This catalog is an introduction to only part of what Mitsubishi Electric has to offer. Mitsubishi Electric offers individualized solutions for the challenges in your factory.
Features

Mitsubishi Electric’s line of industrial robots offers high performance and reliability to address demanding applications across many industries. Utilization of our own leading servo and motion technologies provide superior speed and repeatability. Likewise, extended compatibility with other automation products allows for greater flexibility of integration. Standard, clean-room, and mist-proof models are available for many environments.

- Compliant to all major safety standards for global acceptance (ISO, ANSI, CE and UL models are available)
- Multiple network interfaces assure convenience and flexibility in integration
- Comprehensive programming, modeling and diagnostic software is intuitive and easy to use

Vertical type

Compact but powerful vertically articulated RV models are available in five and six axis configurations. Floor mount or ceiling mount capabilities enhances overall design flexibility. Small footprints with high rigidity and payload capabilities are ideal for high speed / high accuracy applications.

- Offers the fastest high-speed operation in its class
- High-accuracy operation with rigid arm design and active gain control
- Suitable for many environmental conditions

Horizontal type

Our horizontally articulated RH (SCARA) robots range from 350mm to 1000mm in reach and can handle up to 20Kg payload. The RH series is an excellent choice for high speed material handling, packaging, and assembly. Leading acceleration, speeds, settling time, and rigidity allow the RH to handle high throughput applications.

- Application flexibility due to wide variations in payload, reach, and stroke
- Capable of high-speed and high-accuracy operation with a simple arm and advanced motion control
- Available in ceiling mount configuration
Lineup

A wide range of available models allows for ease of selection such as strength, speed, and a compact footprint.

Vertical, multiple-joint type (RV)

<table>
<thead>
<tr>
<th>Type</th>
<th>RV-2SQ</th>
<th>RV-3SQJ</th>
<th>RV-3SQ</th>
<th>RV-6SQ</th>
<th>RV-6SQL</th>
<th>RV-12SQ</th>
<th>RV-12SQL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of axes</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Maximum load capacity (kg)</td>
<td>3</td>
<td>3.5</td>
<td>3.5</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Maximum reach radius (mm)</td>
<td>504</td>
<td>641</td>
<td>642</td>
<td>695</td>
<td>901</td>
<td>1086</td>
<td>1385</td>
</tr>
</tbody>
</table>

Controller *1

For RV-2SQ

| CR1QA-7xx | CR1DA-7xx |

Horizontal, multiple-joint type (RH)

<table>
<thead>
<tr>
<th>Type</th>
<th>RH-3SQHR</th>
<th>RH-3SQH5S</th>
<th>RH-6SQH5S</th>
<th>RH-6SQH5S</th>
<th>RH-12SQH5S</th>
<th>RH-12SQH5S</th>
<th>RH-12SQH5S</th>
<th>RH-12SQH5S</th>
<th>RH-20SQH85</th>
<th>RH-20SQH100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of axes</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Maximum load capacity (kg)</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Maximum reach radius (mm)</td>
<td>350</td>
<td>350</td>
<td>450</td>
<td>550</td>
<td>550</td>
<td>700</td>
<td>850</td>
<td>850</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

Controller *1

| CR2QA-7xx | CR2DA-7xx |

*1: The controller type names differ according to the robot arm.
A COMPACT 6 AXIS ROBOT IDEALLY SUITED FOR ASSEMBLY, MATERIAL HANDLING, INSPECTION, AND A WIDE VARIETY OF OTHER TASKS.

- Reduced profile while maintaining a large operating range
  - The length and shape of the arm are designed for optimum performance and maximum reach while providing the ability to reach positions close to the robot base.
  - A greater range of motion is insured in applications requiring ceiling or wall mount.
  - J1 operation range is expanded to 480° (±240°). This eliminates any rear side dead zone.

- Advanced servo control provides high-speed and high-accuracy operation
  - Maximum composite speed is 4,400mm/s. Additionally, the speeds of axes J4-J6 have been optimized to satisfy high-speed assembly applications.
  - Positioning repeatability of ±0.02mm combined with active-gain control and highly rigid arm design for high accuracy positioning at high speed.

- Unique arm design allows greater range of motion and accessibility.
  - Offset arm design greatly reduces the robots minimum operating radius allowing work close to the robot base.
  - Reduced elbow protrusion lessens rear interference points.
  - A compact wrist design enables the robot to reach into smaller spaces at many angles.

### Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine class</td>
<td>Standard</td>
</tr>
<tr>
<td>Installation</td>
<td>Floor type, ceiling type, wall-mounted type *2</td>
</tr>
<tr>
<td>Arm length</td>
<td>mm</td>
</tr>
<tr>
<td>Minimum reach radius</td>
<td>mm</td>
</tr>
<tr>
<td>J1</td>
<td>150 -120 +120</td>
</tr>
<tr>
<td>J2</td>
<td>240 -120 +120</td>
</tr>
<tr>
<td>J3</td>
<td>225 -120 +120</td>
</tr>
<tr>
<td>J4</td>
<td>400 -200 +200</td>
</tr>
<tr>
<td>J5</td>
<td>240 -120 +120</td>
</tr>
<tr>
<td>J6</td>
<td>275 -120 +120</td>
</tr>
<tr>
<td>Maximum composite speed *4</td>
<td>m/s</td>
</tr>
<tr>
<td>J1</td>
<td>700</td>
</tr>
<tr>
<td>J2</td>
<td>730</td>
</tr>
<tr>
<td>J3</td>
<td>730</td>
</tr>
<tr>
<td>J4</td>
<td>590</td>
</tr>
<tr>
<td>J5</td>
<td>560</td>
</tr>
<tr>
<td>J6</td>
<td>560</td>
</tr>
<tr>
<td>Position/posture at minimum operating radius</td>
<td>mm</td>
</tr>
<tr>
<td>J1</td>
<td>180</td>
</tr>
<tr>
<td>J2</td>
<td>165</td>
</tr>
<tr>
<td>J3</td>
<td>90</td>
</tr>
<tr>
<td>J4</td>
<td>80</td>
</tr>
<tr>
<td>J5</td>
<td>80</td>
</tr>
<tr>
<td>J6</td>
<td>80</td>
</tr>
<tr>
<td>Assembly work typically requires many postures compared to pick and place work.</td>
<td></td>
</tr>
<tr>
<td>Increased space efficiency and the compact layout is possible.</td>
<td></td>
</tr>
<tr>
<td>Cycle time can be shortened if it is possible to take a short cut path.</td>
<td></td>
</tr>
<tr>
<td>Increased flexibility of machine layout.</td>
<td></td>
</tr>
<tr>
<td>Examples of moving paths</td>
<td></td>
</tr>
<tr>
<td>J1 operation range designed +/- 240 degree</td>
<td></td>
</tr>
<tr>
<td>Maximum composite speed is 4,400mm/s. Additionally, the speeds of axes J4-J6 have been optimized to satisfy high-speed assembly applications.</td>
<td></td>
</tr>
<tr>
<td>Positioning repeatability of ±0.02mm combined with active-gain control and highly rigid arm design for high accuracy positioning at high speed.</td>
<td></td>
</tr>
<tr>
<td>The speed of J4, J5 and J6 have improved.</td>
<td></td>
</tr>
<tr>
<td>The J1 operation range designed +/- 240 degree</td>
<td></td>
</tr>
<tr>
<td>Range of motion is now closer to the base of the robot. This allows more flexibility and smaller system footprint.</td>
<td></td>
</tr>
<tr>
<td>Increased space efficiency and the compact layout is possible.</td>
<td></td>
</tr>
<tr>
<td>Cycle time can be shortened if it is possible to take a short cut path.</td>
<td></td>
</tr>
<tr>
<td>Increased flexibility of machine layout.</td>
<td></td>
</tr>
</tbody>
</table>

### Other Tasks

- Assembly cell
- Minimize path. Minimize cycle time. Increased flexibility of machine layout.
**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Type</th>
<th>RV-3SQJ/RV-3SJU</th>
<th>RV-3SQJ-SM/RV-3SDJ-SM</th>
<th>RV-3SQC/RV-3SJC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>Type</td>
<td>RV-3SQ / RV-3SD</td>
<td>RV-3SQ-SM / RV-3SD-SM</td>
<td>RV-3SQC / RV-3SJC</td>
</tr>
<tr>
<td><strong>Degrees of freedom</strong></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Drive system</strong></td>
<td>AC servo motor</td>
<td>AC servo motor</td>
<td>AC servo motor</td>
<td>AC servo motor</td>
</tr>
<tr>
<td><strong>Position repeatability</strong></td>
<td>±0.02</td>
<td>±0.02</td>
<td>±0.02</td>
<td>±0.02</td>
</tr>
<tr>
<td><strong>Maximum speed</strong></td>
<td>320 (±160)</td>
<td>320 (±160)</td>
<td>320 (±160)</td>
<td>320 (±160)</td>
</tr>
<tr>
<td><strong>Maximum load capacity</strong></td>
<td>3.5 (3)</td>
<td>3.5 (3)</td>
<td>3.5 (3)</td>
<td>3.5 (3)</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>Approx. 390</td>
<td>Approx. 412</td>
<td>Approx. 390</td>
<td>Approx. 412</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>0 to 40</td>
<td>0 to 40</td>
<td>0 to 40</td>
<td>0 to 40</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td>Floor type, ceiling type, (wall-mounted type *3)</td>
<td>Floor type, ceiling type, (wall-mounted type *3)</td>
<td>Floor type, ceiling type, (wall-mounted type *3)</td>
<td>Floor type, ceiling type, (wall-mounted type *3)</td>
</tr>
<tr>
<td><strong>Protection degree</strong></td>
<td>IP65 *1</td>
<td>IP65 *1</td>
<td>IP65 *1</td>
<td>IP65 *1</td>
</tr>
<tr>
<td><strong>Wire conduction</strong></td>
<td>Standard (oil mist) Clean</td>
<td>Standard (oil mist) Clean</td>
<td>Standard (oil mist) Clean</td>
<td>Standard (oil mist) Clean</td>
</tr>
<tr>
<td><strong>Locus of point P</strong></td>
<td>View A: Details of Hand Installation Flange (Conforming to ISO 9409-1)</td>
<td>View A: Details of Hand Installation Flange (Conforming to ISO 9409-1)</td>
<td>View A: Details of Hand Installation Flange (Conforming to ISO 9409-1)</td>
<td>View A: Details of Hand Installation Flange (Conforming to ISO 9409-1)</td>
</tr>
</tbody>
</table>

