Rotary Table
**Series MSU**
Vane style (Single, Double)/Size: 1, 3, 7, 20

High precision series MSUA introduced to vane type rotary tables

**Peripheral table deflection**
0.03 mm or less

**Table top deflection**
0.03 mm or less
High Precision Type
Sizes 1, 3, 7, 20

Series **MSUA**
Improved table deflection accuracy:
0.03mm or less

**Easy alignment when mounting the load**
- Table inside/outside diameter tolerance H9/h9
- Female threads for load mounting provided in eight places.
  (increases freedom in mounting the load)
- Mounting reference pin holes

**Easy alignment when mounting the body**
- Mounting reference pin holes
  (alignment with center of body)
  Provided on three sides, excluding port side
- Reference diameter h9
  (alignment with center of table rotation)

**Angle is adjustable**
90°±10°, 180°±10°
Double vane (MSUB only) 90°±5°

**Disengageable**
Maintenance work is simplified.
The drive unit can be replaced with the load mounted.

**Auto switch capable**
Since switches can be moved anywhere on the circumference, they can be mounted at positions which accommodate the specifications.
Rotary actuator with lightweight, compact table for robotic hands

**Free-mount type**
Can be mounted from three directions: axial, lateral, perpendicular

<table>
<thead>
<tr>
<th></th>
<th>Axial mounting</th>
<th>Lateral mounting</th>
<th>Perpendicular mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSUA</strong></td>
<td>Bottom mount</td>
<td>Top mount</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tapped holes (4)</td>
<td>Tapped holes (4)</td>
<td></td>
</tr>
<tr>
<td><strong>MSUB</strong></td>
<td>Through hole (1)</td>
<td>Tapped holes (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tapped holes (2)</td>
<td>Through hole (1)</td>
<td></td>
</tr>
</tbody>
</table>

**Basic Type Series MSUB**

Sizes 1, 3, 7, 20
- Single vane and double vane standardized
- Double vane has the same dimensions as single vane (except size 1)

**Series variations**

<table>
<thead>
<tr>
<th>Series</th>
<th>Size</th>
<th>Rotation</th>
<th>Vane type</th>
<th>Applicable auto switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSUA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>90°</td>
<td>Single vane</td>
<td>D-9, D-T99, D-9JA, D-S99, S9P</td>
</tr>
<tr>
<td>precision</td>
<td>3</td>
<td>180°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MSUB</strong></td>
<td>1</td>
<td>90°</td>
<td>Single vane*</td>
<td>D-9, D-T99, D-9JA, D-S99, S9P</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
<td>Double vane</td>
<td>D-R73, D-T79, D-R80, D-S79, S7P</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Double vane is available with 90° rotation setting only.
### Rotary Table/Vane Type: High Precision

#### Series MSUA

Sizes 1, 3, 7, 20

**How to Order**

**Connection port position**

- **Nil**: Side ports
- **E**: Top ports

Available with side ports only, when equipped with switch unit.

**Nominal size (torque)**

- **1**: MSUA 1
- **3**: MSUA 3
- **7**: MSUA 7
- **20**: MSUA 20

**Without Auto Switch Unit**

**MSUA 20**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Rotation</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>M D SUA 20</td>
<td>180°</td>
<td>90°</td>
<td>S</td>
</tr>
</tbody>
</table>

**With Auto Switch Unit**

**MSUA 20**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Rotation</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>M D SUA 20</td>
<td>180°</td>
<td>90°</td>
<td>R73</td>
</tr>
</tbody>
</table>

**Number of auto switches**

- **S**: 1 pc.
- **Nil**: 2 pcs.

