Motoman NX100 Controller

UH100N NC Locator Manual

Part Number: 151970-1CD
Revision: 0
Chapter 1

Introduction

1.1 About This Document

This manual provides information for the UH100N manipulator 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 - UH100N INSTRUCTIONS
Provides detailed instructions for the UH100N.

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 (UH100N, HP50, etc.)
- Application Type (handling, welding, 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 (29 CFR, 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).
MOTOMAN-UH100N
INSTRUCTIONS

TYPE: YR-UH100N-A00 (Right Type)
YR-UH100N-B00 (Left Type)

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

MOTOMAN INSTRUCTIONS
MOTOMAN-UH100N 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.
### MANDATORY

- This instruction manual is intended to explain operating instructions and maintenance procedures primarily for the MOTOMAN-UH100N.

- 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.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the UH100N.

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 manipulator, check that servo power is turned OFF when the emergency stop buttons on the front door of the NX100 and programing pendant are pressed. When the servo power is turned OFF, the SERVO ON LED on the programing pendant is turned OFF.

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

Emergency Stop Button

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

Injury may result from unintentional or unexpected manipulator motion.

Release of Emergency Stop

• Observe the following precautions when performing teaching operations within the manipulator motion range:
  - View the manipulator 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 manipulator operation may result in injury.

• Confirm that no persons are present in the manipulator motion range and that you are in a safe location before:
  - Turning ON the NX100 power
  - Moving the manipulator with the programing pendant
  - Running the system in the check mode
  - Performing automatic operations

Injury may result if anyone enters the manipulator motion range during operation. Always press an emergency stop button immediately if there are problems. The emergency stop buttons are located on the right of the front door of the NX100 and programing pendant.
**CAUTION**

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

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

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

- Read and understand the Explanation of the Warning Labels in the NX100 instructions before operating the manipulator.

**Definition of Terms Used Often in This Manual**

The MOTOMAN manipulator is the YASKAWA industrial robot product. The manipulator usually consists of the controller, the programing pendant, and supply cables. In this manual, the equipment is designated as follows.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX100 Controller</td>
<td>NX100</td>
</tr>
<tr>
<td>NX100 Programing Pendant</td>
<td>Programing Pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator Cable</td>
</tr>
</tbody>
</table>
Explanation of Warning Labels

The following warning labels are attached to the manipulator. Always follow the warnings on the labels. Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.
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  3.2 Mounting Procedures for Manipulator Base ............... 3-3
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10 Recommended Spare Parts
1 Product Confirmation

1.1 Contents Confirmation

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

- Manipulator
- NX100
- Programming Pendant
- Manipulator Cable (2 cables, between the Manipulator and the NX100)

CAUTION

- Confirm that the manipulator and the NX100 have the same order number. Special care must be taken when more than one manipulator is to be installed.

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

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

Fig. 1 Location of Order Number Labels
2 Transporting

### 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.**

  Failure to observe this caution may adversely affect the performance as the system consists of precision components.

### 2.1 Transporting Method

- Check that the eyebolts are securely fastened.
- The weight of the manipulator is approximately 220 kg. Use a wire rope strong enough to withstand the weight.
- Attached eyebolts are designed to support the manipulator mass. Do not use them for anything other than transporting the manipulator.
- Avoid exerting external force on the arm or motor unit when transporting by a crane, forklift, or other equipment, as injury may occur.
2.1.1 Using a Crane

As a rule, when removing the manipulator from the package and moving it, a crane should be used. The manipulator should be lifted using wire rope threaded through attached eyebolts. Be sure the manipulator is fixed with the shipping bolts and bracket before transporting, and lift it in the posture as shown in "Fig. 2 Transporting Position".
2.1.2 Using a Forklift

When using a forklift, the manipulator should be fixed on a pallet with shipping bolts and bracket as shown in "Fig. 3 Using a Forklift". Insert claws under the pallet and lift it. The pallet must be strong enough to support the manipulator. Transporting of the manipulator must be performed slowly in order to avoid overturning or slippage.
3Installation

**WARNING**

- **Install the safeguarding.**
  Failure to observe this warning may result in injury or damage.

- **Install the manipulator in a location where the manipulator’s tool or the workpiece held by the manipulator will not reach the wall, safeguarding, or NX100 when the arm is fully extended.**
  Failure to observe this warning may result in injury or damage.

