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Chapter 1

Introduction

1.1 About This Document

This manual is intended as an introduction and overview for personnel who have received operator training from Motoman, and who are familiar with the operation of this Motoman positioner model. For more detailed information, refer to the manuals listed in Section 1.4. This manual contains the following sections:

CHAPTER 1 - INTRODUCTION
This chapter provides general information about the MSR2S-Series and its components, options, equipment specifications, a list of reference documents, and customer service information.

CHAPTER 2 - SAFETY
This chapter provides information regarding the safe use and operation of the MSR2S-Series.

CHAPTER 3 - INSTALLATION
This chapter provides instructions for set up and installation of the MSR2S-Series.

CHAPTER 4 - MAINTENANCE
This chapter contains a table listing periodic maintenance requirements for the components of the MSR2S-Series.

APPENDIX A - ILLUSTRATED PARTS LIST
This appendix contains the Illustrated Parts List (IPL). The IPL provides detailed views (with part numbers) of the MSR2S-500 and MSR2S-750 positioner components.
1.2 MSR2S-Series Description

The Motoman MSR2S-Series positioners are 3-axis, 180-degree reciprocating positioners with capacity to handle loads of 500 kg and 750 kg per side. The maximum unbalanced load is 250 kg. The tooling axes of the 500-kg positioners are derivatives of the MH450 headstocks with a work envelope of 1.3 M in diameter and 2.0 M in length. The 750-kg positioner is available for those customers that need greater capacity. The tooling axes of the 750-kg positioner are derivatives of the MRM2-1200M3X product. The work envelope for the 750-kg positioner is 1.3 M in diameter and 3.0 M in length. A 4.5 kW motor drives the sweep axis for both the 500-kg and the 750-kg positioners. 1.3 kW motors drive the two tooling axes of the 500-kg positioner, while 2.2 kW motors drive the two tooling axes of the 750-kg positioner. The NX100 controller can rotate all three positioner axes simultaneously during the sweep motion. The headstocks can be coordinated with the robot’s motion to weld circumferential joints. The operator stations can be programmed to jog in 30-degree increments. Motoman offers an operator station with a jog switch for this function.) The positioners have internal passages for routing air and electrical service to the tooling axes. The tooling tailstock shafts are hollow to allow routing of utilities to the fixtures. Motoman offers an optional slip ring kit for longer service life on rotating fixtures.

The MSR2S-Series positioners include the following features:

- MotoMount™ compliant tool mounting system
- Dual-channel in-position switches on sweep axis
- In-position switches on each tooling axis (30 degree increments)
- Arc screen provides shielding from arc flash

![Figure 1 MSR2S-Series Positioner and Major Components](image-url)
1.2.1 Layout

Figure 2 shows the layout, tooling envelope, and load heights for the MSR2S-Series positioner.

![Figure 2 MSR2S-Series Positioner Layout](image)

1.2.2 Specifications

See Table 4 for specifications.

<table>
<thead>
<tr>
<th>Table 4 MSR2S-Series Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
</tbody>
</table>
| Base axis index sweep time @ 180 degrees | sec       | 3.7 (MSR2S-500)  
|                                      |           | 5.0 (MSR2S-750)                     |
| Capacity per side                   | kg        | 500 per side (MSR2S-500)  
|                                      |           | 750 per side (MSR2S-750)            |
| Distance faceplate to faceplate     | m         | 1977 (MSR2S-500)  
|                                      |           | 2977 (MSR2S-750)                    |
| Maximum fixture diameter            | m         | 1.3                                   |
| Tooling axis torque (static)        | N\(\cdot\)m| 671 (MSR2S-500)  
|                                      |           | 895 (MSR2S-750)                      |
| Tooling axis speed                  | rpm       | 19.6 (MSR2S-500)  
|                                      |           | 20.7 (MSR2S-750)                     |
| Tooling axis index time             | sec/180 degrees | 2.25 (MSR2S-500 @ 19.6 rpm)  
|                                      |           | 2.25 (MSR2S-750 @ 20.7 rpm)          |
| Repeatability                       | mm        | ±0.1                                  |
| Welding capacity @ 100% duty cycle  | amps      | 800 (MSR2S-500)  
|                                      |           | 1200 (MSR2S-750)                     |
| Index sweep diameter                | mm        | (see Figure 2)                        |
| Load height                         | mm        | 821                                   |
| Tailstock thru hole                 | mm        | 41                                    |
1.3 **MotoMount**

MotoMount (see Figure 3) is a flexible tool fixture mounting system which improves tool repeatability and reduces loads on the headstock/tailstock bearing systems. MotoMount accommodates combined headstock/tailstock/tooling misalignments up to two degrees. MotoMount is included with the MSR2S headstock/tailstock positioner.