*For 1 piece, a right hand auto switch is installed.*

**Type of auto switch**

- **S**: Single vane

*Select applicable auto switches from the table below.*

**Applicable auto switches**

<table>
<thead>
<tr>
<th>Applicable auto switches</th>
<th>Electrical entry</th>
<th>Wiring (output)</th>
<th>Load voltage</th>
<th>Auto switch part no.</th>
<th>Lead wire type</th>
<th>Lead wire length (m)*</th>
<th>Applicable loads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDSUA1</td>
<td>Grommet</td>
<td>Yes</td>
<td>2 wire</td>
<td>5V, 12V</td>
<td>5V</td>
<td>90</td>
<td>1.2ms</td>
</tr>
<tr>
<td>MDSUA3</td>
<td>Grommet</td>
<td>Yes</td>
<td>3 wire (NPN)</td>
<td>5V, 12V</td>
<td>100V</td>
<td>93A</td>
<td>Impact resistance</td>
</tr>
<tr>
<td><strong>Solid state</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDSUA7</td>
<td>Grommet</td>
<td>Yes</td>
<td>2 wire</td>
<td>48V, 100V</td>
<td>100V</td>
<td>T79</td>
<td>Operating temperature range</td>
</tr>
<tr>
<td>MDSUA20</td>
<td>Grommet</td>
<td>Yes</td>
<td>3 wire (NPN)</td>
<td>5V, 12V</td>
<td>-</td>
<td>S79</td>
<td>5 to 60°C</td>
</tr>
</tbody>
</table>

*Lead wire length symbols:
- **0.5m**: Nil (Example) R73C
- **3m**: L (Example) R73CL
- **5m**: Z (Example) R73CZ
- **None**: N (Example) R73CN

Order example: MSUA20 single vane type (connection port side position selected)

1. Standard type (without auto switches), rotation 90°, side port position MSUA20-90S
2. With switch unit (without auto switches), rotation 180°, side port position MDSUA20-180S
3. With switch unit + auto switch R73, rotation 180°, side port position MDSUA20-180S-R73

**Symbols**

- **S**: Single vane
- **CL**: Connection position
- **L**: Light
- **N**: None
- **IC**: Inductive circuit
- **IC**: Inductive circuit
- **Relay, PLC**: Relay, Programmable Logic Controller

**Rotation adjustment range**

- Single vane: Both ends ±5° each
### Specifications

<table>
<thead>
<tr>
<th>Model 2)</th>
<th>MSUA1</th>
<th>MSUA3</th>
<th>MSUA7</th>
<th>MSUA20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vane type</td>
<td>Single vane</td>
<td>Single vane</td>
<td>Single vane</td>
<td>Single vane</td>
</tr>
<tr>
<td>Rotation 1)</td>
<td>90°±10°</td>
<td>180°±10°</td>
<td>90°±10°</td>
<td>180°±10°</td>
</tr>
<tr>
<td>Fluid</td>
<td>Air (unlubricated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure MPa</td>
<td>1.05</td>
<td></td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>5 to 60°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure range MPa</td>
<td>0.2 to 0.7</td>
<td>0.15 to 0.7</td>
<td>0.15 to 1.0</td>
<td></td>
</tr>
<tr>
<td>Rotation time adjustment range sec/90°</td>
<td></td>
<td>0.07 to 0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft load</td>
<td>Allowable radial load</td>
<td>20N</td>
<td>40N</td>
<td>50N</td>
</tr>
<tr>
<td></td>
<td>Allowable thrust load</td>
<td>15N</td>
<td>30N</td>
<td>60N</td>
</tr>
<tr>
<td></td>
<td>Allowable moment</td>
<td>0.3N m</td>
<td>0.7N m</td>
<td>0.9N m</td>
</tr>
<tr>
<td>Bearing</td>
<td>Special bearings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port position</td>
<td>Side ports or Top ports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port size</td>
<td>Side ports</td>
<td>M3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Top ports</td>
<td>M3</td>
<td>M5</td>
<td>M5</td>
</tr>
<tr>
<td>Deflection accuracy</td>
<td>0.03mm or less</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Single vane 90° can be adjusted to 90°±10° (both ends of rotation ±5° each)

2) Single vane 180° can be adjusted to 180°±10° (both ends of rotation ±5° each)

---

### Table Rotation Range

Angle adjustment is possible as shown in the drawings below using adjustment bolts (A) and (B).