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

**CAUTION**

- **Do not install or operate a manipulator that is damaged or lacks in parts.**
  Failure to observe this caution may cause injury or damage.
3.1 Installation of the Safeguarding

To insure safety, be sure to install safeguarding. They prevent 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 safeguarding is 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 Manipulator Base

The manipulator should be firmly mounted on a baseplate or foundation strong enough to support the manipulator and withstand repulsion forces during acceleration and deceleration. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the manipulator. If the mounting face is out of plane, the manipulator may be deformed and its functional ability may be compromised. The flatness for installation must be kept at 0.05 mm or less. Mount the manipulator base as in the following way: "3.2.1 Mounting Example".

3.2.1 Mounting Example

Fix the baseplate to the floor. The baseplate should be rugged and durable to prevent shifting of the manipulator or the mounting fixture. The thickness of the baseplate is 40 mm or more, and an M16 size or larger anchor bolt is recommended. The manipulator base is tapped for four mounting holes; fix the manipulator base to the baseplate with the hexagon head bolts M16 (length: 50 mm is recommended). Tighten the hexagon head bolts and anchor bolts securely so that they will not work loose during the operation. See "Fig. 4 Mounting the Manipulator on Baseplate" for the method.
When installing the manipulator, 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 [0.5G or less])
- Free from large electrical noise (plasma)
- The flatness for installation is 0.05 mm or less

When the manipulators are to be installed on a wall, specify "wall-mounting type" when ordering.
4 Wiring

**WARNING**

- 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.

- Do not cover the manipulator cables or allow them to tangle. Keep the cables as straight as possible.

Failure to observe this caution may result in burns as cable heat could not dissipate.

4.1 Cable Connection

Two manipulator cables shown in Fig 5 are delivered with the manipulator; an encoder cable (1BC) and a power cable (2BC). Connect these cables to connectors on the manipulator connector base and connectors on the NX100. Refer to "Fig. 6 (a) Manipulator Cable Connectors (Manipulator Side) " and "Fig. 6 (b) Manipulator Cable Connections to the NX100 ".

4.1.1 Connection to the Manipulator

Before connecting the manipulator cables to the manipulator, verify the numbers on both manipulator cables and connectors on the manipulator connector base. Insert cables in the order of 2BC and 1BC.
4.1.2 Connection to the NX100

Before connecting the manipulator cables to the NX100, verify the numbers on both manipulator cables and connectors on the NX100. Insert cables in the order of 2BC and 1BC.

**Fig. 5 Manipulator Cables**
4.1 Cable Connection

Fig. 6 (a) Manipulator Cable Connectors (Manipulator Side)

Fig. 6 (b) Manipulator Cable Connections to the NX100
### 5 Basic Specifications

#### 5.1 Basic Specifications

<table>
<thead>
<tr>
<th>Name</th>
<th>MOTOMAN-UH100N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>YR-UH100N-A00 and -B00</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Cartesian coordinate type</td>
</tr>
<tr>
<td>Degree of Freedom</td>
<td>3</td>
</tr>
<tr>
<td>Payload</td>
<td>100 kg</td>
</tr>
<tr>
<td>Motion Range</td>
<td></td>
</tr>
<tr>
<td>X-Axis</td>
<td>300 mm</td>
</tr>
<tr>
<td>Y-Axis</td>
<td>300 mm</td>
</tr>
<tr>
<td>Z-Axis</td>
<td>300 mm</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td></td>
</tr>
<tr>
<td>X-Axis</td>
<td>250 mm/s</td>
</tr>
<tr>
<td>Y-Axis</td>
<td>250 mm/s</td>
</tr>
<tr>
<td>Z-Axis</td>
<td>250 mm/s</td>
</tr>
<tr>
<td>Repetitive Positioning Accuracy</td>
<td>±0.1 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>220 kg</td>
</tr>
<tr>
<td>Ambient Conditions</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>0 to 45°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>20 to 80% RH (no-condensing)</td>
</tr>
<tr>
<td>Vibration</td>
<td>Less than 4.9 m/s² (0.5G)</td>
</tr>
<tr>
<td>Others</td>
<td>• Free from corrosive gas or liquid, or explosive gas</td>
</tr>
<tr>
<td></td>
<td>• Free from dust, soot, or water</td>
</tr>
<tr>
<td></td>
<td>• Free from excessive electrical noise (plasma)</td>
</tr>
</tbody>
</table>

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

*2 Conformed to ISO9283
5.2 Part Names and Working Axes

Fig. 7 Part Names and Working Axes

5.3 Baseplate Dimensions

Fig. 8 Baseplate Dimensions (mm)
The above figure shows the dimensions and motion range of YR-UH100N-A00 (X = 300 mm, Y = 300 mm, Z = 300 mm). The dimensions and motion range of YR-UH100N-B00 are reversed.
6 Flange Dimensions

6.1 Flange Dimensions

The flange dimensions are shown in "Fig. 10 Flange".