![Figure 3 MotoMount Components](image)

1.3.1 **Optional Equipment**

The following option is available for the MSR2S-Series:

- Slip ring kit (P/N 147478-1)

1.4 **Reference to Other Documentation**

For additional information refer to the following:

- System manual that came with your system
- Motoman *Concurrent I/O Manual* (P/N 149230-1)
- Vendor manuals for system components not manufactured by Motoman
1.5 Customer Service Information

If you need assistance with any aspect of your MSR2S-Series system, please contact Motoman Customer Support at the following 24-hour telephone number –

[937. 847. 3200]

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

[techsupport@motoman.com]

When using e-mail to contact Motoman 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.

*Note: 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 Motoman Customer Support at the telephone number shown above.*

Please have the following information ready before you call –

- Robot Type (EA1400N, HP20, etc.)
- Application Type (material handling, arc welding, etc.)
- System Type (MSR2S-Series)
- Software Version (access using TOP MENU > SYSTEM INFO > VERSION > SYSTEM on the programming pendant)
- Robot Serial Number (located on back side of robot arm)
- Robot Sales Order Number (located on front door 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 (ANSI/RIA R15.06-1999). 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 robot system. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the robot cell. **NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE ROBOT SYSTEM!**

We recommend approved Motoman training courses for all personnel involved with the operation, programming, or repair of the robot system. This training is designed to familiarize personnel with the safe and correct operation of the robot 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 Important Advisory Information

Throughout this manual you will find advisory paragraphs (denoted by graphic symbols and bold typeface). All of these (except “NOTE”) direct the reader’s attention to information and procedures that are essential to the safety of personnel or protection of equipment.

The type of information contained in the various advisories is described below. These are listed here in descending order of importance to the safety of personnel and protection of equipment.

**DANGER!**

Information appearing under the DANGER caption concerns the protection of personnel from an 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 under the WARNING caption 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 under the CAUTION caption 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 caption provides additional information that can be 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).
Chapter 3
Installation

The MSR2S-Series positioner can be installed easily in just a short time by three workers. The more people involved (within reason), the more quickly installation can be completed. Follow established safety procedures at all times throughout the installation process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

CAUTION!
Installation of the MSR2S-Series positioner is not a task for the novice. The MSR2S-Series positioner is not fragile, but it is a sophisticated machine. Handle components with care. Rough handling can damage electronic components.

3.1 Materials Required

All hardware necessary for installing the MSR2S-Series positioner is included. This section identifies customer-supplied items and tools required to complete installation.

3.1.1 Customer-Supplied Items

- Suitable floor anchors rated at 4000-kgf working load

3.1.2 List of Tools

- Safety glasses
- Face shields
- Gloves
- Level
- Hammer drill with appropriate concrete bits
- Phillips and flat screwdrivers
- Socket set
- Forklift and/or overhead crane
- Large torque wrench
- Large hex sockets-M14, M17, M19, M24
- Wrench sets (standard and metric)
3.2 Site Preparation

All components of the MSR2S-Series positioner must be firmly mounted on a foundation rigid enough to support its static and dynamic forces. Review drawing package for specifications. To prepare your site, proceed as follows:

1. Clear the floor space needed for the positioner. Refer to Figure 4 for the area needed for installation.
2. Gather all customer-supplied items and required tools listed in Section 3.1.

**Figure 4** Area Needed for Installation
3.3 Unpacking the Positioner

This positioner is shipped individually on a shipping pallet. To unpack the positioner, proceed as follows:

1. Carefully remove protective plastic wrapping from the positioner.
2. Inspect positioner for shipping damage.

*Note: Notify your shipping contractor if you notice any shipping damage.*

3. Unbolt positioner from shipping skid. Refer to Figure 5 for location of shipping bolts.

**WARNING!**

This positioner weighs 2070 kg. Be sure that the lifting device used to lift it is capable of handling this much weight or damage to the equipment or injury to personnel can result.

