Automatic exchange of robot hand tools, FMS (flexible manufacturing system) implemented for assembly lines.

The robot hand tools change automatically to accommodate workpieces of different shapes, thus making it possible to adopt the FMS (flexible manufacturing system) in the assembly line.

**Specifications**

<table>
<thead>
<tr>
<th>Series</th>
<th>MA210</th>
<th>MA310</th>
<th>MA311</th>
<th>MA320</th>
<th>MA321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning</td>
<td>Ball coupling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. transportable mass</td>
<td>3 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling</td>
<td>Single acting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling air pressure</td>
<td>0.4 to 0.7 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>0 to 60°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning repeatability</td>
<td>±0.01 mm</td>
<td></td>
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</tr>
</tbody>
</table>

**System Construction**

**Variations**

- Adapter for assembling robot Series MA2 ø8, ø10, ø11, ø14, ø15, ø20
- Adapter for assembling robot Series MA3 ø10, ø11, ø14, ø15, ø20, ø24, ø25

- Air grippers for auto hand changing system (ø18 to ø20)
- Narrow type 10D MHZ2-16D 20D
- Narrow type 10DN MHZ2-16DN 20DN
- Rotary actuated type MHR2-10 15

- Additional installation unit of electrical contact point
  (Able to add 8 contact points.)

- Tool stand
  - The height for setting a tool can be adjusted.
  - An auto switch for detecting a tool can be mounted.
Series MA210 (Compact type)
Max. transportable mass: 3 kg
Compact/Lightweight
O.D.: 52 mm, Mass: 360 g

Series MA3 (Double acting type)
Ideal for carrying heavy loads.
2.5 times the moment resistance and torque resistance of the conventional series.

No adjustment or teaching necessary when replacing tools
All attachment and removal during tool replacement is carried out automatically, allowing for elimination of the onerous labor of the replacement process, and a major reduction of time needed for changing setups.

Quicker launch of assembly lines
Use of the AHC system makes it possible to design the equipment layout more quickly, and reduces the time required for manufacturing.

Failsafe mechanism
Prevents tools from dropping due to reductions in air pressure

Electric interface
Series MA2: 8 power systems (Contact points: gold plated)
Series MA3: 12 power systems (Contact points: gold plated)
Additional installation unit, 8 power systems (option)
D-sub connector, with robot cable (option)

Air interface
Series MA2: 4 power systems, self-seal mechanism, built-in check valve
Series MA3: 6 power systems, self-seal mechanism, built-in check valve

Repeatable high-precision
±0.01 mm
Series MA210
Series MA31 (Ball coupling)
Series MA32 (Curved coupling)

Max. transportable mass:
Series MA2: 3 kg
Series MA3: 5 kg

Series MA31/L50132
Series MA32/L50132
Ball coupling
Curved coupling
(For high torque resistance)
## AHC System Model/Specifications

<table>
<thead>
<tr>
<th>Tool adapter</th>
<th>Port</th>
<th>electric specifications</th>
<th>Without D-sub connector</th>
<th>Without D-sub connector entry</th>
<th>With D-sub connector</th>
<th>With robot cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHC unit</td>
<td></td>
<td>M3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>M5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool adapter</th>
<th>Port</th>
<th>electric specifications</th>
<th>Without D-sub connector</th>
<th>Without D-sub connector entry</th>
<th>With D-sub connector</th>
<th>With robot cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M5</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Cylinder bore

- MHR: Parallel opening and closing for air gripper

<table>
<thead>
<tr>
<th>Cylinder bore</th>
<th>MHR2</th>
<th>MHR3</th>
<th>MHR4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ø15</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ø20</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ø25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Tool stand

- Parallel opening and closing for air gripper

<table>
<thead>
<tr>
<th>Additional installation unit</th>
<th>For Y</th>
<th>For A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel opening and closing for air gripper</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tool stand</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Specifications

- AHC System Series MA
- MA210
- MA310
- MA320

### Robot adapter

- Without D-sub connector
- With D-sub connector
- With robot cable

### Robot cable

- Without D-sub connector
- With D-sub connector
- With robot cable

### Tool stand

- Additional installation unit
- For Y
- For A

### Electric specifications

- Without D-sub connector
- With D-sub connector
- With robot cable

### Robot adapter

- Without D-sub connector
- With D-sub connector
- With robot cable

### Robot cable

- Without D-sub connector
- With D-sub connector
- With robot cable
AHC System/Auto Hand Changing System
Series MA2

