIONS
NX100 INSTRUCTIONS
NX100 OPERATOR’S MANUAL
NX100 MAINTENANCE MANUAL

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

Part Number: 164057-1CD
Revision: 1
MANDATORY

- This instruction manual is intended to explain operating instructions and maintenance procedures primarily for the MOTOPOS.

- General items related to safety are listed in the Section 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 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 MOTOPOS and the NX100.

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.

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**NOTE**

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

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**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.
Before operating the MOTOPOS, check that servo power is turned OFF when the emergency stop buttons on the front door of the NX100 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 MOTOPOS during an emergency. The MOTOPOS should not be used if the emergency stop buttons do not function.

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

Injury may result from unintentional or unexpected MOTOPOS motion.

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

Improper or unintended MOTOPOS operation may result in injury.

Confirm that no persons are present in the work envelope of the MOTOPOS and that you are in a safe location before:
- Turning ON the NX100 power.
- Operating the MOTOPOS with the programming pendant.
- Running check operations.
- Performing automatic operations.

Injury may result if anyone enters the working envelope of the MOTOPOS during operation. Always press an emergency stop button immediately if there is a problem. The emergency stop buttons are located on the right of the front door of the NX100 and the programming pendant.
Definition of Terms Used Often in This Manual

The MOTOPOS is the positioner for the YASKAWA industrial robot. The MOTOPOS usually consists of MOTOPOS positioner unit, a controller unit, a programming pendant, and power cables. In this manual, the equipment is defined as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX100 Controller Unit</td>
<td>NX100</td>
</tr>
<tr>
<td>NX100 Programming Pendant</td>
<td>Programming Pendant</td>
</tr>
<tr>
<td>MOTOPOS to NX100 Cable</td>
<td>Power Cable</td>
</tr>
</tbody>
</table>

Registered Trademark

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

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

WARNING
Do not enter robot work area.

WARNING
Moving parts may cause injury.
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).

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 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 D700B 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:

techsupport@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**: D700B
- **Robots**: ___________________________
- **Primary Application**: ___________________________
- **Controller**: NX100
- **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 NX100 controller data plate
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## 10 Recommended Spare Parts
1 Receiving

1.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives. Standard delivery includes the following six items (information for the content of optional goods is given separately):

- Manipulator
- NX100
- Programming pendant
- Cable between the NX100 and the manipulator (2 cables or 3 cables)
- MOTOPOS
- Cable between the MOTOPOS and the NX100 (2 cables)

CAUTION

• Confirm that the MOTOPOS and the NX100 have the same order number. Special care must be taken when more than one units of MOTOPOS are to be installed.

If the numbers do not match, MOTOPOS may not perform as expected and cause injury or damage.
1.2 Checking the Order Number

Check that the order number of the MOTOPOS corresponds to the NX100. The order number is located on a label as shown below.

![Label (Enlarged View)](image)

(a) NX100 (Front View)  (b) MOTOPOS (Side View)

*Fig. 1 Location of Order Number Labels*
2 Transporting

2.1 Transporting Method

2.1.1 Using a Crane

As a rule, when unpacking the MOTOPOS and moving it, a crane should be used. The MOTOPOS should be lifted using wire rope threaded through attached eyebolts. Be sure that the MOTOPOS is fixed with shipping bolts and bracket before transposition, and lift it in the posture as shown in Fig. 2 "Transporting Position".

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sling applications and crane or forklift operations must be performed by authorized personnel only. Failure to observe this caution may result in injury or damage.</td>
</tr>
<tr>
<td>• Avoid excessive vibration or shock during transportation. The system consists of precision components. Failure to observe this caution may adversely affect the performance.</td>
</tr>
</tbody>
</table>

Fig. 2 Transporting Position
2.2 Shipping Bolts and Bracket

The MOTOPOS is provided with shipping bolts and bracket (Fig. 2 "Transporting Position").

- The shipping bolts and bracket are painted yellow.
- The shipping bracket is mounted with four hexagon socket head cap screws M8 (length: 16 mm; tensile strength: 1200 N/mm² or more).

Before turning ON the power, check to be sure that the shipping bolts and bracket are all removed. The shipping bolts and bracket then must be stored for future use, in the event that the MOTOPOS must be moved again.

