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Chapter 1

Introduction

1.1 About This Document

This manual provides information for the MotoPos-T5000 positioner and contains the following sections:

CHAPTER 1 - INTRODUCTION
Provides general information about the structure of this manual, a list of reference documents, and customer service information.

CHAPTER 2 - SAFETY
This section provides information regarding the safe use and operation of Motoman products.

CHAPTER 3 - MOTOPOS-T5000 INSTRUCTIONS
Provides detailed information for the MotoPos-T5000 positioner.

1.2 Reference to Other Documentation

For additional information refer to the following:

• NX100 Controller Manual (P/N 149201-1)
• Concurrent I/O Manual (P/N 149230-1)
• Operator's Manual for your application
• Vendor manuals for system components not manufactured by Motoman

1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

• Robot Type (MotoPos-T5000)
• Application Type (welding, handling, etc.)
• Robot Serial Number (located on back side of robot arm)
• Robot Sales Order Number (located on back of controller)
Notes
Chapter 2

Safety

2.1 Introduction

It is the purchaser’s responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06-1999. The address is as follows:

RoboticIndustriesAssociation
900VictorsWay
P.O.Box3724
AnnArbor,Michigan48106
TEL:(734)994-6088
FAX:(734)994-3338
INTERNET:www.roboticsonline.com

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. The robot must not be operated by personnel who have not been trained!

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.
This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming, Operation, and Maintenance Safety (Section 2.6)

### 2.2 Standard Conventions

This manual includes the following alerts – in descending order of severity – that are essential to the safety of personnel and equipment. As you read this manual, pay close attention to these alerts to insure safety when installing, operating, programming, and maintaining this equipment.

**DANGER!**

Information appearing in a DANGER concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.

**WARNING!**

Information appearing in a WARNING concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.

**CAUTION!**

Information appearing in a CAUTION concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

*Note: Information appearing in a Note provides additional information which is helpful in understanding the item being explained.*
2.3 **General Safeguarding Tips**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot 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 robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06-1999, 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).

2.4 **Mechanical Safety Devices**

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's 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 R15.06-1999 safety standards, and other local codes that may pertain to the installation and use of industrial 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 fences and barriers
- Light curtains and/or safety mats
- Door interlocks
- Emergency stop palm buttons located on operator station, robot controller, and programming pendant

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.
2.5 Installation Safety

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06-1999 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 Programming, Operation, and Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot 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 robot should be permitted to program, operate, and maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the robot and work envelope 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.
- Do not enter the robot cell while it is in automatic operation. Be sure that only the person holding the programming pendant enters the workcell.
- Check the E-STOP button on the programming pendant for proper operation before programming. The robot 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 PART 1, System Section, of the robot controller concurrent I/O program can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1, System Section. Making any changes without the written permission of Motoman will VOID YOUR WARRANTY!

• Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. YOUR WARRANTY WILL BE VOID if you use these special passwords.

• The robot controller allows modifications of PART 2, User Section, of the concurrent I/O program and modifications to controller parameters for maximum robot performance. Great care must be taken when making these modifications. All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot and other parts of the system. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations.

• Check and test any new or modified program at low speed for at least one full cycle.

• 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 robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
Notes
Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOPOS INSTRUCTIONS
MOTOMAN SETUP MANUAL
MOTOMAN-MANIPULATOR INSTRUCTIONS
YASNAC XRC INSTRUCTIONS
YASNAC XRC OPERATOR’S MANUAL
YASNAC XRC OPERATOR’S MANUAL For BEGINNERS
MOTOPOS INSTRUCTIONS
The YASNAC XRC operator’s manuals above correspond to specific usage.
Be sure to use the appropriate manual.
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 Safety Manual Section 1: Safety. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.

CAUTION

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

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

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

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

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the YASNAC XRC. In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

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

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

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

🚫 PROHIBITED
Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

⚠️ NOTE
To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”. 
Before operating the MOTOPOS, check that servo power is turned OFF when the emergency stop buttons on the playback panel or programming pendant are pressed. When the servo power is turned OFF, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are 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.

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

Operator injury can occur if the Teach Lock is not set and the MOTOPOS is started from the playback panel.

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.
- 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 MOTOPOS’s work envelope and that you are in a safe location before:
- Turning ON the YASNAC XRC power
- Moving 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 are problems. The emergency stop button is located on the right side of both the YASNAC XRC playback panel and programming pendant.
WARNING

• **Install the safety guards.**
  Failure to observe this warning may result in injury or damage.

