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

- This manual explains the maintenance of MotoFit function of the DX200 system. Read this manual carefully and be sure to understand its contents before handling the DX200.
- General items related to safety are listed in the Chapter 1: Safety of the DX200 Instructions. To ensure correct and safe operation, carefully read the DX200 Instructions before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product’s warranty.
We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338  
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment. NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX200.

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

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

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

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

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

🚫 **PROHIBITED**
- Must never be performed.

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

---

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

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

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

Figure 1: 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.

Figure 2: Release of Emergency Stop

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

Improper or unintended manipulator operation may result in injury.

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

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem. The emergency stop buttons are located on the right of front door of the DX200 and the programming pendant.
CAUTION

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

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

- Read and understand the Explanation of the Warning Labels in the DX200 Instructions before operating the manipulator.

Definition of Terms Used In this Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.

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

In this manual, the equipment is defined as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200 Controller</td>
<td>DX200</td>
</tr>
<tr>
<td>DX200 Programming Pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>
Descriptions of the programming pendant, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td></td>
</tr>
<tr>
<td>Character Keys</td>
<td></td>
</tr>
<tr>
<td>/Symbol Keys</td>
<td>The keys which have characters or its symbol printed on them are denoted with [ ].</td>
</tr>
<tr>
<td></td>
<td>ex. [ENTER]</td>
</tr>
<tr>
<td>Axis Keys</td>
<td>[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and</td>
</tr>
<tr>
<td>/Numeric Keys</td>
<td>number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a “*”</td>
</tr>
<tr>
<td></td>
<td>sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }.</td>
</tr>
<tr>
<td></td>
<td>ex. {JOB}</td>
</tr>
</tbody>
</table>

**Description of the Operation Procedure**

In the explanation of the operation procedure, the expression “Select • • •”
means that the cursor is moved to the object item and [SELECT] is pressed.

**Registered Trademark**

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

If you need assistance with any aspect of your DX200 MotoFit Function 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:

technicalsupport@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.

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 Customer Support:

- System MotoFit
- Robots ___________________________
- Primary Application ___________________________
- Controller DX200
- Software Version Access this information on the Programming Pendant’s LCD display screen by selecting {MAIN MENU} - {SYSTEM INFO} - {VERSION}
- Robot Serial Number Located on the robot data plate
- Robot Sales Order Number Located on the DX200 controller data plate
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4  Replacement of Force Sensor Cable ............................................................................ 4-1
5  Drawings for Mounting the Force Sensor ................................................................. 5-1
6  Disabling Procedure of Force Sensor ........................................................................ 6-1
1  System Configuration of MotoFit Function

The system configuration of MotoFit function is shown in the Fig. 1-1 “System Configuration of MotoFit Function”.

Fig. 1-1: System Configuration of MotoFit Function
2 Replacement of Force Sensor

Replacement procedure for the force sensor is described below. The Force sensor is a precision equipment, so when replacing, contact your YASKAWA representative.

■ Preparation

1. Move the robot to face up the flange side for easy mounting of the force sensor shown.

■ Removing Procedure

1. Turn OFF the DX200.
2. Remove the hand.
3. Remove the connector of the force sensor cable.
4. Loosen the bolt which is fixing the force sensor, and remove the force sensor.

*Fig. 2-1: Removal of Force Sensor (for SDA10)*
Mounting Procedure

1. Mounting the spacer and the force sensor
   (1) For dual-arm R1 or single-arm
      I) Mounting the spacer
         Mount the spacer between the flange and the sensor shown in the Fig. 2-2 “Mounting the Spacer (View from View A) (for SDA10)”. Mount it to make the flange opening part and the spacer opening part align in the same direction.

      **Fig. 2-2: Mounting the Spacer (View from View A) (for SDA10)**

      ![Mounting the Spacer (View from View A) (for SDA10)](image1)

      Flange opening part
      Spacer opening part

      II) Mounting the sensor
         Mount the sensor to position the spacer opening part and the mark of the sensor X-direction as shown in Fig. 2-3 “Mounting the Sensor (View from View A) (for SDA10)”. Fix it with four M6 bolts built-in the sensor (tightening torque: 6 Nm).

      **Fig. 2-3: Mounting the Sensor (View from View A) (for SDA10)**

      ![Mounting the Sensor (View from View A) (for SDA10)](image2)
(2) For single-arm R2
   I) Mounting the spacer

   Mount the spacer between the flange and the sensor shown in the Fig. 2-4 "Mounting the Spacer (View from View A) (for SDA10)".