Specifications

<table>
<thead>
<tr>
<th></th>
<th>Series</th>
<th>MA210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning</td>
<td></td>
<td>Ball coupling</td>
</tr>
<tr>
<td>Max. transportable mass</td>
<td></td>
<td>3 kg</td>
</tr>
<tr>
<td>Handling</td>
<td></td>
<td>Single acting/Air supply at disconnection</td>
</tr>
<tr>
<td>Handling air pressure</td>
<td></td>
<td>0.4 to 0.7 MPa</td>
</tr>
<tr>
<td>Proof pressure</td>
<td></td>
<td>1.05 MPa</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td></td>
<td>0 to 60°C</td>
</tr>
<tr>
<td>Positioning repeatability</td>
<td></td>
<td>±0.01 mm</td>
</tr>
<tr>
<td>Combined axial force</td>
<td></td>
<td>150 N</td>
</tr>
<tr>
<td>Moment resistance M</td>
<td></td>
<td>2 N·m</td>
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<tr>
<td>Torque resistance T</td>
<td></td>
<td>2 N·m</td>
</tr>
<tr>
<td>Interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>Max. operating pressure</td>
<td>0.7 MPa</td>
</tr>
<tr>
<td></td>
<td>Operating vacuum pressure</td>
<td>−100 kPa or more (10 Torr or more)</td>
</tr>
<tr>
<td></td>
<td>Cv value</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td>Number of circuits</td>
<td>4</td>
</tr>
<tr>
<td>Electricity</td>
<td>Contact point capacity</td>
<td>2 A/interface</td>
</tr>
<tr>
<td></td>
<td>Number of contact points</td>
<td>8</td>
</tr>
</tbody>
</table>

* Values given on the table for combined axial force, moment resistance, and torque resistance are the values for when the AHC unit and tool adapter begin to separate. During use, make sure the axial force, moment and torque from load are 1/2 or less than those shown above, for safety reasons.

Option Part No.

Robot adapter

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable shaft diameter</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA210-CS1</td>
<td>ø8</td>
<td></td>
</tr>
<tr>
<td>MA210-CR1</td>
<td>ø10</td>
<td></td>
</tr>
<tr>
<td>MA210-CR2</td>
<td>ø11</td>
<td></td>
</tr>
<tr>
<td>MA210-CR3</td>
<td>ø14</td>
<td></td>
</tr>
<tr>
<td>MA210-CR4</td>
<td>ø15</td>
<td></td>
</tr>
<tr>
<td>MA210-CR5</td>
<td>ø20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hexagon socket head cap screw M3 x 8 (4 pcs.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M3 x 10 (4 pcs.)</td>
</tr>
</tbody>
</table>
AHC System Series MA2

How to Order

AHC unit

MA 210 - Y N M3 - R3

- Robot adapter
  - Nil: Without robot adapter
  - S1 ø8
  - R1 ø10
  - R2 ø11
  - R3 ø14
  - R4 ø15
  - R5 ø20

Electric specifications
- N: None

Air connection size
- M3
- M3 x 0.5

Tool adapter

MA 210 - A M3

- Auto hand changer
- Tool adapter
- Transportable mass
  - 2: Transportable mass 3 kg

Air gripper for AHC

<ø10 ø15>

MHR2 - 10 - A210

- Cylinder bore
  - 10 mm
  - 15 mm

<ø10 ø16>

MHZ2 - 16 D N - A210 - Y69A

- Cylinder bore
  - 10 mm
  - 15 mm

- Finger position
  - N: Standard
  - N: Narrow type

- Auto switch type
  - Nil: Without auto switch
  - Y69A: Solid state auto switch
    - D-Y69A (3-wire)
    - D-Y69B (2-wire)
  - Y69B: Solid state auto switch
    - D-Y69B (2-wire)
  - Lead wire: Right angle entry
  - Lead wire length: 0.5 m

- Auto switch additional symbol
  - Nil: 2 pcs.
  - S: 1 pc.