**Notes:**
- *1: Please contact Mitsubishi Electric dealer since the environmental resistance cannot be secured depending on the characteristics of oil you use.
- *2: The maximum load capacity indicates the maximum payload when the wrist flange is facing downward (±10°).
- *3: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
- *4: This is at the hand flange surface when all axes are composited.
- *5: Indicates the space required for the interconnection cable.
- *6: Indicates the screw hole (M4) used for affixing user wiring and piping.
- *7: Vertical, multiple-joint type

---

**External Dimensions/Operating Range Diagram**

---

**Support Software System Configuration**

**Product Lineup**

**Robot Specifications**

**Functions**
Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Type</th>
<th>Unit</th>
<th>RV-6SQ / RV-6SD</th>
<th>RV-6SQ-SM / RV-6SD-SM</th>
<th>RV-6SC / RV-6SDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine class</td>
<td></td>
<td></td>
<td>Standard (all axes)</td>
<td>Clean (all axes)</td>
<td>Clean (all axes)</td>
</tr>
<tr>
<td>Protection degree</td>
<td>5H7</td>
<td></td>
<td>Class 10 (0.3)</td>
<td>IP65 (J4 to J6), IP54 (J1 to J3)</td>
<td>Class 10 (0.3)</td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load capacity (rating) *3</td>
<td>kg</td>
<td>6 (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>deg/sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>°C</td>
<td></td>
<td>0 to 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position repeatability</td>
<td>±0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle time *5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach radius</td>
<td></td>
<td>mm</td>
<td>380 + 425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arm length</td>
<td>mm</td>
<td></td>
<td>500 + 500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load radius</td>
<td></td>
<td>cm</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>deg</td>
<td></td>
<td>150° if 85°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach radius</td>
<td></td>
<td>cm</td>
<td>380 + 425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arm length</td>
<td>mm</td>
<td></td>
<td>500 + 500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load radius</td>
<td></td>
<td>cm</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>deg</td>
<td></td>
<td>150° if 85°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum reach radius</td>
<td></td>
<td>cm</td>
<td>380 + 425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arm length</td>
<td>mm</td>
<td></td>
<td>500 + 500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load radius</td>
<td></td>
<td>cm</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>deg</td>
<td></td>
<td>150° if 85°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: Please refer to the MFCX Ekio Electric data since the environmental conditions cannot be ensured depending on the characteristics of oil you use.
*2: The maximum load capacity is a specification when the speed of the oil axis is 0.5 times.
*3: The maximum load capacity indicates the maximum specified when the oil flange is facing downward (± 1°) or when the oil flange is facing downward (± 1°).
*4: This is the oil flange surface when all axes are interconnected.
*5: The positions of the oil flange are the combination of 0.5 of one and horizontal distance of 200 mm when the oil flange is facing downward (± 1°) or when the oil flange is facing downward (± 1°).
*6: The cycle time may increase if specific requirements apply such as high work positioning accuracy, or depending on the operating position.

Support Software System Configuration

Product Lineup

Robot Specifications

Functions

RV-6SQ

RV-6SDL

RV-6SD

RV-6DLL

RV-6SQL

RV-6SL

RV-6SC

RV-6SDC

RV-6SC

RV-6SDC

RV-6SL

RV-6SQ
### Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Type</th>
<th>CR-12SQ / CR-12SD</th>
<th>CR-12S-Q300 / CR-12SD-Q300</th>
<th>CR-12SC / CR-12SDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. composite speed *4</td>
<td>m/s</td>
<td>Approx. 960</td>
<td>Approx. 930</td>
<td>Approx. 930</td>
</tr>
<tr>
<td>Position repeatability</td>
<td>±0.05°</td>
<td>±0.05°</td>
<td>±0.05°</td>
<td>±0.05°</td>
</tr>
<tr>
<td>Max. load (kg)</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Max. load capacity (kg)</td>
<td>12 (10)</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Additional Information

- Please select a controller according to your application. "-S300" is appended at the end of the robot model name when the CR2QA-701/CR2DA-701 is connected.
- CR2QA-701/CR2DA-701 (IP20) are open structures.
- The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 5 kg. The cycle time may increase if specific requirements apply such as high work. This is at the hand flange surface when all axes are composited.
- The maximum load capacity indicates the maximum payload when the wrist flange is facing downward (±10°).
- Tooling (M4 x 6 locations).
- Take care with the installation environment.
DIVERSE APPLICATIONS INCLUDE ASSEMBLY OF ELECTRIC AND ELECTRONIC PARTS, PRECISION ASSEMBLY OF SMALL PARTS, INSPECTIONS, HIGH SPEED TRANSFER, AND PACKING.

- Capable of high-speed operation with dedicated motor and high rigidity mechanical structure
- The highly rigid arm section and Mitsubishi low-inertia motor enable operations at high acceleration/deceleration speeds with high accuracy.
- An inverted SCARA design that is arranged such that the No. 2 arm can completely pass by the No. 1 arm. This allows high-speed operation between points following the optimum path.
- High-speed movement with a cycle time of 0.32 seconds. (30% increase from Mitsubishi conventional models)
  (*Cycle time: 0.32 sec ... Load: 1kg, Operation: 25mm vertical - 300mm horizontal reciprocal operation)

Space-saving layout realized with ceiling mounted installation
- The ceiling mounted installation allows previously unusable robot installation spaces to be used effectively. A wide operating range encompasses the entire cylindrical area (Ф700 x 150) under the arm.
- The cylindrical operating range simplifies the layout setting by eliminating restrictions resulting from the layout orientation of pallets and conveyors, etc.

