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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
DX200 INSTRUCTIONS
DX200 OPERATOR'S MANUAL (for each purpose)
DX200 MAINTENANCE MANUAL

The DX200 operator's manuals above correspond to specific usage. Be sure to use the appropriate manual.
### MANDATORY

- This manual explains the group change 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 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.
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 “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”.

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WARNING

• Before operating the manipulator, check that servo power is turned OFF pressing 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:
  – 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 cabinet of the DX200 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 Warning Labels in the DX200 Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and manipulator 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>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 keys, 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>Character Keys Symbol Keys</td>
</tr>
<tr>
<td></td>
<td>The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]</td>
</tr>
<tr>
<td></td>
<td>Axis Keys Numeric Keys</td>
</tr>
<tr>
<td></td>
<td>“Axis Keys” and “Numeric Keys” are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td></td>
<td>Keys pressed simultaneously</td>
</tr>
<tr>
<td></td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td></td>
<td>Displays</td>
</tr>
<tr>
<td></td>
<td>The menu displayed in the programming pendant is denoted with { }. 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 the SELECT key is pressed, or that the item is directly selected by touching the screen.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or bland names for each company or corporation. The indication of (R) and ™ are omitted.
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The group change function attaches/detaches a tool with multiple external axes, such as end effector, etc (hereinafter called “hand”).

The following explain how to replace the hand with external axes.

In the example below, the hand with two external axes is group S1, and the hand with three external axes is group S2.

When the manipulator moves with the hand: S1, the job control group is R1 + S1.

When the manipulator moves with the hand: S2, the job control group is R1 + S2.

*Fig. 1-1: Example of Group Change*
Fig. 1-2: Hand Changed to S1 (R1+S1)

Fig. 1-3: Hand Changed to S2 (R1+S2)
Group Change Instruction

2.1 GRPCHG Instruction

To enable the group change function, execute the GRPCHG (Group Change) instruction.

The GRPCHG instruction can be registered as JOB of a single manipulator.

### 2.1 GRPCHG Instruction

<table>
<thead>
<tr>
<th>GRPCHG</th>
<th>S1 ON</th>
</tr>
</thead>
</table>

1. Selects the group to be changed. The group can be selected among the groups for the group change.

2. Specifies ON/OFF (attach/detach) status of the selected group.

   - **ON**: Turns ON the power supply of the specified motor.
   - **OFF**: Turns OFF the power supply of the specified motor.
2.2 Registration of Instruction

1. Move the cursor immediately before the line where the GRPCHG instruction is registered.

2. Press [INFORM LIST].
   - The INFORM LIST dialog box appears.

3. Select “DEVICE”.
   - The GRPCHG instruction appears.
4. Select “GRPCHG”.
   - The GRPCHG instruction appears in the input buffer line.

5. Modify numerical data.
   - <Registration with numerical data unchanged>
     Go on to the step 6 if the instruction in the input buffer line is registered with no change of the numerical data.

   - <Editing the additional items>
     If the additional items are modified, move the cursor to the instruction in the input buffer line and press [SELECT] to display the DETAIL EDIT window. After the settings, press [ENTER] and close the DETAIL EDIT window.
6. Press [ADD], then [ENTER].

   - The instruction displayed in the input buffer line is registered.

![Screenshot showing the registration of the instruction](image-link)
3 Signal Allocation

The GRPCHG instruction has to be executed with the manipulator holding the hand for change.

An alarm occurs if the hand which is not held by the manipulator is specified in the GRPCHG instruction.

Allocation of the following signals allows to identify the types and chuck/unchuck status of the hand.

3.1 Hand Identification Signals

The hand ID is identified by general input signals. Use the following parameters to specify which input signal is to be used.

S4C537: GRP identification signal (Start) for R1
S4C538: GRP identification signal (End) for R1
S4C539: GRP identification signal (Start) for R2
S4C540: GRP identification signal (End) for R2
S4C541: GRP identification signal (Start) for R3
S4C542: GRP identification signal (End) for R3
S4C543: GRP identification signal (Start) for R4
S4C544: GRP identification signal (End) for R4
S4C545: GRP identification signal (Start) for R5
S4C546: GRP identification signal (End) for R5
S4C547: GRP identification signal (Start) for R6
S4C548: GRP identification signal (End) for R6
S4C549: GRP identification signal (Start) for R7
S4C550: GRP identification signal (End) for R7
S4C551: GRP identification signal (Start) for R8
S4C552: GRP identification signal (End) for R8