Tool stand

MA210 - S1 - Y59A

- Tool stand
- Auto switch type
  - Nil: Without auto switch
  - Y59A: Solid state auto switch
    - D-Y59A (3-wire)
    - D-Y59B (2-wire)
  - Y59B: Solid state auto switch
    - D-Y59B (2-wire)
  - Lead wire: Axial direction entry
  - Lead wire length
    - Nil: Grommet
    - L: With 0.5 m lead wire
    - N: With 3 m lead wire

Transportable mass
- 2: Transportable mass 3 kg

Cylinder bore
- 10 mm
- 15 mm

Finger position
- Standard
- Narrow type

Auto switch type
- Nil: Without auto switch
- Y69A: Solid state auto switch
  - D-Y69A (3-wire)
  - D-Y69B (2-wire)
- Y69B: Solid state auto switch
  - D-Y69B (2-wire)
- Lead wire: Right angle entry
- Lead wire length: 0.5 m

Auto switch additional symbol
- Nil: 2 pcs.
- S: 1 pc.

Tool stand
- MA210 - S1 - Y59A

- Tool stand
- Auto switch type
  - Nil: Without auto switch
  - Y59A: Solid state auto switch
    - D-Y59A (3-wire)
    - D-Y59B (2-wire)
  - Y59B: Solid state auto switch
    - D-Y59B (2-wire)
  - Lead wire: Axial direction entry
  - Lead wire length
    - Nil: Grommet
    - L: With 0.5 m lead wire
    - N: With 3 m lead wire
Series MA2

AHC Unit and Tool Adapter

AHC Unit/MA210-YNM3 (Without robot adapter)
AHC Unit/MA210-YNM3-□ (With robot adapter)
Tool adapter/MA210-AM3

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable shaft diameter ød</th>
<th>øD</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA210-YNM3</td>
<td>—</td>
<td>—</td>
<td>260</td>
</tr>
<tr>
<td>MA210-YNM3-S1</td>
<td>8</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>MA210-YNM3-R1</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>MA210-YNM3-R2</td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>MA210-YNM3-R3</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>MA210-YNM3-R4</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>MA210-YNM3-R5</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

AHC unit junction

Tool adapter/MA210-AM3

Mass (g)
AHC System Series MA2

Robot adapter
MA210-□□

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable shaft diameter</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA210-CS1</td>
<td>ø8</td>
<td></td>
</tr>
<tr>
<td>MA210-CR1</td>
<td>ø10</td>
<td></td>
</tr>
<tr>
<td>MA210-CR2</td>
<td>ø11</td>
<td></td>
</tr>
<tr>
<td>MA210-CR3</td>
<td>ø14</td>
<td></td>
</tr>
<tr>
<td>MA210-CR4</td>
<td>ø15</td>
<td></td>
</tr>
<tr>
<td>MA210-CR5</td>
<td>ø20</td>
<td></td>
</tr>
</tbody>
</table>
Series MA2

Ø10/Ø15 Air Gripper: Rotary Actuated Type

Ø10/Ø15: MHR2-Ø10/15-A210

Note) Refer to Series MHR2 (page 492) for the detailed specifications of air grippers.
AHC System Series MA2

Ø10/Ø16 Air Gripper: Standard Type

MHZ2-10D-A210

For mounting tool adapter
3 x M3 x 0.5 depth 4

For attachment mounting
M2.5 x 0.45 through

Finger opening port
With gasket

Finger closing port
With gasket

2 x M3 x 0.5 depth 6

Hexagon width across flats 5

4 x M3 x 0.5 depth 5
Bottom hole dia. 2.6 through

Not possible to use a through-hole when using an auto switch.

Closed: 11.2
Open: 15.2

MHZ2-10DN-A210

For mounting tool adapter
3 x M3 x 0.5 depth 4

Finger opening port
With gasket

Finger closing port
With gasket

2 x M3 x 0.5 depth 6

Hexagon width across flats 5

4 x M3 x 0.5 depth 5
Bottom hole dia. 2.9 through

Closed: 5.7
Open: 9.2

MHZ2-16D-A210

For mounting tool adapter
3 x M3 x 0.5 depth 4

Finger opening port
With gasket

Finger closing port
With gasket

4 x M4 x 0.7 depth 4.5
Hexagon width across flats 7

4 x M4 x 0.7 depth 8
Bottom hole dia. 3.4 through

(Not possible to use a through-hole when using an auto switch.)

