DX200

INSTRUCTIONS

FOR EXPLOSION-PROOF SPECIFICATION

(External Axis Motor Unit :PMU04)

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 Painting)
DX200 MAINTENANCE MANUAL

The DX200 Operator’s manual above corresponds to specific usage. Be sure to use the appropriate manual.

Part Number: 179146-1CD
Revision: 0
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1 Introduction

Before using this product, read this manual and all other documents carefully to ensure knowledge about the product and safety, including all the cautions.

As seen in the figure below, the DX200 consists of the painting unit part and the standard unit part.

Hereinafter, the DX200 which consists of the painting unit part and the standard unit part is referred to as “the DX200”.

“Manipulator” described in this manual contains the external axis motor unit.
2 Indications on Explosion-Proof Devices

2.1 Label

Following warning labels are attached to the DX200.
Always follow the warnings on the labels.
Also, an identification label with important information is placed on the body of the DX200. Prior to operating the DX200, confirm the contents.

Note 1:
Specifications of the standard unit vary depending on its function or the manipulator to be connected.
1. Controller: Painting Unit

List of the Painting Unit Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated</th>
<th>Remarks</th>
<th>Painting unit size</th>
<th>Door opening and closing direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>JZBKR-YCS1-P000</td>
<td>Non explosion-proof</td>
<td>Single phase AC200V 50/60Hz</td>
<td>W600XH330XD520</td>
<td>Right</td>
</tr>
<tr>
<td>JZBKR-YCS1-P010</td>
<td>Explosion-proof</td>
<td>AC200V (+10%~15%) 60Hz</td>
<td>W600XH330XD520</td>
<td>Right</td>
</tr>
<tr>
<td>JZBKR-YCS1-P020</td>
<td>Non explosion-proof</td>
<td>AC220V 60Hz</td>
<td>W600XH330XD520</td>
<td>Right</td>
</tr>
<tr>
<td>JZBKR-YCS1-P021</td>
<td>Explosion-proof</td>
<td>W600XH500XD520</td>
<td>W600XH500XD520</td>
<td>Right</td>
</tr>
<tr>
<td>JZBKR-YCS1-PZ00</td>
<td>Non explosion-proof</td>
<td>Single phase AC200V 50/60Hz</td>
<td>W600XH330XD520</td>
<td>Left</td>
</tr>
<tr>
<td>JZBKR-YCS1-PZ10</td>
<td>Explosion-proof</td>
<td>AC220V 60Hz</td>
<td>W600XH330XD520</td>
<td>Left</td>
</tr>
<tr>
<td>JZBKR-YCS1-PZ20</td>
<td>Non explosion-proof</td>
<td>W600XH500XD520</td>
<td>W600XH500XD520</td>
<td>Left</td>
</tr>
<tr>
<td>JZBKR-YCS1-PZ21</td>
<td>Explosion-proof</td>
<td>W600XH500XD658</td>
<td>W600XH500XD658</td>
<td>Left</td>
</tr>
<tr>
<td>JZBKR-YCS1-PY00</td>
<td>Non explosion-proof</td>
<td>Double door</td>
<td>W600XH500XD658</td>
<td>Right door width: 600mm Right door width: 200mm</td>
</tr>
<tr>
<td>JZBKR-YCS1-PY20</td>
<td>Explosion-proof</td>
<td>W600XH500XD658</td>
<td>W600XH500XD658</td>
<td>Right door width: 600mm Left door width: 200mm</td>
</tr>
<tr>
<td>JZBKR-YCS1-PY21</td>
<td>Explosion-proof</td>
<td>W600XH500XD658</td>
<td>W600XH500XD658</td>
<td>Right door width: 600mm Left door width: 200mm</td>
</tr>
</tbody>
</table>
2 Indications on Explosion-Proof Devices

Fig: Label 3 (Manipulator – Indications on Rating)

Fig: Label A: Caution Label

Fig: Label B: Type of Painting Unit

Fig: Label D: Warning Label

Fig: Label C: Order Number Label

Fig: Label E: Warning Label
2.2 Standards

The DX200 meets the following requirements:

- Directive 94/9/EC for equipment and protective systems for proper use in hazardous areas
- IEC 60079-0:2011 for electrical apparatus for explosive gas atmospheres Part 0: General requirements
- IEC 60079-2:2007 for electrical apparatus for explosive gas atmospheres Part 2: Pressurized enclosures "p"
- IEC 60079-11:2011 for electrical apparatus for explosive gas atmospheres Part 11: Intrinsic safety "i"
- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- EN 1127-1 and EN 13463-1 for hazardous areas

When classifying a manipulator environment as a hazardous area (zone), observe the "Guidelines for the Avoidance of Dangers due to Explosive Atmospheres with Collection of Examples - Explosion Protection Guidelines - (EX-Directives)".

In special cases, or if you are not sure about the specification of areas with the risk of explosion, contact the competent authorities or Yaskawa and have them decide.
3 System configuration

Fig 3-1: System Configuration (PMU04-***)

Note. 1) The programming pendant is equipped with either non-explosion-proof type or explosion-proof type.
## Basic Specifications

<table>
<thead>
<tr>
<th></th>
<th>Standard Unit</th>
<th>Painting Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explosion-proof marking</strong></td>
<td>-</td>
<td>CLASS I, DIVISION 1, GROUPS C, D, Ta = 0-180°C</td>
</tr>
<tr>
<td><strong>Pressure detector/ flow switch circuit</strong></td>
<td>-</td>
<td>Maximum voltage 13.2V, Maximum current 14.2mA</td>
</tr>
<tr>
<td><strong>Solenoid valve circuit</strong></td>
<td>-</td>
<td>Maximum voltage 17.22V, Maximum current 220mA</td>
</tr>
<tr>
<td><strong>Battery circuit</strong></td>
<td>-</td>
<td>Maximum voltage DC3.6V, Maximum current 81mA (lithium thionyl chloride battery (ER17500VLY)) (Note)</td>
</tr>
</tbody>
</table>

### DX200

- **Protective structure**: IP54 (back side fan part: IP2X)
- **Dimensions (Note 1)**: 600(W) × 739(H) × 520(D), 800(W) × 330(H) × 520(D)
- **Mass (Note 2)**: 150kg (total of Standard unit + paint unit)
- **Power Supply**: Three-phase 200VAC 50/60Hz, 220VAC 60Hz, single-phase 200VAC 50/60Hz, 220VAC 60Hz
- **Grounding**: D-class grounding with ground resistance of 100 or less
- **Noise**: 62db or less
- **Installation**: Non-hazardous area
- **Ambient Temperature**: During operation: 0 to +45°C, During transportation or when stored: -10 to +60°C
- **Relative Humidity**: 10% to 90% (Non-condensing)
- **Vibration**: 0.5G or less
- **Others**: Free from corrosive gas or liquid, or explosive gas, Free from exposure to water, oil, or dust, Free from large electrical noise (plasma)

### Non explosion-proof programming pendant (JZRCR-YPP21)

- **Protective structure**: IP65
- **Dimensions**: 169(W) × 314.5(H) × 50(D)
- **Ambient Temperature**: During operation: 0 to +45°C, During transportation or when stored: -10 to +60°C
- **Ambient Temperature**: 10% to 90% (Non-condensing)
- **Installation**: Non-hazardous area

### Explosion-proof programming pendant (JZRCR-NPP07)

- **Explosion-proof marking**: Ex ib II BT4, CLASS I, DIVISION 1, GROUPS C AND D
- **Protective structure**: IP54
- **Dimensions**: 235(W) × 203(H) × 78(D)
- **Ambient Temperature**: During operation: 0 to +45°C (Hazardous area), During operation: 0 to +45°C (Non-hazardous area), During transportation or when stored: -10 to +60°C
- **Ambient Temperature**: 10% to 90% (Non-condensing)
- **Installation**: Hazardous area or non-hazardous area