Improved robot system start up and serviceability
- The iQ Platform is supported allowing the robot to be operated, monitored and controlled easily from the Mitsubishi programmable controller and GOT.
- The robot’s internal information (error status, maintenance information, etc.) can be displayed on the GOT, and control can be realized without a robot program.
- Piping work is simplified by providing a hand piping path in the Z axis shaft.

Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications</td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
</tr>
<tr>
<td>Max. Straight</td>
<td>600 (m/sec)</td>
</tr>
<tr>
<td>Max. Circular</td>
<td>240 (m/sec)</td>
</tr>
<tr>
<td>Max. Speed</td>
<td>5000 (deg/sec)</td>
</tr>
<tr>
<td>Max. Cycle Speed</td>
<td>2000 (min)</td>
</tr>
<tr>
<td>Max. Straight Speed</td>
<td>3500 (deg/sec)</td>
</tr>
<tr>
<td>Max. Controller Speed</td>
<td>750 (m/sec)</td>
</tr>
<tr>
<td>Max. J1 Speed</td>
<td>600 (deg/sec)</td>
</tr>
<tr>
<td>Max. J2 Speed</td>
<td>300 (deg/sec)</td>
</tr>
<tr>
<td>Max. J3 Speed</td>
<td>1500 (deg/sec)</td>
</tr>
<tr>
<td>Max. J4 Speed</td>
<td>1500 (deg/sec)</td>
</tr>
<tr>
<td>Mass</td>
<td>450 (kg)</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>External Dimensions</td>
<td></td>
</tr>
<tr>
<td>Operating Range</td>
<td></td>
</tr>
<tr>
<td>Max. Straight</td>
<td>1500 (mm)</td>
</tr>
<tr>
<td>Max. Circular</td>
<td>750 (mm)</td>
</tr>
<tr>
<td>Max. J1 Limit</td>
<td>225 (mm)</td>
</tr>
<tr>
<td>Max. J2 Limit</td>
<td>120 (mm)</td>
</tr>
<tr>
<td>Max. J3 Limit</td>
<td>150 (mm)</td>
</tr>
<tr>
<td>Max. J4 Limit</td>
<td>150 (mm)</td>
</tr>
<tr>
<td>Mass</td>
<td>24 (kg)</td>
</tr>
</tbody>
</table>

Easy installation and start up
- The robot can be mounted and installed onto the top of a ceiling beam making it easy to install the system.

(1) The robot can be mounted and installed onto the top of a ceiling beam making it easy to install the system.

Saving work-cell space
- Installing the robot on the ceiling eliminates wasted space.

(2) An interior path for piping the hand is provided at the end axis allowing tools to be piped easily. This eliminates problems with external piping.

(3) When starting up a compact system which fits into the robot's maximum operating range, if the cylindrical operating range limit function is used, the robot will move without protruding from the set cylindrical range. This allows the system to be started up and adjusted without worrying about interference.
### Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Type</th>
<th>Unit</th>
<th>RH-6SQH</th>
<th>RH-6SDH</th>
<th>RH-12SQH</th>
<th>RH-12SDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine class</td>
<td>Standard</td>
<td>IP20</td>
<td>RH-6SQH</td>
<td>RH-6SDH</td>
<td>RH-12SQH</td>
<td>RH-12SDH</td>
</tr>
<tr>
<td>Mass kg</td>
<td>Approx. 20</td>
<td>Approx. 23</td>
<td>Approx. 21</td>
<td>Approx. 21</td>
<td>Approx. 23</td>
<td>Approx. 24</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>6 x 2</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
</tr>
<tr>
<td>Primary air supply port</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>C11807 (250)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
</tr>
<tr>
<td>Current supply port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section X-X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section Y-Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum composite speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 20</td>
<td>Approx. 23</td>
<td>Approx. 21</td>
<td>Approx. 21</td>
<td>Approx. 23</td>
<td>Approx. 24</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>6 x 2</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
</tr>
<tr>
<td>Primary air supply port</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>C11807 (250)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
</tr>
<tr>
<td>Current supply port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section X-X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section Y-Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
<td>Horizontal, multiple-joint type</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum composite speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 20</td>
<td>Approx. 23</td>
<td>Approx. 21</td>
<td>Approx. 21</td>
<td>Approx. 23</td>
<td>Approx. 24</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>6 x 2</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
<td>8 x 4</td>
</tr>
<tr>
<td>Primary air supply port</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 4 x 8</td>
<td>Secondary: 8 x 6</td>
</tr>
<tr>
<td>Hand mounting dimensions</td>
<td>C11807 (250)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
<td>C11819 (300)</td>
</tr>
<tr>
<td>Current supply port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section X-X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand mounting cross section Y-Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td>Primary: 6 x 2</td>
<td>Secondary: 8 x 6</td>
<td></td>
</tr>
</tbody>
</table>

### RH-6SQH

- **Name**: RH-6SQH
- **Type**: 6 kg
- **Dimensions**:
  - **Arm length**: 325 mm
  - **Maximum composite speed**: 225 mm/sec
  - **Repeatability**: ±0.02° (J3 (Z))
  - **Ambient temperature**: 0 to 40°C

### RH-6SDH

- **Name**: RH-6SDH
- **Type**: 12 kg
- **Dimensions**:
  - **Arm length**: 350 mm
  - **Maximum composite speed**: 255 mm/sec
  - **Repeatability**: ±0.02° (J3 (Z))
  - **Ambient temperature**: 0 to 40°C