Closed: 14.9
Open: 20.8

MHZ2-16DN-A210

For attachment mounting
4 x M3 x 0.5 through

Closed: 6.6
Open: 12.6

Note) Only D-Y69A and D-Y69B auto switches can be used. Refer to Series MHZ2 (page 400) for the detailed specifications of air grippers.
Series **MA2**

Tool Stand

**MA210-S1-□**

- Mass: 520 g
- Height can be adjusted
- With auto switch
- 2 x 4.5 mounting hole
- 4 x 4.5 mounting hole
Construction: Component Parts

Single acting type

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unit body</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>2</td>
<td>Head cap</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>3</td>
<td>Ball base</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>4</td>
<td>Ball cover</td>
<td>Carbon steel</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Contact probe assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Piston</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Clamp spring</td>
<td>Steel wire</td>
<td>Zinc chromated</td>
</tr>
<tr>
<td>8</td>
<td>Check valve assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Lever</td>
<td>Carbon steel</td>
<td>Special black thin membrane anti-corrosive treated</td>
</tr>
<tr>
<td>10</td>
<td>Pilot pin</td>
<td>Carbon steel</td>
<td>Special black thin membrane anti-corrosive treated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Parallel pin</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Steel ball</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Robot adapter</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>14</td>
<td>Tool adapter</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>15</td>
<td>Hook</td>
<td>Carbon steel</td>
<td>Special black thin membrane anti-corrosive treated</td>
</tr>
<tr>
<td>16</td>
<td>Contact block assembly</td>
<td></td>
<td>Contact point gold plated</td>
</tr>
<tr>
<td>17</td>
<td>Passage seal</td>
<td>Synthetic rubber</td>
<td></td>
</tr>
</tbody>
</table>
AHC System/Auto Hand Changing System

Series MA3

Specifications

<table>
<thead>
<tr>
<th>Series</th>
<th>MA310</th>
<th>MA311</th>
<th>MA320</th>
<th>MA321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning</td>
<td>Ball coupling</td>
<td>Curved coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. transportable mass</td>
<td>5 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling</td>
<td>Single acting/ Air supply at disconnection</td>
<td>Double acting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling air pressure</td>
<td>0.4 to 0.7 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>0 to 60°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning repeatability</td>
<td>±0.01 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined axial force *</td>
<td>200 N</td>
<td>500 N (0.5 MPa)</td>
<td>200 N</td>
<td>500 N (0.5 MPa)</td>
</tr>
<tr>
<td>Moment resistance M *</td>
<td>3 N·m</td>
<td>7.5 N·m (0.5 MPa)</td>
<td>3 N·m</td>
<td>7.5 N·m (0.5 MPa)</td>
</tr>
<tr>
<td>Torque resistance T *</td>
<td>3 N·m</td>
<td>7.5 N·m (0.5 MPa)</td>
<td>12 N·m</td>
<td>30 N·m (0.5 MPa)</td>
</tr>
<tr>
<td>Max. operating pressure</td>
<td>0.7 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating vacuum pressure</td>
<td>-100 kPa or more (10 Torr or more)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cv value</td>
<td>0.072</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of circuits</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact point capacity</td>
<td>2 A/interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of contact points</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Values given on the table for combined axial force, moment resistance, and torque resistance are the values for when the AHC unit and tool adapter begin to separate. During use, make sure the axial force, moment and torque from load are 1/2 or less than those shown above, for safety reasons.

Option Part No.

Robot adapter

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable shaft diameter</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA310-CR1</td>
<td>ø10</td>
<td></td>
</tr>
<tr>
<td>MA310-CR2</td>
<td>ø11</td>
<td></td>
</tr>
<tr>
<td>MA310-CR3</td>
<td>ø14</td>
<td></td>
</tr>
<tr>
<td>MA310-CR4</td>
<td>ø15</td>
<td></td>
</tr>
<tr>
<td>MA310-CR5</td>
<td>ø20</td>
<td></td>
</tr>
<tr>
<td>MA310-CS6</td>
<td>ø24</td>
<td></td>
</tr>
<tr>
<td>MA310-CR6</td>
<td>ø25</td>
<td></td>
</tr>
</tbody>
</table>

Hexagon socket head cap screw
M4 x 10 (4 pcs.)
M4 x 14 (4 pcs.)