**Note 1**: Dimensions are subject to change depending on the type of the DX200.

**Note 2**: Mass is subject to change depending on the specifications of the DX200
### 5 Installation

#### 5.1 Place of Installation

The conditions listed below must be met before installing the DX200:

- Non-Hazardous area
- Ambient temperature must be 0 to 45°C (32 to 113°F) during operation and -10 to 60°C (14 to 140°F) during transportation and maintenance.
- Humidity must be low with no condensation (10~90%RH).
- It must be a place with little dirt, dust, or water.
- No flammable or corrosive liquids or gases, etc. in the area.
- Little jarring or potential for striking of the DX200 (under 0.5G oscillation).
- No large electric noise source nearby.
- No potential for collision with moving equipment such as forklifts.

If the external electric noise applies, the alarm occurs and the manipulator may stop. When the alarm occurs and the manipulator stops, refer to DX200 maintenance manual and reset the alarm.

**WARNING**

Devices that are not explosion proof must not be installed in hazardous area. Failure to observe this warning may result in a fire.
5.2 Location

- Install the DX200 outside of the P-point maximum envelope of the manipulator and outside of the safeguarding.

- Install the DX200 in a location where the manipulator can be clearly seen during operation and can be operated safely.

- Install the DX200 in a location where it can be easily inspected with its door open. (Make sure to keep the maintenance area.)

- Install the DX200 at least 500 mm away from the nearest wall for maintenance access.
5.3 Installation Method

⚠️ CAUTION

- Do not climb on top of the DX200.
Failure to observe this caution may result in injury or damage.

Fix the DX200 to the floor or baseplate by using four user-supplied brackets made according to the specifications shown below. If casters are attached, fix the DX200 in the same way.

![Diagram showing installation specifications and warning]

※1: Fixing JIG is different with specification. For detail, see the following.

<table>
<thead>
<tr>
<th>Specification</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard, with transformer</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>with caster</td>
<td>145</td>
<td>165</td>
</tr>
</tbody>
</table>

(Unit: mm)

Recommended Controller fixing screw: M12 (length: 20 mm) Tightening torque (45N·m (4.6kgf·m²))
Recommended plate thickness: 6mm
Note: Choose screw length in considering effective screw 14mm in depth of the fixed screw in the side panel.
Anchor bolt: M12
6 Connection

6.1 Connection Methods

A connection diagram for the manipulator, manipulator cable, primary power cable, programming pendant, pressure switch unit, and intrinsically safe cable is shown below.

Fig. 6-1: Cable connection
(Non-explosion-proof programming pendant)

Fig. 6-2: Cable connection (Explosion-proof programming pendant)
6.1.1 Connecting the primary power supply

If the transformer unit is not attached to the DX200, refer to the “DX200 INSTRUCTIONS” to connect the primary power supply cable and ground wire.

Table 6-1: Power supply

<table>
<thead>
<tr>
<th>DX200 power supply specifications</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-phase</td>
<td>200V/220V AC (-15%,+10%) 60Hz</td>
</tr>
<tr>
<td></td>
<td>200V AC (-15%,+10%) 50Hz</td>
</tr>
</tbody>
</table>

Table 6-2: DX200 Power Capacity, Cable Sizes, and Breaker Capacities

<table>
<thead>
<tr>
<th>Manipulator</th>
<th>Power capacity (kVA)</th>
<th>Cable size (size of terminal) (mm²)</th>
<th>Capacity of breaker in DX200 (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4kW</td>
<td>1.0</td>
<td>5.5 (M5) (*)</td>
<td>20 (*)</td>
</tr>
</tbody>
</table>

(*): Content in the above mentioned table is only an example.
When an external axis is added, contact your Yaskawa representative.
· The power capacity is subject to change depending on the work condition. However, the maximum load value such as payload, operation speed, and frequency etc. are taken into account to the value.
· When an external axis is added, the power capacity will also increase. In that case, contact your Yaskawa representative, or check the rated value shown on the label on the DX200 for the power capacity.
· When selecting a transformer, contact your Yaskawa representative.