• **Install the MOTOPOS in a location where the fully extended arm and tool will not reach the wall, safety guards, or XRC.**
  Failure to observe this warning may result in injury or damage.

• **Do not start the MOTOPOS or even turn ON the power before it is firmly anchored.**
  The MOTOPOS may overturn and cause injury or damage.

• **Ground resistance must be 100 Ω or less.**
  Failure to observe this warning may result in fire or electric shock.

• **Before wiring, make sure to turn the primary power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)**
  Failure to observe this warning may result in fire or electric shock.

• **Before maintenance or inspection, be sure to turn the main power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)**
  Failure to observe this warning may result in electric shock or injury.
Perform the following inspection procedures prior to conducting MOTO-POS teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
- Check for problems in MOTOPOS movement.
- Check for damage to insulation and sheathing of external wires.

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

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

Read and understand the Explanation of the Alarm Display in the Setup Manual before operating the MOTOPOS.

Confirm that the MOTOPOS and the XRC have the same order number. Special care must be taken when more than one MOTOPOS is to be installed.

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

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

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

Avoid excessive vibration or shock during transporting.

The system consists of precision components, so failure to observe this caution may adversely affect performance.

Do not install or operate a MOTOPOS that is damaged or lacking parts.

Failure to observe this caution may cause injury or damage.

Before turning ON the power, check to be sure that the shipping bolts and jigs have been removed.

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

Wiring must be performed by authorized or certified personnel.

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

Maintenance and inspection must be performed by specified personnel.

Failure to observe this caution may result in electric shock or injury.
Definition of Terms Used Often in This Manual

The MOTOPOS positioner is the positioner product for the YASKAWA industrial robot. The MOTOPOS usually consists of the positioner unit, the controller, the playback panel, the programming pendant, and power 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>YASNAC XRC Controller</td>
<td>XRC</td>
</tr>
<tr>
<td>YASNAC XRC Playback Panel</td>
<td>Playback Panel</td>
</tr>
<tr>
<td>YASNAC XRC Programming Pendant</td>
<td>Programming Pendant</td>
</tr>
</tbody>
</table>

CAUTION

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

Failure to observe this caution may result in injury from unexpected turning of the table.
AN 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

MOTOPOS
TYPE
PAYLOAD kg
MASS kg
ORDER NO.
DATE
SERIAL NO.

YAMAHA ELECTRIC CORPORATION JAPAN
1 Receiving
   1.1 Checking Package Contents ........................................ 1-1
   1.2 Checking the Order Number ........................................ 1-2

2 Transporting
   2.1 Transporting Method ............................................... 2-1
      2.1.1 Using the Crane .............................................. 2-1

3 Installation
   3.1 Safety Guard Installation .......................................... 3-2
   3.2 Mounting Procedures for MOTOPOS Baseplate .................... 3-2
      3.2.1 When the MOTOPOS and Robot are Installed on a Common Base 3-3
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4 Wiring
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      4.2.1 Connection to the MOTOPOS .................................. 4-2
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5 Basic Specifications
   5.1 Basic Specifications List .......................................... 5-1
   5.2 Part Names and Working Axes ..................................... 5-2
   5.3 Baseplate Dimensions .............................................. 5-2
   5.4 Dimensions and Working Envelope ................................. 5-3

6 Load Specifications and Jig Mounting Section
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9  Maintenance and Inspection
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   9.2  Notes on Maintenance Procedures .................9-4
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            ■  Grease Replenishment (Refer to " Fig. 17  Speed Reducer
                 Diagram "). ........................................9-4
            ■  Grease Replacement (Refer to" Fig. 17  Speed Reducer
                 Diagram "). .......................................9-5

10  Recommended Spare Parts
1 Receiving

1.1 Checking Package Contents

When the package arrives, check the contents for the following standard items (Any additional options ordered should be checked as well.):

- Manipulator
- XRC
- Programming pendant
- Power cable between the XRC and the manipulator (×2 or ×3)
- MOTOPOS
- Power cable between the MOTOPOS and the XRC (×2)

CAUTION

- Confirm that the MOTOPOS and the XRC have the same order number. Special care must be taken when more than one MOTOPOS is 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 XRC. The order number is located on a label as shown below.

THE MOTOPOS AND THE CONTROLLER SHOULD HAVE SAME ORDER NUMBER.

ORDER. No. 000000

Check that the MOTOPOS and the XRC have the same order number.

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

Fig. 1 Location of Order Number Labels
2 Transporting

2.1 Transporting Method

2.1.1 Using the Crane

As a rule, when removing the MOTOPos from the package and moving it, a crane should be used. The MOTOPos should be lifted using wire rope threaded through attached eyebolts.