Additional Installation Unit of Electrical Contact Point

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Additional installation unit</th>
<th>Application</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA310-EY1</td>
<td>8 contact points</td>
<td>AHC unit</td>
<td></td>
</tr>
<tr>
<td>MA310-EA1</td>
<td>8 contact points</td>
<td>Tool adapter</td>
<td></td>
</tr>
</tbody>
</table>

Hexagon socket head cap screw
M2.5 x 10 (2 pcs.)
AHC System Series MA3

How to Order

MA3 10 - YA M5 - R3

- Auto hand changer
- Transportable mass: 5 kg
- Operation: No electric specifications
- Robot adapter
  - R1: ø10
  - R2: ø11
  - R3: ø14
  - R4: ø15
  - R5: ø20
  - R6: ø25
- Air connection size
  - M3 x 0.5
  - M5 x 0.8
- Electric specifications
  - With auto switch
  - Without auto switch

Tool adapter

MA 310 - A M5

- Auto hand changer
- Transportable mass: 5 kg
- Tool adapter
- Series
  - 10: Ball coupling
  - 20: Curved coupling

Air gripper for AHC

- Cylinder bore: 10 mm
  - 15 mm
- For MA3
- With adapter

90° reverse unit

MA310 - R1 - 90A

- Auto switch type
  - S99: D-S99A, D-S99B (1 pc. each)
  - T99: D-T99A, D-T99B (1 pc. each)
- Lead wire length
  - 0.5 m

Tool stand

MA310 - S1 - Y59A

- Tool stand
- Auto switch type
  - Y59A: D-Y59A (3-wire)
  - Y59B: D-Y59B (2-wire)
- Lead wire: Right angle entry
  - 0.5 m

- Electric specifications
  - With auto switch
  - Without auto switch

* Can also be used for Series MA320.
**Series MA3**

**AHC Unit and Tool Adapter/Single Acting Type**

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable shaft diameter</th>
<th>øD</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA310-YNM5</td>
<td>10</td>
<td>35</td>
<td>440</td>
</tr>
<tr>
<td>MA310-YNM5-R1</td>
<td>11</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>MA310-YNM5-R2</td>
<td>14</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>MA310-YNM5-R3</td>
<td>15</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>MA310-YNM5-R4</td>
<td>20</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>MA310-YNM5-R5</td>
<td>24</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>MA310-YNM5-R6</td>
<td>25</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>Tool adapter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA30-AM3</td>
<td>10</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>MA30-AM5</td>
<td>10</td>
<td></td>
<td>270</td>
</tr>
</tbody>
</table>

- **AHC Unit/Ma310-YNM5 (Without robot adapter)**
- **AHC Unit/Ma310-YNM5-□ (With robot adapter)**
- **Tool adapter/Ma310-AM□**

*For mounting robot adapter, 4 x M4 x 0.7 depth 7*

*When mounting MA310-AM3*

- Air pressure port (PCD60) 6 x M5 x 0.8
- Robot shaft mounting bolt 4 x M4 x 14 Hexagon socket head cap screw
- Operating port M5 x 0.8

*When mounting MA310-AM5*

- Air pressure port 6 x M5 x 0.8
- For tool mounting 4 x M4 x 0.7 depth 8.5
- For tool mounting 3 x 3.4 depth 12.5

*Electrical contact points: 12*

*For mounting an additional installation unit for electrical contact points 2 x M2.5 x 0.45 thread depth 6*

*For mounting robot adapter 4 x M4 x 0.7 depth 7*
AHC Unit and Tool Adapter/Double Acting Type

AHC Unit/MA3\textsuperscript{1/2}-YNM5 (Without robot adapter)
AHC Unit/MA3\textsuperscript{1/2}-YNM5-□ (With robot adapter)
Tool adapter/MA3\textsuperscript{1/2}-A

When mounting MA3\textsuperscript{1/2}-AM3

For mounting robot adapter
4 x M4 x 0.7 depth 7

Air pressure port (PCD60)
6 x M5 x 0.8

For mounting an additional installation unit for electrical contact points
2 x M2.5 x 0.45 thread depth 6