### RH-12SQH

- **Name**: RH-12SQH
- **Type**: 12 kg
- **Dimensions**:
  - **Arm length**: 450 mm
  - **Maximum composite speed**: 305 mm/sec
  - **Repeatability**: ±0.03° (J3 (Z))
  - **Ambient temperature**: 0 to 40°C

### RH-12SDH

- **Name**: RH-12SDH
- **Type**: 12 kg
- **Dimensions**:
  - **Arm length**: 500 mm
  - **Maximum composite speed**: 355 mm/sec
  - **Repeatability**: ±0.03° (J3 (Z))
  - **Ambient temperature**: 0 to 40°C
MELFA RH SERIES HAS A VERSATILITY TO FULFILL A WIDE RANGE OF TASKS FROM THE PRECISION ASSEMBLY OF SMALL PARTS TO TRANSFER AND PACKAGING OF HEAVY ITEMS.

- **Payload**: 6 kg to 20 kg
  - The conventional 18 kg model has been enhanced to a 20 kg rating. Greater payloads are now possible.
  - Ability to use heavier multifunction tooling.

- **Arm reach**: 350 mm to 1,000 mm
  - Arm reach has been extended to 1000 mm. (20 kg model only)
  - A greater flexibility in choosing pallet sizes and layout design.
  - Also, eliminated are problems with the shortage of stroke which are encountered when rearranging conventional units.

- **Z Stroke**: 200 mm to 450 mm
  - Z stroke with 6 to 20 kg model is available with an extended stroke:
    - 6 kg model: 320 mm added to conventional 200 mm
    - 12/20 kg model: 450 mm added to conventional 350 mm
  - More application versatility in long reach applications such as packaging.

### Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
<th>RH-20SQH100</th>
<th>RH-20SQH100M</th>
<th>RH-20SDH100</th>
<th>RH-20SDH100M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine type</td>
<td></td>
<td>Standard</td>
<td>M4</td>
<td>Standard</td>
<td>M4</td>
</tr>
<tr>
<td>Installation</td>
<td></td>
<td>Upper type</td>
<td>Lower type</td>
<td>Upper type</td>
<td>Lower type</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Position detection method</td>
<td></td>
<td>Magnetic encoder</td>
<td>Magnetic encoder</td>
<td>Magnetic encoder</td>
<td>Magnetic encoder</td>
</tr>
<tr>
<td>Torque</td>
<td></td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
<tr>
<td>Hand mounting</td>
<td></td>
<td>2-8 input points / 2-8 output points (forearm), 8 spare lines: AWG#24 (0.2mm²)</td>
<td>2-8 input points / 2-8 output points (forearm), 8 spare lines: AWG#24 (0.2mm²)</td>
<td>2-8 input points / 2-8 output points (forearm), 8 spare lines: AWG#24 (0.2mm²)</td>
<td>2-8 input points / 2-8 output points (forearm), 8 spare lines: AWG#24 (0.2mm²)</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td>1,122 x 844 x 1,221</td>
<td>1,122 x 844 x 1,221</td>
<td>1,122 x 844 x 1,221</td>
<td>1,122 x 844 x 1,221</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Installation dimensions</td>
<td></td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Operation range</td>
<td></td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
</tr>
<tr>
<td>Reach</td>
<td></td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
<td>350 mm to 1,000 mm</td>
</tr>
<tr>
<td>Payload</td>
<td></td>
<td>6 kg to 20 kg</td>
<td>6 kg to 20 kg</td>
<td>6 kg to 20 kg</td>
<td>6 kg to 20 kg</td>
</tr>
</tbody>
</table>

### External Dimensions/Operating Range Diagram

- **Model**
  - RH-6SQH/6SDH
  - RH-12SQH/12SDH
  - RH-20SQH/20SDH

- **Payload**
  - 6 kg
  - 12 kg
  - 20 kg

- **Reach**
  - 350 mm
  - 450 mm
  - 550 mm
  - 700 mm
  - 850 mm
  - 1000 mm

- **Z Stroke**
  - 200 mm
  - 320 mm
  - 450 mm

---

1. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
2. The torque is given in terms of continuous operation. The torque value does not depend on the type of model. Please check the torque information for the model you are interested in.
3. See the controller manufacturer’s catalog for the information on the number of installation holes.
4. The torque is given in terms of continuous operation. The torque value does not depend on the type of model. Please check the torque information for the model you are interested in.
5. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
6. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
7. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
8. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
9. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
10. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
11. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
12. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
13. Please contact Mitsubishi Electric dealer before ordering the conventional model which you are interested in. The conventional model may be discontinued so you are advised to consult with Mitsubishi Electric dealer.
### Controller Specifications

#### SQ series

**Controller configuration**

- Robotic CPU Q172DRCPU
- Drive unit DU1A-7xx
- SD series
  - Controller CR1DA-7xx
- SD series
  - CR2DA-7xx
- SD series
  - CR3D-7xx

**A variety of interfaces are available as standard.**

- USB communication
- SD communication
- SSCNET III (optical communications)

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive unit</td>
<td>Q172DRCPU</td>
<td><strong>Key</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Key</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of axes controlled</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
<td>6 axes</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>External dimensions (including legs)</td>
<td>(W) x (H) x (D)</td>
<td>470 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
<td>450 x 200 x 200</td>
</tr>
</tbody>
</table>

**Multiple CPU environment**

**Unit**

- High-performance CPU base between CR1DA-7xx, CR2DA-7xx, CR3D-7xx
- CR1DA-7xx (10BASE-T/100BASE-TX)
- CR2DA-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)