CAUTION

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

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

- Avoid excessive vibration or shock during transporting.

  The system consists of precision components, so failure to observe this caution may adversely affect performance.

Fig. 2 Transporting Position
2.1 Transporting Method

• Check that the eyebolts are securely fastened.
• The weight of the MOTOPOS is approximately 950kg including the shipping bolts and jigs. Use a wire rope strong enough to withstand the weight.
• Attached eyebolts are designed to support the MOTOPOS weight. Do not use them for anything other than transporting the MOTOPOS.
• Mount the shipping bolts and jigs for transporting the MOTOPOS.
• Avoid exerting force on the arm or motor unit when transporting, use caution when using transporting equipment other than a crane or forklift, as injury may occur.

Remove the eyebolts after transport and installation. The eyebolts must be stored for future use in the event that the MOTOPOS must be moved again.
3  Installation

WARNING

- Install the safety guards.
  Failure to observe this warning may result in injury or damage.

- Install the MOTOPOS in a location where the fully extended arm and tool will not reach the wall, safety guards, or XRC.
  Failure to observe this warning may result in injury or damage.

- Do not start the MOTOPOS or even turn ON the power before it is firmly anchored.
  The MOTOPOS may overturn and cause injury or damage.

CAUTION

- Do not install or operate a MOTOPOS that is damaged or lacking parts.
  Failure to observe this caution may cause injury or damage.

- Before turning ON the power, check to be sure that the shipping bolts and jigs have been removed.
  Failure to observe this caution may result in damage to the driving parts.
3.1 Safety Guard Installation

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

(ISO 10218)

Responsibility for Safeguarding

The user of a MOTOPOS 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 during acceleration and deceleration. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the MOTOPOS. During installation, if out of the plane is not right, the MOTOPOS shape may change and its functional ability may be compromised. Out of the plane for installation must be kept at 0.5mm or less. Mount the baseplate in either of the following ways: 3.2.1 or 3.2.2.

| Table. 1   Maximum repulsion forces of the MOTOPOS |
|-----------|-----------------------------------------------|
| Maximum torque when rotary axis used | 22000N • m (2250kgf • m) |
3.2.1 When the MOTOPOS and Robot are Installed on a Common Base

The common base should be rugged and durable to prevent shifting of the MOTOPOS or the robot. Use the common base of such thickness or the mounting anchor bolts of such size recommended for the robot to be combined. Mount the MOTOPOS base securely with six M20 hexagon socket head cap bolts (70 mm long recommended). Tighten the bolts and anchor bolts so that they will not work loose during operation.

![Diagram of MOTOPOS Baseplate on Common Base](image)

3.2.2 When the MOTOPOS is Mounted Directly 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". As a rough standard, when there is a concrete thickness (floor) of 200mm or more, base plate (MOTOPOS 36mm or more) can be fixed directly to the floor with M20 anchor bolts. Before mounting the MOTOPOS, however, check that the floor is level and that all cracks, etc. are repaired. Any thickness less than 200mm is insufficient for mounting, even if the floor is concrete.
3.2 Mounting Procedures for MOTOPOS Baseplate

Fig. 4 Affixing the MOTOPOS on the Floor
3.3 Location

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

- 0° to 45°C (Ambient temperature)
- 20 to 80%RH (non-condensing)
- Free from dust, soot, or water
- Free from corrosive gases or liquid, or explosive gases
- Free from excessive vibration (less than 0.5G)
- Free from large electrical noise (plasma)
- Out of the plane for installation is 0.5mm or less.
4.1 Grounding

Follow local regulations for ground line size.

**WARNING**

- **Ground resistance must be 100 Ω or less.**
  Failure to observe this warning may result in fire or electric shock.

- **Before wiring, make sure to turn the primary power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)**
  Failure to observe this warning may result in fire or electric shock.

**CAUTION**

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

**NOTE**

- Do not use this line in common 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.
4.2 Cable Connection

There are two cables for the power supply; a power cable (1BC) and a signal cable for detection (2BC). Connect these cables to the MOTOPOS base connectors and the XRC, respectively. (See “Fig. 6 Connection between the MOTOPOS and Power Cable”.)

4.2.1 Connection to the MOTOPOS

Before connecting the cables to the MOTOPOS, verify the numbers on both cables and the MOTOPOS base connectors. When connecting, adjust the cable connector positions to the main key positions of the MOTOPOS, insert cables, and then tighten the nut until hearing a “click”.