Electrical contact points: 12

Robot shaft mounting bolt
4 x M4 x 14 Hexagon socket head cap screw

Connection/Operating port
M5 x 0.8

Disconnection/Operating port
M5 x 0.8

Electrical contact points: 12

For tool mounting
4 x M4 x 0.7 depth 6

Air pressure port
6 x M3 x 0.5

For tool mounting
4 x M4 x 0.7 depth 8.5

Air pressure port
6 x M5 x 0.8

Magnet for tool stand sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable shaft diameter</th>
<th>oD</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5</td>
<td>—</td>
<td>—</td>
<td>500</td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R1</td>
<td>10</td>
<td>35</td>
<td>580</td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R2</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R3</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R4</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R5</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-S6</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{1/2}-YNM5-R6</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool adapter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3\textsuperscript{0}-AM3</td>
<td>—</td>
<td>—</td>
<td>250</td>
</tr>
<tr>
<td>MA3\textsuperscript{0}-AM5</td>
<td>—</td>
<td>—</td>
<td>270</td>
</tr>
</tbody>
</table>
**Series MA3**

**With D-sub connector**

MA3□□-Y□□M5-□□

**Robot adapter**

MA310-C□□

---

**D-sub connectors**

**D-sub connector specifications**

<table>
<thead>
<tr>
<th>D-sub connector</th>
<th>AHC unit main body side</th>
<th>Robot cable side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact classification</td>
<td>Pin</td>
<td>Socket</td>
</tr>
<tr>
<td>Shell size</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>No. of cores</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Connector type</td>
<td>Crimping connection type</td>
<td></td>
</tr>
<tr>
<td>Effective area</td>
<td>—</td>
<td>0.2 mm²</td>
</tr>
<tr>
<td>No. of cores</td>
<td>—</td>
<td>12</td>
</tr>
</tbody>
</table>

**MA3□□-YAMS-□□ with a D-sub connector**

Since the AHC unit main body is compatible with a pin contact, prepare a socket contact.

**MA3□□-YBMS-□□ with a D-sub connector**

A pin contact is comprised of 12 crimping connection type pins as standard.

For a crimping tool, we recommend the CT150-2-D*C made by Japan Aviation Electronics Industry, Inc.

**MA3□□-YCMS-□□ with a robot cable**

The combination of the electric contact point number and cables of the AHC unit is shown in the table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable shaft diameter</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA310-CR1</td>
<td>ø10</td>
<td>80</td>
</tr>
<tr>
<td>MA310-CR2</td>
<td>ø11</td>
<td></td>
</tr>
<tr>
<td>MA310-CR3</td>
<td>ø14</td>
<td></td>
</tr>
<tr>
<td>MA310-CR4</td>
<td>ø15</td>
<td></td>
</tr>
<tr>
<td>MA310-CR5</td>
<td>ø20</td>
<td></td>
</tr>
<tr>
<td>MA310-CS6</td>
<td>ø24</td>
<td></td>
</tr>
<tr>
<td>MA310-CR6</td>
<td>ø25</td>
<td></td>
</tr>
</tbody>
</table>
AHC System Series MA3

Ø10/Ø15 Air Gripper: Rotary Actuated Type

Ø10/Ø15: MHR2-10-A310

- Mass: 130 g
- With robot adapter
- Use MA3 (1-AM3) for the tool adapter.
- Hexagon socket head cap screw M3 x 14 (3 included)
- View D
- 6 x M2 x 0.4 thread depth 4
  (A, B, C common view)
- Hexagon socket head cap screw M3 x 14 (3 included)
- Open: 16, Closed: 10
- 6 x M3 x 0.5 thread depth 4
  (Thread for mounting attachment)

Ø15: MHR2-15-A310

- Mass: 210 g
- With robot adapter
- Use MA3 (1-AM3) for the tool adapter.
- Hexagon socket head cap screw M3 x 14 (3 included)
- View D
- 6 x M3 x 0.5 thread depth 7
  (A, B, C common view)
- 2 x M3 x 0.5 thread depth 6
  (Thread for mounting attachment)

Note) Refer to Series MHR2 (page 492) for the detailed specifications of air grippers.
Series MA3

Ø16/Ø20 Air Gripper: Standard Type

MHZ2-16D-A310

Finger opening port
With O-ring
For mounting tool adapter
3 x M3 x 0.5 depth 4

MHZ2-16DN-A310

Finger opening port
With O-ring
For mounting tool adapter
3 x M3 x 0.5 depth 4

MHZ2-20D-A310

Finger opening port
With O-ring
For mounting tool adapter
3 x M3 x 0.5 depth 4

MHZ2-20DN-A310

Finger opening port
With O-ring
For mounting tool adapter
3 x M3 x 0.5 depth 4

Note) Only D-Y69A and D-Y69B auto switches can be used. Refer to Series MHZ2 (page 400) for the detailed specifications of air grippers.
AHC System Series MA3