![Table Rotation Range Diagram]

### Applicable Auto Switches

<table>
<thead>
<tr>
<th>Auto switch type</th>
<th>MDSUB1, 3</th>
<th>MDSUB7, 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed switch</td>
<td>D-90/97, D-90A/93A</td>
<td>D-R7, R8</td>
</tr>
<tr>
<td>Solid state switch</td>
<td>D-S99, D-T99, D-S9P</td>
<td>D-S7, S7P, T7</td>
</tr>
</tbody>
</table>

### Weights

<table>
<thead>
<tr>
<th>Size</th>
<th>Rotation</th>
<th>Basic weight</th>
<th>Auto switch unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single vane</td>
<td>Auto switch 2 pcs.</td>
</tr>
<tr>
<td>1</td>
<td>90</td>
<td>162</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>90</td>
<td>261.5</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>259.5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>90</td>
<td>440</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>436</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>90</td>
<td>675</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>670.5</td>
<td></td>
</tr>
</tbody>
</table>

### Weights

<table>
<thead>
<tr>
<th>Size</th>
<th>Allowable radial load (N)</th>
<th>Allowable thrust load (N)</th>
<th>Allowable moment (N m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>30</td>
<td>0.7</td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>60</td>
<td>0.9</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>80</td>
<td>2.9</td>
</tr>
</tbody>
</table>

---

**Table Rotation Range Diagram**

![Adjustment bolts (A) and (B)]

**Applicable Auto Switches Diagram**

![Auto switch types]

**Weights Diagram**

![Weights values]

**Allowable Loads Diagram**

![Allowable loads values]
These drawings indicate the condition when the B port is pressurized.

MSUA1
MSUA1-S, SE

Dimensions

Scale: 70%
These drawings indicate the condition when the B port is pressurized.

With auto switch: MSUA1-□S

   30° When using D-97, 93A

2) 60°: When using D-90, 90A, 97, 93A
These drawings indicate the condition when the B port is pressurized.

**Series MSUA**

**MSUA3**

**MSUA3-S, SE**

**Dimensions**

<table>
<thead>
<tr>
<th>A port</th>
<th>B port</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x M5</td>
<td>2 x M5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top ports/MSUA3-S, SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A port</td>
</tr>
<tr>
<td>B port</td>
</tr>
<tr>
<td>2 x M3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4 x M4 depth 5.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-R1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angle adjustment bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment: Max. 8.2</td>
</tr>
</tbody>
</table>

| 3-3H9 \(0.025\) long groove depth 2.5 |

<table>
<thead>
<tr>
<th>3-R1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ø42h9 (0.002)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ø34</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>8 x M4 depth 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4 x M4 depth 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale: 70%</th>
</tr>
</thead>
</table>

**Notes:**

- Dimensions are given in millimeters.
- Tolerances are indicated in the drawings.
- Scale: 70% for the drawings.
These drawings indicate the condition when the B port is pressurized.

**With auto switch: MDSUA3-□S**

2) 30 : When using D-97, 93A
3) 60° : When using D-90, 90A, 97, 93A
These drawings indicate the condition when the B port is pressurized.

### MSUA7

**MSUA7-□S, SE**

#### Top ports/MSUA7-□SE

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimension</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A port</td>
<td>ø47h9</td>
<td>+0.025</td>
</tr>
<tr>
<td></td>
<td>ø42</td>
<td>+0.052</td>
</tr>
<tr>
<td>B port</td>
<td>ø47h9</td>
<td>+0.025</td>
</tr>
<tr>
<td></td>
<td>ø42</td>
<td>+0.052</td>
</tr>
<tr>
<td>2 x M5</td>
<td>ø26H9</td>
<td>-0.052</td>
</tr>
<tr>
<td>2 x M5</td>
<td>ø26H9</td>
<td>-0.052</td>
</tr>
<tr>
<td></td>
<td>ø48h9</td>
<td>-0.052</td>
</tr>
<tr>
<td></td>
<td>ø48h9</td>
<td>-0.052</td>
</tr>
<tr>
<td>4 x M5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x M5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Adjustment:** Max. 10.2

**Angle adjustment bolt**

**Long groove depth 3**

**Long groove depth 5**

(positioning pin hole)
With auto switch: MDSUA7-□S

Connector type

A port

B port

2 x M5
(Port position: Side port type only)

Angle adjustment bolt

Connector type

MSUA7-□S
These drawings indicate the condition when the B port is pressurized.