• Wash off anti-corrosive paint (yellow) on the flange surface with thinner or light oil.
7 System Application

7.1 Internal User I/O Wiring Harness and Air Line

Internal user I/O wiring harness (0.3mm² × 10 wires) and four air lines are incorporated in the manipulator for the drive of peripheral devices mounted on the flange as shown in "Fig. 11 Internal User I/O Wiring Harness and Air Lines".

The terminals 1 through 10 are allocated on the terminal block inside the box as shown in "Fig.12 Detailed Drawing of Terminal Block". The wiring is to be performed by the customer.

- The maximum pressure for air line: 490 kPa (5 kgf/cm²) or less
  (The air line inside diameter: 6.5 mm)
8 Motoman Construction

8.1 Internal Connections

The manipulator internal connections and connections between the manipulator and NX100 are shown in "Fig. 13 Internal Connection Diagram".
Fig. 13  Internal Connection Diagram

Shielded wire

Encoder power supply board

X-AXIS

Y-AXIS

Z-AXIS

For reserve
9 Maintenance and Inspection

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.)</td>
</tr>
<tr>
<td>Failure to observe this warning may result in electric shock or injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maintenance and inspection must be performed by specified personnel.</td>
</tr>
<tr>
<td>Failure to observe this caution may result in electric shock or injury.</td>
</tr>
<tr>
<td>• For disassembly or repair, contact your Yaskawa representative.</td>
</tr>
<tr>
<td>• Do not remove the motor, and do not release the brake.</td>
</tr>
<tr>
<td>Failure to observe this caution may result in injury from unexpected turning of the manipulator’s arm.</td>
</tr>
<tr>
<td>• The battery pack must be connected before removing detection connector when maintenance and inspection.</td>
</tr>
<tr>
<td>Failure to observe this caution may result in the loss of home position data.</td>
</tr>
</tbody>
</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 six levels. Conduct periodical inspections according to the inspection schedule in "Table. 2 Inspection Items". In "Table. 2 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 the inspection work.
**9.1 Inspection Schedule**

**Table. 2 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>3000 H Cycle</td>
<td>12000 H Cycle</td>
</tr>
<tr>
<td>1. External appearance</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. External lead</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Baseplate mounting bolts</td>
<td>O</td>
<td>Spanner, Wrench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cover mounting screws</td>
<td>O</td>
<td>Screw driver, Wrench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Timing belts</td>
<td>O</td>
<td>Manual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Wire harness in manipulator</td>
<td>O</td>
<td>Visual Multimeter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Battery pack in manipulator</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Ball screws</td>
<td>O</td>
<td>Grease gun</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. LM guide</td>
<td>O</td>
<td>Grease gun</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Overhaul</td>
<td>O</td>
<td>Manual</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 When checking for conduction with multimeter, connect the battery to “BAT” and “OBT” of connectors on the motor side for each axis, and then remove connectors on detector side for each axis from the motor. Otherwise, the home position may be lost.

*2 Wire harness in manipulator to be replaced at 24000H inspection.
9.1 Inspection Schedule

*3 Use AFB-LF grease.
*4 Inspection No. correspond to the numbers in "Fig. 14 Inspection Parts and Inspection Numbers".

Table. 3 Grease Used

<table>
<thead>
<tr>
<th>No.</th>
<th>Grease Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>AFB-LF grease</td>
</tr>
<tr>
<td>9</td>
<td>AFB-LF grease</td>
</tr>
</tbody>
</table>

The numbers in the above table correspond to the numbers in "Table. 2 Inspection Items".
9.2 Notes on Maintenance Procedures

9.2.1 Battery Pack Replacement

The battery pack is installed in the position shown in "Fig. 15 Battery Location". If the battery alarm occurs in the NX100, replace the battery in accordance with the following procedure:

1. Turn off the NX100 main power supply.
2. Remove the plate fastening screws and the plate on the connector base, then pull the battery pack out to replace it with a new battery pack.
3. Remove the battery pack from the battery holder.
4. Connect the new battery pack to the unoccupied connector on the board.
5. Remove the old battery pack from the board.
6. Mount the new battery pack on the battery holder.