90° Reverse Unit

MA310-R1-

With robot adapter

Hexagon socket head cap screw
M3 x 16 (3 included)

Tool adapter

For mounting tool adapter
6 x M3 thread depth 8

With auto switch

Operating port M3 x 0.5

Tool mounting hole
3 x 3 drill

A

Output Table

<table>
<thead>
<tr>
<th>Operating pressure (MPa)</th>
<th>Effective output (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>0.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

View B

Approx. 225°

( Rotary operating angle)

Mass: 260 g

Please consult SMC regarding operating conditions (load, speed, etc.) before using.
**Series MA3**

Additional Installation
Unit of Electrical Contact Point

**MA310-EY1: For AHC unit**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Hexagon socket head cap screw M2.5 x 10 Flat washer, Compact round washer, Nominal size 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>20 g</td>
</tr>
</tbody>
</table>

**MA310-EA1: For tool adapter**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Hexagon socket head cap screw M2.5 x 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>25 g</td>
</tr>
</tbody>
</table>

**Tool Stand**

MA310-S1-

Mounting hole position

Electrical contact point

Height can be adjusted

4 x 5 mounting hole

Mass: 950 g

---

MA310-EY1: For AHC unit

MA310-EA1: For tool adapter

Height can be adjusted

4 x 5 mounting hole

Mass: 950 g
Construction: Component Parts

**Single acting type**

1. Body
   - Material: Aluminum alloy
   - Note: Hard anodized

2. Insulation ring
   - Material: Synthetic resin
   - Note: Black

3. Coupling
   - Material: Carbon steel
   - Note: Special black thin membrane anti-corrosive treated

4. Piston
   - Material: Aluminum alloy
   - Note: Chromated

5. Lever
   - Material: Carbon steel
   - Note: Special black thin membrane anti-corrosive treated

6. Check valve assembly
   - Material: Brass, steel wire, synthetic rubber

7. Pilot pin
   - Material: Carbon steel
   - Note: Special black thin membrane anti-corrosive treated

8. Clamp spring
   - Material: Steel wire

9. Seal
   - Material: Synthetic rubber

10. Parallel pin
    - Material: Carbon steel

11. Multi-tube holder
    - Material: Synthetic resin
    - Note: Black

12. Contact probe

13. D-sub connector assembly

**Double acting type**

Air supply (0.4 to 0.7 MPa)

14. Health cable
   - Material: Stainless steel
   - Note: Contact point gold plated

15. Robot adapter
    - Material: Aluminum alloy
    - Note: Hard anodized

16. Connecting base
    - Material: Aluminum alloy
    - Note: Hard anodized

17. Toe plate
    - Material: Stainless steel
    - Note: Hard anodized

18. Hook
    - Material: Carbon steel
    - Note: Special black thin membrane anti-corrosive treated

19. Contact block assembly
    - Material: Beryllium copper, synthetic rubber
    - Note: Contact point gold plated

20. Passage seal
    - Material: Synthetic rubber

21. Bearing
    - Material: Stainless steel

22. Cap
    - Material: Aluminum alloy
    - Note: Chromated

23. Head cap
    - Material: Aluminum alloy

24. Rod seal
    - Material: Synthetic rubber
1. Supply compressed air: 0.4 to 0.7 MPa to the operating port.

2. Align the positions of the AHC unit and tool adapter as shown below, move the AHC unit to within 0.5 mm of the tool adapter, with the centers aligned, and insert the pilot pin into the pilot hole on the tool adapter side. Move the AHC unit toward until the t dimension in the figure below attains 0 to 2 mm larger than the value at the time of connection.

3. Release the compressed air from the operating port.

1. Supply compressed air: 0.4 to 0.7 MPa to the operating port.

2. Pull up the AHC unit 12 mm or more.

3. Release the compressed air from the disconnection port, and at the same time supply compressed air (0.4 to 0.7 MPa) to the connection port.