**Dimensions**

**MSUA20**

MSUA20-S, SE

### Top ports/MSUA20-□SE

- **A port**
  - 2 x M5
  - ø53.5h9
  - ø38
  - ø78
  - Adjustments: Max. 10.3
- **B port**
  - 2 x M5
  - ø52h9
  - ø30H9
  - ø50

### 4 x M6 depth 7

- ø42

### 8 x M5 depth 10

- ø53.5h9

### Long groove depth 5

- ø46
- ø90

### 4 x M6 depth 11

- ø53.5h9

### 3-R2, 3-R2

- 22.5°
With auto switch: MDSUA20-□S

These drawings indicate the condition when the B port is pressurized.

Connector type

Angle adjustment bolt

Dimensions

Adjustment: Max. 10.3
## Internal construction with auto switch

### Parts list

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body A</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>2</td>
<td>Body B</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>3</td>
<td>Body C</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>4</td>
<td>Vane shaft</td>
<td>Stainless steel</td>
<td>Single vane</td>
</tr>
<tr>
<td>5</td>
<td>Stopper</td>
<td>Resin</td>
<td>Single vane</td>
</tr>
<tr>
<td>6</td>
<td>Stopper seal</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Table</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>8</td>
<td>Stopper lever</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stopper guide</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Lever retainer</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bearing retainer</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>12</td>
<td>Bearing</td>
<td>High carbon chrome bearing steel</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Special bearing</td>
<td>High carbon chrome bearing steel</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Back-up ring</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Adjustment bolt</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Hexagon nut</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Hexagon socket head cap screw</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Button bolt</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Hexagon socket head set screw</td>
<td>Stainless steel</td>
<td>SE type only</td>
</tr>
<tr>
<td>23</td>
<td>Label</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The plug 22 is used only when the connection port is type SE.

### Auto switch unit part number

<table>
<thead>
<tr>
<th>Model</th>
<th>Auto switch unit part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSUA1</td>
<td>P211070-1</td>
</tr>
<tr>
<td>MDSUA3</td>
<td>P211090-1</td>
</tr>
<tr>
<td>MDSUA7</td>
<td>P211060-1</td>
</tr>
<tr>
<td>MDSUA20</td>
<td>P211080-1</td>
</tr>
</tbody>
</table>

* Auto switches are not included with switch units.

### Auto switch block unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Right-handed</th>
<th>Left-handed</th>
<th>Combination left &amp; right-handed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSUA1, 3</td>
<td>Part no.: P211070-8</td>
<td>Part no.: P211070-9</td>
<td>Part no.: P211060-8</td>
</tr>
<tr>
<td>MDSUA7, 20</td>
<td>Part no.: P211060-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* A switch block unit is the assembly required to mount one auto switch on a switch unit.
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body A</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>2</td>
<td>Body B</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>3</td>
<td>Body C</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>4</td>
<td>Vane shaft</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Stopper</td>
<td>Resin</td>
</tr>
<tr>
<td>6</td>
<td>Stopper seal</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>7</td>
<td>Table</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>8</td>
<td>Stopper lever</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>9</td>
<td>Stopper guide</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>10</td>
<td>Lever retainer</td>
<td>Aluminum alloy</td>
</tr>
<tr>
<td>11</td>
<td>Bearing retainer</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>12</td>
<td>Bearing</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>13</td>
<td>Special bearing</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>14</td>
<td>Back-up ring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>15</td>
<td>O-ring</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>16</td>
<td>Adjustment bolt</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>17</td>
<td>Hexagon nut</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>18</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>19</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>20</td>
<td>Button bolt</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>21</td>
<td>Hexagon socket head set screw</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>22</td>
<td>Label</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

**Note**

- Light gray color
- Single vane
- Auto switches are not included with switch units.
- The plug 22 is used only when the connection port is type SE.
How to Order

### Rotary Table/Vane Type: Basic

#### Series MSUB
Sizes 1, 3, 7, 20

**Bearing type**
- **B**: Basic type

**Free-mount**
- **E**: Top ports
- **S**: Side ports

**Connection port position**
- **Nil**: Available with side ports only, when equipped with switch unit.

**Nominal size (torque)**

<table>
<thead>
<tr>
<th>Application</th>
<th>Symbol</th>
<th>Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single vane</td>
<td>90</td>
<td>90°</td>
</tr>
<tr>
<td>Double vane</td>
<td>180</td>
<td>180°</td>
</tr>
</tbody>
</table>