**Power**

- Universal model 10BASE-T/-1 (can be used by multiple CPU high-speed transmission)
- CR3D-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)
- CR3D-7xx (10BASE-T/-1)

**Programmable controller compatible CPU**

- Q100UD (E) HCPU
- Q20UD (E) HCPU
- Q13UD (E) HCPU
- Q06UD (E) HCPU
- Q04UD (E) HCPU
- Q03UD (E) HCPU

**Self-contained floor type/sealed structure [IP54]**

- 4-M3 screw
- 4-M5 screw
- 4-M10 screw

**Dimensions (for enclosures) (factory-set custom specification)**

- 210 x 143 (21)
- 200 x 8 (26)
- 193 (8.5)
- 184 (22)
- 177 (26)
- 16 (22)
- 157 (26)
- 143 (21)
- 135 (26)
- 127.8 (26)

**Note**

- The robot controller is not equipped with an operating panel.
- The rate of power-supply voltage fluctuation is within 10%.
- The power capacity is only a rough guide and whether or not operation can be guaranteed depends on the input power-supply voltage.
- The power capacity does not include the current rating for the load, and the power capacity to be used by each load is specified individually.

**Environment**

- Ambient temperature: -10°C to 60°C
- Relative humidity: 30% to 90% (non-condensing)
- Power supply: 100/200 V (50/60 Hz)
- Drive unit: 100/200 V (50/60 Hz)
- Drive unit: 100/200 V (50/60 Hz)
- Drive unit: 100/200 V (50/60 Hz)
- Drive unit: 100/200 V (50/60 Hz)

**Drive unit DU1A-7xx Controller CR1DA-7xx**

- USB communication
- SD communication
- SSCNET III (optical communications)

**Drive unit DU2A-7xx Controller CR2DA-7xx**

- USB communication
- Drive unit DU1A-7xx
- Drive unit DU2A-7xx
- Drive unit DU3-7xx

**Drive unit DU3-7xx (M) Controller CR3D-7xx (M)**

- USB communication
- Drive unit DU1A-7xx
- Drive unit DU2A-7xx
- Drive unit DU3-7xx

**Drive unit CR1QA-772**

- USB communication
- Drive unit DU1A-7xx
- Drive unit DU2A-7xx
- Drive unit DU3-7xx
Features (SQ series)

- **Shared memory expansion function (operating and monitor functions)**
  - Convenient monitoring and retrieval of information from robot and other machine components at a single point.
  - The following types of operating and information windows can be displayed on the GOT:
    - Robot operation window
    - Robot jog/teach monitor window
    - Maintenance forecast window
    - Display window
    - Display window of example operation
  - GOT interface provides easy access to robot data and status.

- **Sequencer direct operation**
  - The ability to command the robot directly from the programmable controller language.
  - Use of this function
    - Traditional method
      - In most cases, the PLC program and robot program are written independently by different programmers and in different languages. This increases programming and debug time and the need for multiple programming environments.
    - With direct robot control from a programmable controller
      - Programming can be accomplished directly within the programmable controller language. No need to use a second language/program to control the robot.

- **Easy to get the status of the robot!**
  - Essential data from the robot can be displayed without referring to the robot program, editing software, or teaching pendant.

**Robot Controller Software**

- **Robot Controller Software**
  - No need for separate robot programs.
  - System operation can be controlled solely by the programmable controller. Easy to operate those systems because only PLC programmer can handle system specifications or trouble shooting.

**Robot Controller Software**

- **Robot Controller Software**
  - No need for separate robot programs.
  - System operation can be controlled solely by the programmable controller. Easy to operate those systems because only PLC programmer can handle system specifications or trouble shooting.

**High-speed communication between the programmable controller ↔ robot**

- **High capacity communication between the programmable controller ↔ robot**
  - High capacity communication can support multi machines system with large I/O requirements. Enables simplified integration of all I/O in complex systems. (8192 Input/8192 Output)

**Save wiring / save communication modules**

- Less wiring and shared modules reduces overall system cost.
Program maintenance from one port.

Multiple robots can be accessed from a personal computer connected to the main CPU via a control network. This provides convenience and time savings when performing setup and maintenance.

GOT connection (transparent function)

Programs and parameters can be written from the USB interface on the front of the GOT using a transparent function. This function is available for SD Series as well.

Note) Compatible with the transparent function when the GOT and CPU are connected by bus connection and in direct connection mode.

Robot CPU ↔ Robot CPU direct communication

High speed direct communication with shared memory between CPUs increases the efficiency of detailed control programs which improves processing time.

Robot CPU ↔ IO control unit direct operation

High speed direct communication with shared memory, robot CPU, and I/O signals improves response time and reduces tact time.

Functions

Optimal acceleration/deceleration control and optimal override function

- The optimal acceleration/deceleration time and speed are automatically set according to operation position, posture, and load conditions of the robot.

Improved productivity through shortened cycle times

- Shortened startup time

Active gain control

- Optimal motor control tuning is set automatically based on the operating position, posture, and load conditions of the robot.
- Active gain control is a control method that allows the position gain to be changed in real time. This is effective for standard operations and tooling work requiring high accuracy.