1. Supply compressed air: 0.4 to 0.7 MPa to the operating port.

2. Pull up the AHC unit 12 mm or more.

3. Release the compressed air from the operating port.

### Connection and disconnection procedures

**Disconnected state**

1. Supply compressed air: 0.4 to 0.7 MPa to the operating port.
2. Pull up the AHC unit 12 mm or more.

3. Release the compressed air from the disconnection port, and at the same time supply compressed air (0.4 to 0.7 MPa) to the connection port.

1. Release the compressed air from the connection port, and at the same time supply compressed air (0.4 to 0.7 MPa) to the disconnection port.

2. Pull up the AHC unit 12 mm or more.

**Connected state**

- Air interface: Port number
- Electric interface: Contact point number

**Disconnected state**

- Connection/Operating port M5 x 0.8
- Disconnection/Operating port M5 x 0.8

**Connected state**

- Electric interface: Port number

**Robotic Adapter Mounting**

- Mount the AHC unit to the shaft of the assembling robot by evenly tightening the 4 hexagon socket head cap screws with the maximum tightening torque mentioned in the figures below.

- Hexagon socket head cap screw
  - Maximum tightening torque: 2.5 N·m

- Shaft on the top of assembling robot

- M4 x 10
- Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

- Robot adapter
  - M4 x 10
  - Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

- AHC unit
  - M4 x 10
  - Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

- M3 x 8
  - Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

- Robot adapter
  - M3 x 8
  - Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

- AHC unit
  - M3 x 8
  - Hexagon socket head cap screw
  - Maximum tightening torque: 1.06 N·m

--
Series MA
Specific Product Precautions 2
Be sure to read before handling.

<table>
<thead>
<tr>
<th>Series</th>
<th>MA3□□</th>
<th>MA210</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Based on the positioning of the tool adapter and the air gripper shown in the figures below, note that it is possible to rotate them every 120° and in three different directions. Mount them accordance with your operating conditions.</td>
<td>1. Mount the tool adapter and the air gripper using the positioning shown in the figures below.</td>
</tr>
<tr>
<td>2.</td>
<td>Evenly tighten 3 hexagon socket head cap screws with a maximum tightening torque of 1.06 N·m.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Before mounting, confirm that the O-ring or gasket of the air gripper is mounted properly, and make sure there is no dust or debris on the sheet surface of the tool adapter.</td>
<td></td>
</tr>
</tbody>
</table>

How to use dedicated air grippers

Mounting procedures

1. Based on the positioning shown in the figures below, note that it is possible to rotate them every 60° and in six different directions.
2. Mount the 90° reverse unit to the tool adapter, and evenly tighten the 3 hexagon socket head cap screws (M3 x 16) with a maximum tightening torque of 1.06 N·m.

Pipe the driving air for tools or the rotary actuator to the air port of the tool adapter.

When wiring for use with an auto switch, etc., solder it to the terminal on the tool adapter.

1. As shown in the figure below, determine the position in accordance with the leveled part of the AHC unit and tool adapter, and evenly tighten the 2 hexagon socket head cap screws (M2.5 x 10) with a maximum tightening torque of 0.3 N·m.

SMC

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1. Align the positions of the tool adapter positioning groove and the tool stand detent spring. When using an auto switch, position the auto switch in relation to the magnet fitted on the tool adapter in accordance with the figure below. By changing the auto switch mounting position to the right side, it is possible to use it by turning it around 180°. When doing so, be sure the auto switch cable is coming out of the post side. Tighten the auto switch mounting screws with a maximum tightening torque of 0.1 N·m.

2. Connect or disconnect the AHC unit and tool adapter only after attaching the AHC unit in a horizontal direction.

3. When positioning the holder, loosen the hexagon socket head cap screws shown in the figure below right, and set it at the desired height, then tighten with a maximum tightening torque of 5 N·m.

How to use the tool stand

Piping and wiring precautions

1. Use SMC compact one-touch fittings, one-touch mini (M3, M5), or miniature fittings (M3, M5). Thoroughly flush out the connector piping and be sure that dirt and chips, etc., do not get inside the equipment.
2. When wiring, except for the D-sub connector entry, solder to the probe socket of the AHC unit, or the terminal of the tool adapter. We recommend insulating the connection points with heat shrinking tube, etc.
3. During piping and wiring, be sure that there is no external forces such as pulling and twisting at work.