4. Using a forklift, lift the positioner from the shipping pallet and place in position on floor. Make sure there is adequate room for tooling installation and part positioning.
3.4 Anchoring Positioner Base

1. Use bolt holes shown in Figure 6 as a guide for installation of the anchors. Transfer the hole locations to the concrete.
2. Install the anchors in the concrete per the manufacture’s instructions.
3. Install a leveling shim at each anchor location.
4. Screw each leveling bolt down until it just contacts the leveling shim and hand tighten the anchor bolts or nuts.

3.5 Connecting the Cables

Do not connect the encoder, power, and ground cables until after the positioner is securely in place. When the MSR2S positioner is delivered with a Motoman robot, connections between the two usually have been made at the factory, or if not, instructions for making connections can be found in the system manual. See separate schematics and/or documentation specific to your system.

Attach weld ground cables (one for each power supply) to the weld ground bar located next to the Power and Encoder connectors (see Figure 6).
3.6 Tooling Fixture Installation

The initial tooling installation is required prior to the headstock/tailstock alignment procedure.

1. Jog the headstock to the Home position (see Section 4.5).

**WARNING!**
Make certain servo power is OFF for the remainder of the installation, or serious operator injury and/or equipment damage may result.

2. Use a suitable lifting device to position the tooling above the headstock/tailstock assemblies.
3. Slowly lower tooling fixture while aligning with the headstock locating pin and the tailstock locating pin. Adjust tailstock angle as needed.
4. Secure the tooling to the drive assembly with customer-supplied M12, grade 8.8 (or better) bolts and hardened washers. Hardened washers are included with the MotoMount kit for this purpose.
5. Tighten tool mounting bolts to 76 N•m.

**WARNING!**
Check tool mounting bolts daily for proper tightness.

6. Continue lowering the tooling until the hoisting straps are loose.
7. Tighten the tailstock bearing retaining set screws.

3.7 Conducting a Safety/Operation Check

Before operating the MSR2S-Series positoner, take a few minutes to perform a safety/operation check. To perform a safety/operation check, proceed as follows:

1. Check that all cable connections are tight.
2. Check that all component hardware is tight.
Chapter 4

Maintenance

Maintenance of MSR2S-Series components should be performed only by authorized personnel who are familiar with the design and construction of this product. The following procedures should be performed only as needed. Read through the instructions completely before performing any maintenance procedure. Be sure that you understand the procedure, have the proper tools, and observe all applicable safety precautions.

WARNING!
Ensure that servo power is OFF before performing the following procedures. Observe standard lockout/tagout practices.

4.1 Parts Ordering

To order replacement parts, or replacement parts for the MSR2S-Series, please contact Motoman Customer Service (refer to Section 1.4).
4.2 **Spare Parts**

When a part malfunctions, it is helpful to have replacement parts in stock for quick replacement. Table 5 lists the recommended spare parts with Motoman part numbers. Motoman recommends the following parts be kept on hand:

**Table 5 Recommended Spare Parts**

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weld Ground Brush Post</td>
<td>144370-1</td>
<td>2</td>
</tr>
<tr>
<td>Weld Ground Brush Holder</td>
<td>144372-1</td>
<td>1</td>
</tr>
<tr>
<td>Switch</td>
<td>143963-1</td>
<td>4</td>
</tr>
<tr>
<td>Brush</td>
<td>144371-1</td>
<td>2</td>
</tr>
<tr>
<td>Grease (drive components)</td>
<td>Molywhite RE00</td>
<td>1</td>
</tr>
<tr>
<td>Grease (slewing bearing)</td>
<td>Kluber #039067, Lubricate 3000</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note: The motor and reducer are not recommended for field service. The unit should be returned to Motoman for repairs to these components.*

4.3 **Servomotor**

The AC servomotor has no wear parts (i.e. brushes), so a simple daily inspection is sufficient. *Do not disassemble the motor.* If you suspect that the servomotor is in need of overhaul, please contact the Motoman Customer Service (refer to Section 1.5).

4.4 **Weld Ground Brush Replacement**

To replace the grounding brush(s) proceed as follows:

1. Shut down cell at main disconnect.
2. Use a flathead screwdriver to disconnect the brush cable(s) from the ground post (refer to Figure 7).
Figure 7 Disconnecting Brush Cable from Ground Post

3. Release the spring tensioner on the back of the brush by squeezing both black spring levers and pulling away from the faceplate.
4. Disconnect the brush cables from the ground posts. Remove the brush.
5. To install new brush, release spring tensioner on back of new brush and insert into faceplate.
6. Using a flathead screwdriver, reconnect brush cables to the ground post.