NOTE: Remove the old battery pack after connecting the new one so that the encoder absolute data does not disappear.
7. Reinstall the plate.

**NOTE** Do not pinch the cable when the plate is installed.

### 9.2.2 Grease Replenishment for X-, Y-, and Z-Axis Bearings

![Diagram of X-, Y-, and Z-Axis Diagram](image)

Greasing guidelines are as shown below. Excess grease may increase resistance and give adverse effect.

**Grease type:** AFB-LF

**Amount of grease:**
- 1.7 cc/block for X-axis LM guide
- 1.7 cc/block for Y-axis LM guide
- 0.7 cc/block for Z-axis LM guide
- 1.0 cc for X-axis ball screw
- 1.0 cc for Y-axis ball screw
- 2.8 cc for Z-axis ball screw
9.2 Notes on Maintenance Procedures

9.2.3 Notes for Maintenance

Remove the old battery pack after connecting the new one so that the encoder absolute data does not disappear. For the battery pack connection, refer to "Fig. 18 Battery Pack Connection for Motor".

- Battery Pack Connection for Motors

The connector (crimped contact-pin) for the battery backup is installed in the end point of the cable for the encoder of the motors (BAT and OBT are marked). Connect the battery pack according to the following procedure.

1. Remove the cap attached to the battery backup connector of the motor.
2. Connect the battery pack connection cable (HW9470917) for the motor with the battery backup connector of the motor. (Under such a condition, remove the encoder connector and do the maintenance check work.)
3. Confirm all connectors connection after the maintenance check ends, and remove the battery pack connection cable for the motor and the battery pack.
4. Install the cap attached to the battery backup connector of the motor.

**NOTE** Do not remove the battery pack in the base connector.

---

Fig. 18 Battery Pack Connection for Motor
10 Recommended Spare Parts

It is recommended that the following parts and components be kept in stock as spare parts for the MOTOMAN-UH100N. The spare parts list for the MOTOMAN-UH100N is shown below. Product performance cannot 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.

Table. 4 Spare Parts for MOTOMAN-UH100N

<table>
<thead>
<tr>
<th>Rank</th>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Grease</td>
<td>AFB-LF Grease</td>
<td>AFB-LF Grease</td>
<td>THK Co., Ltd.</td>
<td>16 kg</td>
<td>-</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Battery Pack (for replacement)</td>
<td>HW0470360-A</td>
<td>HW0470360-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Battery Pack (for encoder backup during motor replacement)</td>
<td>HW9470917-F</td>
<td>HW9470917-F</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>X-Axis Ball Screw</td>
<td>HW0381491-A</td>
<td>HW0381491-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>Y-Axis Ball Screw</td>
<td>HW0381491-A</td>
<td>HW0381491-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>Z-Axis Ball Screw</td>
<td>HW0381493-A</td>
<td>HW0381493-A</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>X-Axis LM Guide</td>
<td>HW0381492-A</td>
<td>HW0381492-A</td>
<td>Yaskawa Electric Corporation</td>
<td>2</td>
<td>2</td>
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<tr>
<td>B</td>
<td>9</td>
<td>Z-Axis LM Guide</td>
<td>HW0381494-A</td>
<td>HW0381494-A</td>
<td>Yaskawa Electric Corporation</td>
<td>2</td>
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Table. 4  Spare Parts for MOTOMAN-UH100N

<table>
<thead>
<tr>
<th>Rank</th>
<th>Parts No.</th>
<th>Name Description</th>
<th>Type</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
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<tbody>
<tr>
<td>B</td>
<td>10</td>
<td>Z-Axis Timing Belt</td>
<td>B150-S3M-522</td>
<td>B150-S3M-522</td>
<td>Mitsuboshi Belt- ing Limited</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>Wire Harness in Manipulator</td>
<td>HW0171130-A</td>
<td>HW0171130-B</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>12</td>
<td>X-Axis AC Servomotor</td>
<td>HW0382280-A (SGMPH-04A2A-YR1*)</td>
<td>HW0382280-A (SGMPH-04A2A-YR1*)</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>13</td>
<td>Y-Axis AC Servomotor</td>
<td>HW0382280-A (SGMPH-04A2A-YR1*)</td>
<td>HW0382280-A (SGMPH-04A2A-YR1*)</td>
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<tr>
<td>C</td>
<td>14</td>
<td>Z-Axis AC Servomotor</td>
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<td>HW0382280-A (SGMPH-04A2A-YR1*)</td>
<td>Yaskawa Electric Corporation</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
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