Rotation adjustment range
- Single vane: Both ends ±5° each
- Double vane: Both ends ±2.5° each

**Number of auto switches**
- **S**: 1 pc.
- **Nil**: Without auto switch

**Type of auto switch**
- **S**: Single
- **D**: Double

**Without Auto Switch Unit**
- MSUB 20 90 S

**With Auto Switch Unit**
- MD SUB 20 90 S R73

**Applicable auto switches**

<table>
<thead>
<tr>
<th>Applicable model</th>
<th>Type</th>
<th>Electrical entry</th>
<th>Individual light (output)</th>
<th>Wiring (output)</th>
<th>Load voltage</th>
<th>Auto switch part no.</th>
<th>Lead wire length (m)</th>
<th>Applicable loads</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSUB1</td>
<td>Reed</td>
<td>No</td>
<td>2 wire</td>
<td>5V, 12V</td>
<td>90</td>
<td>Parallel cord</td>
<td></td>
<td>IC circuit</td>
</tr>
<tr>
<td>MDSUB3</td>
<td>Grommet</td>
<td>Yes</td>
<td>2 wire</td>
<td>24V</td>
<td>90A</td>
<td>Heavy duty</td>
<td></td>
<td>PLC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDSUB7</td>
<td>Grommet</td>
<td>Yes</td>
<td>3 wire (NPN)</td>
<td>5V, 12V</td>
<td>97</td>
<td>Parallel cord</td>
<td></td>
<td>IC circuit</td>
</tr>
<tr>
<td>MDSUB8</td>
<td>Grommet</td>
<td>Yes</td>
<td>3 wire (PNP)</td>
<td>5V, 12V</td>
<td>93A</td>
<td>Heavy duty</td>
<td></td>
<td>IC circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD SUB20</td>
<td>Reed</td>
<td>No</td>
<td>2 wire</td>
<td>24V</td>
<td>99</td>
<td>Heavy duty</td>
<td></td>
<td>IC circuit</td>
</tr>
<tr>
<td></td>
<td>Connector</td>
<td>Yes</td>
<td>3 wire (NPN)</td>
<td>5V, 12V</td>
<td>T99</td>
<td>Heavy duty</td>
<td></td>
<td>Relay, PLC</td>
</tr>
<tr>
<td></td>
<td>Connector</td>
<td>Yes</td>
<td>3 wire (PNP)</td>
<td>5V, 12V</td>
<td>T99C</td>
<td>Heavy duty</td>
<td></td>
<td>Relay, PLC</td>
</tr>
</tbody>
</table>

**Order example:** MSUA20 single vane type (connection port side position selected)
1. Standard type (without auto switches), rotation 90°, side port position MSUB20-90S
2. With switch unit (without auto switches), rotation 180°, side port position MSUB20-180S
3. With switch unit + auto switch R73, rotation 180°, side port position MSUB20-180S-R73

**Operating time**
- 1.2ms

**Operating temperature range**
- 5 to 60°C

**Impact resistance**
- 300m/s² (reed), 1000m/s² (solid state)
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MSUB1</th>
<th>MSUB3</th>
<th>MSUB7</th>
<th>MSUB20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vane type</strong></td>
<td>Single vane</td>
<td>Double vane</td>
<td>Single vane</td>
<td>Double vane</td>
</tr>
<tr>
<td><strong>Rotation</strong></td>
<td>90°±10°</td>
<td>180°±10°</td>
<td>90°±10°</td>
<td>180°±10°</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>Air (unlubricated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Proof pressure MPa</strong></td>
<td>1.05</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient and fluid temperature</strong></td>
<td>5 to 60°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating pressure range MPa</strong></td>
<td>0.2 to 0.7</td>
<td>0.15 to 0.7</td>
<td>0.15 to 1.0</td>
<td></td>
</tr>
<tr>
<td><strong>Shaft load</strong></td>
<td>Allowable radial load 20N</td>
<td>40N</td>
<td>50N</td>
<td>60N</td>
</tr>
<tr>
<td></td>
<td>Allowable thrust load 2 15N</td>
<td>30N</td>
<td>60N</td>
<td>80N</td>
</tr>
<tr>
<td></td>
<td>Allowable moment 0.3N·m</td>
<td>0.7N·m</td>
<td>0.9N·m</td>
<td>2.9N·m</td>
</tr>
<tr>
<td><strong>Bearing</strong></td>
<td>M3</td>
<td>M3</td>
<td>M5</td>
<td>M5</td>
</tr>
<tr>
<td><strong>Port position</strong></td>
<td>Side ports</td>
<td>Top ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Port size</strong></td>
<td>M3</td>
<td>M5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table Rotation Range