The power capacity shown above is the continuous rating value. When the robot is rapidly accelerated, the power capacity of several times the continuous rating value may be needed instantly.
6.1.2 Connecting the Manipulator Cable

Confirm the apparatus sign of the connector of the manipulator cable, connect the manipulator cable to the connectors on the back side of the DX200.

(※) The following connector layout and name depend on specification.

Back side view
6.1.3 Connecting the Programming Pendant

(1) Non-explosion proof programming pendant

Connect the programming pendant cable to the connector on the door lower right side of the DX200.
(2) Explosion proof programming pendant
1. Connect a ground wire to the ground terminal (for the power supply barrier for explosion proof programming pendant) on the back side of the DX200 painting unit.

MANDATORY

- Ground resistance to be connected to the backside of the painting unit must be 10 ohms or less with independent ground connection.

The performance of explosion proof programming pendant cannot be maintained.

The customer must prepare the ground wire.

2. Connect the explosion proof programming pendant cable to the connector on the door of the DX200 painting unit.
6.1.4 Intrinsically safe cable

Intrinsically safe cable is connected to the DX200 painting unit from pressure switch unit.

1. Draw the intrinsically safe cable into the painting unit through the cable inlets for intrinsically safe cable on the back side of the painting unit.

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**CAUTION**

- Connect the intrinsically safe cable through the cable inlets for intrinsically safe cable so that the intrinsically safe cable is separated from other cables. The performance of explosion proof cannot be maintained.
- The intrinsically safe cable must be fixed on the support, which is already mounted, after tied with the cable tie.

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Fix the Intrinsically safe cable

Cable support

Isolated Barrier (7BAR)
(For external axis)

Relay Barrier (6BAR)
(For external axis)

Painting Unit Inside
2. As illustrated in the figure below, connect the intrinsically safe cable to the terminal and of the relay barrier (6BAR) and the terminal of the isolated barrier (7BAR) in the painting unit.

3. For grounding the intrinsically safe cables, that are to be connected to (6BAR) and (7BAR), open the back panel of the painting unit, and then connect the grounding cables to the terminals.

4. The content described in this diagram is a representative example, and it is subject to change depending on the specifications.

(*)1
Crimped terminal shown below is recommended for connecting the relay barrier (6BAR) inside the DX200

1.25-MS3 (J.S.T. CONNECTORS)

(*)2
Crimped terminal shown below is recommended for connecting the isolated barrier (7BAR) inside the DX200

1.25-AF2.3B (J.S.T. CONNECTORS)
6.2 Equipment Connection Diagram

Note: Above mentioned diagrams are examples among many
7 Turning ON the Power Supply

7.1 Turning ON the Main Power Supply

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
</table>

- Confirm that nobody is present in the P-point maximum envelope of the manipulator when turning ON the DX200 power supply.

Failure to observe this caution could result in injury caused by accidental contact with the manipulator.

Press the emergency stop button immediately if any problems occur.

The emergency stop buttons are located on the right side of the front door of the DX200 and on the right side of the programming pendant.

(When the programming pendant is explosion-proof specification, the Emergency stop button is located on the upper side of the operating window.)

The main power supply is turned ON when the main power supply switch on the front of the DX200 is turned to the "ON" position, and the initial diagnosis and the current position setting begin.

![Main power supply switch](image)

7.2 Air purge

The air purge of the manipulator is started when turning ON the main power supply, and a message "Purging" is displayed on the programming pendant. The servo power cannot be turned ON during the purge.