**NOTE**
- Check that the eyebolts are securely fastened.
- The weight of the MOTOPOS is approximately 350 kg including the shipping bolts and bracket. Use a wire rope strong enough to withstand the weight.
- Attached eyebolts are designed to support the MOTOPOS weight. Never use them for anything other than transporting the MOTOPOS.
- Be sure to mount the shipping bolts and bracket before transporting the MOTOPOS.
- Avoid exerting force on the table or motors when transporting the MOTOPOS. To avoid injury, be careful when using transporting equipment other than a crane or forklift.
- Remove the eyebolts after transportation and installation, and cover the tapped holes with the attached caps. Operating the MOTOPOS with the eyebolts on may cause the jigs to interfere with the eyebolts. The eyebolts must be stored for future use in the event that the MOTOPOS must be moved again.

Before turning ON the power, check to be sure that the shipping bolts and bracket are all removed. The shipping bolts and bracket then must be stored for future use, in the event that the MOTOPOS must be moved again.
3 Installation

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Install the safeguarding.</td>
</tr>
<tr>
<td>Failure to observe this warning may result in injury or damage.</td>
</tr>
<tr>
<td>• Install the MOTOPOS in a location where the MOTOPOS with a jig does not hit against anything such as the wall or the safeguarding.</td>
</tr>
<tr>
<td>Failure to observe this warning may result in injury or damage.</td>
</tr>
<tr>
<td>• Do not start operating the MOTOPOS or turn ON the power before it is firmly anchored.</td>
</tr>
<tr>
<td>The MOTOPOS may overturn and cause injury or damage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Do not install or operate a MOTOPOS which is damaged or lacks parts.</td>
</tr>
<tr>
<td>Failure to observe this caution may cause injury or damage.</td>
</tr>
<tr>
<td>• Before turning ON the power, check to be sure that the shipping bolts and bracket are removed.</td>
</tr>
<tr>
<td>Failure to observe this caution may cause in damage to the major driving parts.</td>
</tr>
</tbody>
</table>
### 3.1 Installation of the Safeguarding

To insure safety, be sure to install safeguarding. It prevents unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance.

**Responsibility for Safeguarding (ISO10218)**

The user of a manipulator or robot system shall ensure that safeguards are provided and used in accordance with Sections 6, 7, and 8 of this standard. The means and degree of safeguarding, including any redundancies, shall correspond directly to the type and level of hazard presented by the robot system consistent with the robot application. Safeguarding may include but not be limited to safeguarding devices, barriers, interlock barriers, perimeter guarding, awareness barriers, and awareness signals.

### 3.2 Mounting Procedures for MOTOPOS Baseplate

The MOTOPOS should be firmly mounted on a baseplate or foundation strong enough to support the MOTOPOS and withstand repulsion forces in acceleration and deceleration. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the MOTOPOS. (See Table 1 "Maximum Repulsion Forces of the MOTOPOS").

The flatness for installation must be kept at 0.5 mm or less: if the flatness of the mounting face is insufficient, the shape of the MOTOPOS may deform and its functional ability may be compromised. Mount the baseplate either as shown in "3.2.1 In Case of Installing the MOTOPOS and Manipulator on a Common Baseplate" or "3.2.2 In Case of Mounting the MOTOPOS on the Floor".

<table>
<thead>
<tr>
<th>Table 1 Maximum Repulsion Forces of the MOTOPOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum torque when rotary axis used</td>
</tr>
<tr>
<td>Maximum torque when tilting axis used</td>
</tr>
</tbody>
</table>
3.2 Mounting Procedures for MOTOPOS Baseplate

3.2.1 In Case of Installing the MOTOPOS and Manipulator on a Common Baseplate

The baseplate should be rugged and durable to ensure that the MOTOPOS and the manipulator are in the correct relative position. Thickness of the baseplate and the size of the mounting anchor bolts should meet the recommendations in the manual for the manipulator to be combined.

Mount the MOTOPOS base securely with four hexagon head screws M16 (recommended length: 60 mm). Tighten the screws and anchor bolts securely so that they will not work loose during the operation.