Improved trajectory accuracy

- Improved vibration-damping performance

Orthogonal compliance control

- This function reduces the rigidity of the robot arm and tracks external forces. The robot itself is equipped with a compliance function, which makes special hands and sensors unnecessary.
- The amount of force generated through interference during chucking and workpiece insertion can be reduced, and external movement copying forces can be controlled.
- The compliance direction can be set arbitrarily using the robot coordinate system, the tool coordinate system, etc.
- This is useful in protecting against workpiece interference and cutting down on stoppage.

Reduce tooling cost

- Shortened startup time

Automatic gravitation compensation

- Independent of the load fixture - if near the base or far away - the gravitation control positions the load always with the same accuracy. This supports the high precision robot arm.
- Calculates the amount of compensation needed based on the movement position, posture, and load conditions of the robot and compensates for any deflection automatically.
- This is effective for work transporting workpieces to cassettes with low pitch and palletizing work.

Improved palletization accuracy

- Improved trajectory accuracy
Function for passing through points of singularity

- The robot can pass through the singularity point, and the flexible layout can be achieved.
- Teaching operations can be performed easily as there is no longer any need to cancel operations due to the singularity point.

What is a singularity point?:
There is an unlimited number of angles at which one interpolation axis can be achieved. What is a singularity point?:

In moving from P1→P2, if the robot is passing the singularity point (J5 axis=0°) or a location in the vicinity at a constant posture, the J4 axis on the robot will rotate at high speed, unable to pass through it.

Collision detection function

- This function detects if the arm collides with an obstacle while teaching or operating, and helps reduce damage to the robot arm and tools.
- The detection level can be changed according to the protection targets.
- The collision detection function can be programmed to generate an alarm or perform a specific escape move or both. Ex.) An error is output due to the robot stopping suddenly, an error is output after escape movements are made, etc.

Multi-tasking function

- Division of tasks other than robot motion tasks, such as machine vision, external motion, and I/O can be divided and executed in one of 32 slots at the same time.
- Reading external sensor data for example has no impact on robot motion processing or movement.
- Priority can be assigned to processes between programs.

Safety features

- Safety circuits (emergency stop circuits) can easily be installed for the customer’s entire system, not just for the robot itself.
- Enables the detection of when to complete maintenance tasks such as grease replacement and belt replacement.
- System status can also be checked using the personal computer support software.

Tracking function

- Transport, alignment, and installation work, etc. can be performed while robots are tracked with the workplace on the conveyor without stopping the conveyor.
- Different variations can be selected, including vision tracking in combination with a vision sensor, tracking in combination with an opto-electric sensor, etc.
- Tracking can be performed simultaneously for more than one conveyor.

Additional axis function

- The robot controller has plug-and-play connection to the MELSERVO-J3 servos.
- Up to 8 additional axes can be controlled by the controller.
- Additional axes and user machines can be operated from the robot program and teach pendant without any additional motion control hardware.
- Additional axis control is performed directly from the robot program.

Maintenance forecast function

- This function notifies users of when to complete maintenance tasks such as greasing, replacing belts, etc. Signals and warnings are output as notification at scheduled times set in advance.
- Data for load conditions during times when the robot is in an actual operating state is collected and analyzed so that the rate of usage of consumables such as grease and belts can be estimated and used in calculating replacement periods.
- System status can also be checked using the personal computer support software.

Improved safety

- Enables the detection of when to complete maintenance tasks such as grease replacement and belt replacement.
- System status can also be checked using the personal computer support software.
**System Configurations**

**SDseries**

*(Example with RV-3SDJ-SM)*

- Hand output cable (Option)
- Hand input cable (Option)
- Vision sensor (Option)
- Controller (Connection interface 1)
- Program controller (Optional)
- Encoder: Incremental
- Servo amplifier
- Robot arm, clean specifications
- Extension cable for connecting robot CPU and DU
- Hand (curl) tube
- Personal computer cable
- Machine cable, for extension/flexible
- Controller (Connection interface 2)
- Robot arm
- Controller: Parallel I/O interface (Sink type)
- Controller: Parallel I/O interface (Source type)
- Controller: Remote Parallel I/O (Sink type)
- Air hand interface (Sink type)
- Video connector
- USB cable
- Rj45 connection

**Notes:**
1. Select an appropriate interface for the I/Os or network functions of the peripheral device.
2. A welding device is required for the vision sensor connection. It must be provided by the customer.
3. The customer is to select the programmable controller unit.
4. The equipment configuration will be changed prior to shipment from the factory. Since this product is produced on order, inquire about the timeframe for delivery and applicable specifications as necessary.

**Classifications**

- Standard configurations
- Service part

**SDseries**

*(Example with RV-4S5QL)*

- Hand output cable (Option)
- Hand input cable (Option)
- Vision sensor set (Option)
- Controller (Connection interface 1)
- Program controller (Optional)
- Encoder: Incremental
- Servo amplifier
- Robot arm
- Controller: Parallel I/O interface (Sink type)
- Controller: Parallel I/O interface (Source type)
- Controller: Remote Parallel I/O (Sink type)
- Air hand interface (Sink type)
- Video connector
- USB cable
- Rj45 connection

**Notes:**
1. Select an appropriate interface for the I/Os or network functions of the peripheral device.
2. The equipment configuration will be changed prior to shipment from the factory. Since this product is produced on order, inquire about the timeframe for delivery and applicable specifications as necessary.

**Classifications**

- Standard configurations
- Service part

**Configurations Options**

*For details, refer to the specifications sheets.*
Support Software

RT ToolBox2
Software for program creation and total engineering support.