After the air pressure becomes to normal state, and the purge time count of the timer is completed, the message "purge completed" is displayed on the programming pendant. When purge is completed, it becomes possible to turn ON the servo power.
### 8 Inspections

#### 8.1 Regular Inspection Item

<table>
<thead>
<tr>
<th>NO.</th>
<th>Item</th>
<th>Operation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DX200 front door</td>
<td>Check whether it is completely closed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check whether the gasket is not damaged.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fan</td>
<td>Check whether it is functioning normal.</td>
<td>When the power is turned ON</td>
</tr>
<tr>
<td></td>
<td>-Inside the DX200</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Duct fan at the backside</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Heat exchanger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Emergency stop button</td>
<td>Check whether it is functioning normal.</td>
<td>When the servo power is turned ON</td>
</tr>
<tr>
<td>4</td>
<td>Enable switch</td>
<td>Check whether it is functioning normal.</td>
<td>When Teach mode is enabled.</td>
</tr>
<tr>
<td>5</td>
<td>Battery</td>
<td>Check the message indication</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Power supply</td>
<td>Check the power supplying voltage (by tester)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lead wires for the breaker</td>
<td>Check disconnection or missing of lead wires, and the screw loose.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Intrinsically safe cable</td>
<td>Check disconnection or missing of lead wires, and the screw loose.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Power supply cable</td>
<td>Check disconnection or missing of lead wires, and the screw loose.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Relay barrier</td>
<td>Check whether it is functioning normal.</td>
<td>Placed Inside the painting unit.</td>
</tr>
<tr>
<td>11</td>
<td>Isolated barrier</td>
<td>Check whether it is functioning normal.</td>
<td>Placed Inside the painting unit.</td>
</tr>
<tr>
<td>12</td>
<td>Purge control board JARCR-YIS21</td>
<td>Check whether it is functioning normal.</td>
<td>Placed Inside the painting unit.</td>
</tr>
<tr>
<td>13</td>
<td>Encoder separating board JARCR-YIS22</td>
<td>Check whether it is functioning normal.</td>
<td>Placed Inside the painting unit(back side).</td>
</tr>
<tr>
<td>14</td>
<td>Encoder separating board JARCR-YIS23</td>
<td>Check whether it is functioning normal.</td>
<td>Placed Inside the painting unit(back side).</td>
</tr>
</tbody>
</table>
9 Maintenance

9.1 Maintenance for DX200

**WARNING**

- Turn OFF the power supply before opening the DX200 doors. Failure to observe this warning may result in electric shock.

- To prevent anyone inadvertently turning ON the power supply during maintenance, put up a warning sign such as "DO NOT TURN ON THE POWER" at the primary power supply (knife switch, wiring circuit breaker, etc.) and at the DX200 and related controllers and use accepted lockout/tag out Procedures. Failure to observe this caution may result in electric shock or injury.

- After maintenance is completed, carefully check that no tools are left inside the DX200 and that the doors are securely closed. Failure to observe this caution may result in electric shock or injury.

<table>
<thead>
<tr>
<th>Item</th>
<th>Schedule Inspection</th>
<th>Operation Method</th>
<th>Operation</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DX200 front door</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. DX200 front door gasket</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Fan inside the DX200</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Duct fan back side of the DX200</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Heat exchanger fan</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Emergency stop button (programming pendant)</td>
<td>Press the button after servo power is turned ON.</td>
<td>Refer to the DX200 MAINTENANCE MANUAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Enable switch</td>
<td>Check that the enable switch functions securely (programming pendant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Battery</td>
<td>Visually (programming pendant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Power supply</td>
<td>Check for the power supplying voltage (use a tester)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Intrinsically safe cable</td>
<td>Visually, Manually</td>
<td>Check for off, loose connection, or no disconnection of the connectors or lead wires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Power isolated barrier</td>
<td>Visually, Manually</td>
<td>Check for off, loose connection, or no disconnection of the connectors or lead wires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Relay barrier (inside the painting unit)</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Insulation barrier (inside the painting unit)</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Purge control board JARCR-YIS21 (inside the painting unit)</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Encoder separation board JARCR-YIS22 (Note1) (back side the inner painting unit)</td>
<td>Visually</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note1:** Even if the encoder separating board is functioning normally, it is recommended to replace it in 36000H cycle.

---

*HW1483656 24/25*
DX200

INSTRUCTIONS

FOR EXPLOSION-PROOF SPECIFICATION

(External Axis Motor Unit :PMU04)

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