Fig. 3 Mounting the MOTOPOS Base on a Common Base
### 3.2.2 In Case of Mounting the MOTOPOS on the Floor

The floor should be strong enough to support the MOTOPOS. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the MOTOPOS as shown in Table 1 "Maximum Repulsion Forces of the MOTOPOS". When the thickness of the concrete floor is 200 mm or more, a baseplate (MOTOPOS baseplate thickness of 28 mm or more) can be fixed directly to the floor with anchor bolts M20. Before mounting the MOTOPOS on the floor, check the flatness, cracks, etc. of the floor. If there are any cracks and the like on the floor, they should be repaired before installation. Any thickness less than 200 mm is insufficient for mounting, even if the floor is concrete.

![Diagram of MOTOPOS mounting on floor](attachment:image.png)

**WARNING**

Do not enter robot work area.

**WARNING**

Moving parts may cause injury.
3 Installation

3.3 Location

When the MOTOPOS is installed, it is necessary to satisfy the undermentioned environmental conditions:

- Ambient Temperature: 0° to +45°C
- Humidity: 20% to 80% RH (non-condensing)
- Free from dust, soot, or water
- Free from corrosive gas or liquid, or explosive gas
- Free from excessive vibration (Vibration acceleration: 4.9 m/s² [0.5 G] or less)
- Free from large electrical noise (plasma)
- Flatness for installation: 0.5 mm or less
4 Wiring

4.1 Grounding

Follow the local regulations and electrical installation standards for grounding. The recommended grounding wire size is 5.5 mm² or more.

- Never use this line sharing with other ground lines or grounding electrodes for other electric power, motor power, welding devices, etc.
- Where metal ducts, metallic conduits, or distributing racks are used for cable laying, ground in accordance with Electric Equipment Technical Standards.

WARNING

- Ground resistance must be 100 Ω or less.
- Failure to observe this warning may result in fire or electric shock.
- Before wiring, make sure to turn 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 fire or electric shock.

CAUTION

- Wiring must be performed by authorized or certified personnel.
- Failure to observe this caution may result in fire or electric shock.
4.2 Cable Connection

There are two cables for the power supply: a power cable (1BC) and an encoder cable for detection (2BC). Connect these cables to the MOTOPOS base connectors and the NX100 respectively. Refer to (a) to (c) of “Fig. 6 Connection between the MOTOPOS and the NX100”.

4.2.1 Connection to the MOTOPOS

Before connecting the cables to the MOTOPOS, check the numbers on both cables and the MOTOPOS base connectors. Connect each cable adjusting the cable connector positions to the main key positions of the MOTOPOS, and then tighten the nut until it clicks.

4.2.2 Connection to the NX100

Remove the cover of the lower side on the NX100 side. Pass the power cable (1BC) and the encoder cable (2BC) through the opening for the cables, and then fasten bolts on the opening.

Connect the power cable (1BC) to the relay connector (CNEX\textsubscript{PW} and CNEX\textsubscript{BRK}). Check the numbers on both the cable and the relay connectors before connecting.

Connect the encoder cable (2BC) to the relay connector (CNEX\textsubscript{SG} and CNEX\textsubscript{T}). Check the numbers on both the cable and the relay connector before connection.
4.2 Cable Connection

Fig. 6 (a) Connection between the MOTOPOS and the NX100
Fig. 6 (b) Connection between the MOTOPOS and the NX100 (MOTOPOS Side)
4.2 Cable Connection

Fig. 6 (c) Connection between the MOTOPOS and the Power Cable (NX100 Side)
### Basic Specifications List