4.5 Homing

4.5.1 Homing Base Axis

To Home the base axis of the MSR2S positioner, jog the base axis so the B side is at the robot and the A side is at the operator loading area. Continue to rotate the axis into the hardstop until 50 to 60 percent motor torque is achieved. Reset this point as Home:

1. Make sure robot(s) is in Home position.
2. Place the programming pendant in TEACH MODE and jog the base axis slowly until the B-side is facing the robot side and the A-side is facing the operator loading area.
3. Continue to rotate the axis into the hardstop until 50 to 60 percent motor torque is achieved.
4. Enter this point as Home.
5. Rotate base axis slowly until the A side is facing the robot side.
6. Continue to rotate the axis into the hardstop until 50 to 60 percent motor torque is achieved.
7. Enter this point.
4.5.2 Homing Swing Arm Axes

To Home the swing arm axes of the MSR2S positioner, install the alignment pins in the faceplate holes and swing arm. Then reset the headstock as follows:

1. Make sure robot(s) is in Home position.
2. Place the programming pendant in TEACH MODE and jog the faceplate slowly until the homing hole in the face plate is aligned with the homing pin hole in the swing arm (see Figure 8).

![Figure 8 Home Position](image)

3. Once the faceplate has been jogged into place, install both the faceplate and swing arm homing pins.
4. Slowly jog the drive assembly until the plastic pins just touch each other (see Figure 8). If you go too far, the pins will bend. Slowly jog the faceplate in reverse rotation until the pins return to a straight position.
5. Enter this point in the controller.

4.6 Adjusting Position Limit Switches

The headstock tooling plate can be rotated from the Home position (zero degrees) using the programming pendant and the three-position joystick at the operator station. Moving the joystick FORWARD rotates the headstock tooling plate clockwise 30 degrees, while moving it to REVERSE rotates the tooling plate counter clockwise 30 degrees.
As the tooling plate rotates, a factory installed screw (see Figure 9) located at Home position activates a limit switch. When activated, the limit switch overrides the safety light curtain functions. That allows operator access to the positioner without disrupting cycle time in the other zones.

Position limit functions are active during rotation of the headstock because the next tooling plate screw has not yet reached a limit switch.

Twelve user-defined load positions are available on the tooling plate at 30-degree intervals.

![Figure 9 Position Limit Switch Setting](image)

### 4.7 Positioner Maintenance Schedule

See Table 6 for the periodic maintenance schedule for positioner.

<table>
<thead>
<tr>
<th>Inspection Item</th>
<th>Frequency</th>
<th>Inspection Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical damage</td>
<td>Daily</td>
<td>Check for physical damage; this indicates a load collision and is evidence of misuse.</td>
</tr>
<tr>
<td>Excessive or unusual noise</td>
<td>Daily</td>
<td>Listen for grinding, excessive or irregular noise. Contact the Motoman Customer Service (refer to Section 1.5).</td>
</tr>
<tr>
<td>Weld Brushes</td>
<td>First Week</td>
<td>Check for dirt and ensure full contact with faceplate.</td>
</tr>
<tr>
<td></td>
<td>Weekly</td>
<td>Check for dirt and ensure full contact with faceplate.</td>
</tr>
<tr>
<td>Cleaning</td>
<td>As required</td>
<td>Clean with dry cloth or compressed air.</td>
</tr>
</tbody>
</table>
Positioner Manual
Chapter 4  Maintenance

Table 6  Periodic Maintenance for Positioner (Continued)

<table>
<thead>
<tr>
<th>Inspection Item</th>
<th>Frequency</th>
<th>Inspection Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioner Axis Motor Connectors</td>
<td>1,000 H</td>
<td>Check for loose connections. Tighten if necessary.</td>
</tr>
<tr>
<td></td>
<td>6,000 H</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12,000 H</td>
<td></td>
</tr>
<tr>
<td>Positioner Axis Speed Reducer and Gear</td>
<td>6,000 H</td>
<td>Grease at 6,000 H with Motoman P/N 132412-1, Molywhite RE00.</td>
</tr>
<tr>
<td>Positioner Axis Speed Reducer and Gear</td>
<td>12,000 H</td>
<td>Replace grease at 12,000 H with Motoman P/N 132412-1, Molywhite RE00.</td>
</tr>
<tr>
<td>Limit Switch Actuator for Positioner Axis</td>
<td>6,000 H</td>
<td>Check for damage and looseness. Tighten and check the actuator movement.</td>
</tr>
<tr>
<td></td>
<td>12,000 H</td>
<td></td>
</tr>
<tr>
<td>Slewing Bearing</td>
<td>Monthly</td>
<td>Grease with Motoman P/N 133174-2, Kluber #039067, Lubricate 3000, or equivalent. Apply lubricant to bearing with a suitable brush.</td>
</tr>
</tbody>
</table>