Angle adjustment is possible as shown in the drawings below using adjustment bolts (A) and (B).

### Applicable Auto Switches

<table>
<thead>
<tr>
<th>Auto switch type</th>
<th>MSUB1, 3</th>
<th>MSUB7, 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed switch</td>
<td>D-90/07, D-90A/93A</td>
<td>D-R7, R8</td>
</tr>
<tr>
<td>Solid state switch</td>
<td>D-S99, D-T99, D-S9P</td>
<td>D-S7, D-S7P, T7</td>
</tr>
</tbody>
</table>

### Weights

<table>
<thead>
<tr>
<th>Size</th>
<th>Rotation</th>
<th>Basic weight</th>
<th>Auto switch unit</th>
<th>Auto switch 2 pcs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>145</td>
<td>150</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>140</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>90</td>
<td>230</td>
<td>240</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>225</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>90</td>
<td>360</td>
<td>375</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>355</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>90</td>
<td>510</td>
<td>580</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>505</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### Allowable Loads

Do not permit the load and moment applied to the table to exceed the allowable values shown in the table below. (Operation above the allowable values can cause adverse effects on service life, such as play in the table and loss of accuracy.)

<table>
<thead>
<tr>
<th>Size</th>
<th>Allowable radial load (N)</th>
<th>Allowable thrust load (N)</th>
<th>Allowable moment (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>30</td>
<td>0.7</td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>60</td>
<td>0.9</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>80</td>
<td>2.9</td>
</tr>
</tbody>
</table>
These drawings indicate the condition when the B port is pressurized.

**MSUB1** (Single vane)

**MSUB1-□S, SE**

*If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.*
With auto switch: MDSUB1-S

*1) When using 24: D-90, 90A, S99(V), T99(V), S9P(V)
   When using 30: D-97, 93A

*2) When using 60°: D-90, 90A, 97, 93A
   When using 69°: D-S99(V), T99(V), S9P(V)

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
These drawings indicate the condition when the B port is pressurized.

**Series MSUB**

**Dimensions**

**MSUB1 (Double vane)**

MSUB1-D

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
With auto switch: MDSUB1-D

*1) When using 24°: D-90, 90A, S99(V), T99(V), S9P(V)
   When using 30°: D-97, 93A
*2) When using 60°: D-90, 90A, 97, 93A
   When using 69°: D-S99(V), T99(V), S9P(V)

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
These drawings indicate the condition when the B port is pressurized.

**Series MSUB**

**Dimensions**

**MSUB3** (Single vane, Double vane)

**MSUB3-□S, D**

The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
With auto switch: MDSUB3

1) When using 24°: D-90, 90A, S99(V), T99(V), S9P(V)
   When using 30°: D-97, 93A
2) When using 60°: D-90, 90A, 97, 93A
   When using 69°: D-S99(V), T99(V), S9P(V)

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
**Series MSUB**

**Dimensions**

The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

**MSUB7 (Single vane, Double vane)**

**MSUB7-□S, D**
With auto switch: MDSUB7

* If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

Connector type

*1) 25.5: Grommet type  
34.5: Connector type

*2) 20.5: Grommet type  
26.5: Connector type
These drawings indicate the condition when the B port is pressurized.

**MSUB20 (Single vane, Double vane)**

MSUB20-□S, D

The outside drawings show the single vane type, but only the position of the chamfered sections shown in the above drawings differs for single and double vane.

- If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.
With auto switch: MDSUB20

If the adjustment bolt is removed, rotation will be approximately 270° for the single vane type and 100° for the double vane type. Since this will make it impossible to satisfy the specifications, operate with adjustment within the range of maximum values.