#### Table 2 Basic Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>YR-MPD700B-A00</th>
<th>YR-MPD700B-A02</th>
<th>YR-MPD700B-B00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Degree of Freedom</strong></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Payload</strong></td>
<td>700 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repetitive Positioning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.1 mm (R250 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motion Range</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tilting Axis</strong></td>
<td>±90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rotary Axis</strong></td>
<td>±200°</td>
<td>±370° (Endless)</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Speed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tilting Axis</strong></td>
<td>1.40 rad/s (80°/s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rotary Axis</strong></td>
<td>2.80 rad/s (160°/s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Allowable Moment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tilting Axis</strong></td>
<td>2842 N·m (200 kgf·m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rotary Axis</strong></td>
<td>686 N·m (70 kgf·m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Allowable Inertia (GD^2/4)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tilting Axis</strong></td>
<td>250 kg·m^2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rotary Axis</strong></td>
<td>70 kg·m^2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equipment Specifications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Signal</strong></td>
<td>0.5 mm^2 × 6 wires x 12 wires</td>
<td>0.5 mm^2 × 6 wires x 24 wires</td>
<td>0.5 mm^2 × 6 wires</td>
</tr>
<tr>
<td></td>
<td>AWG19 x 22 wires</td>
<td>0.5 mm^2 × 3 wires + shielded (for CCLINK)</td>
<td></td>
</tr>
<tr>
<td><strong>Air</strong></td>
<td>3/8&quot; x 1 line</td>
<td>3/8&quot; x 2 lines</td>
<td></td>
</tr>
<tr>
<td><strong>Standard Painted Color</strong></td>
<td>Light gray</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>350 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient Conditions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>0 to 45°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>20 to 80% RH (non-condensing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>4.9 ms^2 (0.5 G) or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>Free from corrosive gas or liquid, or explosive gas</td>
<td>Free from dust, soot, or water</td>
<td>Free from excessive electrical noise (plasma)</td>
</tr>
<tr>
<td><strong>Power Capacity</strong></td>
<td>6 kVA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. SI units are used in this table. However, gravitational unit is used in ( ).
2. Conformed to ISO9283.0
3. The rotary axis endless function is optional.
4. Refer to "6.1 Allowable Load" for details on the permissible moment of inertia.
5.2 Part Names and Working Axes

![Diagram of part names and working axes]

Fig. 7 Part Names and Working Axes

5.3 Baseplate Dimensions

![Diagram of baseplate dimensions (mm)]

Fig. 8 Baseplate Dimensions (mm)
5.4 Dimensions and Working Envelope

Fig. 9 Dimensions and Working Envelope
6 Load Specifications and Jig Mounting Section

6.1 Allowable Load

This section describes the allowable values and various limitations. The payload of the MOTOPOS is 700 kg. The moment and moment of inertia are limited as shown in Table 3 "Moment and Total Inertia".

Table 3  Moment and Total Inertia

<table>
<thead>
<tr>
<th>Axis</th>
<th>Moment N-m (kgf·m)</th>
<th>$GD^2/4$ Total Moment of Inertia kgf·m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilling Axis</td>
<td>2842 (290)</td>
<td>250</td>
</tr>
<tr>
<td>Rotary Axis</td>
<td>686 (70)</td>
<td>70</td>
</tr>
</tbody>
</table>

*: Gravitational unit

When the volume load is small, refer to the moment rating shown in Fig. 10 "Moment Rating". The allowable total moment of inertia is calculated when the moment is at the maximum. Contact your Yaskawa representative beforehand when only the moment of inertia is created, or when the load moment is small while the moment of inertia is large. Also, when the load mass is combined with an outside force, contact your Yaskawa representative beforehand.

Fig. 10  Moment Rating
6.2 Details of Jig Mounting Face

The jig mounting dimensions are shown in Fig. 11 "Details of Jig Mounting Face". It is recommended that the table and the jig be mounted using an inside dowel and dowel pin, or two dowel pins. The dowel pins are to be prepared by customers.

Provide a space for positioner maintenance on the jig side as shown in the following figure.

NOTE: Wash OFF anti-corrosive paint (solid color) on the jig mounting surface with thinner or light oil before mounting the tools.
### 7 System Application

#### 7.1 Internal User I/O Wiring Harness and Air Line

For the drives of the devices such as a jig, internal user I/O wires and an air line are built into the MOTOPOS as shown in Fig. 12 "Internal User I/O Wiring Harness and Air Line".

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR-MPD700B-A00:</td>
<td>Internal user I/O wiring harness</td>
<td>0.5 mm² × 12 wires, AWG19 × 22 wires</td>
</tr>
<tr>
<td></td>
<td>Air line</td>
<td>Inside diameter: 8 mm × 1 line</td>
</tr>
<tr>
<td>YR-MPD700B-A02:</td>
<td>Internal user I/O wiring harness</td>
<td>0.5 mm² × 6 wires, 0.75 mm² × 24 wires, 0.5 mm² × 3 wires + shielded (for CC-LINK)</td>
</tr>
<tr>
<td></td>
<td>Air line</td>
<td>Inside diameter: 8 mm × 1 line</td>
</tr>
<tr>
<td>YR-MPD700B-B00:</td>
<td>Internal user I/O wiring harness</td>
<td>0.5 mm² × 6 wires, Inside diameter: 8 mm × 2 lines</td>
</tr>
<tr>
<td></td>
<td>Air line</td>
<td></td>
</tr>
</tbody>
</table>

Connector pins are assigned as shown in Fig. 12 "Internal User I/O Wiring Harness and Air Line". Wiring must be performed by user.