<Example> When the GRP identification signals are allocated to IN10 (Start) to 13 (End)
(at S4C537=10, S4C538=13)

<table>
<thead>
<tr>
<th>IN13</th>
<th>12</th>
<th>11</th>
<th>10</th>
</tr>
</thead>
</table>
| 0    | 0  | 0  | 0  | → Identified as GRP not connected
| 0    | 0  | 0  | 1  | → Identified as GRP S1 connected
| 0    | 0  | 1  | 0  | → Identified as GRP S2 connected
| 0    | 0  | 1  | 1  | → Identified as GRP S3 connected
| 1    | 1  | 0  | 0  | → Identified as GRP S12 connected

0: OFF, 1: ON
3.2 Identification Signals for ATC Chuck/Unchuck

General input signals identify the ATC chuck/unchuck status. Use the following parameters to specify which input signal is to be used.

- S4C553: For R1
- S4C554: For R2
- S4C555: For R3
- S4C556: For R4
- S4C557: For R5
- S4C558: For R6
- S4C559: For R7
- S4C560: For R8

<Example> When the ATC chuck/unchuck identification signal is allocated to IN14
(At S4C553=14)

<table>
<thead>
<tr>
<th>IN14</th>
<th>Identified as “unchuck”</th>
<th>Identified as “chuck”</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0: OFF, 1: ON
4 Job Examples

The following describe the job examples for attaching and detaching of the hand.

\textbf{<Job for attaching the hand (S1)>}

Job name: HAND1-ON
Control group: R1

\begin{verbatim}
NOP
MOVJ : Moves to the position where the hand is attached.
TIMER T=0.2 : Timer for 0.2 seconds.
DOUT OT#(1) OFF : Outputs the ATC chuck signal.
WAIT IN#(14)=ON : Confirms the ATC chuck.
GRPCHG S1 ON : Turns ON the hand servo power.
MOVJ : Attaches the hand and moves.
\end{verbatim}

END

\textbf{<Job for detaching the hand (S1)>}

Job name: HAND1-OFF
Control group: R1

\begin{verbatim}
NOP
MOVJ : Moves to the position where the hand is detached.
TIMER T=0.2 : Timer for 0.2 seconds.
WAIT IN#(14)=ON : Confirms the ATC chuck.
GRPCHG S1 OFF : Turns OFF the hand servo power.
DOUT OT#(1) ON : Outputs the ATC unchuck signal.
WAIT IN#(14)=OFF : Confirms the ATC unchuck.
MOVJ : Detaches the hand and moves the manipulator only.
\end{verbatim}

END
5  Alarm Message

<table>
<thead>
<tr>
<th>Alarm Number</th>
<th>Message</th>
<th>Sub Code</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4629</td>
<td>GROUP CHANGE ERROR</td>
<td></td>
<td>1 The group change parameter was invalid.</td>
<td>Validate the group change parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 The GRPCHG instruction was executed while the external axis motor was servo ON.</td>
<td>The GRPCHG instruction cannot be executed for the group which is already in the servo ON status.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 The GRPCHG instruction was executed in unchuck status.</td>
<td>Check the chuck/unchuck status, then execute the GRPCHG instruction in chuck status.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 The group identification signal was not received.</td>
<td>After the group identification signal is received, execute the GRPCHG instruction in chuck status.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 The specified control group number and the group identification number were unmatched.</td>
<td>Match the specified control group number with the group identification number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 The encoder PG power supply was OFF when the GRPCHG was ON.</td>
<td>(1) Reset the alarm, and then try again. (2) Turn OFF the power, then back ON. If the error occurs again, contact your Yaskawa representative.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 The encoder PG power supply was ON when the GRPCHG was OFF.</td>
<td>(1) Reset the alarm, and then try again. (2) Turn OFF the power, then back ON. If the error occurs again, contact your Yaskawa representative.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8 The control group that corresponds to the received group identification signal did not exist.</td>
<td>(1) Reset the alarm, and then try again. (2) Turn OFF the power, then back ON. If the error occurs again, contact your Yaskawa representative.</td>
</tr>
</tbody>
</table>
DX200 OPTIONS
INSTRUCTIONS
FOR GROUP CHANGE FUNCTION

Specifications are subject to change without notice
for ongoing product modifications and improvements.