4.2.2 Connection to the XRC

Remove the cover on the XRC side. Pass the power cable (1BC) and the signal cable (2BC) through the opening for the cables, and then fasten bolts on the opening. Connect the power cable (1BC) to the boards. Be sure to verify the numbers on both the cable and board connectors before connecting, and to fasten the bolts on connectors to prevent cables from loosening. Connect the signal cable (2BC) to the SERVOPACK and the board. Be sure to verify the numbers on both the cable and the SERVOPACK board connectors before connecting.
4.2 Cable Connection

Fig. 6 (a) Connection between the MOTOPOS and the Power Cable

Fig. 6 (b) Connection between the MOTOPOS and the Power Cable
## 5 Basic Specifications

### 5.1 Basic Specifications List

#### Table. 2 Basic Specifications *1

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>YR-MPT5000-A00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of Freedom</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Allowable Loading Weight</td>
<td></td>
<td>5000kg</td>
</tr>
<tr>
<td>Repetitive Positioning Accuracy*2</td>
<td></td>
<td>±0.3mm (R1000mm)</td>
</tr>
<tr>
<td>Motion Range</td>
<td></td>
<td>(0°, -180°, -90°, +90°)</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td></td>
<td>1.05rad/s (13.3r.p.m), (10r.p.m)</td>
</tr>
<tr>
<td>Allowable Moment*3</td>
<td></td>
<td>7350N•m (750kgf•m)</td>
</tr>
<tr>
<td>Allowable Inertia (GD²/4)</td>
<td></td>
<td>6000kg•m²</td>
</tr>
<tr>
<td><strong>Equipment Specifications</strong></td>
<td>Signal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td><strong>Standard Painting Color</strong></td>
<td>Dark gray</td>
<td></td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td></td>
<td>950kg</td>
</tr>
<tr>
<td><strong>Ambient Conditions</strong></td>
<td>Temperature</td>
<td>0 to 45°C</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>20 to 80% RH (non-condensing)</td>
</tr>
<tr>
<td></td>
<td>Vibration</td>
<td>Less than 0.5G</td>
</tr>
<tr>
<td>Others</td>
<td>• Free from corrosive gasses or liquids, or explosive gasses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Clean and dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Free from excessive electrical noise (plasma)</td>
<td></td>
</tr>
<tr>
<td><strong>Power Capacity</strong></td>
<td></td>
<td>3kVA</td>
</tr>
</tbody>
</table>

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

*2 Conformed to ISO9283.

*3 Refer to "6.1 Allowable Load" for details on the permissible moment of inertia.
5.2 Part Names and Working Axes

Fig. 7 Part Names and Working Axes

5.3 Baseplate Dimensions

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

The allowable load is up to 5000 kg. This section describes the allowable values and various limitations. The moment and moment inertia are limited as shown in "Table. 3 Moment and Total Inertia".

When the volume load is small, refer to the moment rating shown in "Fig. 10 Moment Rating". The allowable total inertia is calculated when the moment is at the maximum. Contact your Yaskawa representative when only inertia moment, or load moment is small and inertia moment is large. Also, when the load is combined as a force but a mass, contact your Yaskawa representative.

---

**Table. 3 Moment and Total Inertia**

<table>
<thead>
<tr>
<th>Axis Name</th>
<th>Moment N•m (kgf•m) (*1)</th>
<th>GD^2/4 Total Inertia kg•m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary Axis</td>
<td>7350 (750)</td>
<td>6000</td>
</tr>
</tbody>
</table>

*1 ( ): Gravitational unit
6.2 Details in 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 outside dowel and dowel pin, or two dowel pins.

It is recommended that a hole of φ200mm or more be made on the rotational center of the jig baseplate for cable. When the hole is made, attach a cover to prevent spatters, etc. from entering.
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 Stopper pin

Operators sometimes insert/remove workpieces in/from jig on the table directly. To prevent injury, the table can be locked using a stopper pin so it does not move. Using an air cylinder, insert the stopper pin into the hole on the movable side with the rotary axis positioned at +90° and -90°.

Because there is between the pin and the hole, do not use it for positioning. For wiring, refer to "8.2 Internal Connections".

Fig. 13 Stopper Pin
8 MOTOPOS Construction

8.1 Position of Limit Switch

Two limit switches are provided inside. For the location, refer to "Fig. 14 Location of Limit Switch".

8.2 Internal Connections

High reliability connectors which can be easily removed are used with each connector part.
Fig. 15 Internal Connection Diagram

8-2
9 Maintenance and Inspection

**WARNING**

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

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

**CAUTION**

- Maintenance and inspection must be performed by specified personnel.

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

- For disassembly or repair, contact your Yaskawa representative.