- The allowable current for internal user I/O wiring harness: 3 A or less for each wire (30 A or less in total)
- The allowable current for internal user I/O wiring harness for B00: 2 A or less for each wire
- The maximum pressure for the air line: 490 kPa (5 kgf/cm²) or less
### Table. 4 List of Connector Types

<table>
<thead>
<tr>
<th>Positioner</th>
<th>Name</th>
<th>Connector Type</th>
<th>Applicable Pin No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR-MPD700B-A00</td>
<td>Connector base section: Internal user I/O wiring harness</td>
<td>JL05-2A28-21PCW (JL05-6A28-21SCW: Optional)</td>
<td>1 to 35</td>
</tr>
<tr>
<td></td>
<td>Table section: Internal user I/O wiring harness</td>
<td>Crimped contact-pin PC2005-W (Crimped contact-pin PC2005-M: Optional)</td>
<td>1 to 35</td>
</tr>
<tr>
<td>YR-MPD700B-A02</td>
<td>Connector base section: Internal user I/O wiring harness</td>
<td>JL05-2A28-21PCW (JL05-6A28-21SCW: Optional)</td>
<td>1 to 35</td>
</tr>
<tr>
<td></td>
<td>Table section: Internal user I/O wiring harness</td>
<td>Crimped contact-pin PC2005-W (Crimped contact-pin PC2005-M: Optional)</td>
<td>1 to 35</td>
</tr>
<tr>
<td>YR-MPD700B-B00</td>
<td>Connector base section: Internal user I/O wiring harness</td>
<td>JL05-2A18-1PC (JL05-6A18-1SC: Optional)</td>
<td>1 to 6</td>
</tr>
<tr>
<td></td>
<td>Table section: Internal user I/O wiring harness</td>
<td>Crimped contact-pin PC2005-W (Crimped contact-pin PC2005-M: Optional)</td>
<td>1 to 6</td>
</tr>
</tbody>
</table>

Fig. 12 Internal User I/O Wiring Harness and Air Line

Crimped contact-pin for internal user I/O wiring harness

Exhaust port: Urethane tube: TU1208B

Air inlet: Tapped hole PT3/8

Cable connector for internal user I/O wiring harness
The internal wiring harness and the air line on the table side are designed to be pulled out from the center part. Provide a hole for pullout on the jig base plate. Be sure to mount a cover on the hole to avoid spatters going inside the MOTOPOS. Refer to a mounting example in Fig. 13 "Pullout Section of Internal Wiring Harness and Air Line".

**Fig. 13 Pullout Section of Internal Wiring Harness and Air Line**

Be sure to provide a cover for the internal user I/O wiring harness and air line pullout section on the table side. Otherwise, spatters may go inside the MOTOPOS resulting in a failure.

**NOTE**
7 System Application
7.2 Minus Cable for Welding

7.2 Minus Cable for Welding

Minus cable for welding is equipped inside the MOTOPOS.

- Allowable current for minus cable: 500 A

The minus cable on the table side is connected directly to the table. It is connected to the jig base plate through the table, requiring no minus cable on the jig side. However, to connect the cable to any place near the welded part, connect the minus cable to the jig base plate as shown in Fig. 14 "Minus Wire Connection".

![Fig. 14 Minus Wire Connection](image)
8 Electrical Equipment Specification

8.1 Position of Limit Switch

The overrun limit switch is provided only for the tilting axis. For the location, refer to Fig. 15 "Location of Limit Switch".

8.2 Internal Connections

High reliability connectors which can be easily put on and removed are used in each connector part.
Fig. 16 (a) Internal Connection Diagram (Type: YR-MPD700B-A00)
8.2 Internal Connections

Fig. 16 (b) Internal Connection Diagram (Type: YR-MPD700B-A02)
8.2 Internal Connections

Fig. 16 (c) Internal Connection Diagram (Type: YR-MPD700B-B00)
9 Maintenance and Inspection

9.1 Inspection Interval

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation. Inspection intervals are classified into six levels as shown in Table 5. Conduct periodical inspections according to the inspection schedule in Table 1 “Inspection Items”.