1) 25.5: Grommet type
34.5: Connector type

2) 20.5: Grommet type
26.5: Connector type
**Series MSUB**

**Construction/Parts List**

### Internal construction with auto switch
Units are common for both single and double vane.

**MDSUB1, 3**

- **A port**
- **B port**

The external configuration of the MDSUB1 double vane is different.

**MDSUB7, 20**

**Parts list**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body (A)</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>2</td>
<td>Body (B)</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>3</td>
<td>Vane shaft</td>
<td>Stainless steel (MSUB20: Carbon steel)</td>
<td>Single vane</td>
</tr>
<tr>
<td>4</td>
<td>Stopper</td>
<td>Resin</td>
<td>Single vane</td>
</tr>
<tr>
<td>5</td>
<td>Stopper</td>
<td>Stainless steel</td>
<td>Double vane</td>
</tr>
<tr>
<td>6</td>
<td>Stopper seal</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Table</td>
<td>Aluminum alloy</td>
<td>Light gray color</td>
</tr>
<tr>
<td>8</td>
<td>Stopper lever (D)</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stopper lever (S)</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Lever retainer</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ring collar</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bearing</td>
<td>High carbon chrome bearing steel</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing</td>
<td>High carbon chrome bearing steel</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Back-up ring</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Scraper</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Adjustment bolt</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Hexagon nut</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Button bolt</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Rubber cap</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Hexagon socket head cap screw</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Cover</td>
<td>Aluminum alloy</td>
<td>SE type only</td>
</tr>
<tr>
<td>26</td>
<td>Plate</td>
<td>Resin</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Gasket</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Label</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The plug number 24 is used only when the connection port is type SE.

### Auto switch block unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Auto switch unit part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSUB 1</td>
<td>P211070-1</td>
</tr>
<tr>
<td>MDSUB 3</td>
<td>P211090-1</td>
</tr>
<tr>
<td>MDSUB 7</td>
<td>P211060-1</td>
</tr>
<tr>
<td>MDSUB20</td>
<td>P211080-1</td>
</tr>
</tbody>
</table>

* Auto switches are not included with switch units.

**For MDSUB1, 3**

- **Right-handed**
- **Left-handed**
- **Combination left & right-handed**

**Part no.: P211070-8**
**Part no.: P211070-9**
**Part no.: P211060-8**

* A switch block unit is the assembly required to mount one auto switch on a switch unit.
Series MSU
Auto Switch Specifications

Applicable auto switches

<table>
<thead>
<tr>
<th>Applicable series</th>
<th>Auto switch model</th>
<th>Electrical entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSU□1</td>
<td>Reed switch</td>
<td>D-90, 90A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (2 wire)</td>
</tr>
<tr>
<td>MDSU□3</td>
<td>Solid state switch</td>
<td>D-97, 93A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (2 wire)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-S99, S99V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (3 wire)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-S9P, S9PV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (3 wire) PNP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-T99, T99V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (2 wire)</td>
</tr>
<tr>
<td>MDSU□7</td>
<td>Reed switch</td>
<td>D-R73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (2 wire)</td>
</tr>
<tr>
<td>MDSU□20</td>
<td>Solid state switch</td>
<td>D-R80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (3 wire)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-S79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (3 wire) PNP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-S7P</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (3 wire) PNP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-T79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grommet (2 wire)</td>
</tr>
</tbody>
</table>

Table Positioning Pin Hole Rotation Range and Auto Switch Mounting Position

| MSU□1, 3          |                  |                  |
|                   | Single vane type | 90°               |
|                   | Switch for END1  | 180°              |
|                   | Switch for END2  |                  |

| MSU□7, 20         |                  |                  |
|                   | Single vane type | 90°               |
|                   | Switch for END1  | 180°              |
|                   | Switch for END2  |                  |

- In drawings that show the rotation range, the arrows on the solid line 90° (180°) indicate the rotation range of the positioning pin holes on the table surface. When the pin hole is at END1, the END1 switch operates, and when the pin hole is at END2, the END2 switch operates.
- The arrows on the broken line indicate the rotation range of the internal magnet. The rotation range of each switch can be reduced by moving the END1 switch clockwise and the END2 switch counterclockwise.