H=Hours of operation

4.8 MotoMount

See Table 7 for periodic maintenance schedule for MotoMount.

Table 7  Periodic Maintenance for MotoMount

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Using compressed air or a suitable brush, remove any weld spatter and dirt from the drive components, with particular attention to the drive bushing area.</td>
</tr>
<tr>
<td></td>
<td>Verify tooling bolts are tight.</td>
</tr>
<tr>
<td>Monthly</td>
<td>Provide 2-3 pumps of grease (Motoman P/N 133174-2, Kluber #039067, Lubricate 3000, or equivalent) to the main bearing zerk fitting.</td>
</tr>
<tr>
<td></td>
<td>Verify the leveling and lag bolts are tight on the positioner base.</td>
</tr>
<tr>
<td>Daily</td>
<td>Using compressed air or a suitable brush, remove any weld spatter and dirt from the drive component, with particular attention to the drive bushing area.</td>
</tr>
</tbody>
</table>
4.9 Troubleshooting

Table 8 identifies common problems that may occur during positioner operation. To troubleshoot your positioner, identify the type of problem and look for it in the Symptom column. Next to this column is a list of Probable Cause, followed by possible Corrective Action.

Be aware that sometimes more than one problem can occur at the same time. After identifying and resolving a problem, test the system thoroughly to make sure no other problems exists.

Table 8 Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor does not start</td>
<td>Loose connection</td>
<td>Check all wire connections.</td>
</tr>
<tr>
<td></td>
<td>Incorrect wiring</td>
<td>Check that system has been wired correctly.</td>
</tr>
<tr>
<td></td>
<td>Overload</td>
<td>Reduce load or reduce unbalanced load.</td>
</tr>
<tr>
<td>Unstable operation</td>
<td>Incorrect wiring</td>
<td>Inspect and correct wiring across motor terminals L1, L2, L3, and PE.</td>
</tr>
<tr>
<td>Motor overheats</td>
<td>Excessive ambient temperature</td>
<td>Reduce ambient temperature below 40°C (104°F). Positioner has an operating range of 0 to 45°C (32 to 113°F).</td>
</tr>
<tr>
<td></td>
<td>Motor surface is dirty</td>
<td>Clean motor surface.</td>
</tr>
<tr>
<td></td>
<td>Motor overloaded</td>
<td>Reduce load or unbalanced load.</td>
</tr>
<tr>
<td>Unusual noise</td>
<td>Motor loosely mounted</td>
<td>Tighten mounting bolts.</td>
</tr>
<tr>
<td></td>
<td>Positioner misaligned</td>
<td>Realign headstock/tailstock.</td>
</tr>
<tr>
<td></td>
<td>Noisy bearing</td>
<td>Check alignment, noise of bearing, lubrication. Call Motoman Service.</td>
</tr>
<tr>
<td>Weld quality bad</td>
<td>Brushes misaligned</td>
<td>Remove brush(s) and reinstall them properly. Recheck as needed.</td>
</tr>
</tbody>
</table>
Appendix A

Illustrated Parts List

A.1 Introduction

The Illustrated Parts List identifies, and illustrates detail parts of the main assemblies for the MSR2S-Series positioner. This list provides parts identification and descriptive information for use in provisioning, requesting, purchasing, storing, and issuing spare parts.

A.1.1 Contents

The parts list contains a breakdown of the equipment into detail parts. All parts of the equipment are listed except the following:

1. Standard hardware items (attaching parts such as nuts, screws, washers, etc., available commercially).
2. Bulk items such as wire, cable, sleeving, tubing, etc., which are also commercially available.
3. Permanently attached parts which lose their identity by being welded, soldered, riveted, etc., to other parts, or assemblies.