   As shown in Fig. 2-5 "Difference of the Flange Opening Part Directions of R1 and R2 (for SDA10)", the flange opening part positions of R1 and R2 differ 180°. Therefore, mount it to make the flange opening part and the spacer opening part displaced 180°.

   **Fig. 2-4: Mounting the Spacer (View from View A) (for SDA10)**

   **Fig. 2-5: Difference of the Flange Opening Part Directions of R1 and R2 (for SDA10)**
2. Mount the hand which is prepared by the user as shown in Fig. 2-6 "Mounting the Hand". Make sure not to insert the M6 bolts for mounting into the main unit of the sensor 6 mm or more (tightening torque: 6 Nm).

![Fig. 2-6: Mounting the Hand](image)

3. After the operation pattern of the robot is determined, fix the sensor cables to the manipulator.

---

**CAUTION**

- When operating a robot, make sure that a sensor cable is not twined around the peripheral devices. Especially in a working posture that the robot contacts to a workpiece, make sure not to pinch the cable between the robot and the workpiece.

The conditions of the bend radius for fixing should be as follows.

- The bend radius \( R = 33d \) or more, also \( R = 6D \) or more
- \( d = \) the outer diameter of insulation wire core of the cable (dia. 0.98mm)
- \( D = \) the finishing outer diameter of the cable (dia. 6.7mm)
3 Replacement of Board

The communication board is fixed on the board rack of the DX200 CPU unit (JZNC-YRK21-1E) (refer to DX200 INSTRUCTIONS chapter 14 Description of Units and Circuit Boards). Turn OFF the DX200, and then replace the communication board (PCI-466102P01).
4 Replacement of Force Sensor Cable

If a cable disconnection etc. occurs, the cable needs to be replaced. Turn OFF the DX200, replace the cable according to the following steps:

1. Remove the connector of the force sensor cable from the main unit of the sensor (refer to Fig. 4-1 “How to Remove the Force Sensor Cable (The Force Sensor Side)

2. Remove the assembled part.

3. Remove the connector of the force sensor cable from the backside of the DX200 (refer to Fig. 4-2 “How to Remove the Force Sensor Cable (The DX200 Side)

4. Connect a new connector of the force sensor cable to the backside of the DX200.

5. Fix the assembly part of the cable.

6. Connect the connector of the force sensor cable to the main unit of the sensor.

Fig. 4-1: How to Remove the Force Sensor Cable (The Force Sensor Side)

Fig. 4-2: How to Remove the Force Sensor Cable (The DX200 Side)
5 Drawings for Mounting the Force Sensor

For the positioning of the spacer and force sensor of each robot for assembling, refer to the assembly drawings and the spacer drawings shown in the following table.

<table>
<thead>
<tr>
<th>Robot type</th>
<th>Force sensor type</th>
<th>Number of assembly drawing</th>
<th>Number of spacer drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH5S II/ MH5LS II</td>
<td>WEF-6A200-4-RC24-YB3</td>
<td>HW1372086</td>
<td>HW1403857</td>
</tr>
<tr>
<td>MH12</td>
<td>WEF-6A1000-30-RC24-YB3</td>
<td>HW1371719</td>
<td>HW1304333</td>
</tr>
<tr>
<td>MH24</td>
<td>WEF-6A1000-30-RC24-YB3</td>
<td>HW1372093</td>
<td>HW1304333</td>
</tr>
</tbody>
</table>
6 Disabling Procedure of Force Sensor

Please disable the sensor as the following operation before the sensor is removed.

Disabling Procedure

1. Start up the DX200 in the maintenance mode, and set the mode to management mode. Select (SYSTEM) → (SETUP) → (OPTION BOARD), and move the cursor to "Interface466102" to open the Interface466102 setting window.

2. On the Interface466102 setting window, move the cursor to "DETAIL", and press [SELECT] to open the ROBOT SENSOR OPTION setting window.
3. Modify the setting of “FORCE SENSOR” for R1 from “O”(valid) to “—”(invalid).

4. After pressing [ENTER], the confirmation dialog shows up. Select {YES} and press [ENTER].
5. The message “Select ‘Machine Safety Board FLASH Reset’” is displayed in the human interface display area. Set the mode to safety mode and select {FILE} → {INITIALIZE} → ‘Machine Safety Board FLASH Reset’.

6. After pressing [ENTER], the confirmation dialog shows up. Select {YES} and press [ENTER].