Auto switch rotation and actuation ranges

<table>
<thead>
<tr>
<th>Model</th>
<th>Rotation range</th>
<th>Actuation range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSU□1, 3</td>
<td>110°</td>
<td>10°</td>
</tr>
<tr>
<td>MDSU□7, 20</td>
<td>90°</td>
<td></td>
</tr>
</tbody>
</table>
**Series MSU**

**Auto Switch Specifications**

### How to change Auto switch Detecting Positions

To set a new detection position, slightly loosen the set screw, move the switch to the desired position and retighten the screw. Over-tightening can damage the screw making it impossible to hold the position. Use a tightening torque of about 0.5N·m.

### Auto Switch Mounting Classifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit part numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSU 1</td>
<td>P211070-1</td>
</tr>
<tr>
<td>MDSU 3</td>
<td>P211090-1</td>
</tr>
<tr>
<td>MDSU 7</td>
<td>P211060-1</td>
</tr>
<tr>
<td>MDSU 20</td>
<td>P211080-1</td>
</tr>
</tbody>
</table>

*The magnet lever is included.

### Auto Switch Units

**Auto switch unit part numbers**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit part numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSU 1</td>
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</tr>
<tr>
<td>MDSU 20</td>
<td>P211080-1</td>
</tr>
</tbody>
</table>

*The magnet lever is included.

**Auto switch block units**

<table>
<thead>
<tr>
<th>Model</th>
<th>Right-handed</th>
<th>Left-handed</th>
<th>Combination left &amp; right-handed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDSU 1, 3</td>
<td>Part no.: P211070-8</td>
<td>Part no.: P211070-9</td>
<td>Part no.: P211060-8</td>
</tr>
</tbody>
</table>

*A switch block unit is the assembly required to mount one switch on a switch unit.

### Caution

Be sure to read before handling. Refer to pages 2.11-2 through 2.11-4 before using auto switches.
Warning
1. Keep the load energy within the product’s allowable energy value.
Operation with a load kinetic energy exceeding the allowable value can cause human injury and/or damage to equipment or machinery. (Refer to model section procedures in this catalog.)

Caution
1. When there are load fluctuations, allow a sufficient margin in the actuator torque.
In case of horizontal mounting (operation with product facing sideways), malfunction may occur due to load fluctuations.

Caution
1. Adjust the rotation angle within the prescribed ranges. \((90^\circ \pm 10^\circ, 180^\circ \pm 10^\circ)\) \((\pm 5^\circ \text{ at end of rotation})\)
Adjustment outside the prescribed ranges may cause malfunction of the product or failure of switches to operate.

2. Adjust the rotation time within the prescribed values using a speed controller, etc. \((0.07 \text{ to } 0.3s/90^\circ)\)
The product is provided with a fixed throttle and is designed not to operate faster than \(0.07s/90^\circ\). However, in cases such as a large load inertia, it can exceed the allowable energy causing damage to equipment. (Refer to the model selection procedures in this catalog.)
Furthermore, adjustment to a speed slower than \(0.3s/90^\circ\) can cause sticking and slipping or stopping of operation.

Caution
<High precision type/MSUA>
In case a rotary unit and table unit are required for maintenance, order with the unit part numbers shown below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSUA 1- 90 :</td>
<td>P402070-2A</td>
</tr>
<tr>
<td>MSUA 1-180</td>
<td>P402070-2B</td>
</tr>
<tr>
<td>MSUA 3- 90 :</td>
<td>P402090-2A</td>
</tr>
<tr>
<td>MSUA 3-180</td>
<td>P402090-2B</td>
</tr>
<tr>
<td>MSUA 7- 90 :</td>
<td>P402060-2A</td>
</tr>
<tr>
<td>MSUA 7-180</td>
<td>P402060-2B</td>
</tr>
<tr>
<td>MSUA20- 90 :</td>
<td>P402080-2A</td>
</tr>
<tr>
<td>MSUA20-180</td>
<td>P402080-2B</td>
</tr>
</tbody>
</table>

Note 1) Note that the rotation angle should not be changed even though the rotary unit has been changed.
For maintenance, order units with a part number suitable for the model being used.
Note 2) Due to the integral construction of the MSUB series, the rotary and table units cannot be ordered separately.