A.1.2 Parts List Form

This form is divided into four columns as follows:

“Figure & Item No.” Column
The Figure column lists the figure number of the illustration applicable to a particular parts list and also identifies each part in the list by an item number. Item numbers also appear on the illustration. Each item number is connected to the part to which it pertains by a leader line and arrow. The figure and item numbering system ties the parts list to the illustrations and vice versa.

“Motoman Part No.” Column
All part numbers appearing in this column are Motoman part numbers.
“Description” Column
Item nomenclature appears in this column.

“Qty” Column
This column indicates the quantity of parts required for an assembly or subassembly in which the part appears. This column does not reflect the total used in the complete end item.

A.2 Parts List

A.2.3 Explanation of Parts List Arrangement
The parts list is arranged so that the illustration will appear on left-hand page and the applicable parts list will appear on the opposite right-hand page. Unless the list is unusually long, the user will be able to look at the illustration and read the parts list without turning a page.

A.2.4 Symbols and Abbreviations
The following is a list of symbols and abbreviations used in the parts list.

amp – ampere
AC – alternating current
cyl – cylinder
DC – direct current
fig – figure
hex – hexagon
ID – inside diameter
in. – inch
m – meter
mm – millimeter
No. – number
psi – pounds per square inch
v – voltage
Figure A.1 MSR2S Positioner Exploded - Base
### Table A.1 MSR2S Positioner Exploded - Base

<table>
<thead>
<tr>
<th>Figure &amp; Item No.</th>
<th>Motoman Part No. MSR2S-500</th>
<th>Motoman Part No. MSR2S-750</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>148164-1</td>
<td>148164-1</td>
<td>Base, Positioner, MRS2S-500</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>148150-1</td>
<td>148150-1</td>
<td>Block Limit Switch</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>143963-1</td>
<td>143963-1</td>
<td>Limit Switch</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>148154-1</td>
<td>148154-1</td>
<td>Bearing, Radial</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>148166-1</td>
<td>148166-1</td>
<td>Adapter</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>148951-1</td>
<td>148951-1</td>
<td>Cover, Lower</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>148953-2</td>
<td>148953-2</td>
<td>Cover, Ring RH</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>148953-1</td>
<td>148953-1</td>
<td>Cover, Ring LH</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>150503-1</td>
<td>150503-1</td>
<td>Shock Absorber Assy</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>150499-1</td>
<td>150499-2</td>
<td>Plate, Drive Housing</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>150507-1</td>
<td>150507-1</td>
<td>Block Adjust</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>148856-1</td>
<td>148856-1</td>
<td>Gear, Pinion</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>148588-1</td>
<td>148588-2</td>
<td>RV320E-81/RV320E-118.5</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>148590-1</td>
<td>148590-1</td>
<td>Pinion</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>150501-1</td>
<td>150501-1</td>
<td>Housing, Drive Assy</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>142142-1</td>
<td>142142-1</td>
<td>4.5 kW Motor</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure A.2  MSR2S Positioner Exploded - Top
## Table A.2 MSR2S Positioner Exploded - Top

<table>
<thead>
<tr>
<th>Figure &amp; Item No.</th>
<th>MotoMan Part No.</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MSR2S-500</td>
<td></td>
<td>MSR2S-750</td>
</tr>
<tr>
<td>A.2 1</td>
<td>149835-1</td>
<td>Bracket, Mounting Shield</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>150540-1</td>
<td>Guard Housing</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>148153-1</td>
<td>Housing, Flange Bearing</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>148134-2</td>
<td>Shaft</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>150537-1</td>
<td>Cover, Side</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>150536-1</td>
<td>Side Frame Weldment</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>143963-1</td>
<td>Limit Switch</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>145896-1</td>
<td>Pin</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>150532-1</td>
<td>Plate, Face</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>150533-1</td>
<td>Drive Assy</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>145381-1</td>
<td>Motomount</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>148169-1</td>
<td>Cover</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>148167-1</td>
<td>Housing</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>150539-1</td>
<td>Screen, Arc, Positioner</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>148162-1</td>
<td>Screen, Arc</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>144370-1</td>
<td>Ground Lug</td>
<td>12</td>
</tr>
<tr>
<td>17</td>
<td>144372-1</td>
<td>Brush Holder</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>144371-1</td>
<td>Brush</td>
<td>6</td>
</tr>
</tbody>
</table>
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