This PC software supports everything from system startup to debugging, simulation, maintenance and operation. This includes programming and editing, operational checking before robots are installed, measuring process task time, debugging during robot startup, monitoring robot operation after startup, and trouble shooting.

Enhanced simulation functions
- This function is compatible with all models that connect to CnR-500 series and CnR-700 controllers.
- Robots can be operated and test data calculated using a personal computer.
- Not available for the mini version.
- Motion movements, operating status, input signals, and servo status can be monitored.

Support for all processes, from programming to startup maintenance
- Programming can be completed using the MELFA-BASIC IV/V and Movemaster languages (depending on the model).
- Robot movement and operating status, input signals, and servo status can be monitored.
- The software has a maintenance function that notifies the operators greasing period, battery life cycles as well as position recovery support function when trouble occurs, etc. and is effective for preventative maintenance, shortening of recovery time.

Advanced maintenance functions
- Support for all processes, from programming to startup maintenance
- Programmimg can be completed using the MELFA-BASIC IV/V and Movemaster languages (depending on the model).
- Robot movement and operating status, input signals, and servo status can be monitored.

Automatic robot program creation function
- Creation of programs in MELFA-BASIC IV/V and Movemaster languages. *1 Improvement of work operations by multi-window format and the various telling functions. This is helpful in checking instructions such as the execution of program steps, setting of breakpoint settings, and other tasks.

Program editing and debugging functions
- Creation of instructions that are used to create parts of a program that can be compiled with the processor.

Action (commands)
- Mov Pput,-80
- Wait M_In
- Dly 0.2
- Hclose 1
- Dly 0.2
- Mvs Pget

Difficult to realize in BASIC language can make it possible to operate MELFA
- Expansion of the command as well as parallel processing or structuring that were difficult to realize in BASIC language can make it possible to operate MELFA.

*1: MELFA-BASIC is a programming language that further expands upon and develops the commands needed for robot control. In MELFA-BASIC IV/V, the expansion of the command as well as parallel processing or structuring that were difficult to realize in BASIC language can make it possible to operate MELFA.

3D viewer
- Graphical representation of a work along with the dimensions, color and other specified details of the work area to be processed.

Monitor functions
- This is used to monitor program execution status and variables, input signals, etc.

Maintenance functions
- This function is for maintenance and includes maintenance forecast and position recovery support functions, a parameter management function, etc.

Automatic robot program creation function
- The teaching position data and robot operation programs necessary for operating robots can be generated automatically by simple loading of 3D CAD data (3) for the applicable works into SolidWorks® and then setting of processing conditions and areas using MELFA-Works.
- *1: Frames that can be linked into SolidWorks

Loading of part data from peripheral devices and movement
- Part data created in SolidWorks® can be loaded. The positions and related data can be manipulated relative to the CAD origin and otherwise. Part positions can be changed via numerical input.

Installation of hands
- Hands designed/created in SolidWorks® can be installed on robots. An ATC (Auto Tool Change) can also be specified for each hand.

Handling of work
- Simulations of hand signal control can be created using a robot program to handle workpieces. Simulated movements can be saved to video files (AVI format).

Display of the robot movement path
- The cycle time of robot movement can be measured using an easy-to-use function resembling a stopwatch. It realizes the measurement the cycle time of a specified part in a program.

Robot program debugging functions
- The following functions are provided to help you debug robot programs.
- Step operation: A specified program can be executed step by step.
- Breakpoint: Breakpoints can be set in a specified program.
- Direct execution: Desired robot commands can be executed.

Calibration tool
- The robot shown in SolidWorks® can be jogged just like you normally jog a robot using a listening pendant.

Trafving axis
- A travelling axis can be installed to a robot to verify the operation of the system equipped with this.

Calibration
- Point sequence data of CAD coordinates created by the CAD link function can be corrected to robot coordinate data.

Operation programs and point sequence data can also be transferred to robots. To provide greater convenience for operators who perform calibration frequently on site, the calibration tool can be operated effectively on a notebook computer in which SolidWorks® software is not installed.

What is MELFA-Works?
- MELFA-Works is an add-in tool ("1) for 3D CAD SolidWorks® ("2) software (hereinafter SolidWorks®). Adding MELFA-Works into the SolidWorks® platform adds to and expands on the robot simulation functions.
- "1: An add-in tool is a software program that adds certain functions to applications. Software program package.
- "2: SolidWorks® is a registered trademark of SolidWorks Corp, (USA).

Features
- Automatic robot program creation function

List of functions
- Display of the robot movement path
- Robot movement path can be displayed in space as trace lines.
- Measurement of cycle times
- The cycle time of robot movement can be measured using an easy-to-use function resembling a stopwatch. It realizes the measurement the cycle time of a specified part in a program.
- Robot program debugging functions
- The following functions are provided to help you debug robot programs.
- Step operation: A specified program can be executed step by step.
- Breakpoint: Breakpoints can be set in a specified program.
- Direct execution: Desired robot commands can be executed.
- Calibraion tool
- The robot shown in SolidWorks® can be jogged just like you normally jog a robot using a listening pendant.
- Travelling axis
- A travelling axis can be installed to a robot to verify the operation of the system equipped with this.

Software line up
- Robot Specifications
- Functions

*1: MELFA-BASIC is a programming language that further expands upon and develops the commands needed for robot control. In MELFA-BASIC IV/V, the expansion of the command as well as parallel processing or structuring that were difficult to realize in BASIC language can make it possible to operate MELFA.

*2: SolidWorks® is a registered trademark of SolidWorks Corp. (USA).