In Table 1 “Inspection Items”, the inspection items are categorized by 3 types of operations: operations which can be performed by personnel authorized by 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 depends on the total servo operation time.
- For axes which are used very frequently other than arc welding, it is recommended that inspections be conducted at shorter intervals. Contact your YASKAWA representative.
## 9 Maintenance and Inspection

### 9.1 Inspection Interval

<table>
<thead>
<tr>
<th>Items</th>
<th>Inspection Interval</th>
<th>Method</th>
<th>Operation</th>
<th>Inspection Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>1000 H Cycle</td>
<td>6000 H Cycle</td>
<td>12000 H Cycle</td>
</tr>
<tr>
<td>1</td>
<td>Alignment mark</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>External lead</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Working area and</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>whole exterior of</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOTOPOS</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tilting axis motor</td>
<td></td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Earth brush</td>
<td></td>
<td>Air blow</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Baseplate mounting</td>
<td></td>
<td>Spanner</td>
<td>Wrench</td>
</tr>
<tr>
<td>7</td>
<td>Cover mounting</td>
<td></td>
<td>Screwdriver</td>
<td>Wrench</td>
</tr>
<tr>
<td>8</td>
<td>Connectors</td>
<td></td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Air line</td>
<td></td>
<td>Auditory</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rotary joint</td>
<td></td>
<td>Visual,</td>
<td>Auditory</td>
</tr>
<tr>
<td></td>
<td>(only for type:</td>
<td></td>
<td>Auditory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BS0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Cross Roller</td>
<td></td>
<td>Auditory,</td>
<td>Grease Gun</td>
</tr>
<tr>
<td></td>
<td>Bearing (only for</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>type: A00, A02)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Wire harness in</td>
<td></td>
<td>Multimeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOTOPOS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Battery pack in</td>
<td></td>
<td>Replace.</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1: Inspection Items**
9.1 Inspection Interval

When checking for conduction with multimeter, remove connectors on detector side for each axis from the motor.

Wire harness in MOTOPOS should be replaced at 24000H inspection.

For the grease, refer to Table 2 "Inspection Parts and Grease Used".

Fig. 1   Inspection Parts and Inspection Numbers

The numbers in the above table correspond to the numbers in Table 1 "Inspection Items".
9.2 Notes on Maintenance Procedures

9.2.1 Battery Pack Replacement

The battery pack is mounted in the location indicated in Fig. 2 "Battery Location". If a battery alarm occurs in the NX100, replace the battery according to the following procedure:

1. Turn OFF the NX100 main power supply.
2. Remove the cover of the tilting frame and pull out the battery pack to replace.
3. Remove the battery pack mounting screw.
4. Remove the plastic tape (insulation tape) protecting the connection part of the battery pack in the MOTOPOS.
5. Connect the new battery.
6. Remove the old battery.
9.2 Notes on Maintenance Procedures

7. Protect the connection part of the battery pack in the MOTOPOS with plastic tape (insulation tape).
8. Mount the battery pack with the screws, and then reinstall the cover to complete the replacement.

**NOTE**

Be sure not to pinch cables in reinstalling the cover of the frame section.

### 9.2.2 Grease Replenishment/Exchange for Tilting Axis Speed Reducer

**Grease Replenishment**

(Refer to Fig. 4 "Tilting Axis Speed Reducer Diagram").

1. Remove the motor cover.
2. Remove the plug from Bo grease exhaust port.

**NOTE**

If grease is added with the plug on, grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.
3. Inject grease into the Bi grease inlet using a grease gun.

4. Move the tilting axis for a few minutes to discharge the excess grease.
5. Wipe the Bo grease exhaust port with a cloth and reinstall the plug. (Apply the Modifier silicon Caulk on the thread part of the plug.)
6. Reinstall the motor cover.

**Grease Exchange**

(Refer to Fig. 4 "Tilting Axis Speed Reducer Diagram").

1. Remove the motor cover.
2. Remove the plug from Bo grease exhaust port.

**NOTE**

If grease is added with the plug on, grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.