- Do not remove the motor, and do not release the brake.

Failure to observe this caution may result in injury from unexpected turning of the table.

9.1 Inspection Schedule

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation. Inspection intervals are displayed in the levels shown in "Table. 4 Inspection Items". Conduct periodical inspections according to the inspection schedule in "Table. 4 Inspection Items". In "Table. 4 Inspection Items", the inspection items are classified into three types of operation: 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 must be based on the servo power supply on 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.

### Table 4 Inspection Items

<table>
<thead>
<tr>
<th>Items(^4)</th>
<th>Schedule</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>Home position key</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>External lead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Working area and MOTOPOS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Stopper pin, cylinder and value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Baseplate mounting bolts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cover mounting screws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Connectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Air hose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Limit switch, dog</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wire harness in MOTOPOS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

- Replace.\(^2\)

---

\(^1\) Check for wear of protective spring.

\(^2\) Replace.
9.1 Inspection Schedule

Table. 4 Inspection Items

<table>
<thead>
<tr>
<th>Items*4</th>
<th>Schedule</th>
<th>Method</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>1000 H Cycle</td>
<td>6000 H Cycle</td>
</tr>
<tr>
<td>11 Speed reducers</td>
<td>O</td>
<td>O</td>
<td>Grease Gun</td>
</tr>
<tr>
<td>12 Overhaul</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

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

*2 Wire harness in MOTOPOS to be replaced at 24000H inspection.

*3 For the grease, refer to “Table. 5 Inspection Parts and Grease Used”.

*4 Inspection No. correspond to the numbers in “Fig. 16 Inspection Parts and Inspection Numbers”.

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![Fig. 16 Inspection Parts and Inspection Numbers](image-url)
9.2 Notes on Maintenance Procedures

The numbers in the above table correspond to the numbers in "Table. 4 Inspection Items".

### Table. 5 Inspection Parts and Grease Used

<table>
<thead>
<tr>
<th>No.</th>
<th>Grease Used</th>
<th>Inspected Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>13, 14</td>
<td>Molywhite RE No. 00</td>
<td>Speed reducers</td>
</tr>
</tbody>
</table>

Do not pinch the cable when the connector base is installed.

#### 9.2.1 Grease Replenishment/Replacement for Speed Reducer

![Speed Reducer Diagram](image)

- Grease Replenishment (Refer to "Fig. 17 Speed Reducer Diagram ")
  1. Remove the Wo exhaust plug.

  **NOTE** If grease is added without removing the exhaust plug, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plug.
2. Inject the grease into the Wi grease inlet using a grease gun.

   Grease type: Molywhite RE No.00
   Amount of grease: 700cc
   (1400cc for 1st supply)

3. Move the rotary axis for a few minutes to discharge the excess grease.
4. Wipe the Wo exhaust plugs with a cloth and reinstall the plugs. (Spread the Modifier silicon Caulk on the screw of the plug.)

**Grease Replacement (Refer to" Fig. 17  Speed Reducer Diagram ").**

1. Remove the Wo exhaust plug.

   **NOTE**
   If grease is added without removing the exhaust plug, the grease will go inside the motor and may damage it. It is absolutely necessary to remove the plug.

2. Inject the grease into the Wi grease inlet using a grease gun.

   Grease type: Molywhite RE No.00
   Amount of grease: 3400cc

3. The grease replacement is complete when new grease appears in the Wo 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 Wo exhaust port with a cloth and reinstall the plug. (Spread the Modifier silicon Caulk on the screw of the plug.)
10 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the MOTOPOS. The spare parts list for the MOTOPOS is shown below. 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

![NOTE]

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

### Table 6  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</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 Electric Corporation</td>
<td>16kg</td>
<td>-</td>
<td>Speed reducers</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Silicon Rubber Compound Tube</td>
<td>Modifier Silicon Caulk</td>
<td>Konishi Co., Ltd.</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Battery Unit</td>
<td>HW8471030-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>Air Cylinder</td>
<td>CDQ2B80-35DCM-P50DWL</td>
<td>SMC</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>Solenoid Value</td>
<td>VFS3201-5FZ-03</td>
<td>SMC</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>Speed Reducer</td>
<td>HW9381388-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>Gear</td>
<td>HS9382005-1 HS9382006-1 HS9382007-1 HS9381476-1</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>8</td>
<td>AC Servomotor</td>
<td>HW9380963-A SGMD-40AWAY13</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>9</td>
<td>Internal Wiring</td>
<td>HS0470014-A HS0470013-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
MOTOPOS-T5000 POSITIONER

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