3. Inject grease into the Bi grease inlet using a grease gun.

Grease type: Molywhite RE No.00

4. The grease replacement is completed when new grease appears in the Bo grease exhaust port. The new grease can be distinguished from the old grease by color.
5. Move the tilting axis for a few minutes to discharge the excess grease.
6. Wipe the Bo grease exhaust port with a cloth and reinstall the plug. (Apply the Modifier silicon Caulk on the thread part of the plug.)
7. Reinstall the motor cover.
Grease Replenishment/Exchange for Rotary Axis Speed Reducer

**Grease Replenishment**
(Refer to Fig. 5 "Rotary Axis Speed Reducer Diagram").

1. Stop the tilting axis at the following position.
   - A00, A02: home position
   - B00: +90° position

2. Remove the plug from To grease exhaust port.

3. Inject grease into the Ti grease inlet using a grease gun.

   **NOTE**
   If grease is added with the plug on, grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.

4. Move the rotary axis for a few minutes to discharge the excess grease.

5. Wipe the To grease exhaust port with a cloth and reinstall the plug. (Apply the Modifier silicon Caulk on the thread part of the plug.)

- Grease type: Molywhite RE No.00
9.2 Notes on Maintenance Procedures

#### Grease Exchange

(Refer to Fig. 5 "Rotary Axis Speed Reducer Diagram").

1. Remove the plug from To grease exhaust port.

![NOTE]

**If grease is added with the plug on, grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.**

2. Inject grease into the Ti grease inlets using a grease gun.

   Grease type: Molywhite RE No.00

3. The grease replacement is completed when new grease appears in the To grease exhaust port. The new grease can be distinguished from the old grease by color.

4. Move the rotary axis for a few minutes to discharge the excess grease.

5. Wipe the To grease exhaust port with a cloth and reinstall the plug. (Apply the Modifier silicon Caulk on the thread part of the plug.)
9.2.4 Grease Replenishment for Cross Roller Bearing
(for A00, A02)

**Grease Replenishment**

(Refer to Fig. 6 "Cross Roller Bearing Diagram").

1. Remove the cover of the rotary axis frame.
2. Inject grease into the Ci grease inlet using a grease gun.

**Grease type: Alvania EP Grease 2**

3. Reinstall the cover to the rotary axis frame.
10 Recommended Spare Parts

It is recommended that the parts and components in the following table be kept in stock as spare parts for the MOTOPOS. Product performance can not be guaranteed when using spare parts from any company other than YASKAWA. The spare parts are ranked as follows:

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

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

Table 7  Spare Parts for the MOTOPOS

<table>
<thead>
<tr>
<th>Rank</th>
<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>A</td>
<td>1</td>
<td>Grease</td>
<td>Molywhite RE No.00</td>
<td>YASKAWA</td>
<td>16kg</td>
<td>For speed reducer of each axis</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Silicon Rubber Compound Tube</td>
<td>Modifier Silicon Calk</td>
<td>Konishi Co., Ltd.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Battery Pack</td>
<td>HWI471030-A</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>Brush Unit</td>
<td>HS9381711-A</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>Bearing</td>
<td>6026LLU</td>
<td>Nippon Seiko K.K.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>Tilting Axis Speed Reducer</td>
<td>HS0382070-A</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>Rotary Axis Speed Reducer</td>
<td>HW0384017-A</td>
<td>YASKAWA</td>
<td>1</td>
<td>For YR-MPD700B-A00, A02</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>Rotary Joint (only for YR-MPD700B-B00)</td>
<td>HS0381083-A</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>Cross Roller Bearing</td>
<td>CRBH17025VUE01</td>
<td>Nippon Thompson Co., Ltd.</td>
<td>1</td>
<td>For YR-MPD700B-A00, A02</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>AC Servomotor for Tilting Axis</td>
<td>SGMRS-37A2A-YR11</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>11</td>
<td>AC Servomotor for Rotary Axis</td>
<td>SGMRS-13A2A-YR11</td>
<td>YASKAWA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>12</td>
<td>Wire Harness in MOTOPOS</td>
<td>HS0170370-A</td>
<td>YASKAWA</td>
<td>1</td>
<td>For YR-MPD700B-A00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE

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